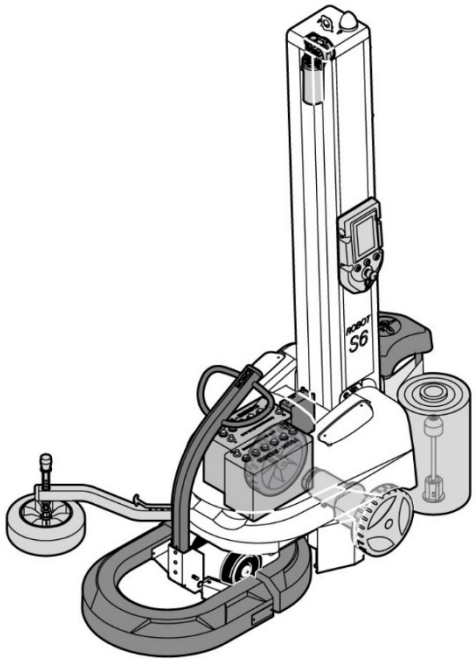
ROBOPAC

# ROBOT S6



USE AND MAINTENANCE MANUAL

ENG

| N. matricola • Serial number • Serienummer<br>N. d'identification • Matricula n. | |
|---|---|
| Cod.: 3709303816 | Ed.: 07/2018 |

**ROBOPAC S.p.a**
**Via Fabrizio da Montebello, 81**
**47892 Repubblica di San Marino**
**Phone (+378) 0549 910511**
**Fax (+378) 0549 908549**

Page left blank intentionally

Index


1. GENERAL INFORMATION ..... 6
1.1. PURPOSE OF THE MANUAL ..... 6
1.2. MANUFACTURER AND MACHINE IDENTIFICATION ..... 7
1.3. TERMS AND DEFINITIONS ..... 8
1.3.1. PICTOGRAMS INDICATING DANGER ..... 9
1.3.2. PICTOGRAMS INDICATING PROHIBITION ..... 10
1.3.3. PICTOGRAMS INDICATING OBLIGATION ..... 11
1.4. HOW TO REQUEST ASSISTANCE ..... 12
1.5. ATTACHED DOCUMENTATION ..... 12
1.6. HOW TO READ THE INSTRUCTIONS FOR USE ..... 12

2. SAFETY INFORMATION ..... 13
2.1. GENERAL SAFETY WARNINGS ..... 13
2.2. SAFETY WARNINGS FOR HANDLING AND INSTALLATION ..... 14
2.3. SAFETY WARNINGS FOR USE AND OPERATION ..... 15
2.4. SAFETY WARNINGS RELATED TO MISUSE ..... 16
2.4.1. REASONABLY FORESEEABLE MISUSE ..... 16
2.4.2. EMPLOYER OBLIGATIONS ..... 16
2.5. SAFETY WARNINGS ON RESIDUAL RISKS ..... 17
2.6. SAFETY WARNINGS FOR ADJUSTMENTS AND MAINTENANCE ..... 19
2.7. SAFETY WARNING FOR THE ELECTRICAL EQUIPMENT ..... 20
2.8. INFORMATION AND SAFETY SIGNS ..... 21
2.9. PERIMETER AREAS ..... 22
2.10. MACHINE SAFE STOP ..... 23

3. TECHNICAL INFORMATION ..... 24
3.1. MACHINE GENERAL DESCRIPTION ..... 24
3.1.1. MACHINE MODELS DESCRIPTION ..... 26
3.2. DESCRIPTION OF OPERATING CYCLE AND WRAPPING MODES ..... 27
3.2.1. DESCRIPTION OF THE OPERATION CYCLE ..... 27
3.2.2. WRAPPING MODES ..... 28
3.3. SAFETY DEVICE DESCRIPTION ..... 29
3.4. DESCRIPTION OF ELECTRICAL DEVICES ..... 30
3.5. DESCRIPTION OF ACCESSORIES ON REQUEST ..... 31
3.6. TECHNICAL SPECIFICATIONS ..... 32
3.6.1. MACHINE AND PALLET DIMENSIONS ..... 32
3.6.2. TECHNICAL FEATURES ..... 33
3.6.3. S.P.E. BATTERY CHARGER ..... 33
3.6.4. NORDELETTRONICA BATTERY CHARGER ..... 33
3.7. SPOOL TECHNICAL SPECIFICATIONS ..... 34
3.7.1. SPOOL FEATURES ..... 34
3.8. NOISE LEVEL ..... 35
3.9. INSTALLATION ENVIRONMENT CHARACTERISTICS ..... 35

4. INFORMATION ON HANDLING AND INSTALLATION ..... 36
4.1. RECOMMENDATIONS FOR HANDLING AND LOADING ..... 36
4.2. PACKING AND UNPACKING ..... 36
4.3. TRANSPORT AND HANDLING ..... 37
4.4. INSTALLATION OF DISASSEMBLED PARTS ..... 38
4.4.1. INSTALLATION (WITH TILTED COLUMN) ..... 38
4.4.2. INSTALLATION (WITH HORIZONTAL COLUMN) ..... 39
4.4.3. INSTALLATION OF FEELER AND RUDDER ..... 41
4.4.4. INSTALLATION OF LIGHTENED STEERING WHEEL (OPTIONAL) ..... 43

5. INFORMATION ON ADJUSTMENTS ..... 44
5.1. RECOMMENDATIONS FOR ADJUSTMENTS ..... 44
5.2. “FILM STRETCH” ADJUSTMENT ..... 44
5.2.1. SPOOL CARRIAGES OF "FRD for mesh" TYPE ..... 44
5.2.2. "PDS" SPOOL CARRIAGES FOR CHANGING THE PRE-STRETCH RATIOS ..... 45
5.3. SPOOL CARRIAGE LIFTING CHAIN ADJUSTMENT ..... 48
5.4. BRAKE ADJUSTMENT ..... 49
5.5. STEERING WHEEL RETURN SPEED ADJUSTMENT ..... 50
5.6. ADJUSTING THE HEIGHT OF THE FEELER WHEEL ..... 50
5.7. FEELER THRUST ADJUSTMENT ..... 51
5.7.1. STANDARD FEELER ..... 51
5.7.2. FEELER WITH LIGHTENED STEERING WHEEL OPTION ..... 51

6. INFORMATION ABOUT THE USE ..... 52
6.1. RECOMMENDATIONS FOR OPERATION AND USE ..... 52
6.2. DESCRIPTION OF THE CONTROLS ..... 53
6.3. DESCRIPTION OF USER INTERFACE ..... 54
6.3.1. NUMERICAL AND ALPHANUMERICAL KEYBOARD ..... 57
6.3.2. PROGRAMMING WINDOW ..... 58
6.4. “HOME” PAGE ..... 59
6.5. “MANUAL HANDLING” PAGE ..... 61
6.6. “RECIPES” PAGE ..... 62
6.6.1. “COPY RECIPE” PAGE ..... 63
6.6.2. “COPY LEVEL” PAGE ..... 63
6.6.3. “DATA TRANSFER” PAGE ..... 64
6.7. “WRAPPING CYCLE” PAGE ..... 65
6.8. “GENERAL PARAMETERS” PAGE ..... 66
6.9. “PRODUCTION COUNTERS (PALLETS)” PAGE ..... 67
6.10. “HMI SETTINGS” PAGE ..... 68
6.11. “PASSWORD CHANGE” SCREEN ..... 69
6.12. “ENTER PASSWORD” SCREEN (USER LOGIN)” ..... 70
6.13. "SERVICE” SCREEN ..... 71
6.14. WRAPPING PAGE WITH "SPECIAL CYCLES" ..... 72
6.15. NEW RECIPE PROGRAMMING ..... 73
6.16. WRAPPING START AND STOP ..... 74
6.17. FILM SPOOL FEEDING ..... 75
6.18. FILM SPOOL FEEDING (APPLICABLE TO “PVS” CARRIAGES ONLY) ..... 77
6.19. CUT ADJUSTMENT ..... 78
6.20. BATTERY CHARGER MODE ..... 78

7. MAINTENANCE INFORMATION ..... 80
7.1. RECOMMENDATIONS FOR MAINTENANCE ..... 80
7.2. PERIODICAL MAINTENANCE INTERVALS ..... 81
7.3. LUBRICATION POINT DIAGRAM ..... 82
7.4. LUBRICANT TABLE ..... 83

8. FAULT INFORMATION ..... 84
8.1. ALARM MESSAGES ..... 84

9. REPLACEMENT INFORMATION ..... 86
9.1. RECOMMENDATIONS FOR REPLACING MACHINE PARTS ..... 86
9.2. BATTERY REPLACEMENT ..... 87
9.3. RECOMMENDED SPARE PARTS LIST ..... 88
9.4. MACHINE DECOMMISSIONING AND SCRAPPING ..... 88
9.4.1. MACHINE DECOMMISSIONING ..... 88
9.4.2. MACHINE SCRAPPING ..... 88

10. ANNEXES ..... 89
10.1. WARRANTY CONDITIONS ..... 89
10.2. S.P.E. BATTERY CHARGER OPERATION MANUAL ..... 90
10.3. NORDELETTRONICA BATTERY CHARGER OPERATION MANUAL ..... 99
10.4. ENERSYS BATTERY DOCUMENTATION ..... 105
10.5. EXIDE BATTERY DOCUMENTATION ..... 110
10.6. MIDAC BATTERY DOCUMENTATION ..... 114

# 1. GENERAL INFORMATION

## 1.1. PURPOSE OF THE MANUAL

- The manual is an integral part of the machine and is aimed at providing the operator with the “Instructions for use” in order to prevent and minimise the risks that arise from human-machine interaction.
  **The information has been written by the Manufacturer in Italian (the original language) in full compliance with the professional writing principles and the regulations in force.**
  **The communication principles were chosen according to the target readers in order to ease the reading and understanding of the information.**
  **The information may be translated into other languages to satisfy the legal and/or market requirements.**
  **The manuals must be translated directly from the original instructions, without modifications.**
  **Each translation (including that provided by the purchasing agent or by the company that introduces the machine into the country in question) must specify the message “Translation of the original instructions”.**
- Refer to the table of contents in order to easily identify the subjects of interest.
- Some information may not correspond completely to the actual configuration of the machine delivered.
- Any additional information does not affect the readability of the text and the safety level.
- The Manufacturer reserves the right to modify the contents of the manual without prior notice provided that the safety level is not altered.
- Every notification by the recipients can be an important contribution to the improvement of after-sales services that the manufacturer intends to offer to its customers.
- The symbols described below are used to highlight important information or specifications.

**Danger - warning**
The symbol indicates critically dangerous situations that if neglected can result in serious personal safety and health hazards.

**Caution - warning**
The symbol indicates that suitable actions must be taken in order to avoid personal safety and health hazards and economic damages.

**Important**
The symbol indicates particularly important technical and operating information that should not be neglected.

## 1.2. MANUFACTURER AND MACHINE IDENTIFICATION

The illustrated identification plate is applied directly to the machine. It contains references and indispensable operating safety indications.

1) Machine model.
2) Machine serial number.
3) Year of manufacture.
4) Power supply voltage.
5) Power supply frequency.
6) Power supply phases.
7) Absorbed electric current.
8) Installed power.
9) Air consumption.
10) Air supply max. pressure.
11) Machine weight.
12) Manufacturer's identification.
13) Name.

## 1.3. TERMS AND DEFINITIONS

Some recurring terms found within the manual are described in order to complete their meaning.

**Maintenance:**
The set of operations required to maintain the machine efficient and in good working order.
Normally some operations are scheduled by the manufacturer, who defines the necessary skills and methods of intervention.
Some unscheduled operations must be performed after consulting the manufacturer.

**Operator:**
A person chosen and authorised among those who have the requirements, skills and information necessary for installation, use and ordinary maintenance of the machine.

**Maintenance technician:**
Technician chosen and authorised among those who have the requirements to perform routine and extraordinary maintenance on the machine. Therefore, the technician must have accurate information and competences with particular skills in the field of intervention.

**Format changeover:**
Set of operations to carry out on the machine before starting to work with characteristics other than the previous ones.

**Training:**
Training process aimed at transferring to the new operator the knowledge, skills and behaviours required to operate the machine autonomously, properly and safely.

**Installer:**
Technician chosen and authorised by the manufacturer or by its representative, among those with the requirements to install and test the machine or the relevant system.

**Assistant:**
Employee assigned to assist the production processes of the machine or system in question.

**Production manager:**
Qualified technician, with experience and competence in the field of machinery for the reference sector.
Depending on the production requirements, the production manager can operate the machine directly, or
select the operator to be assigned to the task.

### 1.3.1. PICTOGRAMS INDICATING DANGER

The following table summarises the safety-related pictograms which indicate **DANGER**.

ATTENTION - GENERIC DANGER
This draws the attention of the personnel concerned to the risk of physical injuries caused by the operation described if it is not carried out in compliance with safety regulations.

ATTENTION - DANGER DUE TO CONTACT WITH LIVE PARTS
This indicates to the personnel concerned that the described operation poses, if not carried out in compliance with safety regulations, a risk of electric shock.

ATTENTION - DANGER DUE TO FLAMMABLE MATERIAL

ATTENTION - DANGER DUE TO MOVING PARTS

ATTENTION- DANGER DUE TO HIGH TEMPERATURES

ATTENTION - DANGER DUE TO SUSPENDED LOADS

ATTENTION - DANGER DUE TO CONTACT WITH OVERHEAD OBSTACLES

ATTENTION - TRIPPING OR FALLING DANGER

ATTENTION - TANGLING DANGER
It signals to the concerned personnel that the device bearing this pictogram features parts where there is the risk getting tangled when accessed.

ATTENTION - HAND CRUSHING DANGER

ATTENTION - SHEARING DANGER

ATTENTION - CUTTING DANGER
It signals to the concerned personnel that the device on which the pictogram is located has sharp parts that may injure their hands.

ATTENTION - DANGER DUE TO CARRIAGE MOVEMENT

ATTENTION - EXPLOSION DANGER

### 1.3.2. PICTOGRAMS INDICATING PROHIBITION

The following table summarises the safety-related pictograms indicating **PROHIBITION**.

**GENERIC PROHIBITION**

**NO SMOKING**
Smoking is not allowed in the area where this sign is located.

**NO NAKED FLAMES**
This symbol prohibits the use of naked flames near the machine or parts of it to prevent a fire hazard.

**NO PEDESTRIANS**
Pedestrians are not allowed to pass through the area where this signal is located.

**DO NOT EXTINGUISH WITH WATER**
Any fire that may occur near the machine or parts of it must NOT be extinguished with jets of water.

**DO NOT INSERT YOUR HANDS**

**DO NOT PUSH**

**DO NOT SEAT DOWN**

**DO NOT CLIMB ONTO THE SURFACE**

**DO NOT REMOVE THE OPERATOR GUARDS**

### 1.3.3. PICTOGRAMS INDICATING OBLIGATION

The following table summarises the safety-related pictograms indicating **OBLIGATION**.

**GENERIC OBLIGATION**
The presence of the symbol next to the description indicates the obligation to carry out the operation/manoeuvre as described and in compliance with current safety regulations, in order to avoid risks and/or injuries.

**OBLIGATION TO REFER TO THE OPERATOR'S MANUAL**
Obligation, before carrying out any operation on the machine, to read the Instruction Manual supplied with the machine.

**OBLIGATION TO USE LUBRICANTS RECOMMENDED BY IMA**
Obligation, before changing the oil or the lubricants, to read the Instruction Manual supplied with the machine.

**OBLIGATION TO WEAR PROTECTIVE GLOVES**
The presence of the symbol next to the description requires the use of protective gloves by the operator, since the risk of injury is implicit.

**OBLIGATION TO WEAR PROTECTIVE GOGGLES**
The presence of the symbol next to the description requires the use of safety goggles by the operator, since the risk of injury is implicit.

**OBLIGATION TO WEAR A PROTECTIVE HELMET**
The presence of the symbol next to the description requires the use of a protective helmet by the operator since the risk of injury is implicit.

**OBLIGATION TO WEAR A PROTECTIVE MASK**
The presence of the symbol next to the description requires the use of a respiratory protective mask by the operator, since the risk of injury is implicit.

**OBLIGATION TO WEAR SAFETY SHOES**
The presence of the symbol next to the description requires the use of protective shoes by the operator, since the risk of injury is implicit.

**OBLIGATION TO WEAR PROTECTIVE CLOTHING**
The presence of the symbol next to the description requires the use of a protective overall by the operator, since the risk of injury is implicit.

**OBLIGATION TO WEAR EARMUFFS FOR PROTECTION AGAINST NOISE**
The presence of the symbol next to the description requires the use of earmuffs by the operator as the risk of injury is implicit.

## 1.4. HOW TO REQUEST ASSISTANCE

**Robopac** distribution network is at your disposal for any problem regarding technical assistance, spare parts and any new requirement you might need for your business.
For every technical service request regarding the machine, please indicate the data found on the identification plate, the approximate hours of use and the type of fault detected.
Please refer to one of the authorised service centres or directly to the address indicated for any need.

ROBOPAC S.p.A
VIA FABRIZIO DA MONTEBELLO, 81
47892 GUALDICCIOLO REPUBLIC OF S. MARINO (RSM)
Tel. 0549 (international ++378) 910511
Fax 0549/908549 - 905946
htpp://www.aetnagroup.com

## 1.5. ATTACHED DOCUMENTATION

The machine is provided with the documentation listed below, unless otherwise agreed.

- EC DECLARATION OF CONFORMITY.
- Warranty conditions
- S.P.E. battery charger user manual (In Italian and English).
- NORDELETTRONICA battery charger user manual (Italian, English, French, German, Spanish).
- Battery documentation (In Italian and English).
- Manuals of installed commercial devices (if necessary for machine use).
- Unpacking and installation instructions.
- Quick guide for quick start.
- USB pendrive containing the information listed below.
    - Use and maintenance manual translated into various languages.
    - Spare parts catalogue.
    - Machine programming software.
    - Wiring Diagrams.

## 1.6. HOW TO READ THE INSTRUCTIONS FOR USE

The manual is divided into chapters, each of which describes a specific category of information.

**Important**
**Every operator who interacts with the machine, in addition to reading all the documentation, must read and learn the information that falls within his/her operational competence.**

Refer to the abbreviation that precedes the title of the chapters in the index, to search for topics to consult.
These instructions are the result of an automatic system that assembles text and illustrations, so it is possible that when changing pages, there might be interruptions in the flow of text and tables.

**Important**
**Keep this manual for the entire duration of the machine useful life in a well known and easy to access place, available for reference any time the need should arise.**

# 2. SAFETY INFORMATION

## 2.1. GENERAL SAFETY WARNINGS

**Caution - warning**
Carefully read the “Instructions for use” specified in the manual and those applied directly to the machine.

It is important to dedicate a little time to read the “Instructions for use” in order to minimise the risks and avoid unpleasant accidents.

Before performing any operation, the operator must make sure that he/she has understood the “instructions for use”.

**Danger - warning**
Pay attention to the safety warnings, do not misuse the machine and assess the possible residual risks.

Caution is essential.

Safety is also in the hands of those who interface with the machine throughout its life span.

**Important**
**Sometimes, accidents can be caused by a “careless” use of the machine by the operator.**
**Usually it is too late to remember what should have been done when the accident has already happened.**

**Caution - warning**
Preserve the readability of the information signs and observe the indications given.
The information signs may have different shapes and colours, indicating hazards, obligations, prohibitions and indications.

Tampering with the safety devices and the removal of the same may create risks (even severe) for the operators.

The personnel authorised to carry out any operation with the machine must have acknowledged experiences in the specific field.

**Important**
**The manufacturer is not responsible for any damage to the packaged product occurred during wrapping, stabilisation and following operations.**

**Important**
**Non-compliance with the instructions given may cause risks to the safety and health of people, as well as economic damages.**

## 2.2. SAFETY WARNINGS FOR HANDLING AND INSTALLATION

**Danger - warning**
The personnel authorised to handle the machine (load and unload) must possess the necessary technical and professional knowledge and skills.

Handle (load and unload) the machine according to the instructions affixed directly to the machine, to the package and in the user manual.

During handling use one or more assistants, if required. This may pose unexpected risks.

In order to minimise the risks related to assistants' involvement, you must inform them in advance on the type of work to be carried out and the behaviour to adopt.

Handling must be carried out with the aid of specific means (crane, forklift truck etc.) by qualified personnel capable of observing the safety requirements.

When using the lifting means, insert and/or fasten the devices (hooks, forks etc.) only into the points provided on the package and/or on the machine.

Transport the machine with suitable means of adequate capacity.

The minimum and maximum temperature (during transport and/or storage) must fall within the range allowed in order to prevent damaging the electrical components (see paragraph "technical features").

Install the machine only in spaces with no explosion and/or fire risks.

Avoid spaces exposed to atmospheric and corrosive agents.

Assess, prior to installation, if it is necessary to implement a "safety plan" in order to protect the safety of the personnel involved.

Provide proper safety conditions when operating in high areas that are dangerous or hard to access.

Install the machine according to the minimum perimeter spaces indicated by the Manufacturer and the surrounding working activities.

Prepare a machine installation project if the machine is to interact (directly or indirectly) with another machine or with a production line.

The project must take into account all operating conditions, in order to comply with all laws in force on matter of safety in the workplace.

Check that the installation space is properly ventilated in order to avoid unhealthy air concentration for the operators.

Implement the most suitable solutions to minimise noise emission levels and acoustic pollution.

Carry out the electrical connections in accordance with the best practice and in full compliance with the instructions provided by the Manufacturer and the specific regulations in force.

**Important**
**The electrical connections must be carried out exclusively by operators with acquired and acknowledged skills in the field of intervention.**

The installer must test the machine and check, through a general test, that the machine can be commissioned without any risk for the operator.
Dispose of all the packaging components in compliance with the standards in force in the Country of installation.

**Non-compliance with the instructions given may cause risks to the safety and health of people, as well as economic damages.**

## 2.3. SAFETY WARNINGS FOR USE AND OPERATION

**Danger - warning**
The operator must be trained and possess the adequate skills required to carry out the specific tasks and must be fit to use the machine safely.

When using the machine for the first time, the operator must read the manual and identify the control functions and simulate some operations, especially machine start and stop.

The machine has been designed and manufactured to meet all the operating conditions indicated by the Manufacturer.

**Caution - warning**
Use the machine only with the original safety devices installed by the Manufacturer.
Do not tamper with, disable, remove or bypass the safety devices installed on the machine.

**Danger - warning**
Do not modify the constructive and functional characteristics of the machine in any way.

Do not use the machine with the safety devices not properly installed and efficient.

Always wear the Personal Protective Equipment indicated in the “Instructions for use”, **in particular safety shoes**, and that provided for by the laws in force on matter of safety in the workplace.

Always keep the perimeter areas in suitable conditions and free from obstacles in order to minimise the risks for the operator, especially near the control station.

The machine must be used **by one operator only**, that must be appointed and authorised by the employer.

The involvement of one or more assistants when performing some operations or maintenance (ordinary) interventions may pose unpredictable risks.

In order to minimise the risks related to assistants’ involvement, you must inform them in advance on the type of work to be carried out and the behaviour to adopt.

Make sure that no unauthorised persons are within the machine operating area during its production activity and during maintenance.

**Important**
**Non-compliance with the instructions given may cause risks to the safety and health of people, as well as economic damages.**

## 2.4. SAFETY WARNINGS RELATED TO MISUSE

### 2.4.1. REASONABLY FORESEEABLE MISUSE

- The reasonably foreseeable misuse is: “the use of the machine in a way other than that indicated in the manual, that may stem from the easily predictable human behaviour”.
- **The machine must be used to wrap and stabilise objects placed on pallets.**
  **The objects must be positioned in advance so that:**

  1. **there are no protruding parts out of the pallet;**
  2. **the stability of the objects is such that during film wrapping they will not move.**

  **The packages that contain the products must be closed and sealed so that the product contained cannot come out.**
- Do not palletize or wrap products housed in irregularly shaped packages (boxes, liquid containers, etc.) or packages that do not guarantee their stability.
- Do not use the machine on slippery surfaces or surfaces that could be slippery (e.g.: wet, oily or greased).
- The machine should only be used for the uses intended by the Manufacturer.
- Do not allow the machine to be used by operators who are not properly trained and authorised.
- Packages containing liquid or insubstantial products must ensure that they do not leak out.
- Do not wrap bulk products of irregular shape and improperly collected.
- Do not use the machine to wrap and stabilise living beings (animals and persons).
- Do not use the machine with wrapping material other than that provided by the Manufacturer.
- Do not use the machine as a lifting device or as a work surface (e.g. workbench).
- Do not stretch or pre-stretch the film excessively and do not wrap the product with too many wrappings to prevent damaging the packages and the products contained in them.
- Do not use or let the machine be used for purposes or in ways other than those intended by the Manufacturer.
- Do not use or let the machine be used with defective, deactivated and/or incorrectly installed safety devices.
- Do not continue to use the machine if malfunctions have been detected.
- Stop the machine immediately and restart it only after the normal conditions of use have been restored.
- Never carry out any intervention with the machine running, but only after stopping it properly, under safety conditions (see paragraph “machine safe stop”).
- Never use the machine without wearing the Personal Protective Equipment indicated by the Manufacturer and provided for by the laws in force on workplaces, with particular reference to safety shoes.
- Never use the machine if the scheduled maintenance interventions have not been carried out.
- Do not clean or wash the machine with aggressive products to avoid damaging the components.
- Do not replace the components with non-original spare parts or part with different design and construction features.
- Do not leave the machine unattended at the end of the production activity without shutting it down first in safety conditions (see paragraph “machine safe stop”).

### 2.4.2. EMPLOYER OBLIGATIONS

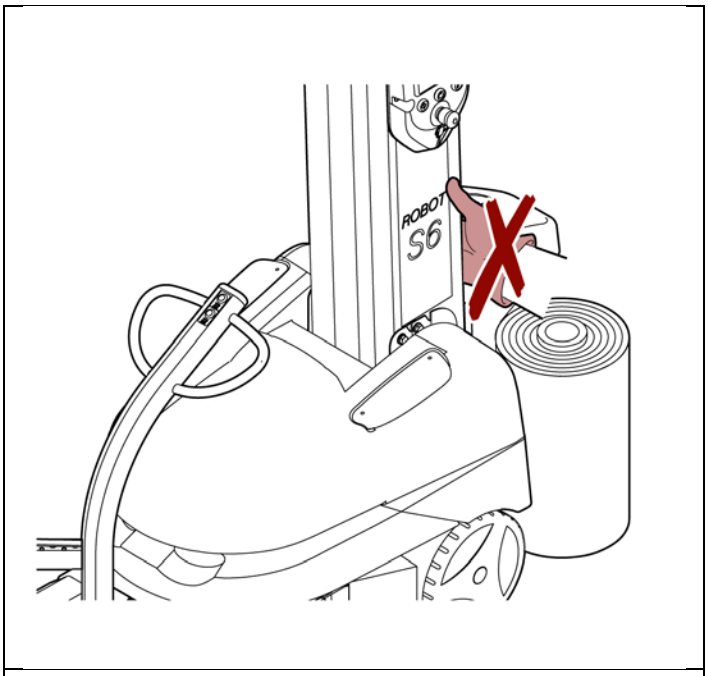
- The operator must be trained to acquire the required skills in the field of packaging machines or equivalent. Upon completing the training, ensure that the operator has understood the entire content of the operating manual, in particular the safety information.
- The operator must have the required skills and must be fit for the activities to be carried out in safety conditions.
- The employer must inform the operator on the reasonably foreseeable misuses and on the persistent residual risks.
- The operator must be capable of reading and understanding the user manual and must easily identify the safety signs.
- Allow the machine to be used only by operators that are properly trained, informed and authorised.

**Important**
**The employer must document the training carried out for the operators.**

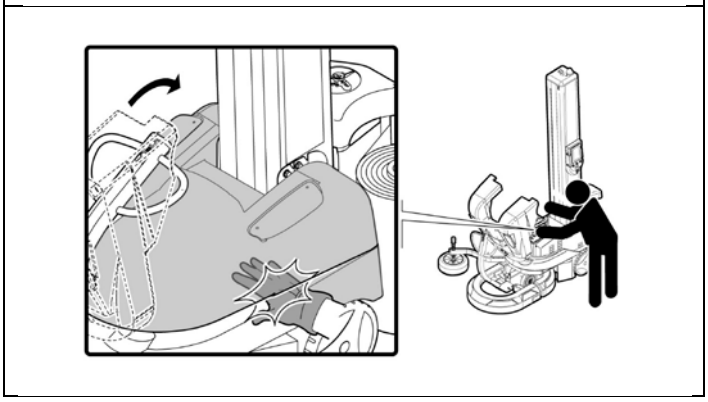
## 2.5. SAFETY WARNINGS ON RESIDUAL RISKS

**Danger - warning**
During design and manufacturing, the Manufacturer has paid particular attention to the residual risks that may affect the safety and health of the operators.
The residual risks are: “all the risks that persists although all safety solutions have been applied and integrated during machine design”.
The list specifies the residual risks specific for this type of machine.

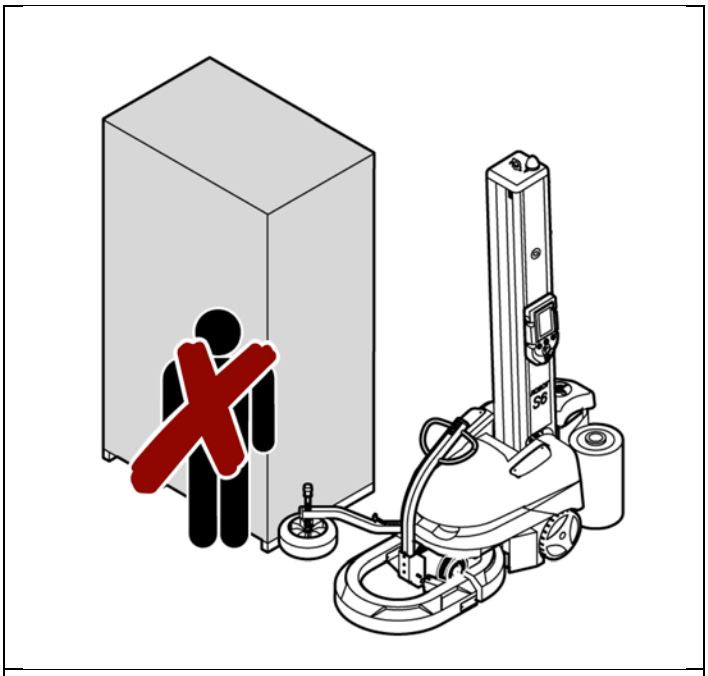
**Risk of shearing upper limbs:**
Do not insert your hands inside.



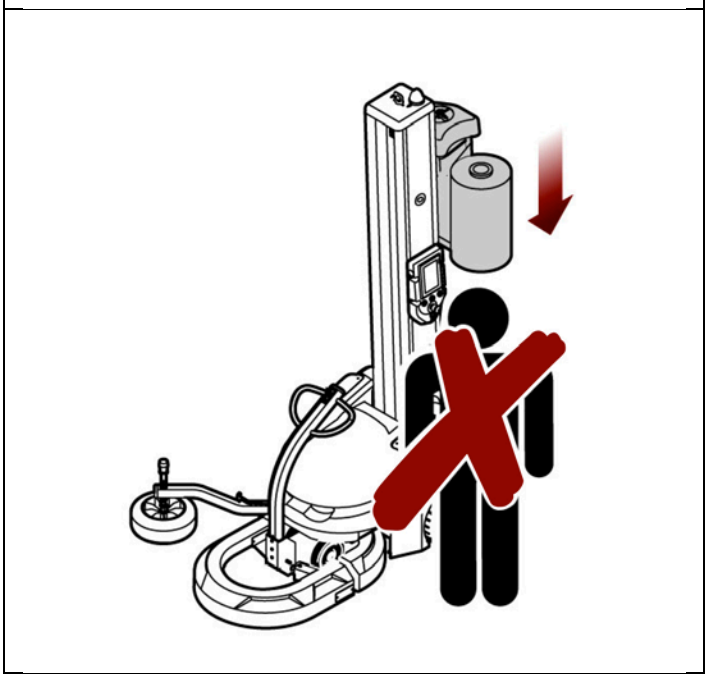

**Risk of crushing upper limbs:**
To close the battery cover, lower it slowly and avoid placing your hands in-between.



**Risk of impact and body trapping**:
Do not stand in the machine operating area.



**Risk of impact and crushing of body parts**:
Do not stand in the machine operating area.



## 2.6. SAFETY WARNINGS FOR ADJUSTMENTS AND MAINTENANCE

**Danger - warning**
Keep the machine in maximum efficiency conditions and perform all the scheduled maintenance operations provided for by the Manufacturer.
Proper maintenance will provide the best performance, a longer life span and constant compliance with safety requirements.
Before any maintenance operation stop the machine in safe conditions (see paragraph “machine safe stop”).

Enable all machine safety devices before performing any maintenance and adjustment operations.

Mark the surrounding areas and implement adequate safety measures, as provided for by the standards on safety at work, in order to prevent and minimise the risks.

Maintenance interventions in areas that are not easily accessible or dangerous must be carried out after having made sure that the necessary conditions are met.
The personnel authorised to carry out the ordinary maintenance (adjustments, replacements etc.) must possess the necessary technical and professional knowledge and skills.

Do not carry out interventions other than those indicated in the user manual without the express authorisation of the Manufacturer.

Do not use products that contain corrosive and flammable substances or that are harmful to people's health.

Always wear the Personal Protective Equipment indicated in the “Instructions for use”, **in particular safety shoes**, and that provided for by the laws in force on matter of safety in the workplace.

The use of similar but non-original spare parts may result in improper repairs, altered performance and economic damage.

Use lubricants (oils and greases) recommended by the Manufacturer or with similar chemical-physical features.

Do not dispose of polluting liquids, worn parts and maintenance waste into the environment.

Select the components according to the chemical and physical features of the material and dispose of them separately in accordance with the applicable laws.

All the extraordinary maintenance interventions shall be carried out only by authorised personnel with experience and expertise in the field of intervention.

**Important**
**Non-compliance with the instructions given may cause risks to the safety and health of people, as well as economic damages.**

## 2.7. SAFETY WARNING FOR THE ELECTRICAL EQUIPMENT

The electrical equipment has been designed and manufactured in accordance with the relevant standards.
These standards consider operating conditions based on the surrounding environment.
The list contains the conditions necessary for the correct operation of the electrical equipment.

- Ambient temperature must be within **5°C** and **40°C**.
- The relative humidity should be between **50%** (measured at **40°C**) and **90%** (measured at **20°C**).
- The installation environment must be immune to and must not be a source of electromagnetic interference or radiation (x-rays, lasers, etc.).
- The environment must not have areas with concentrations of gas and dust that are potentially explosive and/or with a fire risk.
- The products and materials used during production and maintenance must not contain contaminants or corrosive agents (acids, chemicals, salts, etc.) and must not be able to penetrate and/or come into contact with electrical components.
- During transport and storage, the ambient temperature must be between **-25°C** and **55°C**.
- The electrical equipment may still be exposed to a temperature of up to **70°C**provided that the exposure time does not exceed **24** hours.
- The electrical equipment operates correctly up to **1000 m** above sea level.

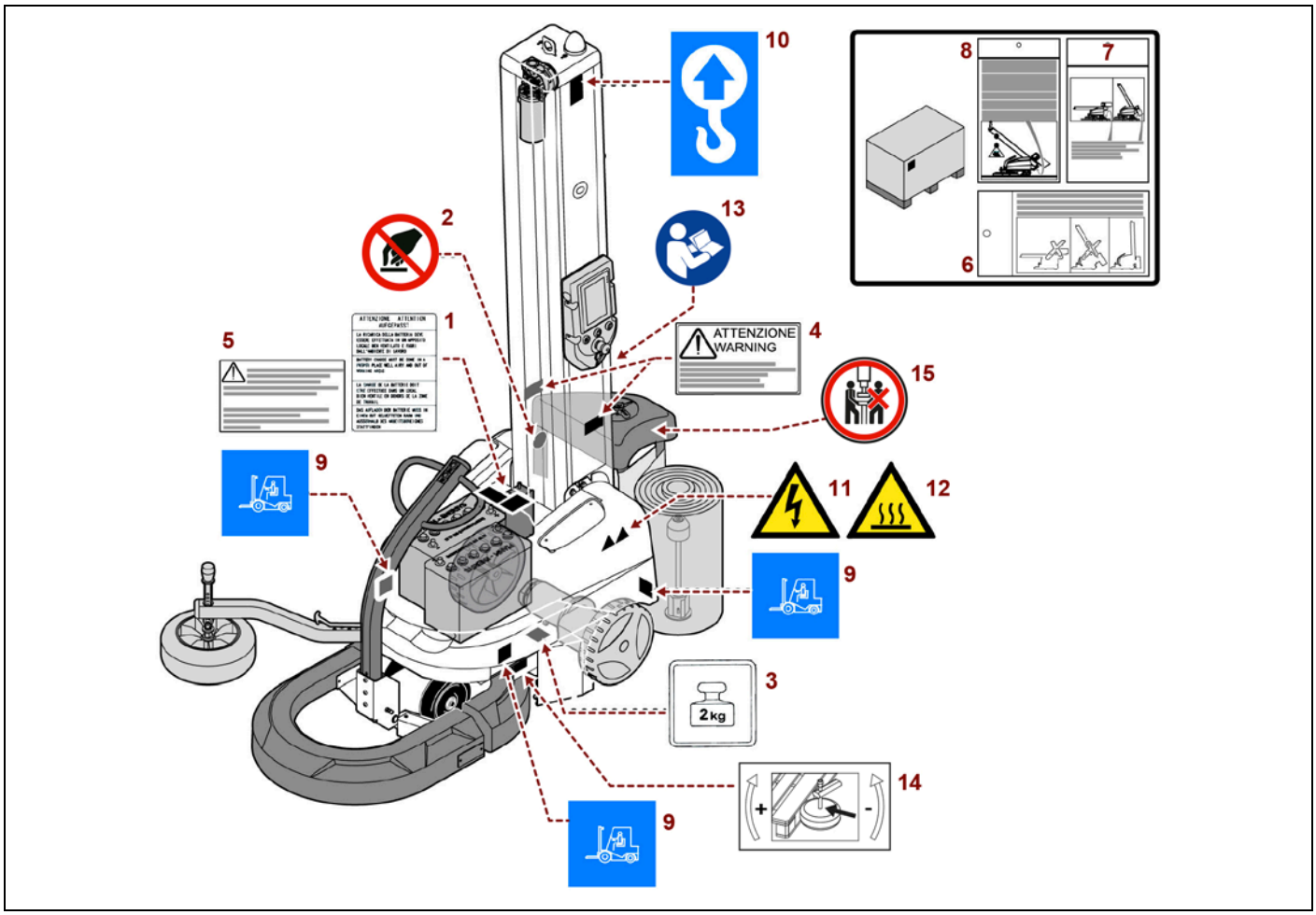
**Important**
**If it is not possible to comply with one or more of the conditions listed, which are essential for the correct operation of the electrical equipment, it is necessary to agree at the contractual stage which additional solutions to adopt in order to create the most suitable conditions (e.g. specific electrical components, air conditioning equipment, etc.).**

## 2.8. INFORMATION AND SAFETY SIGNS

The figure indicates the position of the safety and information signs affixed to the machine.
For each sign the relative description is specified.

1. **Warning sign**: it indicates that “the battery should be charged in a suitable and well-ventilated environment, outside the working area”.
2. **Prohibition sign**: do not use your hands to act on the component.
3. **Warning sign**: it specifies the weight of the component.
4. **Warning sign**: it indicates the screws that should be fastened after the column is lifted.
5. **Warning sign**: it indicates that the batteries must be charged after a prolonged period of inactivity.
6. **Warning sign (applied during transport)**: it informs about the hazards and provides instructions on how to prepare the machine for use after the transport phase.
7. **Warning sign (applied during transport)**: it indicates how to remove the pallet from the machine.
8. **Warning sign (applied during transport)**: it indicates column lifting conditions.
9. **Warning sign**: it indicates the lifting points with a fork device.
10. **Warning sign**: it indicates the lifting points with a hook device.
11. **Electrical hazard sign**: do not enter area to avoid electrical shocks or electrocution.
12. **Hazard sign**: do not touch the area to avoid burns.
13. **Information sign**: Carefully read the manual before carrying out any type of work.
14. **Adjustment sign**: it indicates how to adjust the feeler thrust (Optional).
15. **Prohibition sign:** it indicates that no more than one person can operate with the device.

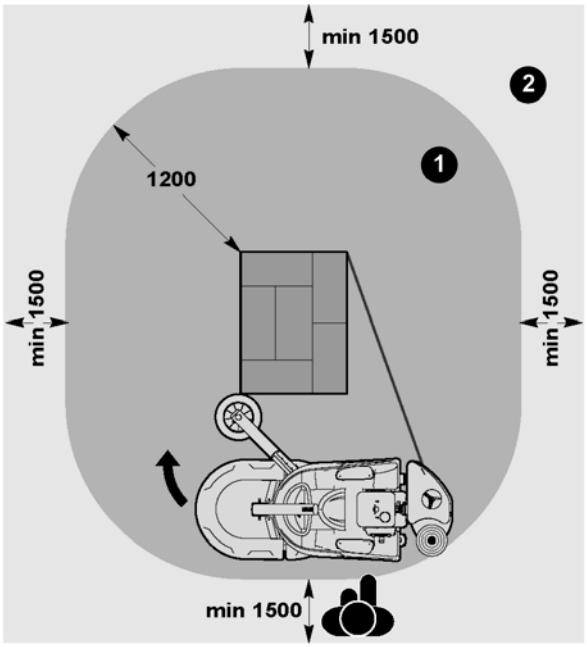
**Important**
Make sure that the nameplates are clearly legible.
If not, replace and reposition them at the original position.



## 2.9. PERIMETER AREAS

The illustration shows the perimeter working areas of the machine.

1. Machine operating area.
2. Perimeter area.



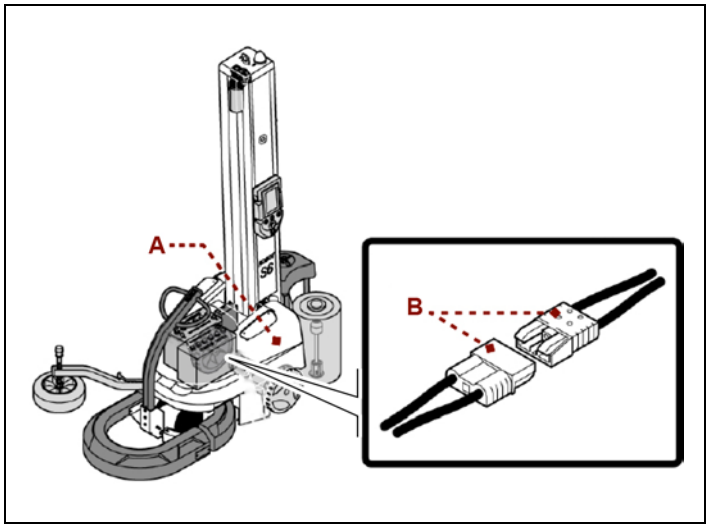

Measures are expressed in [mm].

## 2.10.MACHINE SAFE STOP

Machine safe stop
Perform the following procedure to safely stop the machine:

1. bring the carriage all down
2. press the emergency stop button
3. open the battery cover (**A**)
4. disconnect connector (**B**)
5. close the battery cover (**A**)

**Danger - warning**
should it not be possible to lower the carriage, the stop at different heights can be considered safe only for film insertion operations. For all other activities on the carriage, this latter must be kept in the correct position through the use of external means, such as a support.
Follow the instructions provided in paragraph “ADJUSTMENT OF THE LIFTING CHAIN OF THE SPOOL CARRIAGE” for the tensioning of the chain



# 3. TECHNICAL INFORMATION

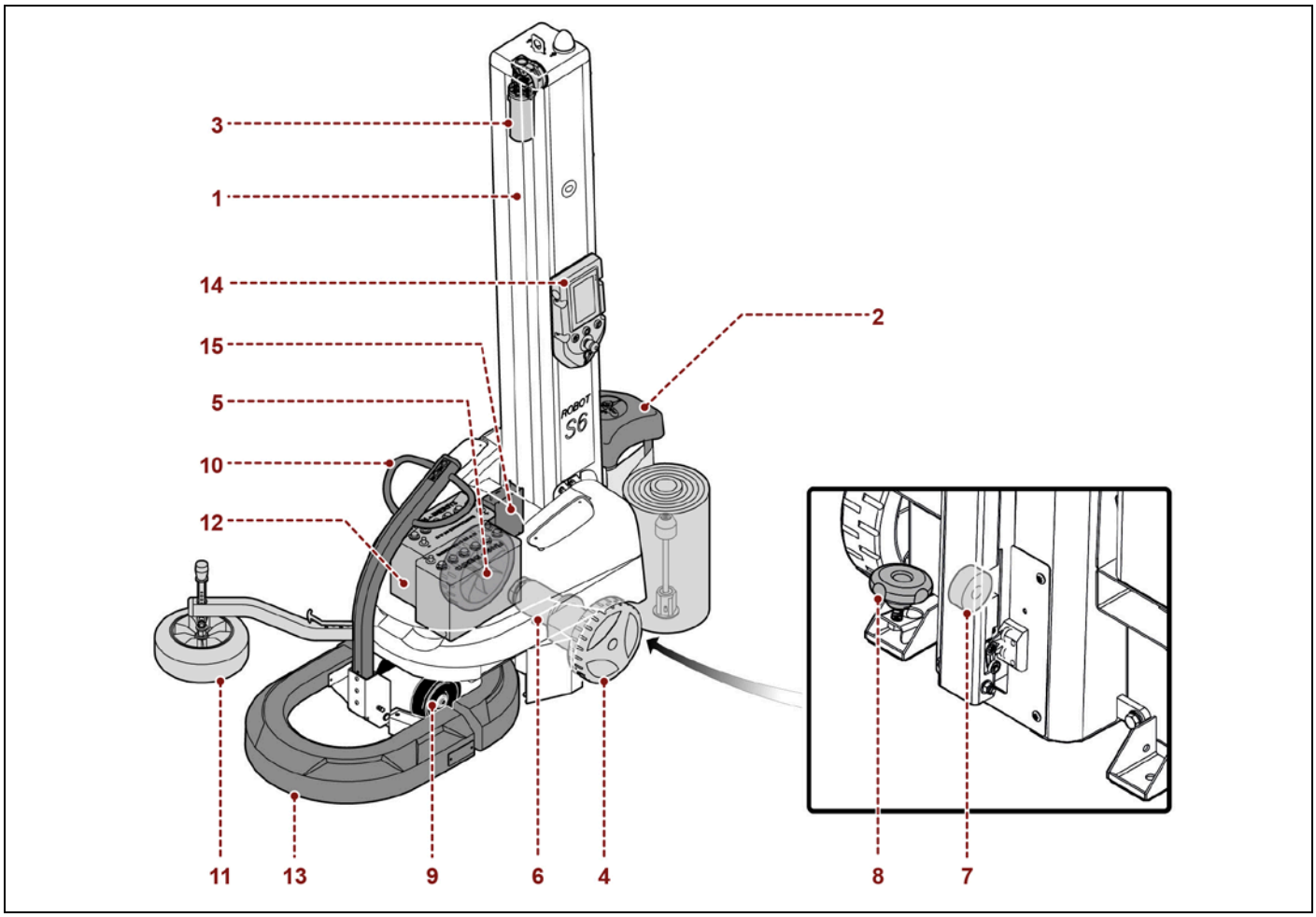
## 3.1. MACHINE GENERAL DESCRIPTION

- The S6 series Robot is a semi-automatic self-propelled machine designed to wrap and stabilise palletised loads using a stretch film.
- The machine is suitable for installation in workshops and factories, protected against weather conditions. The installation surface must be levelled and even, to allow the machine to easily move around the pallet.
- **Just one operator is required** to bring the machine close to the pallet, tie the film, perform the cut at the end of the wrapping and feed the spool.
- **If the machine is equipped with an automatic cutting device, the film will be automatically cut at the end of each wrapping cycle.**
- Stretch film spools commonly available on the market are used for load wrapping (see paragraph “spool features”).
- The machine must be used only for wrapping and stabilising products contained in packages (boxes, liquid containers, etc.) with regular shape or with a shape that ensures a stable palletisation.
- Packages containing liquids or insubstantial materials must have characteristics suitable to the product and be perfectly closed and sealed to prevent the contents from flowing out.
- The machine is equipped with a series of safety devices designed to avoid any injuries to the operator or other persons using the machine.
- The machine frame is provided with lifting points (right-hand and left-hand sides and column side) for the handling with a forklift device.
- The machine is manufactured in various models to meet the different market requirements.

The illustration shows, for information purposes only, the machine models, and the legend lists the parts.

Legend:

1. **Sliding column**:
   for the vertical handling of the spool carriage.
2. **Spool carriage**:
   it includes different spool film stretching and pre-stretching devices.
   For further details, refer to the table "spool carriage characteristics".
   The vertical movement is controlled by the gearmotor (**3**), operated by an electric motor powered by the batteries (**12**).
4. **Driving wheel**:
   it is operated by the electric motor (**6**), powered by the battery (**12**). This wheel is equipped with an electromagnetic brake.
   The electromagnetic brake stops the driving wheel when the battery power is turned off due to a fault (e.g. upon an element failure) or when the machine is stopped (upon an emergency or a cycle Stop).
   When the driving wheel is locked, the machine can be moved only over short distances using the small backup wheel (**7**).
5. **Idle wheel**:
   it is installed in line with the driving wheel (**4**).
7. **Backup wheel**:
   by means of handwheel (**8**), the backup wheel allows lifting the locked driving wheel (**4**) from the ground, in order to move the machine over short distances.
10. **Rudder**:
    it is equipped with leading wheels (**9**) and is used to manually move the machine.
11. **Feeler**:
    its purpose is to follow the perimeter of the pallet during the wrapping cycle.
12. **Batteries**:
    they power the electric motors and the electric circuit.
13. **Safety bumper**:
    in case of collision, this safety device stops the machine.
    For further details refer to paragraph “safety device description”.
14. **Control panel**:
    it is equipped with electromechanical controls and a touch-screen display for the programming of the wrapping parameters.
15. **Battery charger**:
    it is electronic and is used to recharge the batteries.




### 3.1.1. MACHINE MODELS DESCRIPTION

**Table: Spool carriage features**

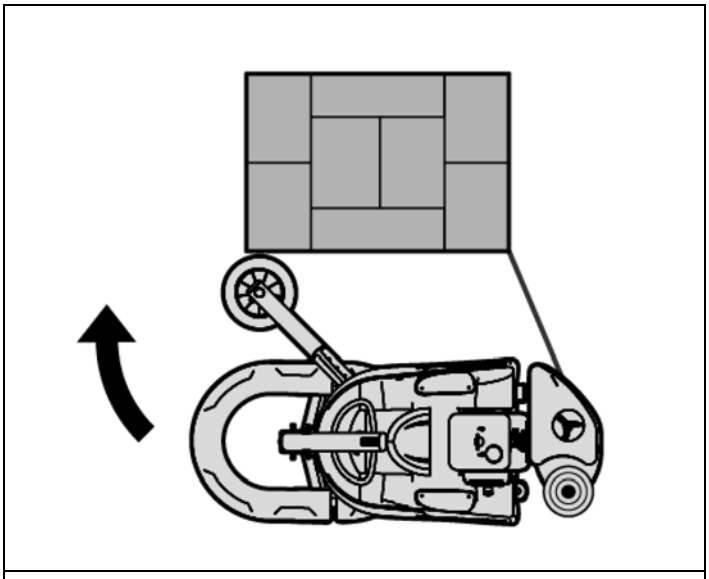
| Spool carriage type | General features |
|---|---|
| FRD | Spool carriage of the “FRD” and “FRD for mesh” type with friction roller, mechanical brake and manual adjustment of film stretch. |
| FR | Spool carriage of the FR type with friction roller, electromagnetic brake and film stretch adjustment from the control panel. |
| PDS | PDS type spool carriage; with motorised pre-stretch rollers and electronic film tensioning.<br>Pre-stretch can be adjusted from the control panel (0%÷250%). |
| PVS | PVS type spool carriage: with dual-motor pre-stretch rollers and electronic film tensioning.<br>Pre-stretch can be adjusted from the control panel (0%÷400%). |

## 3.2. DESCRIPTION OF OPERATING CYCLE AND WRAPPING MODES

### 3.2.1. DESCRIPTION OF THE OPERATION CYCLE

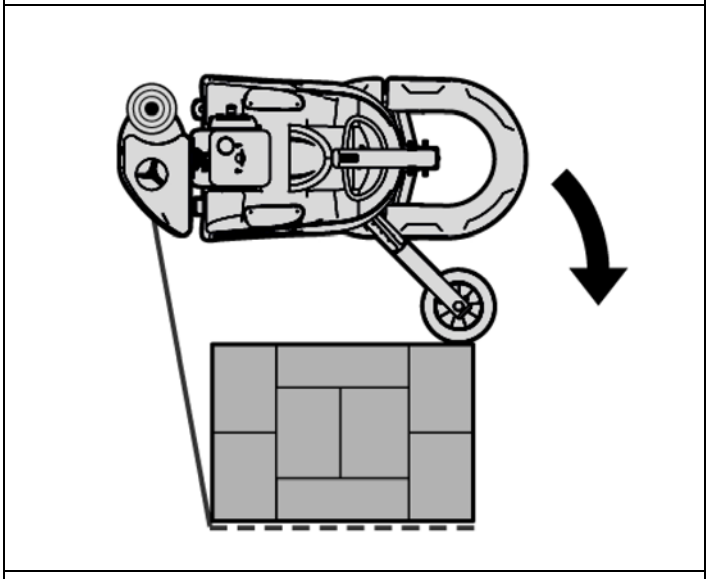
**Phase 1**

The Operator approaches the machine until the feeler wheel is in contact with the pallet, then ties the end of the film to the pallet and starts the wrapping cycle.



**Phase 2**

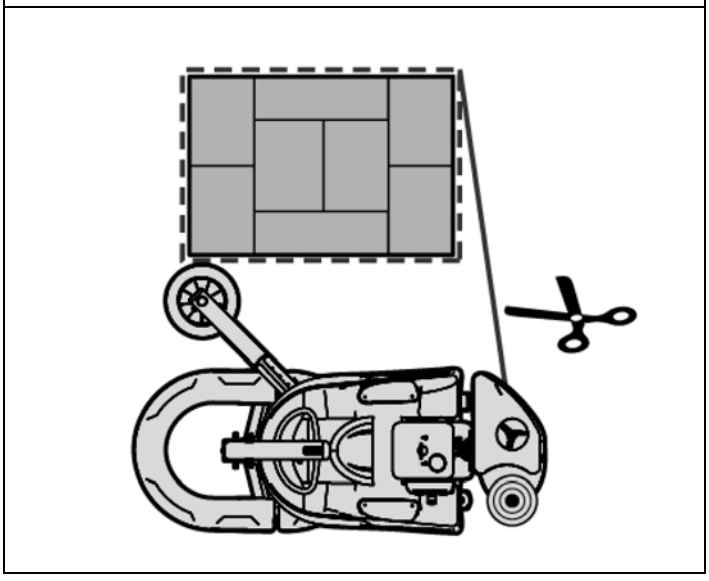
The machine turns clockwise around the pallet, while the spool carriage lifts and unwinds the film according to the set parameters.



**Phase 3**

Upon completion of the wrapping phase, the machine stops.

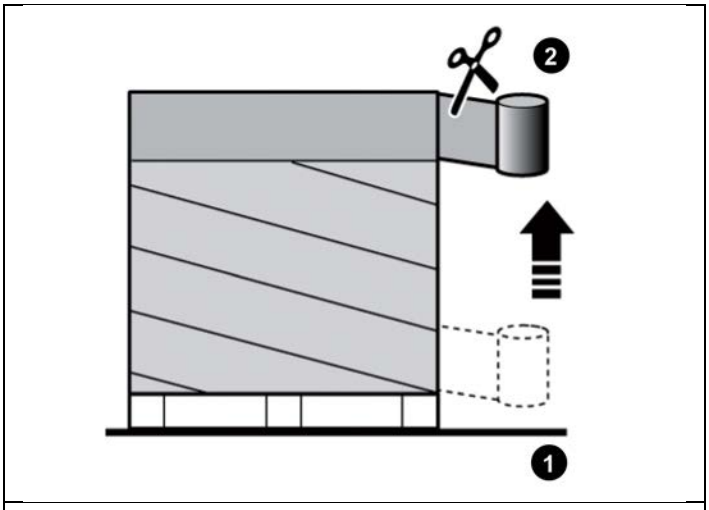
After cutting the film (manually or automatically) the machine can be set to wrap the following pallet.



### 3.2.2. WRAPPING MODES

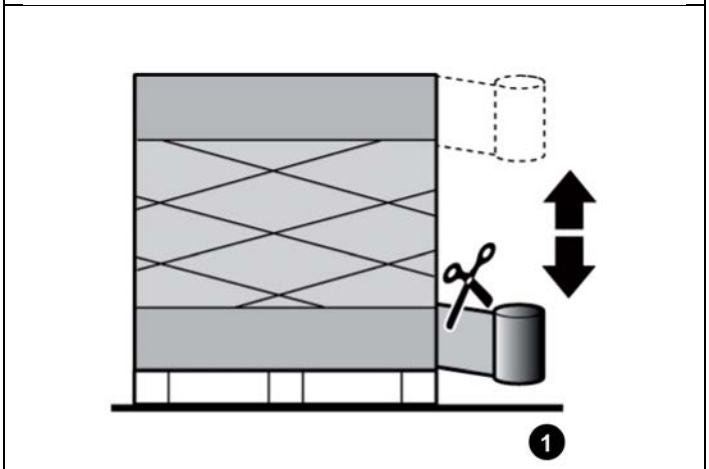
**Single wrapping**
It starts at the base of the pallet (with a series of stabilising wrappings) and then stops at the top after completing the final wrapping.
To start a new wrapping phase from the base, the spool carriage must be lowered using the manual controls.

1) START
2) Stop



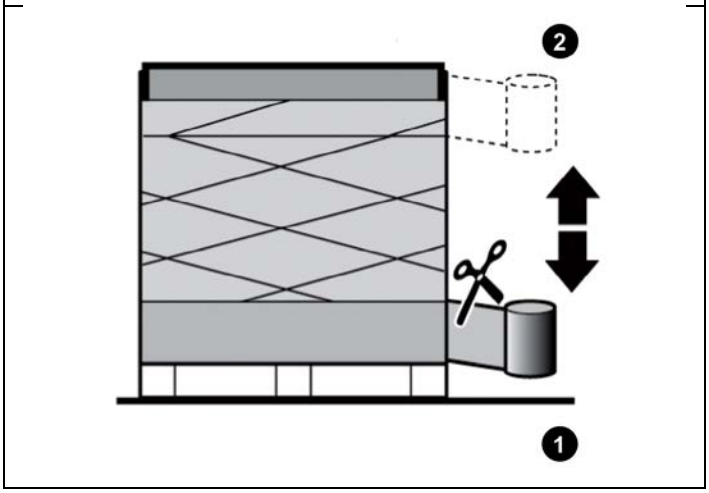

**Double wrapping**
It starts at the base of the pallet (with a series of stabilising wrappings) up to the top side.
After performing a reinforcement wrapping at the top, the wrapping process continues to the bottom and stops after performing the final wrapping.

1) START
Stop




**Double wrapping with feeder**
It starts at the base of the pallet (with a series of stabilising wrappings) and then momentarily stops at the top side.
After the protection sheet (**TOP**) has been added, the operator resumes the wrapping cycle using the relevant control.
After performing a reinforcement wrapping at the top, the wrapping process continues to the bottom and stops after performing the final wrapping.

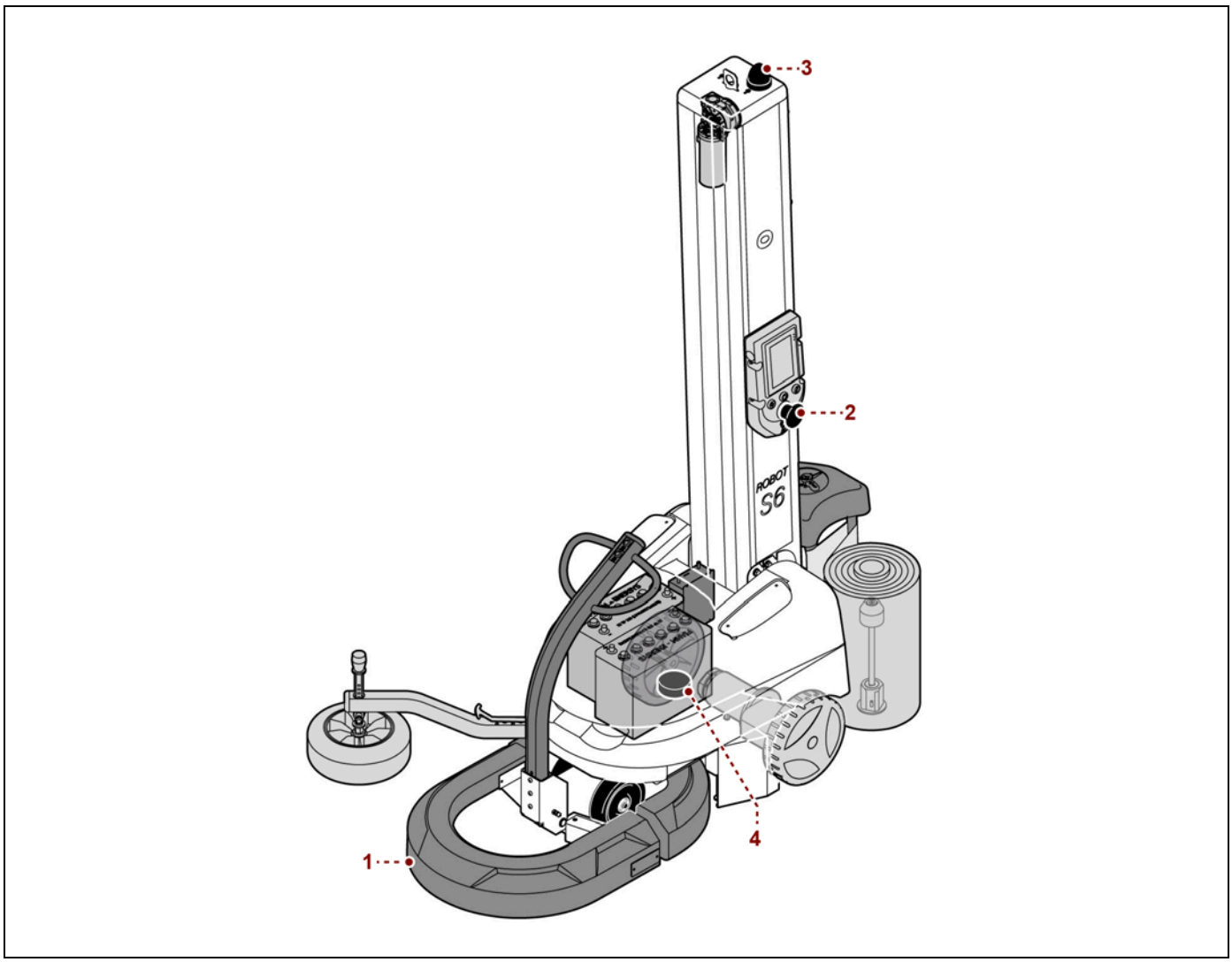
1) START
Stop
2) START
Stop



### 3.3. SAFETY DEVICE DESCRIPTION

The figure shows the position of the devices on the machine.

1. **Safety bumper**
   in case of collision against an obstacle, it stops the machine run and the wrapping cycle.
   To reset the machine, remove the obstacle, cut the film and press the control.
   When the spool carriage has reached its starting position, restart the machine to repeat the wrapping.
   For further details, see paragraph "Wrapping Start and Stop".
2. **Emergency stop button**
   it is used in case of imminent risk to stop, with a voluntary action, the machine parts which may pose a risk.
   The control must stay "locked" until all the normal operating conditions have been restored.
   Restore the normal operating conditions, cut the film, unlock the button and press the control to reset the machine.
   When the spool carriage has reached its starting position, restart the machine to repeat the wrapping.
   For further details, see paragraph "Wrapping Start and Stop".
3. **Light indicator (orange light)**
   it signals that the machine is running.
4. **Acoustic warning**
   it warns that the wrapping cycle has started.



## 3.4. DESCRIPTION OF ELECTRICAL DEVICES

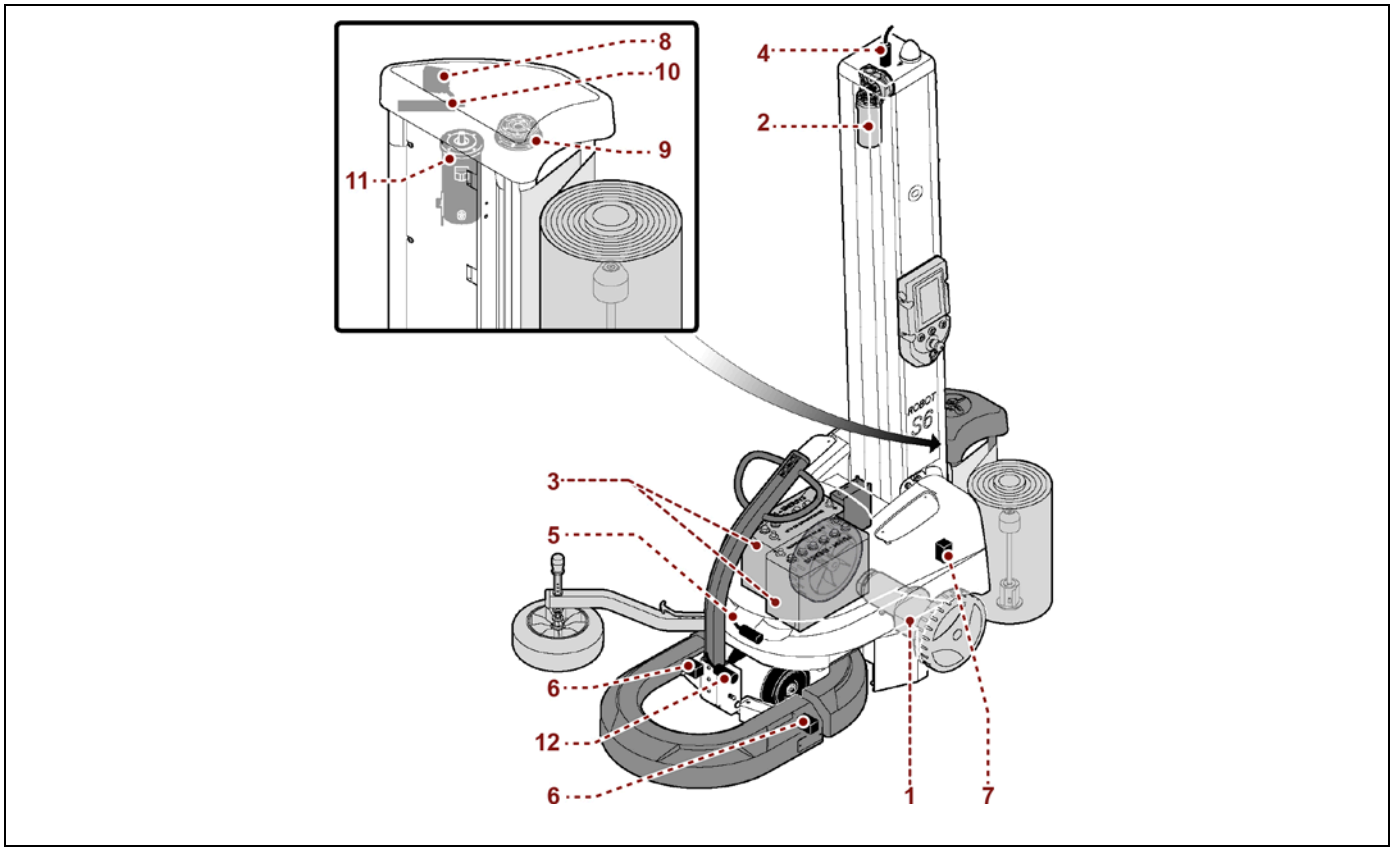
The figure shows the position of the devices on the machine.

1. **Electric motor**
   it activates the driving wheel.
2. **Gearmotor**
   it activates the spool carriage movement.
3. **Batteries**
   they power the electric motors and the electric circuit.
4. **Sensor**
   it is equipped with a phonic wheel and it detects the drive speed of spool carriage.
5. **"Corner counting" sensor**
   it counts the number of wrapping turns carried out.
6. **Microswitch**
   it starts and enables the stop of the machine movement when the bumper hits against an obstacle.
7. **Carriage limit microswitch**
   it is activated when the spool carriage reaches the minimum and maximum wrapping height.
8. **Photocell**
   it detects the height and the presence of the load to be wrapped.
9. **Electromagnetic clutch**
   it activates and deactivates the pre-stretch roller to keep film tightening constant.

**Information valid only for "PDS" type spool carriages**

10. **"Load cell" sensor**
    it detects the film tensioning and enables the variation of the pre-stretching roller speed.
11. **Electric motor**
    it powers pre-stretching rollers.
12. **"Rudder down" sensor**
    rudder is in low position.

**Important**
For further details see the wiring diagram.



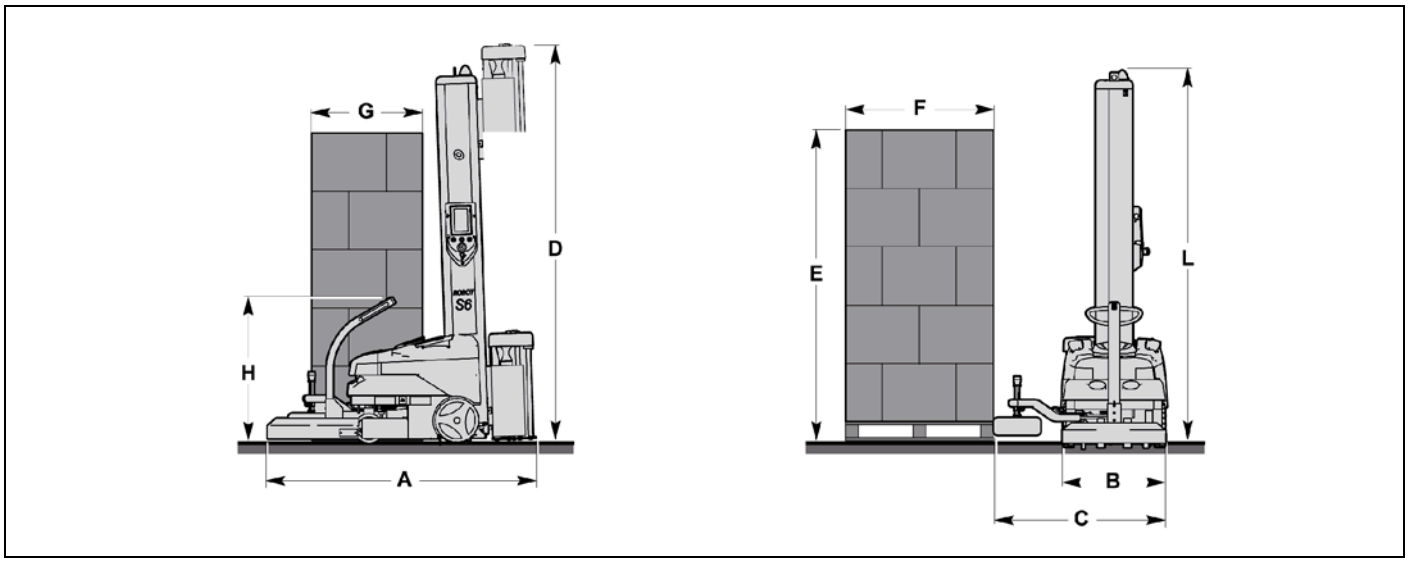
## 3.5. DESCRIPTION OF ACCESSORIES ON REQUEST

To increase the machine performance and versatility, the Manufacturer makes available the following accessories.

- **Non-stain wheels**
  Wheels made of a material that reduces stain formation on the floor.
- **Additional battery kit**
  it is equipped with a recharging device, two batteries and two baskets containing the batteries.
  The kit allows replacing the flat battery holder with the charged battery holder, to minimise the machine downtime.
- **Spool carriage shaft**
  it allows using film spools with a different core diameter with respect to the standard one.
- **Spool carriage "FRD for mesh"**
  Carriage for wrapping the pallet with a mesh film.
- **Automatic cutting device**
  it automatically cuts the film at the end of the cycle.
- **Photocell for black products**
  it offers a degree of sensitivity capable of detecting also the height of pallets with prevailing black surfaces.
- **Sliding shafts (increased)**
  they allow wrapping heights up to 2400 mm, 2800 mm and 3100 mm.
- **Double feeler** (Ø260÷400 mm)
  it is suitable for wrapping pallets where the product protrudes from the pallet in an irregular way.
- **Feeler with increased wheel** (Ø400 mm)
  suitable for wrapping pallets whose product is not compact.
- **Film breakage sensor**
  it detects broken film and empty spool.
- **Lightened rudder**
  it allows the operator to move the machine manually with less effort. It allows also an easier adjustment of the feeler wheel thrust.
- **Spool carriage with height 750 mm**
  it allows the use of spools with height 750 mm (only for certain markets).
- **Boost battery charger**
  it allows the batteries to be charged in about 10 hours (this value depends on the state of the batteries).
- **UL/CSA battery chargers**
  for certain markets only.
- **Film height adjuster – creasing head device**
  The device has a double function during the wrapping of the packaging, it can be used to adjust the height of the film (height adjuster) or to tighten the film and form a reinforcement rope for the packaging.

## 3.6. TECHNICAL SPECIFICATIONS

The illustration and the table include the machine dimensional specifications and technical data.




### 3.6.1. MACHINE AND PALLET DIMENSIONS

| Description | Unit of measurement | Machine model | | | |
|---|---|---|---|---|---|
| | | FRD | FR | PDS | PVS |
| Total machine length (**A**) | mm | 1825 | | | |
| Machine width (**B**) | mm | 722 | | | |
| Machine width (**C**) with feeler open | mm | 1183 | | | |
| Rudder height (**H**) | mm | 984 | | | |
| Pallet size (**FxG**) | mm | ≥ 800 | | | |

**Standard version**

| | | | | | |
|---|---|---|---|---|---|
| Pallet height (**E**) | mm | 2200 | | | |
| Max. machine height (**D**)<br>(**E**) max = 2200 | mm | 2580 | 2630 | 2630 | 2805 |
| Sliding column max. height (**L**)<br>(**E**) max = 2200 | mm | 2556 | | | |

**Optional version**

| | | | | | |
|---|---|---|---|---|---|
| Pallet height (**E**) | mm<br>mm<br>mm | 2400<br>2800<br>3100 | | | |
| Max. machine height (**D**)<br>(**E**) max = 2400<br>(**E**) max = 2800<br>(**E**) max = 3100 | <br>mm<br>mm<br>mm | <br>2780<br>3180<br>- | <br>2830<br>3230<br>- | <br>2830<br>3230<br>3430 | <br>3005<br>3405<br>3605 |
| Sliding column max. height (L)<br>(**E**) max = 2400<br>(**E**) max = 2800<br>(**E**) max = 3100 | <br>mm<br>mm<br>mm | 2756<br>3156<br>3356 | | | |

### 3.6.2. TECHNICAL FEATURES

| Description | Unit of measurement | Machine model | | | |
|---|---|---|---|---|---|
| | | FRD | FR | PDS | PVS |
| Lead-acid batteries | no. | 2<br>12V 110 Ah<br>(Capacity referred to a 5-hour use) | | | |
| Forward speed | m/min. | 35÷80 | | | |
| Carriage upstroke / downstroke speed | m/min. | 1.5÷5[1] | | | |
| Total weight (Standard version) | kg | 345 | 340 | 365 | 370 |
| Pallet min. weight | kg | 45 | | | |
| Ambient operating temperature | °C | 5÷40 | | | |

[1] **2÷7.5** m/min with spool height **750 mm**.

### 3.6.3. S.P.E. BATTERY CHARGER

| Description | Unit of measurement | Machine model | | | | |
|---|---|---|---|---|---|---|
| | | FRD | FR | FS | PDS | PVS |
| Supply voltage | Vac | 100-240 +/-10% 1Ph | | | | |
| Electrical current frequency | Hz | 50/60 | | | | |
| Installed power | kW | 0.3[1] | | | | |
| Current absorption | A | 4 (100 V)[2]<br>1.7 (240 V)[3)] | | | | |

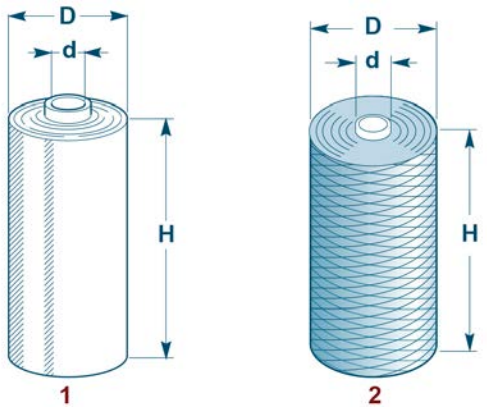
[1] **0.4 kW** with boost battery charger.
[2] **4.3 A (100 V)** with boost battery charger.
[3] **1.8 A (240 V)** with boost battery charger.

### 3.6.4. NORDELETTRONICA BATTERY CHARGER

| Description | Unit of measurement | Machine model | | | | |
|---|---|---|---|---|---|---|
| | | FRD | FR | FS | PDS | PVS |
| Supply voltage | Vac | 100-240 +/-10% 1Ph | | | | |
| Electrical current frequency | Hz | 50/60 | | | | |
| Installed power | kW | 0.4 | | | | |
| Current absorption | A | 5 (100 V)[2]<br>2 (240 V)[3] | | | | |

## 3.7. SPOOL TECHNICAL SPECIFICATIONS

### 3.7.1. SPOOL FEATURES




| Description | Unit of measurement | Value |
|---|---|---|
| **Film spool dimensions (1)** | | |
| Maximum outer diameter (D) | mm | 300 |
| Spool height (H) | mm | 500 |
| Film thickness | µm | 17÷35 |
| Internal diameter (d) | mm | 50[1] - 76 |
| Max. weight | kg | 20 |
| **Mesh spool dimensions (2)** | | |
| Maximum outer diameter (D) | mm | 300 |
| Spool height (H) | mm | 500 |
| Internal diameter (d) | mm | 76 |
| Max. weight | kg | 20 |

[1] Install the spool carriage shaft provided as an optional.

## 3.8. NOISE LEVEL

The values relating to airborne noise have been detected in compliance with standards:

- **EN 415 - 9**

| Description | A-weighted emission sound pressure measured level at the operator's position (LpA) | Emitted sound power level (Lw) |
|---|---|---|
| Operation in working conditions. | 66.5 dB (A) | 79.8 dB (A) |

The use of appropriate protection systems is recommended (earmuffs, ear plugs, etc.).

## 3.9. INSTALLATION ENVIRONMENT CHARACTERISTICS

The place where the machine is to be installed must be carefully selected taking into account the environment conditions in order to have correct and risk-free operating conditions.
Therefore we suggest to take into account the following prerequisites:

- An appropriate ambient temperature (see “Technical data”).
- A perimeter area that must be left around the immediate working area, also for safety reasons (see “Perimeter areas”).
- A flat surface, steady and without vibrations with adequate load bearing capacity, considering also the weight of palletised loads.
- The area must feature suitable sockets for compressed air and power distribution.

**Danger - warning**
Using this machine in explosive environments or when exposed to atmospheric agents is strictly forbidden.

# 4. INFORMATION ON HANDLING AND INSTALLATION

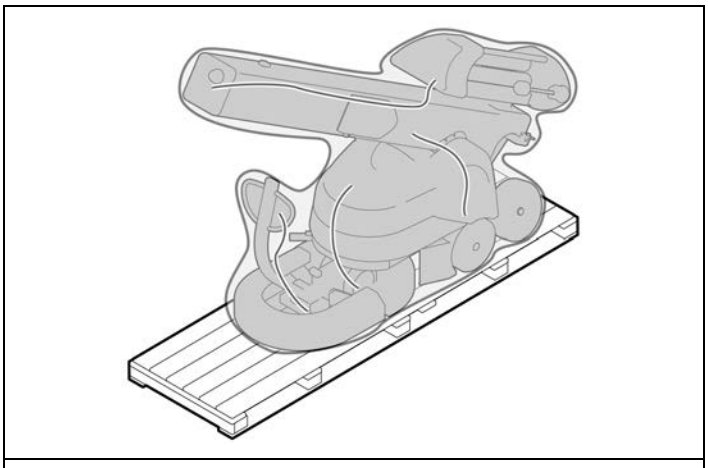
## 4.1. RECOMMENDATIONS FOR HANDLING AND LOADING

- **Before performing any operation, the authorised operator must make sure to have understood the "Instructions for use".**
- **Carefully read the "Instructions for use" specified in the manual and those applied directly to the machine and/or the package.**
- **Provide suitable safety conditions in compliance with the regulations on workplace safety to prevent and minimise the risks.**
- **Pay attention to the safety warnings, do not misuse the machine and assess the possible residual risks.**

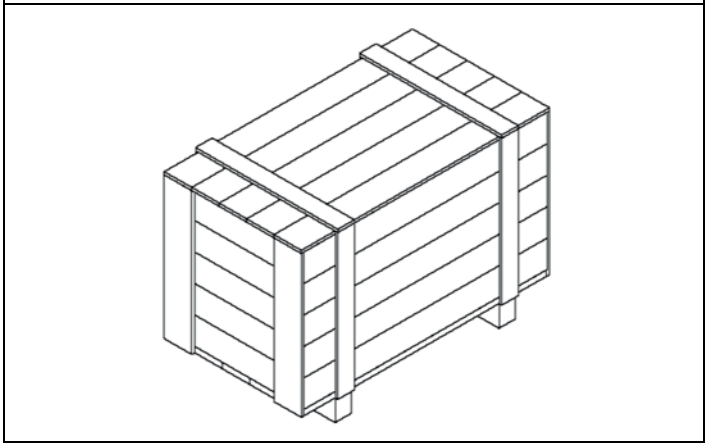
## 4.2. PACKING AND UNPACKING

The packing is realised, keeping the overall dimensions limited, also in consideration of the transport chosen.
To facilitate transport, shipping can be performed with some components disassembled and appropriately protected and packaged.
Some parts, especially electrical equipment, are protected with anti-moisture nylon covers.
The packages bear all necessary information for loading and unloading.
When unpacking, check the integrity and exact quantity of the components.
Packaging material should be appropriately disposed of according to the laws in force.
The illustrations show the common types of packaging used.

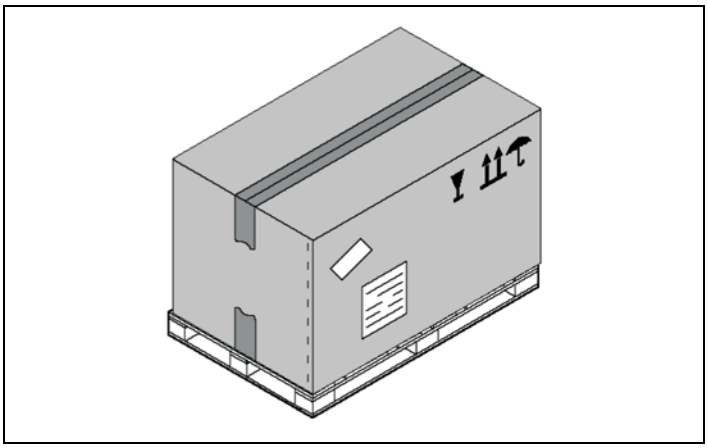
**Package on pallet with nylon protection**



**Package in crate**



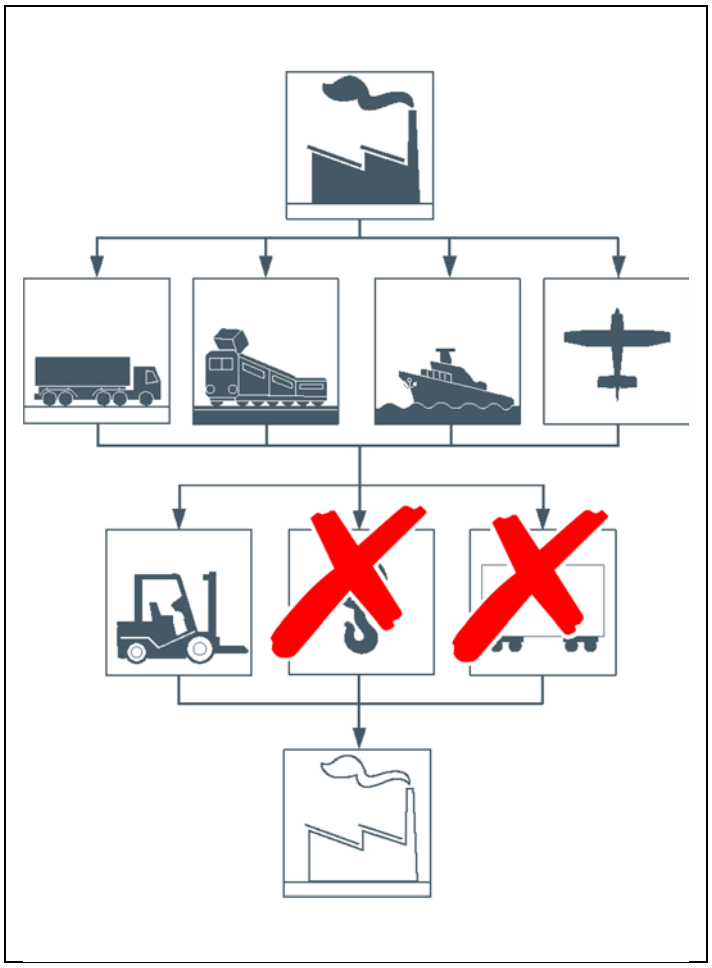
Package with cardboard box



## 4.3. TRANSPORT AND HANDLING

Transport, also according to the destination, can be performed with different vehicles.
The diagram represents the most used solutions.

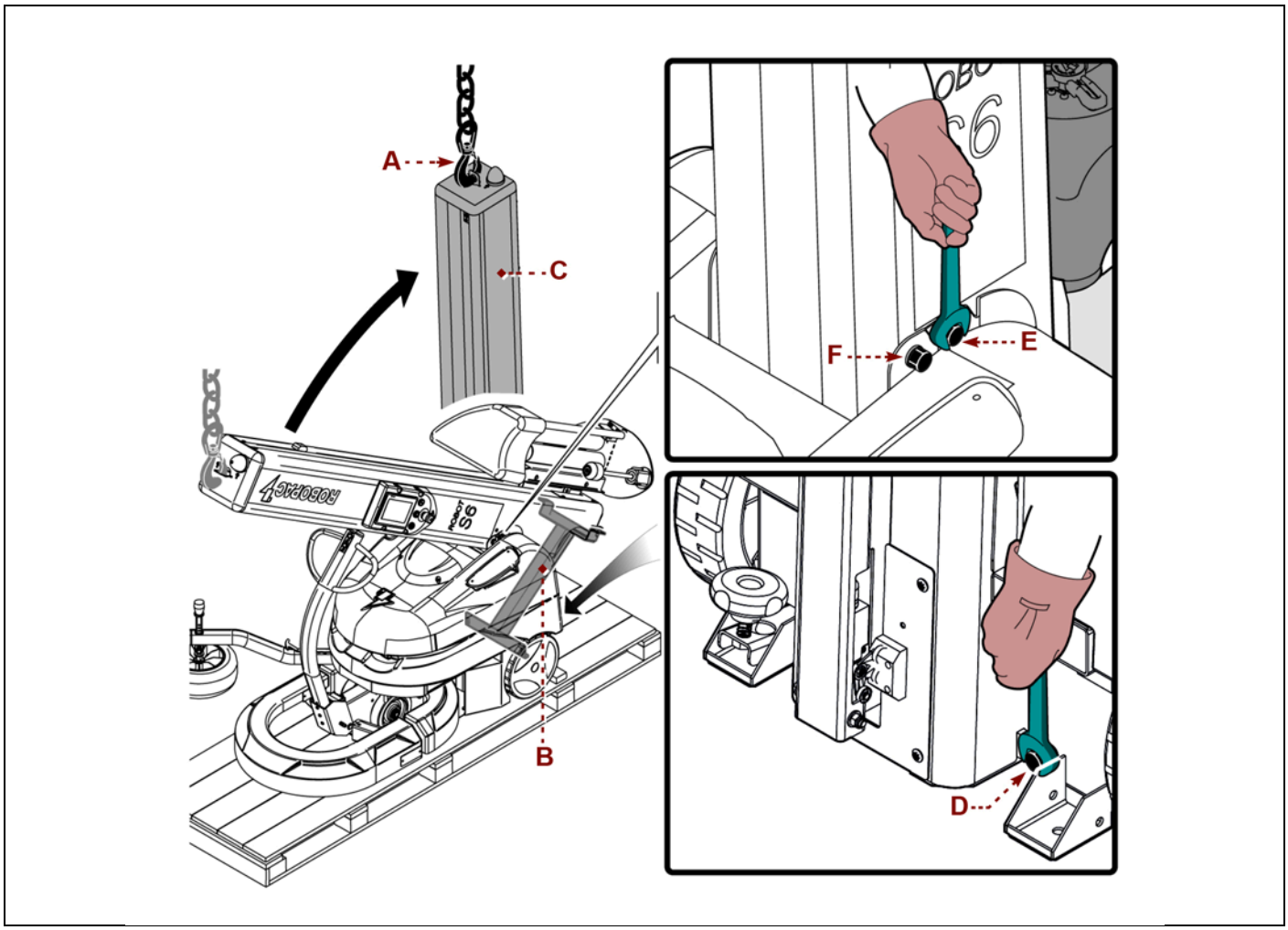
**Important**
For the transport use appropriate means with suitable load-bearing capacity.



## 4.4. INSTALLATION OF DISASSEMBLED PARTS

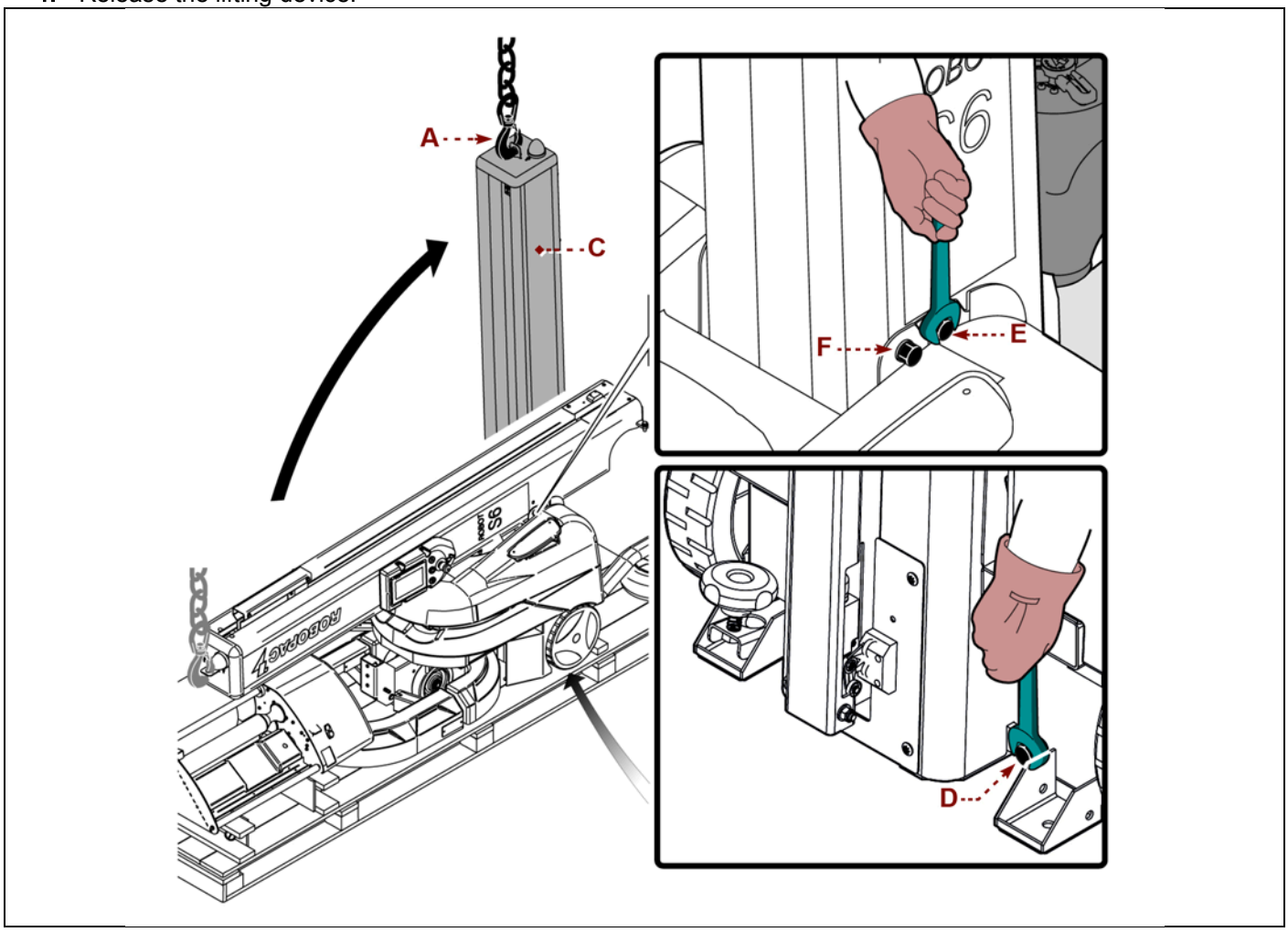
### 4.4.1. INSTALLATION (WITH TILTED COLUMN)

1. Fasten the lifting device to the eyebolt (**A**) to keep the column in position.
2. Remove the support (**B**).
3. Lift the column (**C**).
4. Tighten the fastening screws (**D**-**E**).
5. Tighten the hinge fastening screws (**F**).
6. Release the lifting device.

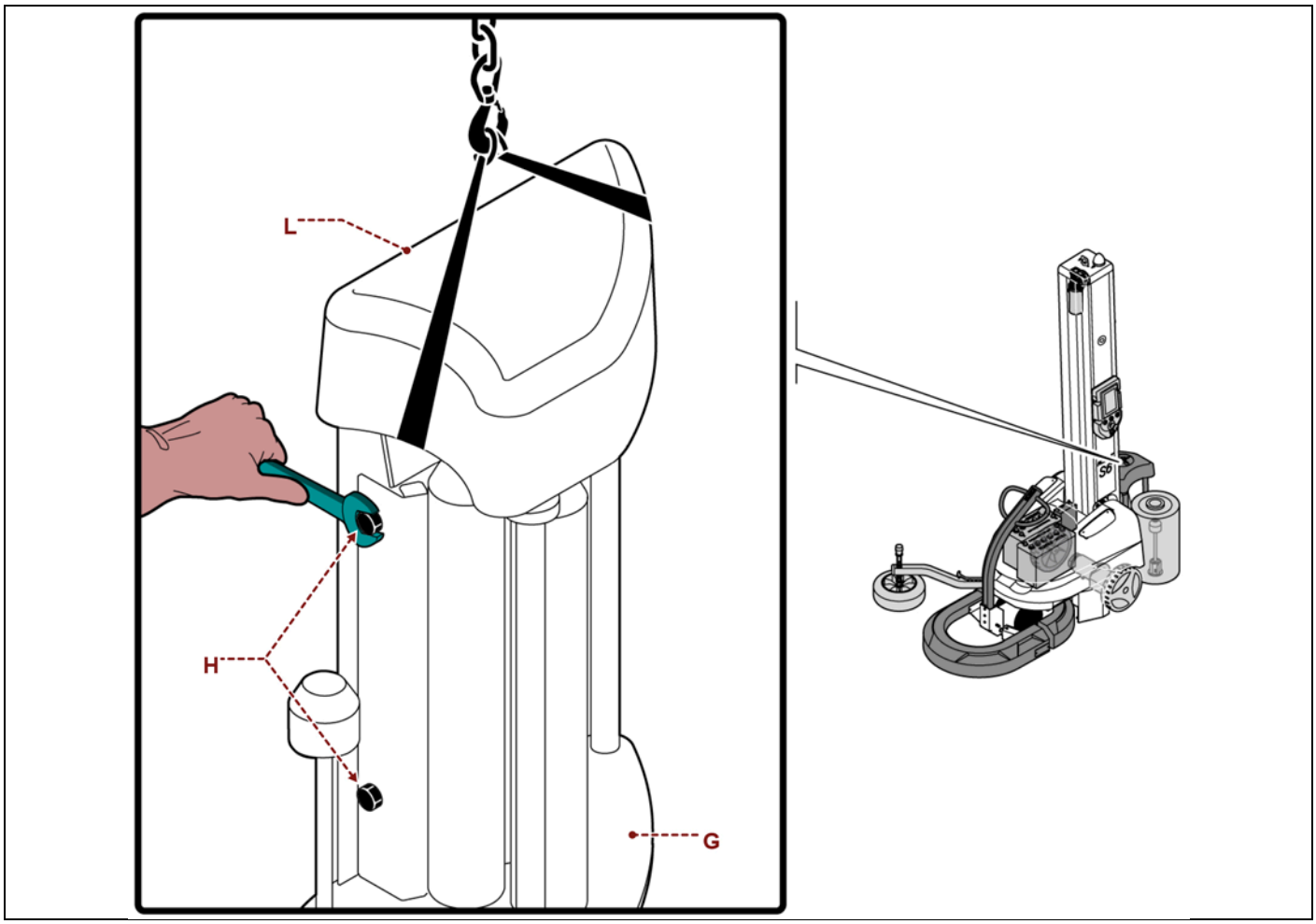


### 4.4.2. INSTALLATION (WITH HORIZONTAL COLUMN)

1. Connect lifting device to eyebolt (**A**) and lift column (**C**).
2. Tighten the fastening screws (**D-E**).
3. Tighten the hinge fastening screws (**F**).
4. Release the lifting device.

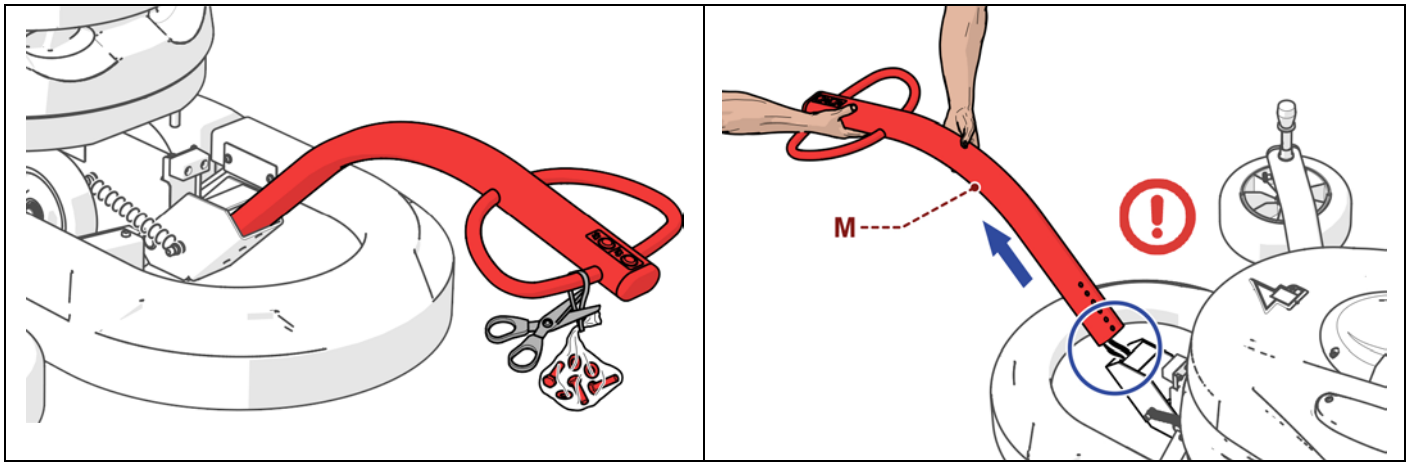


5. Hook the lifting device to the spool carriage (**G**).
6. Lift the spool carriage (**G**) and bring it close to the column, then secure it with the screws (**H**).
7. Remove casings (**L**).
8. Connect the electric connectors to the terminal board of the spool carriage.
9. Refit casing (**L**).

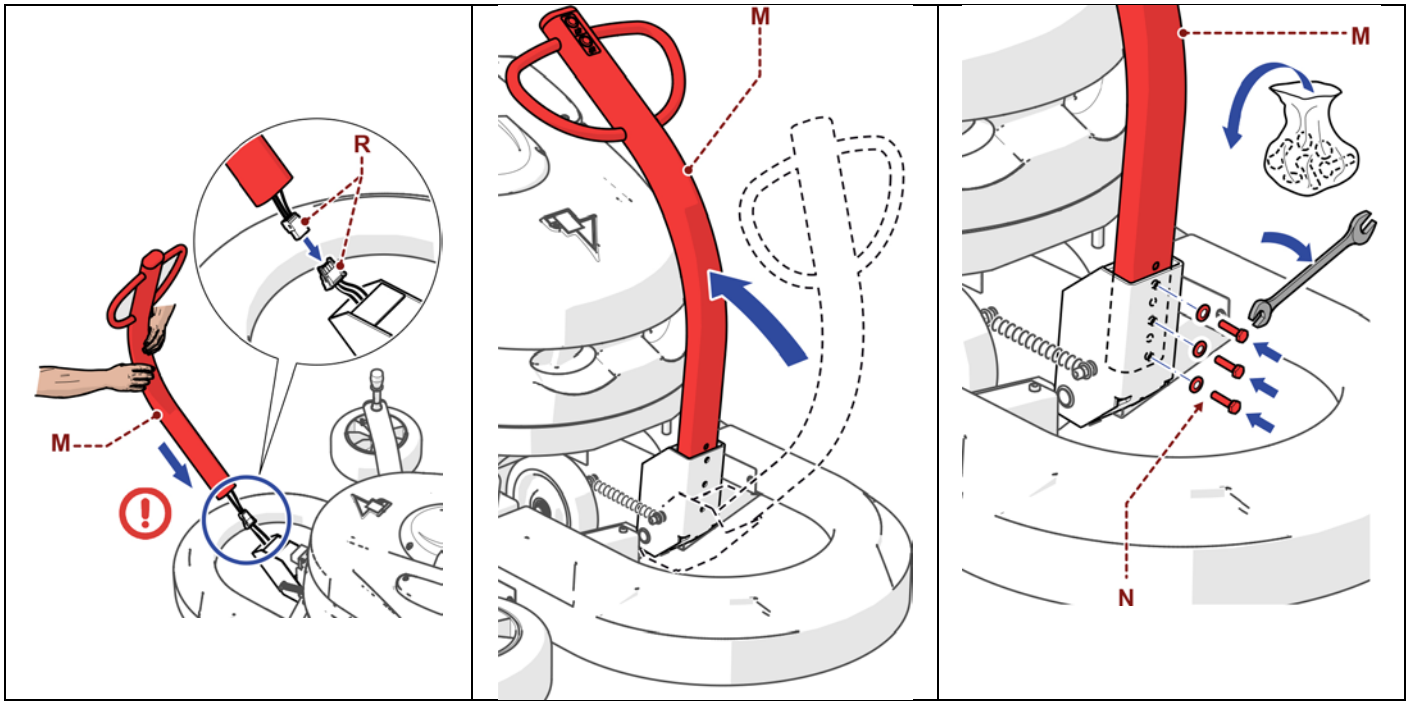


### 4.4.3. INSTALLATION OF FEELER AND RUDDER

1. Lift and take out the rudder (**M**) from the machine.

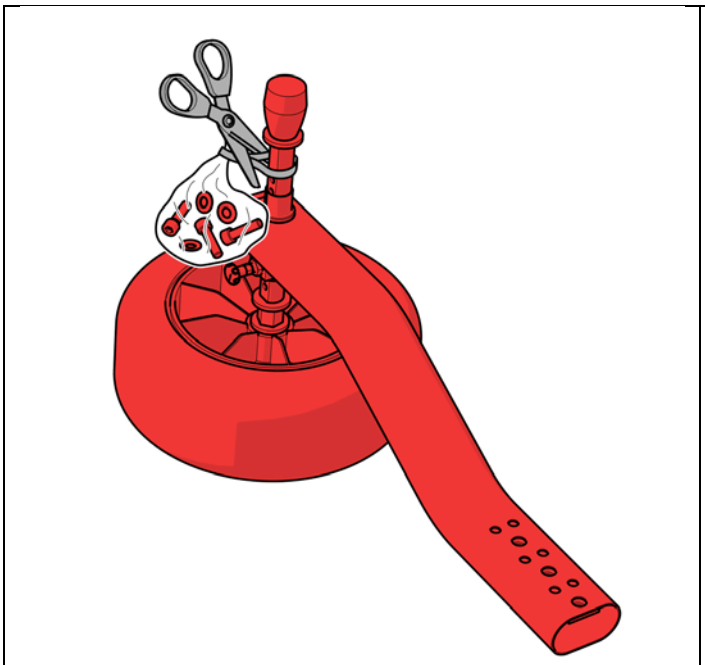



2. Turn the rudder (**M**), connect the connectors (**R**) and insert it into the machine's support.
3. Lift the rudder (**M**) and fix it with the screws (**N**).

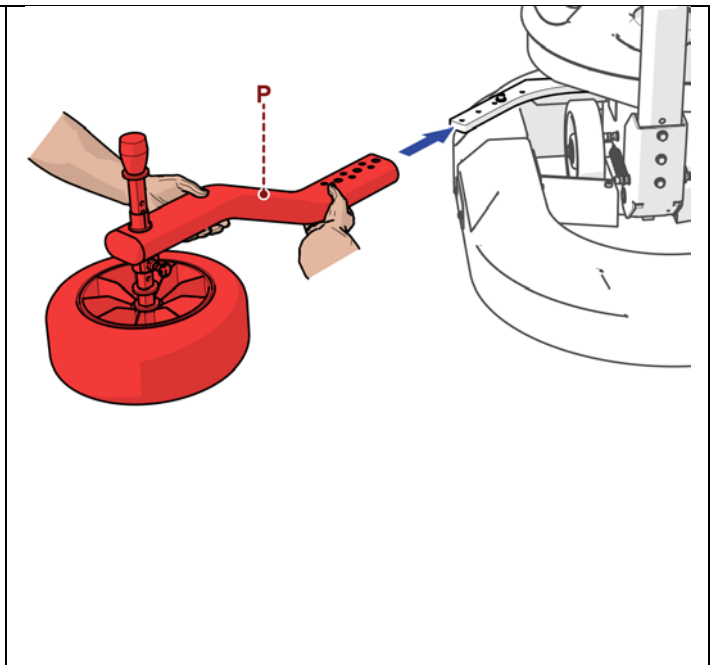


4. Fit the feeler (**P**) and secure it with the screws (**Q**).

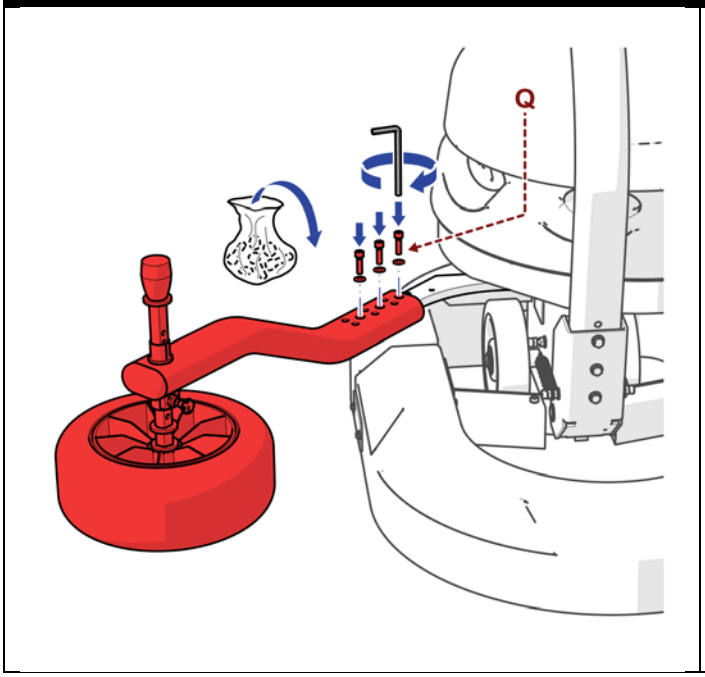
**Important**
To install the rudder and the feeler, use the nuts and bolts supplied with the machine.

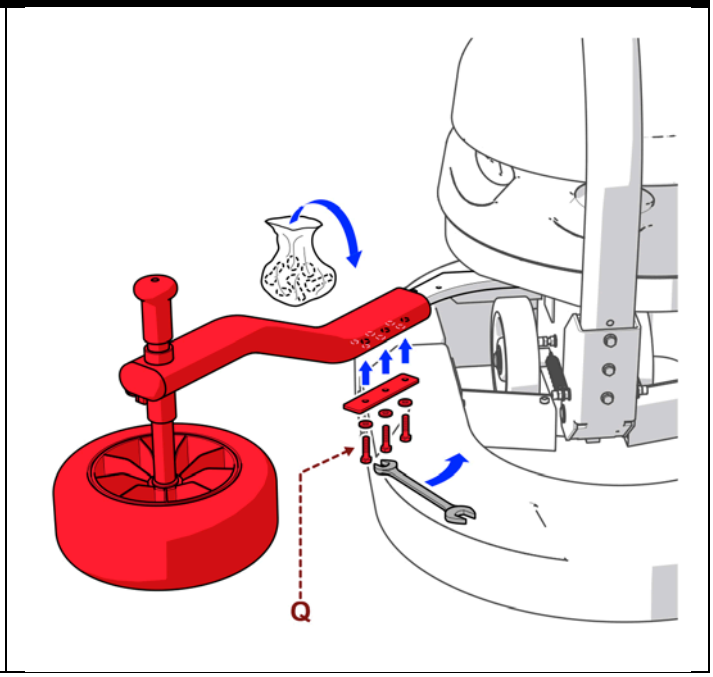


Standard version




USA version

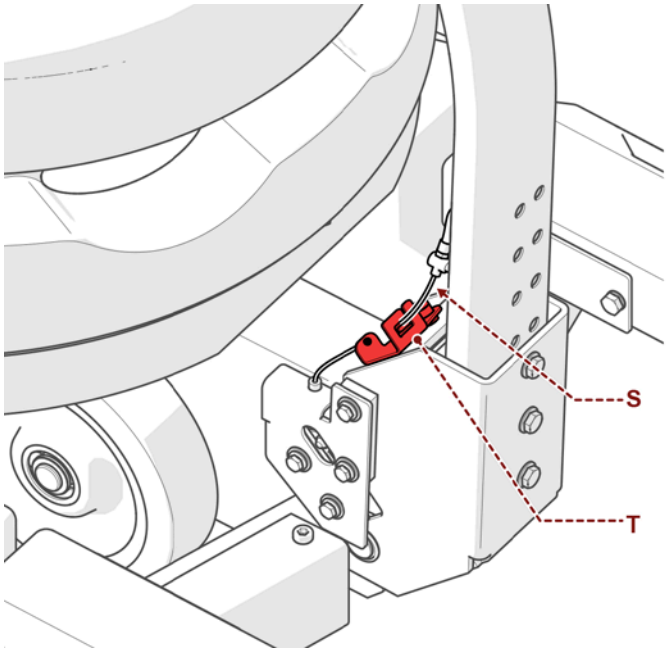


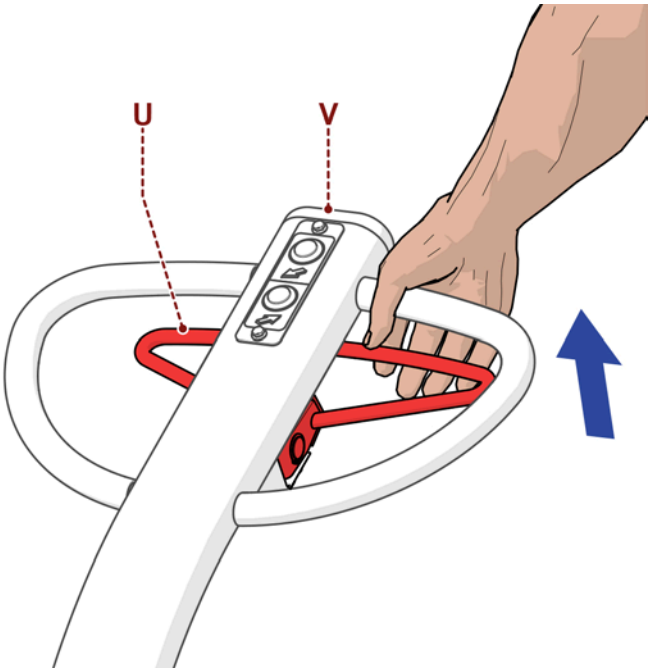



### 4.4.4. INSTALLATION OF LIGHTENED STEERING WHEEL (OPTIONAL)

1. Repeat the operations, mentioned in paragraph “Installation of feeler and rudder”.
2. Connect the cable (**S**) to the metal sheet (**T**).

**Important**
To lower the rudder (**V**) pull the handle (**U**).



# 5. INFORMATION ON ADJUSTMENTS

## 5.1. RECOMMENDATIONS FOR ADJUSTMENTS

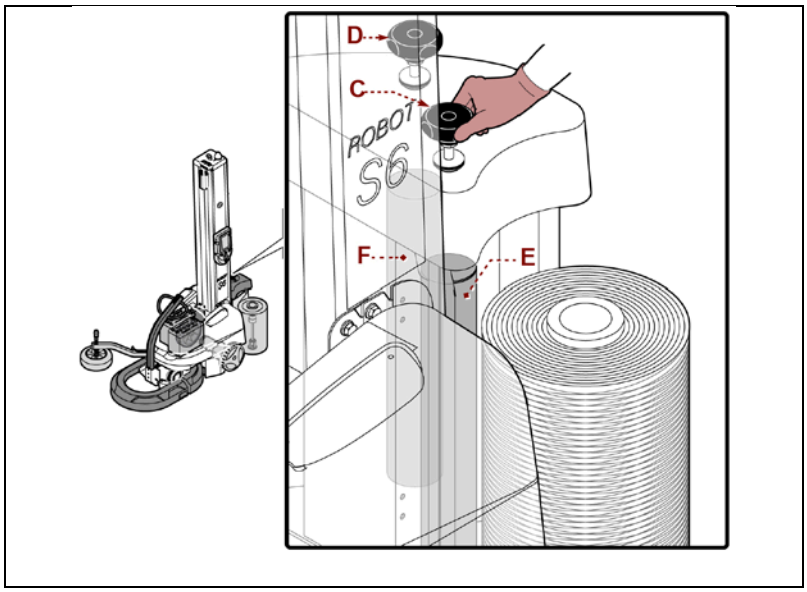
- **Before performing any operation, the authorised operator must make sure to have understood the "Instructions for use".**
- **Activate all the safety devices provided, stop the machine and assess whether there is any residual energy before carrying out the operations.**
- **Provide suitable safety conditions in compliance with the regulations on workplace safety to prevent and minimise the risks.**
- **Pay attention to the safety warnings, do not misuse the machine and assess the possible residual risks.**

## 5.2. "FILM STRETCH" ADJUSTMENT

### 5.2.1. SPOOL CARRIAGES OF "FRD for mesh" TYPE

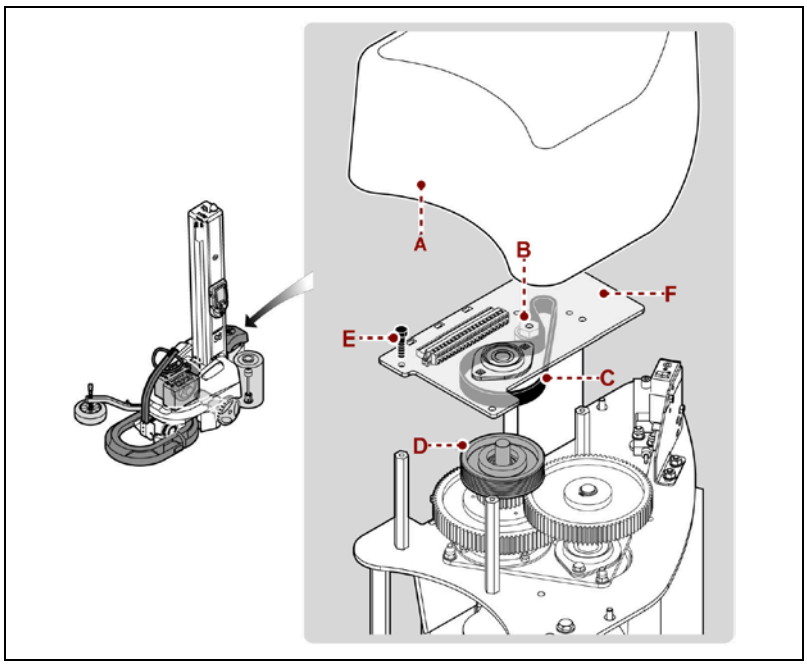
1. Act on the handwheels (**C**-**D**) to adjust the braking effect of the stretch rollers (**E**-**F**) that determine the tensioning of the mesh.
   (Refer to the graduated index provided on the machine).

**Important**
For a correct tensioning of the mesh, adjust the braking effect so that the outfeed roller (**F**) is more braked than the infeed roller (**E**); moreover, it is necessary to avoid braking the stretching rollers too much to prevent the mesh from slipping.



### 5.2.2. "PDS" SPOOL CARRIAGES FOR CHANGING THE PRE-STRETCH RATIOS

1. Stop the machine in safety conditions (see paragraph “Machine safe stop”).
2. Remove the guard (**A**).
3. Slacken the belt (**C**) using the tensioner (**B**).
4. Slide the belt out of the pulley (**D**).
5. Loosen the screws (**E**).
6. Remove the plate (**F**) with motor and bearings.



7. Remove the retaining ring (**G**).
8. Remove the pulley (**D**).
9. Remove the retaining ring (**H**).
10. Remove the gear (**L**).
11. Remove the retaining ring (**M**).
12. Remove the gear (**N**).
13. Loosen the screws and remove the disc (**P**) from the gear (**N**).
14. Select the set of gears (**L-N**) relating to the concerned pre-stretch percentage (see table).

The table indicates the pre-stretch values which can be obtained with the relevant transmission gear set.

**Important**
Set the pre-stretch according to the film resistance and quality in order to obtain a low consumption.

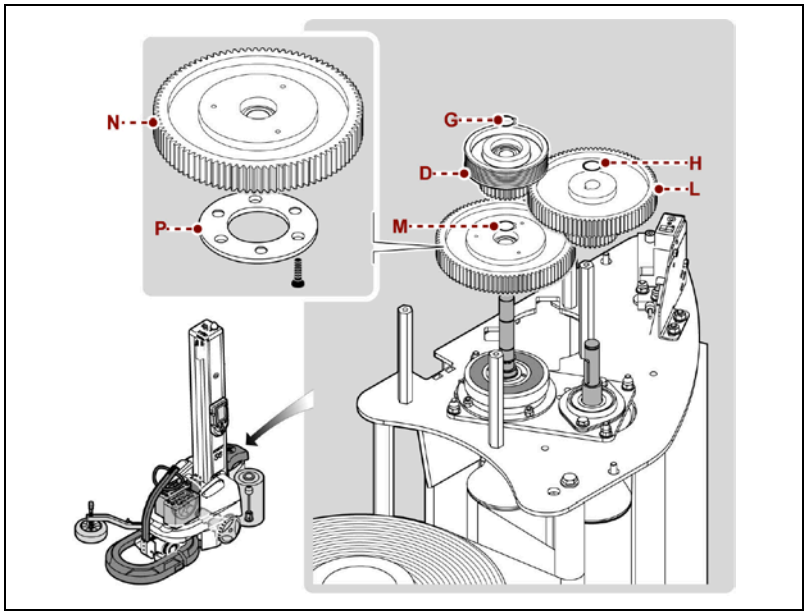
**Pre-stretch values**

| Pre-stretch percentage | Gear code (L) | Gear code (N) |
|---|---|---|
| 150% | (*) | (*) |
| 200% | (*) | (*) |
| 250% | (*) | (*) |
| 300% | (*) | (*) |

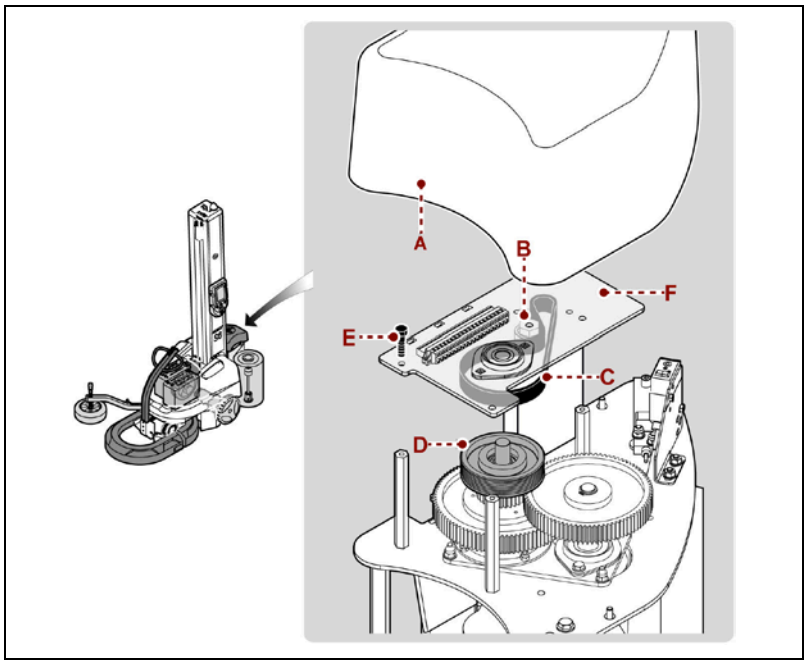
(*) See spare parts catalogue.

15. Fit the disc (**P**) and correctly fasten it to the gear (**N**) of the new gear ratio.
16. Fit the gear (**N**) of the new transmission gear set.
17. Position the gear with the disc side (**P**) coupled with the clutch (**Q**).
18. Fit the retaining ring (**M**).
19. Fit the gear (**L**) of the new transmission gear set.
20. Fit the retaining ring (**H**).
21. Fit the pulley (**D**).
22. Fit the retaining ring (**G**).

**Important**
During reassembly, make sure that coupling tabs are correctly engaged.

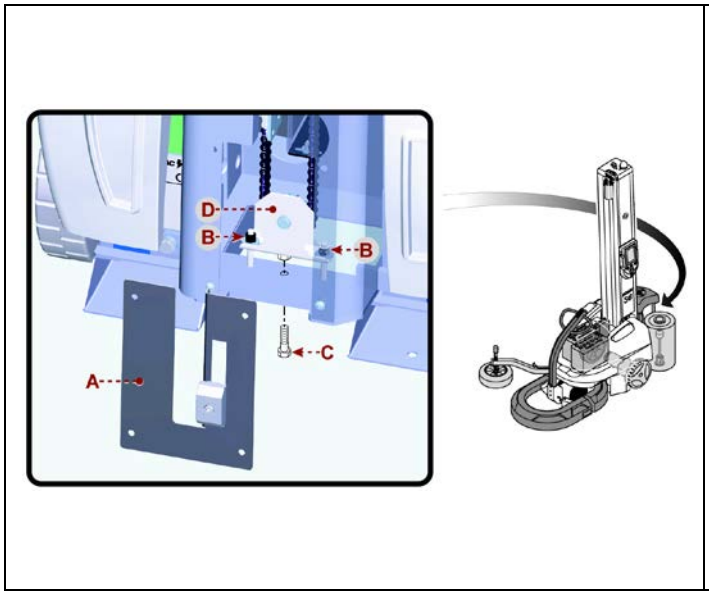


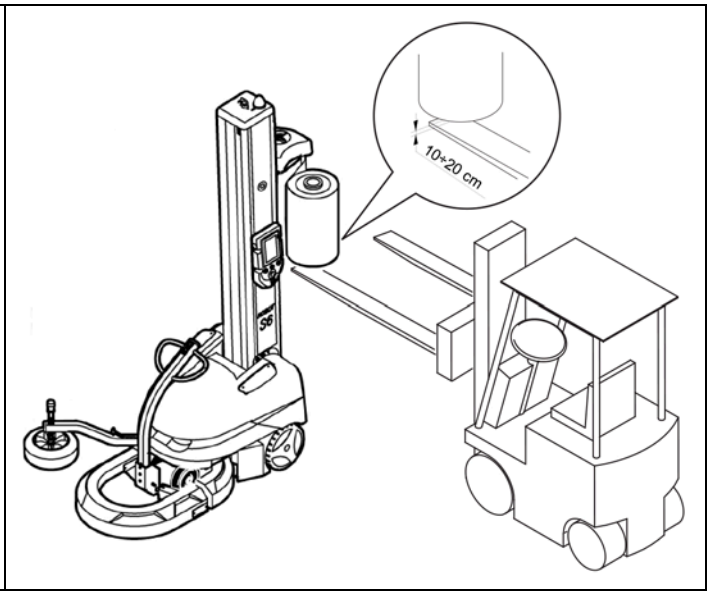
23. Rest the plate (**F**) on the stud bolts, paying attention to fit the belt (**C**) on the pulley (**D**).
24. Tighten the screws (**E**).
25. Tension the belt (**C**) using the tensioner (**B**).
26. Manually turn the pre-stretching rollers in both directions to correctly seat the coupling between belt and pulleys.
27. Check the belt tensioning again and properly adjust it if necessary.
28. Refit the guard (**A**) when finished.



## 5.3. SPOOL CARRIAGE LIFTING CHAIN ADJUSTMENT

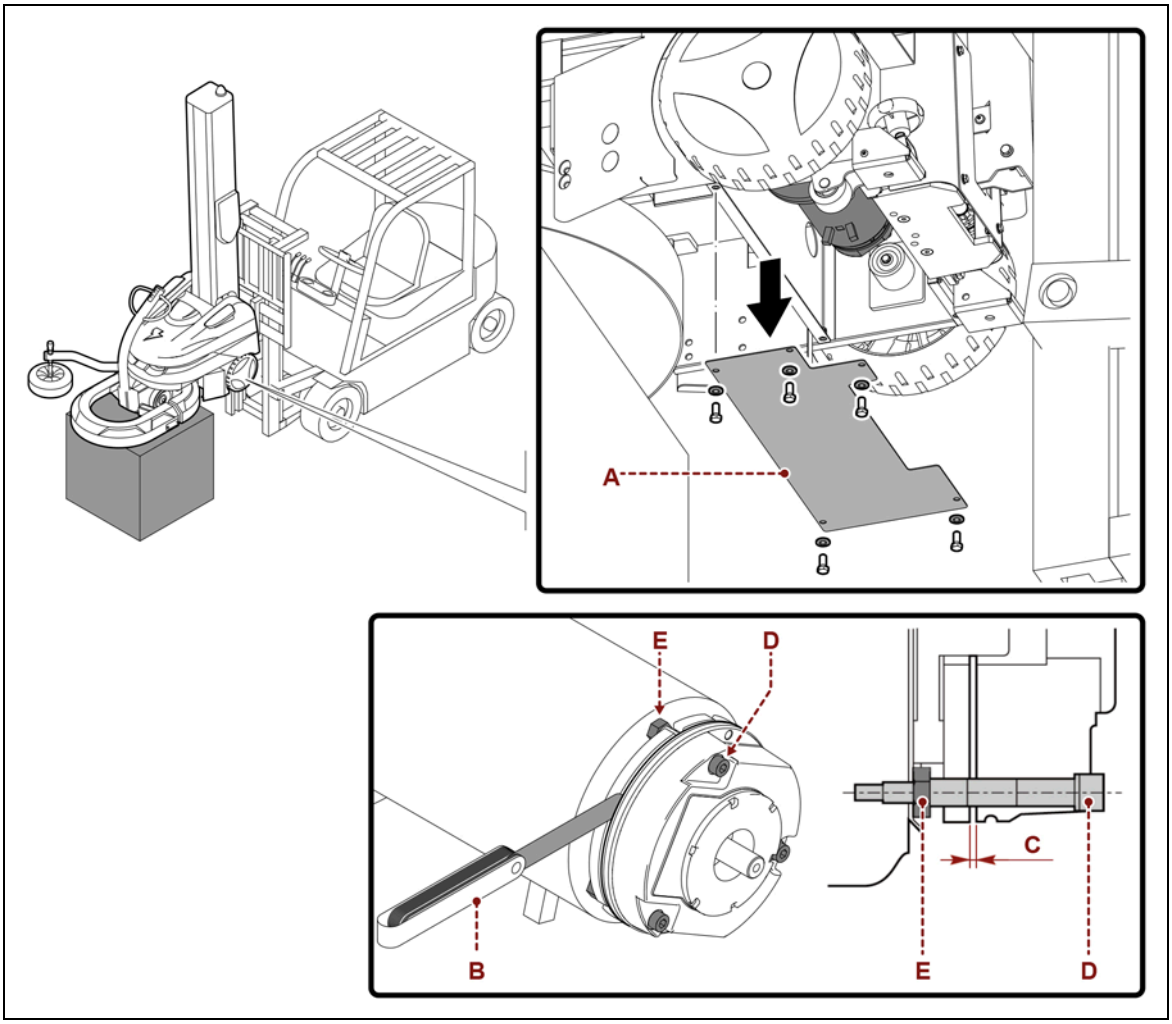
1. Lift the spool carriage (with the machine operating in “manual mode”) until it reaches the “upper” limit switch.
2. Turn the machine off (refer to paragraph “machine safe stop”).
3. Use any means to prevent possible falls from the carriage (e.g. forklift truck).
4. Remove the guard (**A**).
5. Loosen the nuts (**B**).
6. Tighten screw (**C**) "M8x50 UNI 5739" with a tightening torque of 3 Nm on the chain tensioner (**D**).
   The screw and the torque wrench are not supplied.
7. Re-tighten the nuts **(B)** up to the surface of the chain tensioner **(D)**.
8. Undo screw (**C**).
9. Refit the guard (**A**).



## 5.4. BRAKE ADJUSTMENT

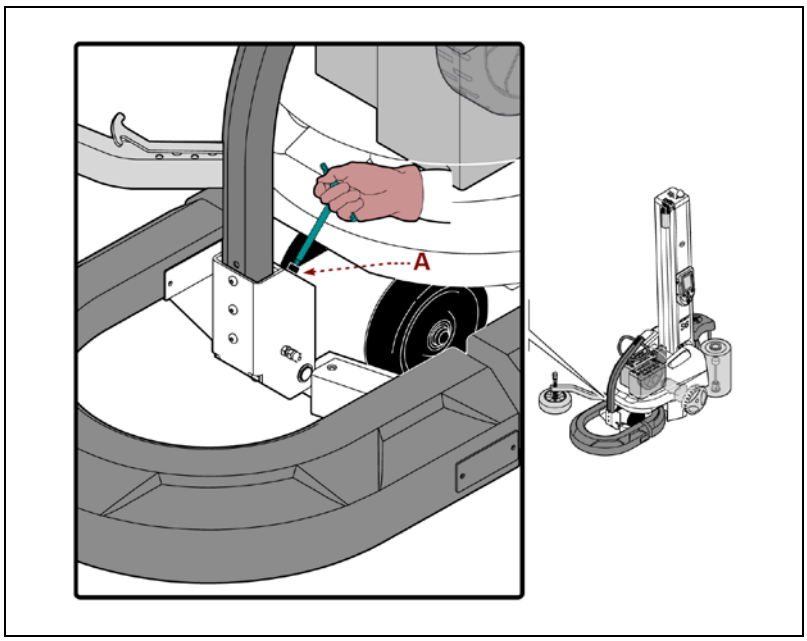
1. Perform “machine safe stop”.
2. Lift the machine and place it on a support.
3. Make sure that the machine is resting correctly, to prevent the risk of crushing during the operation.
4. Remove the guard (**A**).
5. Loosen the lock nuts (**E**).
6. Using a feeler gauge (**B**), insert a spacer of 0.25 mm near the screw (**D**).
7. Adjust the distance (**C**) between the magnet and the flange using the screw (**D**) until you feel a slight resistance on the feeler gauge.
8. Repeat the operation near the other screws.
9. Using a feeler gauge, try to insert a spacer of 0.3 mm between the magnet and the flange in correspondence of the screws (**D**).
   The operation is considered as performed correctly if it is not possible to insert the feeler gauge.
10. Tighten lock nuts (**E**).
11. Refit the guard (**A**).



## 5.5. STEERING WHEEL RETURN SPEED ADJUSTMENT

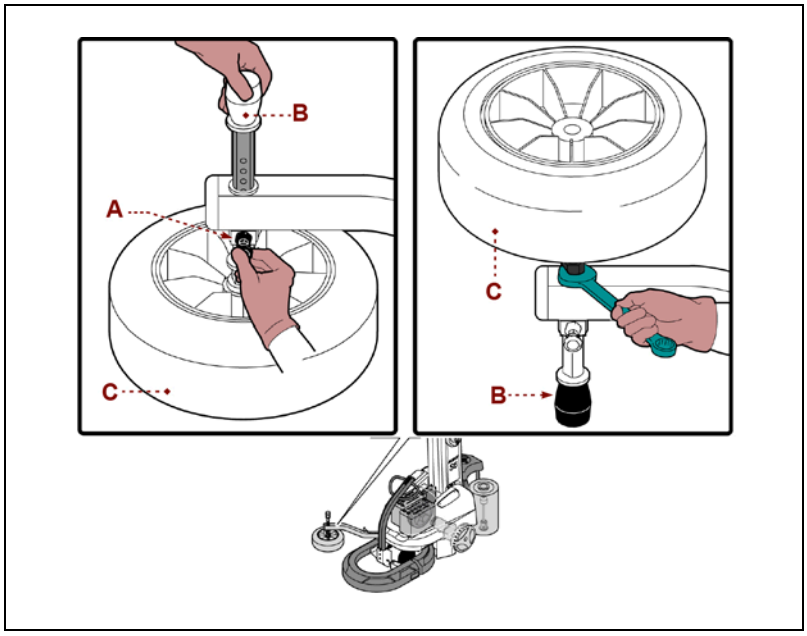
1. Perform “machine safe stop”.
2. Use the screw (**A**) to adjust the rudder return speed.

**Important**
The return speed of the rudder must not be too high to avoid posing a risk to people’s safety.




## 5.6. ADJUSTING THE HEIGHT OF THE FEELER WHEEL

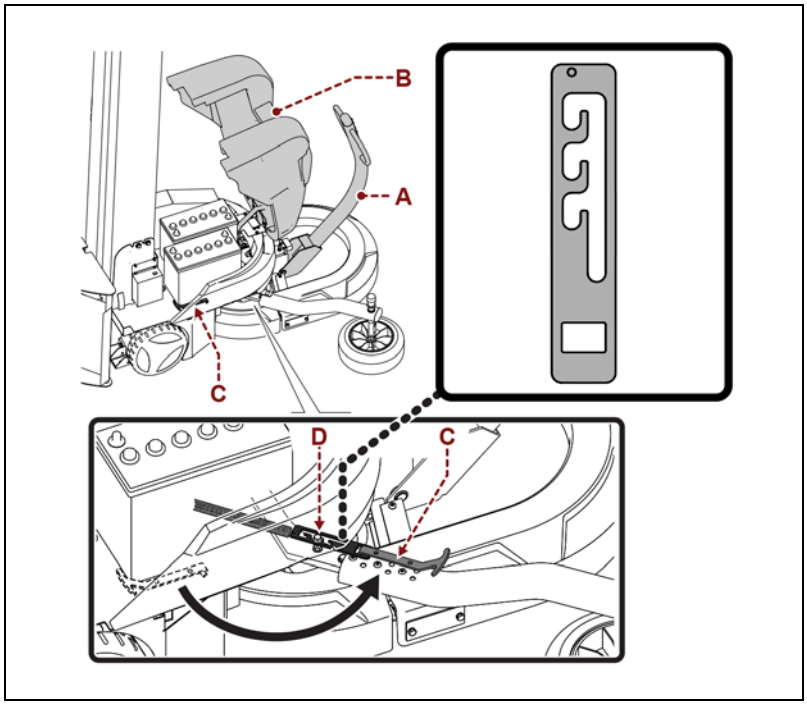
1. Perform “machine safe stop”.
2. Pull knob (**A**), adjust the height of wheel (**C**) by means of knob (**B**), then release knob (**A**) ensuring that the pin correctly inserts in one of the holes.
3. To obtain higher heights, remove knob (**B**), loosen the nut of wheel (**C**) and then refit them in inverted order.



## 5.7. FEELER THRUST ADJUSTMENT

### 5.7.1. STANDARD FEELER

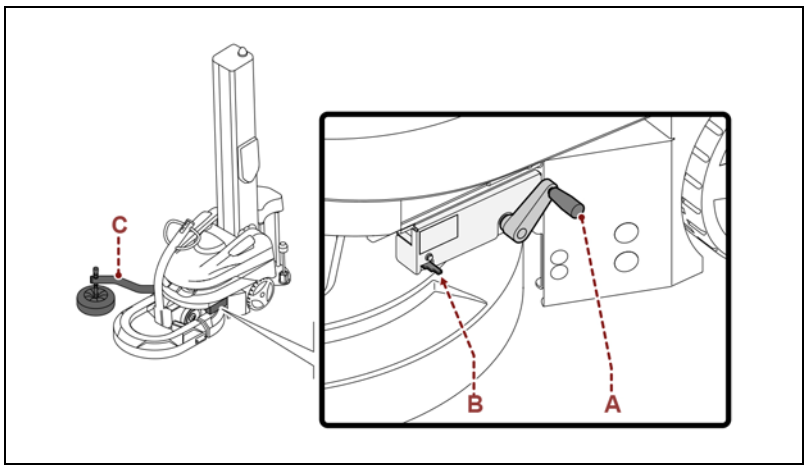
1. Perform “machine safe stop”.
2. Lower the rudder (**A**).
3. Lift the hood (**B**).
4. Grasp the lever (**C**).
5. Connect the lever (**C**) to the tensioner (**D**).
6. Adjust the tensioner (**D**) following its path.
7. Disconnect the lever (**C**) from the tensioner (**D**).
8. Put the lever (**C**) away.
9. Lower the hood (**B**).
10. Raise the rudder (**A**).




### 5.7.2. FEELER WITH LIGHTENED STEERING WHEEL OPTION

1. Open the knob of the crank (**A**).
2. Turn the crank (**A**) clockwise to increase the thrust of the feeler (**C**).
3. Turn the crank (**A**) anti-clockwise to decrease the thrust of the feeler (**C**).
4. Close the knob of the crank (**A**).

The index (**B**) provides a visual indication of the intensity of the thrust of the feeler.



# 6. INFORMATION ABOUT THE USE

## 6.1. RECOMMENDATIONS FOR OPERATION AND USE

- When using the machine for the first time, the operator must read the manual and identify the control functions and simulate some operations, especially machine start and stop.
- Make sure that all safety devices are properly installed and efficient.
- Only carry out the operations foreseen by the Manufacturer and do not tamper with any device to obtain different performance levels.
- Daily, before each use of the machine, check that it stops by pressing the emergency button to trigger the bumper.

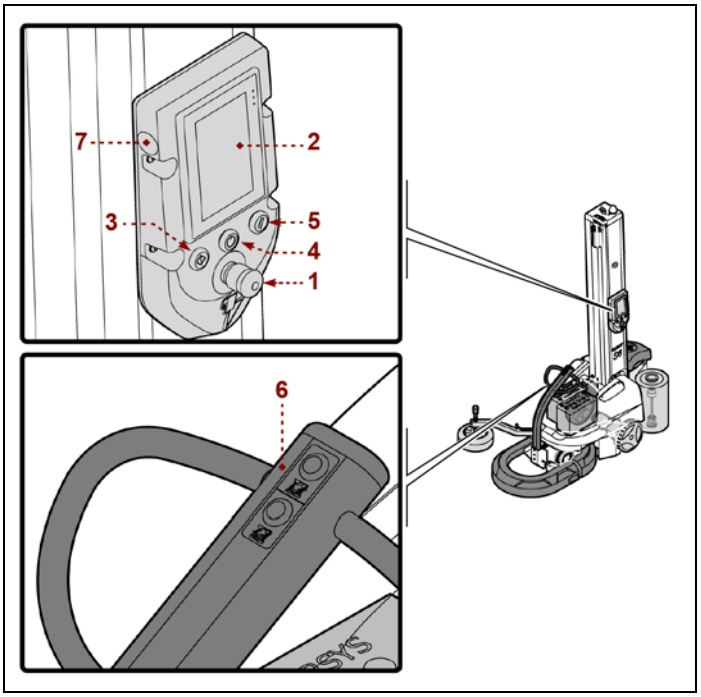
**Caution - warning**
Bumper can be triggered by placing an obstacle in front of the machine at a distance of approximately 20 cm.

**Important**
The frequency of the accidents derived from machine use depends on many factors that cannot always be foreseen and controlled.
Some accidents may be caused by unpredictable environmental factors, others are mainly due to users' behaviours.
On first use, and if required, in addition to being authorised and appropriately informed, the personnel must simulate some manoeuvres to identify the main controls and functions.
Only carry out the operations foreseen by the Manufacturer and do not tamper with any device to obtain different performance levels.
Make sure the safety devices are properly installed and efficient before use.
Users, besides complying with these requirements, must apply all the safety regulations and carefully read the descriptions of the controls and commissioning.

## 6.2. DESCRIPTION OF THE CONTROLS

The illustration shows the main controls of the machine and the list shows their descriptions and functions.

1. **Emergency stop button**:
   it is used in case of imminent risk to stop, with a voluntary action, the machine parts which may pose a risk.
   For further details, see the paragraph “description of safety devices”.
2. **User interface**:
   it is used to set or modify the machine operating parameters.
   For more details, see the paragraph “Description of user interface”.
3. **“Cycle start” button**:
   it is used to start the wrapping automatic cycle.
4. **Light button (white light)**:
   it is used to power the controls on and off.
   When the light indicator turns on, the relevant function is active.
5. **“Reset” button**:
   it is used to reset the machine before restarting it after an emergency stop or after a shut-down due to the disconnection of the power supply.
6. **Buttons (hold to run)**:
   they are used to manually move the machine.
7. **USB port**:
   it allows exchange of data.



## 6.3. DESCRIPTION OF USER INTERFACE

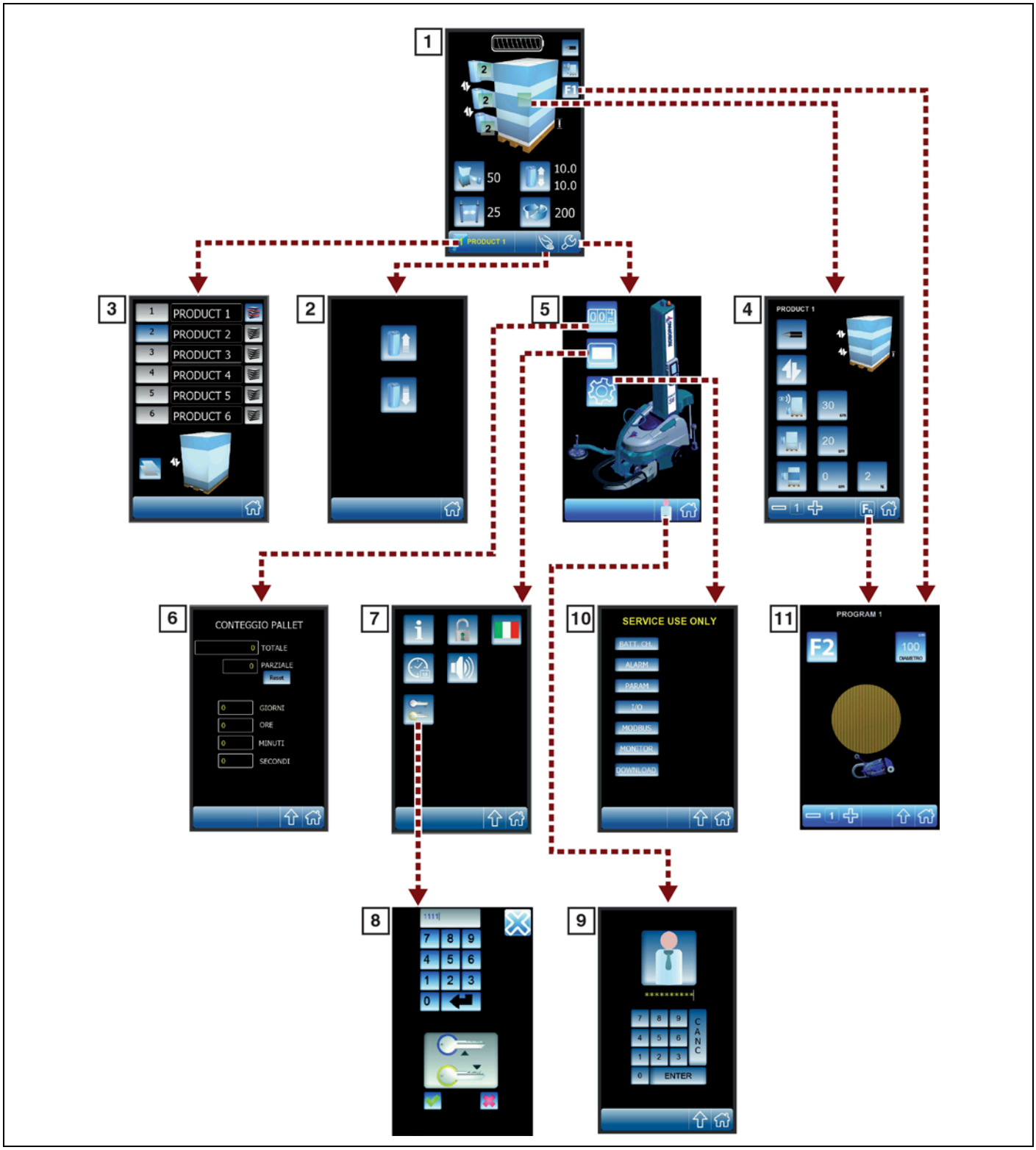
The user interface is equipped with an active matrix “touch screen” colour display.
To view the different functions, just “touch with a finger” the display areas.

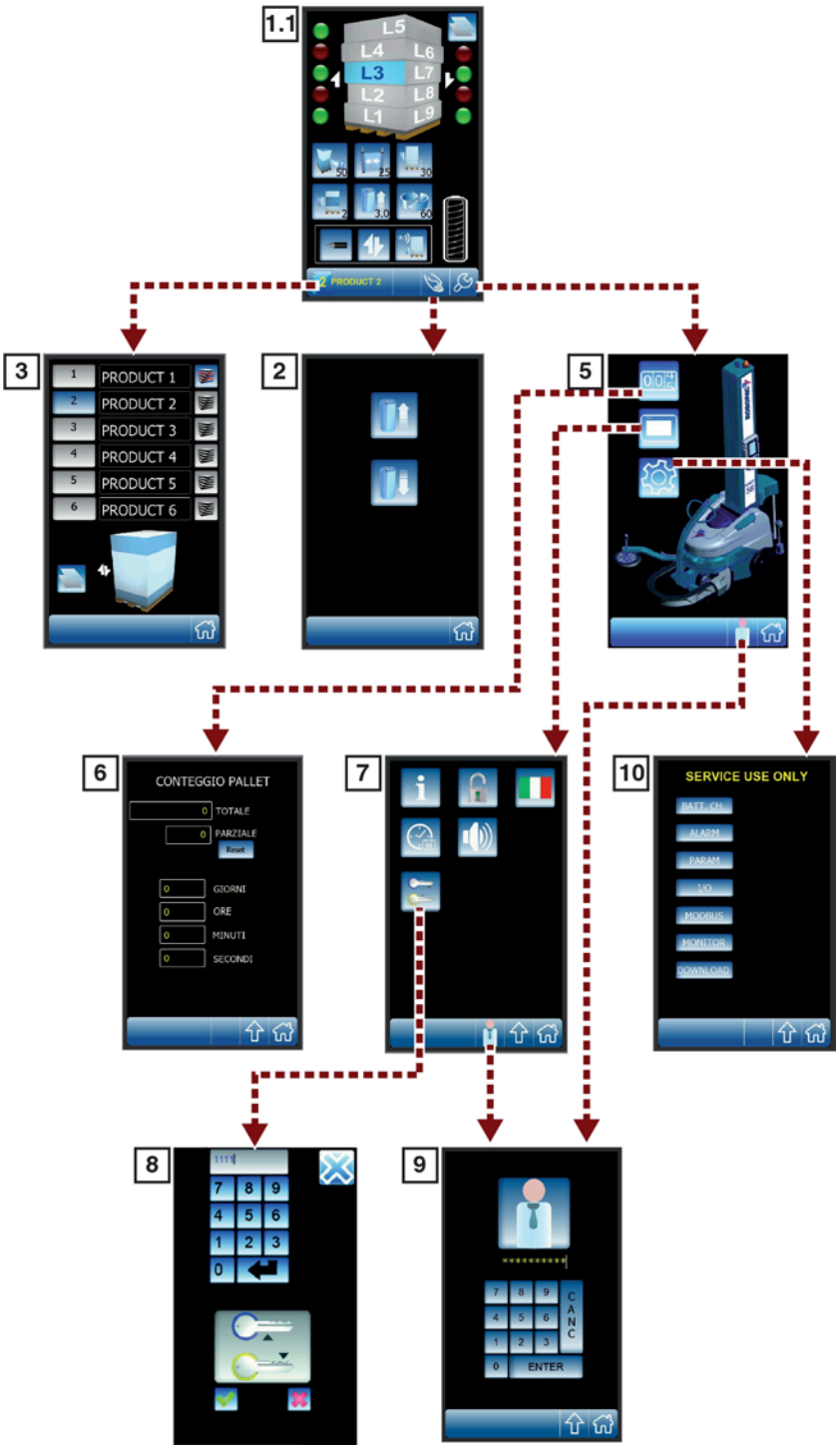
The figure shows the functional logic diagram of the “navigation” modes.
There are two controls for automatic packaging cycle: STANDARD and MULTILEVEL CONTROL (from the “layer home” page).

MULTILEVEL CONTROL allows breaking down the product height in **5** different levels with adjustable thickness and, for each one of them, it is possible to adjust film stretch, pre-stretch (only on motorised carriages), reinforcement wrapping turns, machine rotation speed and carriage speed.
Each one of the **5** levels can be set with values depending on the carriage movement direction, namely also with different values for upstroke and downstroke.

| No. | Name | Description of the function |
|---|---|---|
| 1 | “Home” page | The page is displayed upon the activation of the reset control.<br>The page displays the wrapping values currently in use and grants<br>access to the other pages. |
| 1.1 | “Layer home” page | The page is displayed upon the activation of the control on the right<br>of the various recipes from the “recipes” page.<br>The page displays the wrapping values currently in use and gives access to the other pages |
| 2 | “Carriage vertical handling” page. | The page displays the controls to activate the spool carriage vertical movement in “manual mode”. |
| 3 | "Recipes" page | The page displays the controls to activate the concerned recipe. |
| 4 | “Wrapping cycle” page | The page displays the controls to activate the wrapping cycle |
| 5 | “General parameters” page | The page displays the controls to program the machine set-up parameters |
| 6 | “Production counters (pallets)” page | The page displays the controls to check the quantity (partial and total) of the pallets made |
| 7 | “(H.M.I.) enabling” page | The page displays the controls to customise the user interface operating mode |
| 8 | “Change password”<br>page | The page displays the controls to change the password to access protected functions |
| 9 | “Enter password (user login)” page | The page displays the controls to enter the password (relating to the selected user) to access the protected functions. |
| 10 | "Service” page | The page is reserved to the Manufacturer’s Service support only, to perform diagnostics and basic programming. |
| 11 | Wrapping page with "special cycles". | This page shows the controls that activate wrapping with "special cycles". |

For details on the listed pages, see the description in the specific paragraph.

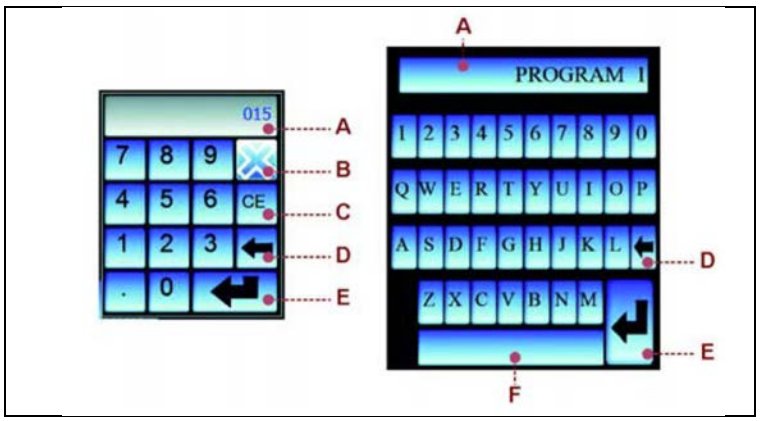

1
50
10.0
10.0
25
200
PRODUCT 1
3
PRODUCT 1
PRODUCT 2
PRODUCT 3
PRODUCT 4
PRODUCT 5
PRODUCT 6
2
5
4
PRODUCT 1
30
20
0
2
6
CONTEGGIO PALLET
TOTALE
PARZIALE
Reset
GIORNI
ORE
MINUTI
SECONDI
7
10
SERVICE USE ONLY
BATT. CH.
ALARM
PARAM.
I/O
MODBUS
MONITOR
DOWNLOAD
11
PROGRAM 1
F2
100
8
9
ENTER


1.1
L5
L4
L6
L3
L7
L2
L8
L1
L9
PRODUCT 2
3
1 PRODUCT 1
2 PRODUCT 2
3 PRODUCT 3
4 PRODUCT 4
5 PRODUCT 5
6 PRODUCT 6
2
5
6
CONTEGGIO PALLET
0 TOTALE
0 PARZIALE
Reset
0 GIORNI
0 ORE
0 MINUTI
0 SECONDI
7
10
SERVICE USE ONLY
ALARM
PARAM
I/O
MODBUS
MONITOR
DOWNLOAD
8
1111
7 8 9
4 5 6
1 2 3
0
9
CANC
ENTER

### 6.3.1. NUMERICAL AND ALPHANUMERICAL KEYBOARD

Some values, displayed in the areas of each single page, can be properly programmed.
The keyboard is displayed each time that an editable or programmable area is pressed.
After entering the characters (numerical or alphabetical), press the button to confirm.
The new value will appear in the selected area.

| No. | Name | Description of the function |
|---|---|---|
| A | Display area | The area displays the numerical and alphabetical characters entered |
| B | Button | Activating the control will close the page and the values entered will not be saved. |
| C | Button | Activating the control will delete the selected character |
| D | Button | Activating the control will delete one character at a time (starting from the last one on the right). |
| E | Button | Activating the control will save the value or the text entered |
| F | Button | Activating the control will perform the functions of the “space bar” |

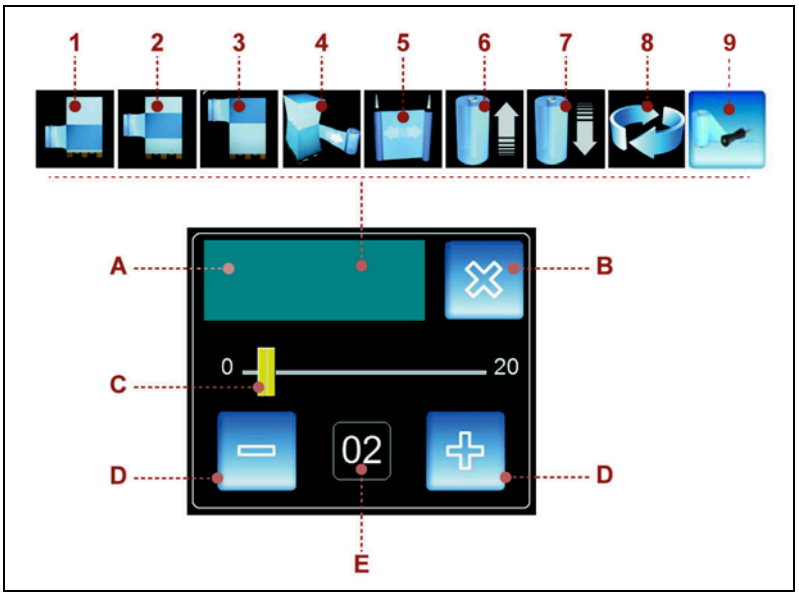


### 6.3.2. PROGRAMMING WINDOW

The window is displayed each time that an editable or programmable area is pressed.

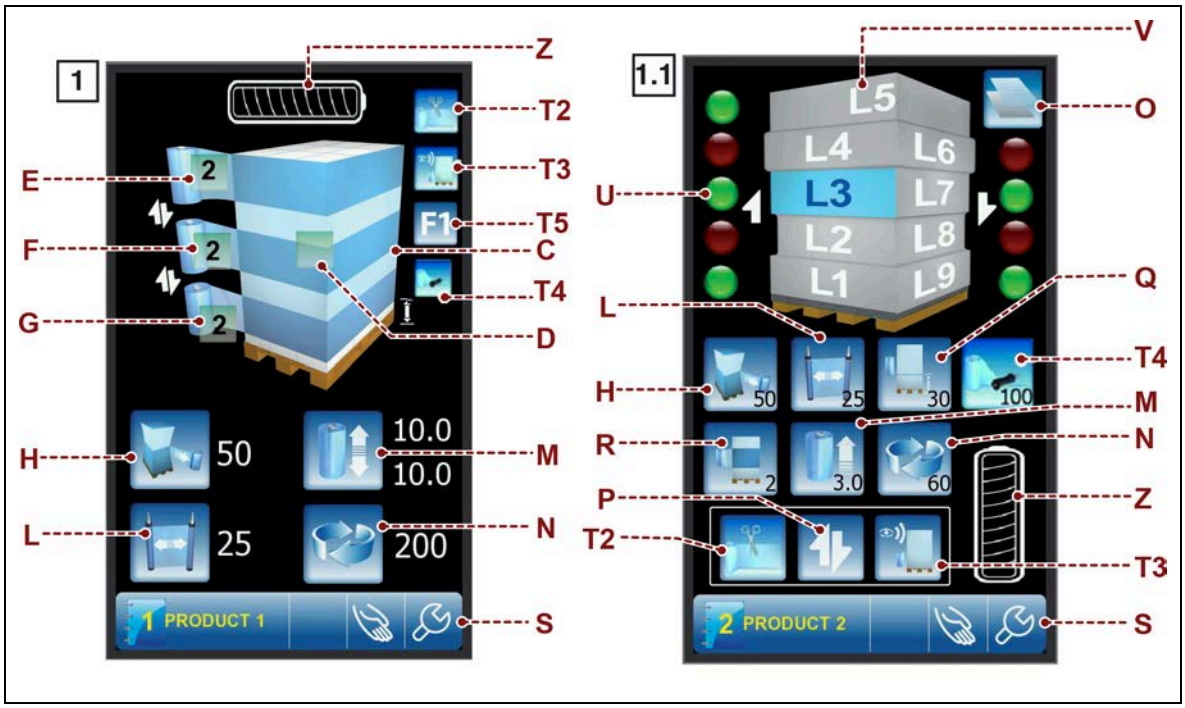
- **A)** Area: it displays the icon corresponding to the concerned parameter to be programmed.
  The figure shows a typical example of window and the table includes the description of the icons.
- **B)** Button: it is used to close the programming window.
- **C)** Bar: it is used to (quickly) increase or decrease the value displayed in the area (**E**).
- **D)** Buttons: they are used to increase or decrease (one unit at a time) the value displayed in the area (**E**).
- **E)** Area: it displays the programmed parameter value.

| Icon | Description of the function |
|---|---|
| 1 | Lower wrapping |
| 2 | Reinforcing wrapping |
| 3 | Upper wrapping |
| 4 | Film stretch |
| 5 | Film pre-stretch |
| 6 | Carriage upstroke speed |
| 7 | Carriage downstroke speed |
| 8 | Machine forward speed |
| 9 | Film height adjuster – creasing head device. |



### 6.4. “HOME” PAGE

The page displays the wrapping values currently in use and gives access the other pages.



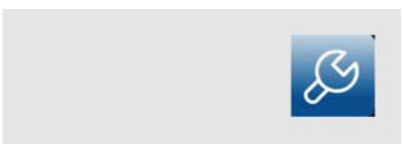
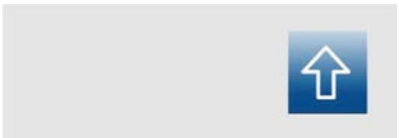
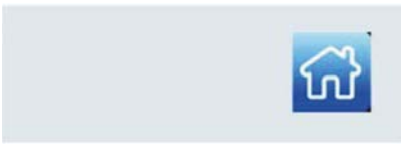

- **C)** Area: it displays the preview of the selected pallet wrapping cycle.
- **D)** Button: used to display the "wrapping cycle" page.
- **E)** Button: used to program the quantity of wrappings at the upper end of the pallet. The displayed number indicates the programmed value.
- **F)** Button: used to program the quantity of wrappings at the upper end of the pallet. The displayed number indicates the programmed value.
- **G)** Button: used to program the quantity of reinforcing wrappings in the middle area of the pallet. The displayed number indicates the programmed value.
- **H)** Button: used to program the quantity of wrappings at the base of the pallet. The displayed number indicates the programmed value.
- **I)** Button: used to program the stretch value of the film. The displayed number indicates the programmed value.
- **L)** Button: used to program the pre-stretch value of the film (only for "**PDS**" - "**PVS**” carriages). The displayed number indicates the programmed value.
- **M)** Button: used to program the vertical handling speed of the carriage. The displayed number indicates the programmed value.
- **N)** Button: used to program the wrapping speed of the machine. The displayed number indicates the programmed value.
- **O)** Button: used to copy the data of one layer onto another.

For a description of the keys P, Q, R, T2, T3 and T5 see the chapter “wrapping cycle” page.

P) Wrapping cycle.
Q) Distance from the ground at wrapping start.
R) Reinforcing wrapping programming.
T2) Cutting (Optional).
T3) Altimeter.
T4) Film height adjuster – creasing head device.
T5) F1 Special cycle.
U) Button: used to enable/disable the indicated level.
V) Area: indicates the number of the level.
Z) Battery charge status indicator: indicates battery charge status.
- Battery charge: the battery condition is signalled by means of coloured bars (green, yellow and red).
- Battery flat: this condition is signalled with an alarm message and an acoustic warning when the battery level is below 20%.

S) Toolbar.
The toolbar is displayed in every page and features only the buttons which can be activated.

The list includes the description of the elements (buttons, icons, etc.) displayed in the area.

| | |
|---|---|
|   | Button: used to display the "Recipes" page.<br>The displayed number indicates the activated recipe. |
|   | Area: displays the name of the activated recipe. |
|   | Buttons: used to display the pages for programming the recipes of the wrapping cycles.<br>The recipe displayed is the one that will be carried out in the wrapping cycle.<br>For further details, see paragraph "Wrapping cycle page". |
|  | Button: used to display the "password entry" page.<br>For further details consult the paragraph "password entry page (user login)". |
|  | Button: it is used to display the “Manual handling” page. |
|  | Button: it is used to display the “General parameters” page. |
|  | Button: it is used to display the upper level page. |
|  | Button: it is used to display the “home” page. |

### 6.5. “MANUAL HANDLING” PAGE

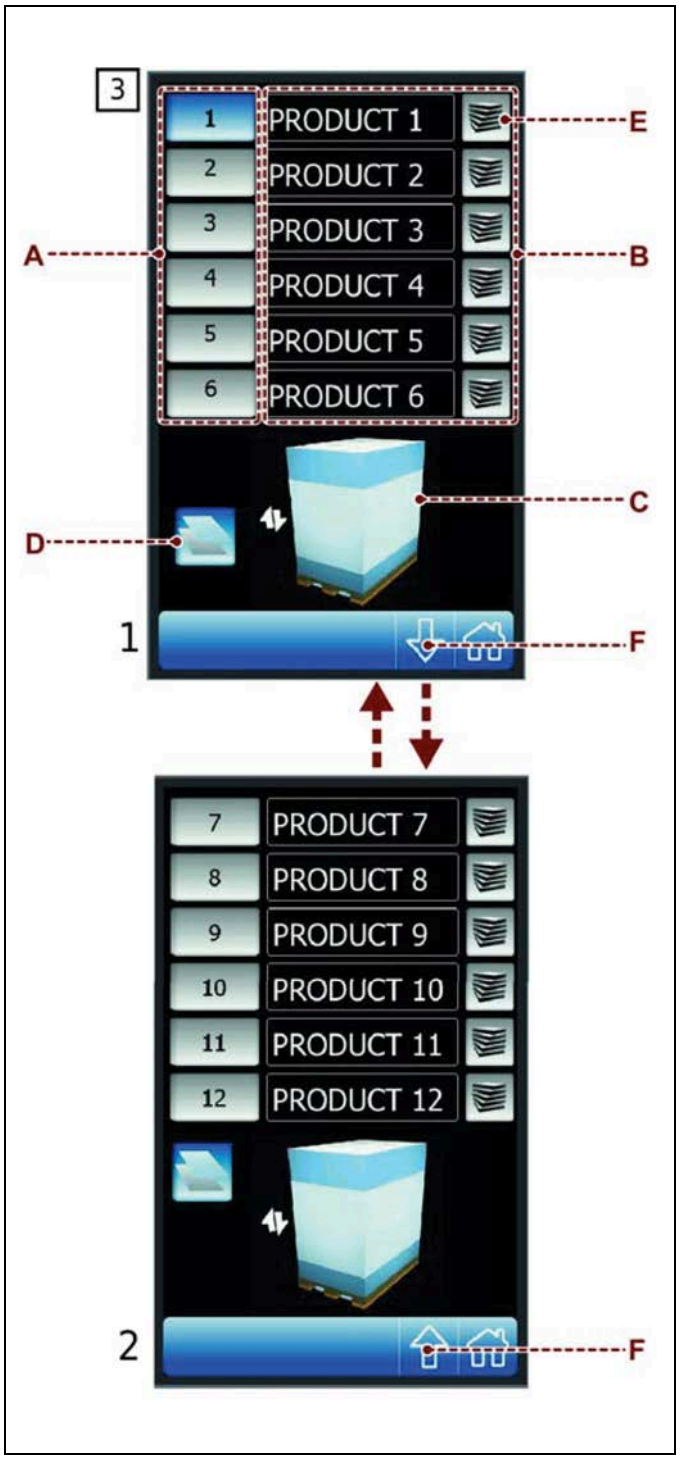
The page displays the controls to activate the spool carriage vertical movement in “manual mode”.

| | |
|---|---|
|  | Button (hold to run): it is used to activate the carriage upstroke. |
|  | Button (hold to run): it is used to activate the carriage downstroke. |
|  | Button (hold to run): it is used to activate the creasing head upstroke. |
|  | Button (hold to run): it is used to activate the creasing head downstroke. |
|  | it is used to display the “home” page. |

## 6.6. “RECIPES” PAGE

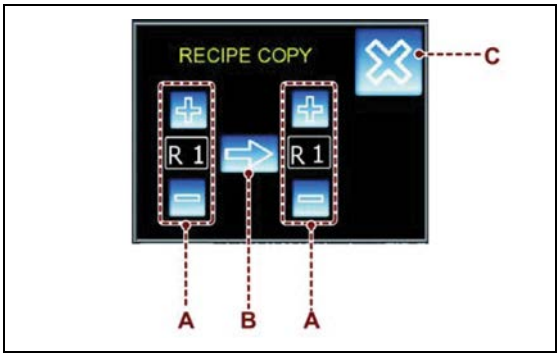
The page displays the controls to activate the concerned recipe.

- **A)** Buttons: they are used to activate the concerned recipe.
- **B)** Red background: function enabled.
- **C)** Buttons: they are used to program the recipe name.
- **D)** Area: it displays the preview of the selected pallet wrapping cycle.
- **E)** Button: press it to access the "copy recipe" page.
- **F)** Button: it is used to enable/disable the “multilevel control” for each individual recipe.
- **G)** Button: it is used to pass from page 1 to 2 and vice versa, in the “RECIPES” 3 page.



### 6.6.1. "COPY RECIPE" PAGE

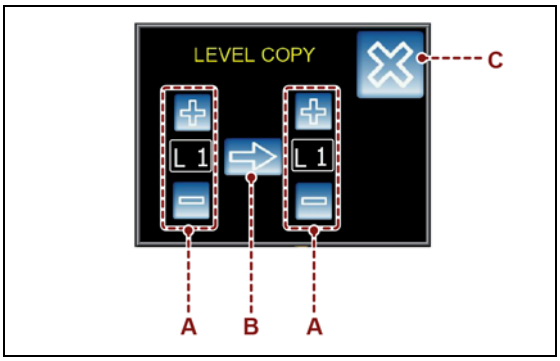
A) Button: press +/- to change the starting recipe.
B) Button: press to confirm the operation (Enter).
C) Button: used to go back to the "RECIPES" page.




### 6.6.2. "COPY LEVEL" PAGE

To copy and move the parameters from one level to another, use the following buttons:

D) Button: press +/- to change the starting level and destination.
E) Button: press to confirm the operation (Enter).
F) Button: used to go back to the "home" page.

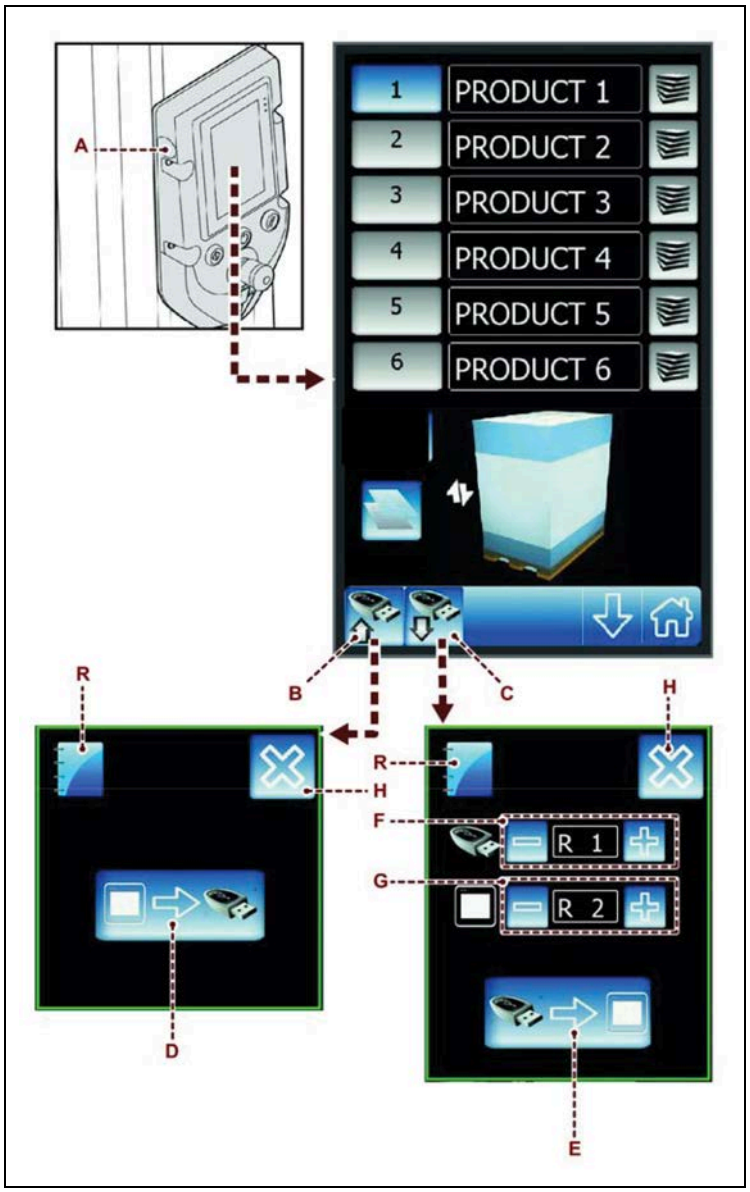


### 6.6.3. "DATA TRANSFER" PAGE

To transfer or update the parameters of a certain "work recipe", it is necessary to:

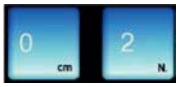
- Insert the portable mass storage in the USB port (**A**).
  In the bar of the "RECIPES" page, the buttons (**B**) and (**C**) will appear.
- By pressing the key (**B**) it is possible to enable the page "DOWNLOAD RECIPES".
  By pressing the central key (**D**), all the "Work recipes" displayed are copied in the mass storage, inserted in the USB port (**A**).
- Pressing the key (**C**), the page "UPLOAD RECIPES" is enabled.
  By pressing the central key (**E**), the starting "Recipe", selected in the mass storage, is transferred in the destination "Recipe" of the machine.

**F)** Button: press +/- to change the starting recipe.
**G)** Button: press +/- to change the destination recipe.
**E)** Button: press to confirm the operation (Enter).
**H)** Button: used to go back to the "HOME" page.
**R)** Button: used to go back to the "RECIPES" page.



## 6.7. "WRAPPING CYCLE" PAGE

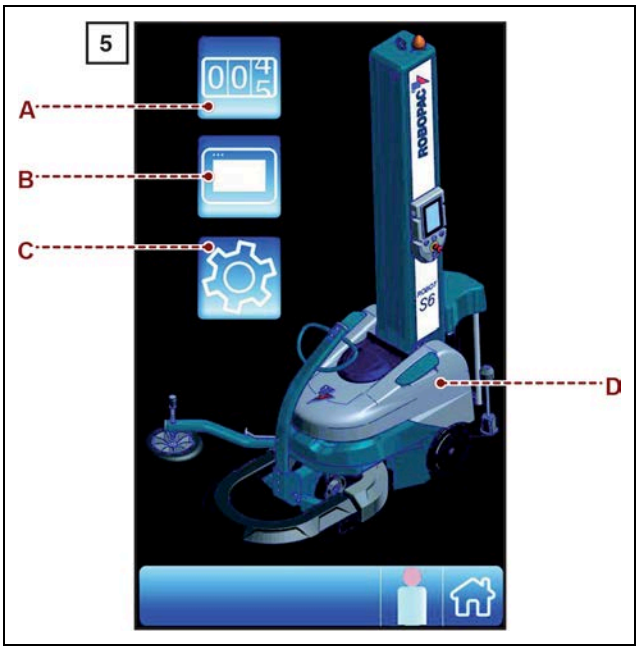
The page displays the controls to program the wrapping cycle.
At every activation, the button displays the enabled function with the reference icon.

| | |
|---|---|
|   | **A)** Area: it displays the name of the recipe being programmed. |
|  | **B)** Area: it displays the preview of the selected pallet wrapping cycle. |
|     | **C)** Button: it is used to select the type of pallet wrapping cycle.<br>At every activation, the button displays the enabled function with the reference icon.<br>– Icon (**C1**): it is used to select the "Single wrapping" cycle.<br>– Icon (**C2**): it is used to select the "Double wrapping" cycle.<br>– Icon (**C3**): it used to select the "Double wrapping cycle with feeder". |
|    | **D)** Button: it is used to select the stop modes (automatic or programmed) of spool carriage during upstroke.<br>At every activation, the button displays the enabled function with the reference icon.<br>– Icon (**D1**): it is used to select the automatic stop of the spool carriage (upstroke phase) depending on the height of the pallet being wrapped.<br>– Icon (**D2**): it is used to select the programmed stop of the spool carriage (upstroke phase) depending on the height of the pallet. |
|   | **E)** Button: it is used to program the delay time of the stopping point of the spool carriage during upstroke (automatic or programmed stopping). |
|  | **F)** Button: it is used to enable and disable the programming of the distance from the ground (offset) at the beginning of wrapping.<br>– Blue background: Function enabled.<br>– Grey background: Function disabled. |
|   | **G)** Button: it is used to program the distance from the ground (offset) for wrapping start.<br>The button is only visible if the function was enabled through the button (**F**). |
|  | **H)** Button: it is used to enable and disable the reinforcing wrapping programming mode.<br>– Light blue background: the function is enabled.<br>– Gray background: the function is disabled. |
|   | **L)** Buttons: they are used to program the positioning value and the number of reinforcing wrappings.<br>The buttons are visible only if the function has been enabled with the button (**H**). |
|   | **M)** Button: it shows the "Wrapping with special cycles" page. |
|  | **N)** Button: used to enable/disable the cutting. |
|   | **O)** Button: used to enable and disable the programming of the cycle with creasing head.<br>– Light blue background: the function is enabled.<br>– Gray background: the function is disabled. |

## 6.8. “GENERAL PARAMETERS” PAGE

The page is used to program the machine operating parameters.

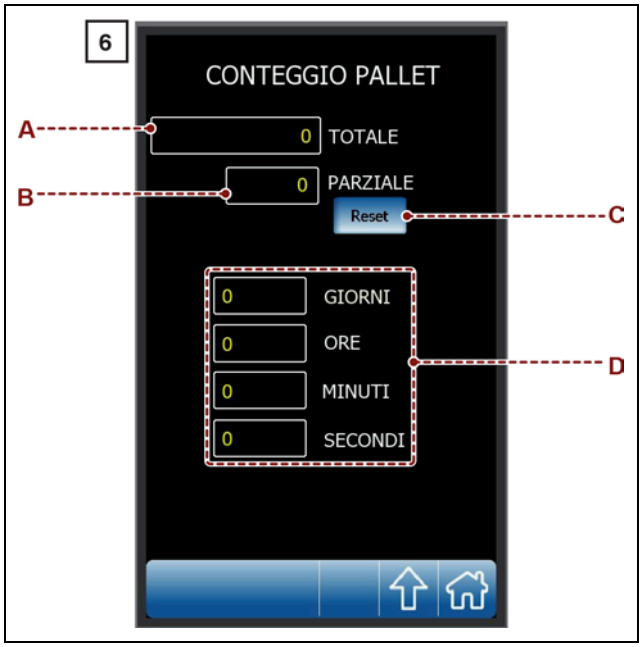
- **A)** Button: it is used to display the “production counters (pallets)” page.
- **B)** Button: it is used to display the “H.M.I. settings” page.
- **C)** Button: it is used to display the “service” page.
- **D)** Area: it displays the machine.



## 6.9. “PRODUCTION COUNTERS (PALLETS)” PAGE

The page displays the controls to check the quantity (partial and total) of the pallets made.

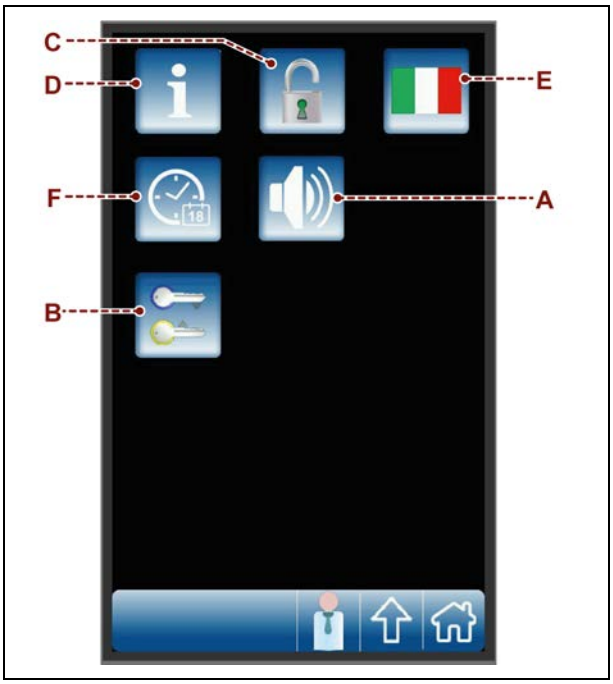
- **A)** Area: it displays the counter (total) of the wrapping cycles performed by the machine.
- **B)** Area: it displays the counter (partial) of the wrapping cycles performed by the machine.
- **C)** Button: it is used to reset counter (**B**).
  The function is active only if the system is accessed by a “machine operator” user (see the “enter password page (user login)”.
- **D)** Area: it displays the machine operating time in days, hours, minutes and seconds.



## 6.10.“HMI SETTINGS” PAGE

The page displays the controls to customise the user interface operating mode.

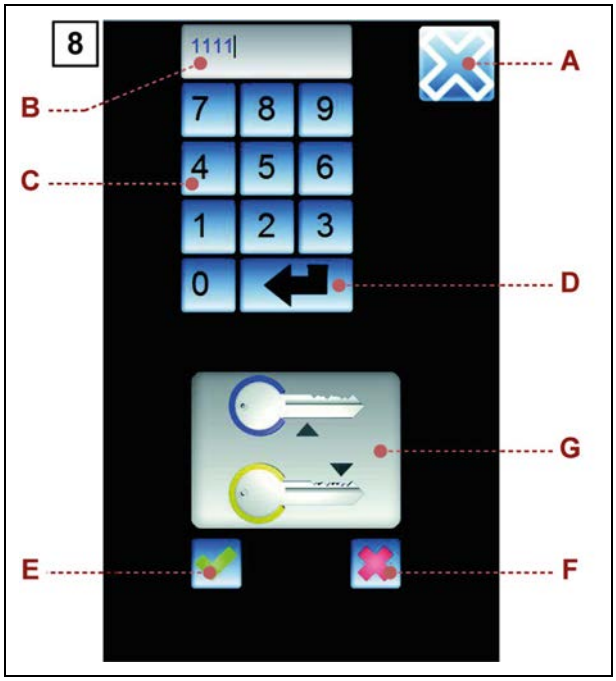
- **A)** Button: it is used to enable and disable the display acoustic signal.
- **B)** Button: it is used to display the “change password” page .
- **C)** Button: it is used to enable and disable the recipe programming mode.
  The function is active only if the system is accessed by a “machine operator” user (see the “enter password page (user login)”.
- **D)** Button: it is used to display the page with the software version.
- **E)** Button: it is used to select the language.
- **F)** Button: it is used to display the page for setting date and time.



## 6.11.“PASSWORD CHANGE” SCREEN

The page displays the controls to change the password to access protected functions.

- **A)** Button: it is used to display the upper level page .
- **B)** Area: it displays the entered characters.
- **C)** Numerical keyboard.
- **D)** Button: it is used to confirm the entered values.
  The activation of the control is signalled by the animation of icon (**G**).
- **E)** Button: it is used to save the password.
  The control is enabled only if the animation of icon (**G**) is active.
- **F)** Button: it is used to reset the entered values.
  The activation of the control disables the animation of icon (**G**).



## 6.12.“ENTER PASSWORD” SCREEN (USER LOGIN)”

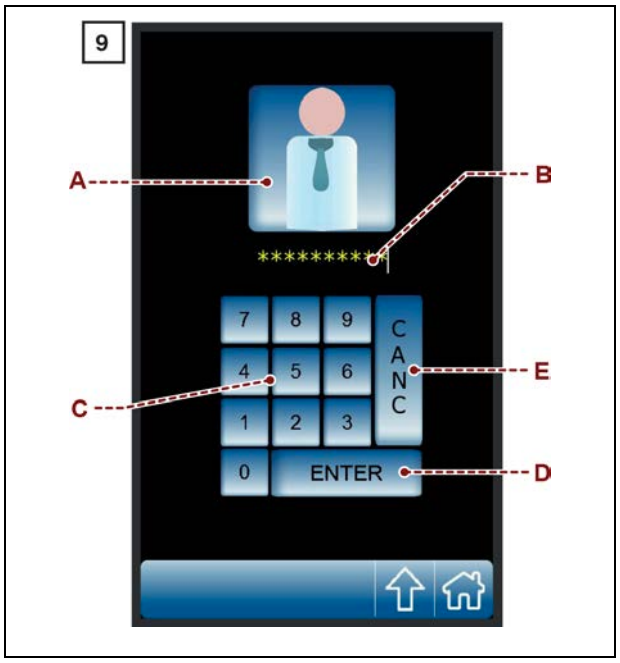
The page displays the controls to enter the password (relating to the selected user) to access the protected functions.

**A)** Button: it is used to select the type of user concerned.
At every activation, the button displays the enabled function with the reference icon.

| | |
|---|---|
|  | Icon (**A1**): it is used to select the “machine operator” user. |
|  | Icon (**A2**): it is used to select the “service support” user. |

**B)** Area: it displays the entered characters.
**C)** Numerical keyboard.
**D)** Button: it is used to confirm the entered password (login).
To prevent another type of user from accessing the protected functions, use one of the following procedure to perform the “user logout” at the end of the operations.
- Touch the icon (**A1**) located in the toolbar.
- Switch the machine off and then on again.

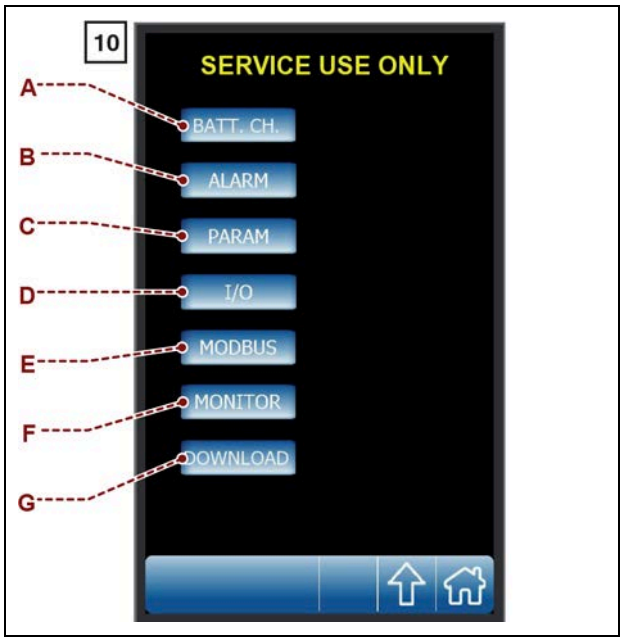
**E)** Button: it is used to delete incorrect entered values.



## 6.13."SERVICE" SCREEN

The page is reserved to the Manufacturer's Service support only, to perform diagnostics and basic programming.

- **A)** Button: it is used to display the status of the various electronic components of the electric control board.
- **B)** Button: it is used to display the **MODBUS** status.
- **C)** Button: it is used to display the load cell offset.
- **D)** Button: it is used to display the status of motors.
- **E)** Button: it is used to update the software.
- **F)** Button: it is used to display the machine set-up general parameters.
- **G)** Button: it is used to display the alarm log.



## 6.14.WRAPPING PAGE WITH "SPECIAL CYCLES"

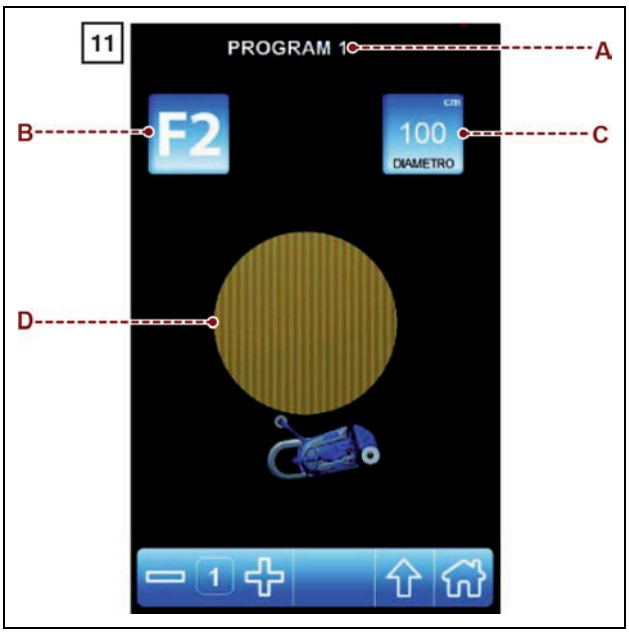
This page shows the controls that activate wrapping with "special cycles".

**A)** Area: it displays the name of the recipe being programmed.

**B)** Button: it is used to select the type of wrapping with "special cycles".
Press control several times in order to show the desired function.
- Function "**F0**": it disables the wrapping with "special cycles".
- Function "**AAA**": it enables the wrapping of large products with "special cycles".
- Function "**AAA**": it enables the wrapping of cylindrical products with "special cycles".

**C)** Button: it programmes the wrappings with "special cycles" according to the function selected by means of button (**B**).
The displayed number indicates the programmed value.
- With function "**AAA**" selected: the control is used to programme the step of the carriage movement upon each complete wrapping cycle.
- With function "**AAA**" selected: the control is used to programme the diameter of the product to be wrapped.

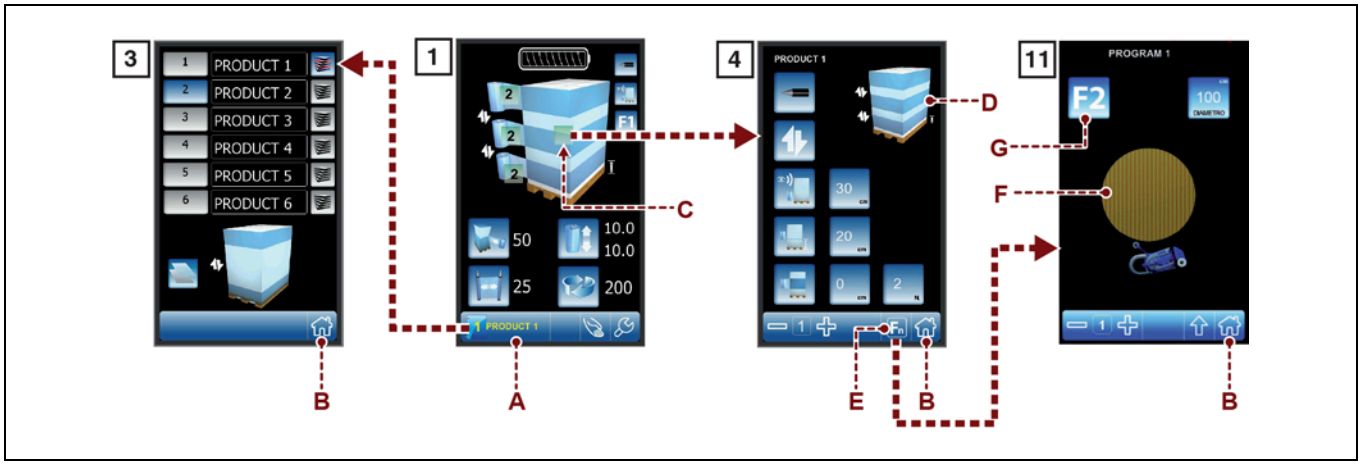
**D)** Area: it displays the preview of the selected pallet wrapping cycle.



## 6.15.NEW RECIPE PROGRAMMING

Proceed as follows.

1. Display the “home” page **1**.
2. Press the button (**A**) to display the “recipes” **3** page.
3. Select the concerned recipe.
4. Set the recipe name.
5. Press the button (**B**) to display the “home” page **1**.
6. Press the button (**C**) to display the “wrapping cycle” page **4**.
7. Set the recipe parameters.
   The area (**D**) displays the preview of the selected pallet wrapping cycle.
8. Press button (**E**) to show the wrapping page with "special cycles" 11.
9. Check the type of function shown in button (**G**) in order to programme the desired wrapping.
   - Wrapping without "special cycles".
     Press button (**G**) until function "**F0**" is shown.
   - Wrapping with "special cycles".
     Press button (**G**) until function "**F1**" (large products) or "**F2**" (cylindrical products) is shown.
     The display in area (**F**) shows the programmed wrapping preview with "special cycles".
10. Press button (**B**) to confirm the programmed recipe.
    The “home” **1** page appears on the display.



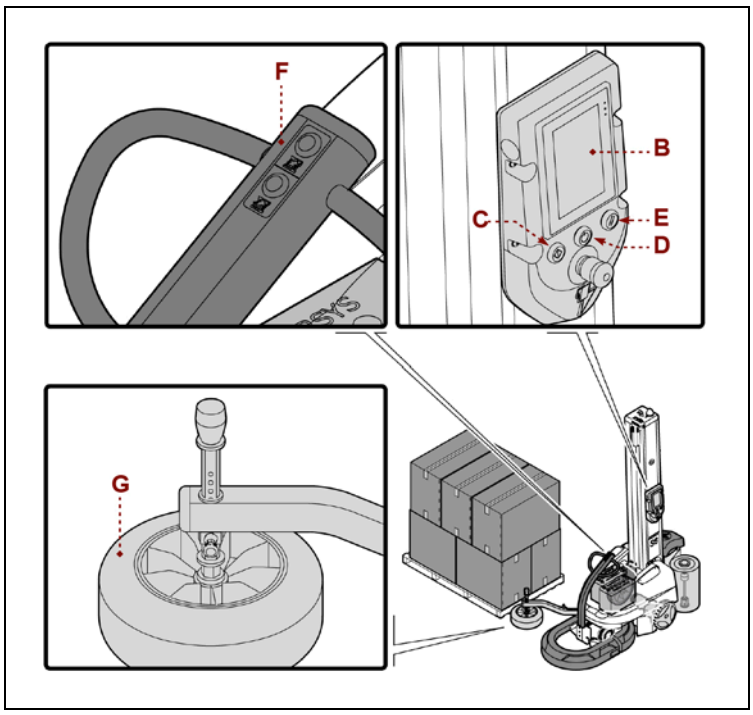
## 6.16.WRAPPING START AND STOP

Proceed as follows.

1. Press button (**D**) to activate the control power supply.
   The digital display (**B**) turns on.
2. Press the button (**E**) to reset the machine.
3. Use the buttons (**F**) to move the machine close to the pallet, until the feeler wheel (**G**) is in contact with the pallet.
4. Ensure that the feeler wheel (**G**) is resting against the pallet and not against the product.
   Adjust the height of the feeler wheel.
   (See “Adjusting the height of the feeler wheel”).
5. Let the film adhere to the pallet.
6. Set the wrapping mode.
   For further details, see paragraph "Programming a new recipe".
7. Check that the parameters on the "Home" page are correct.

**Caution - warning**
Do not stretch or pre-stretch the film excessively and do not wrap the product with too many wrappings to prevent damaging the packages and the products contained in them.

1. Press the "Cycle start" button (**C**).
   The machine performs the wrapping process and automatically stops at the end of the cycle.
2. Cut the film (in manual or automatic mode).



**Important**
If the automatic cut optional unit is provided on the machine, this operation will be performed automatically.
Information applicable only to the "feeder cycle" wrapping mode.

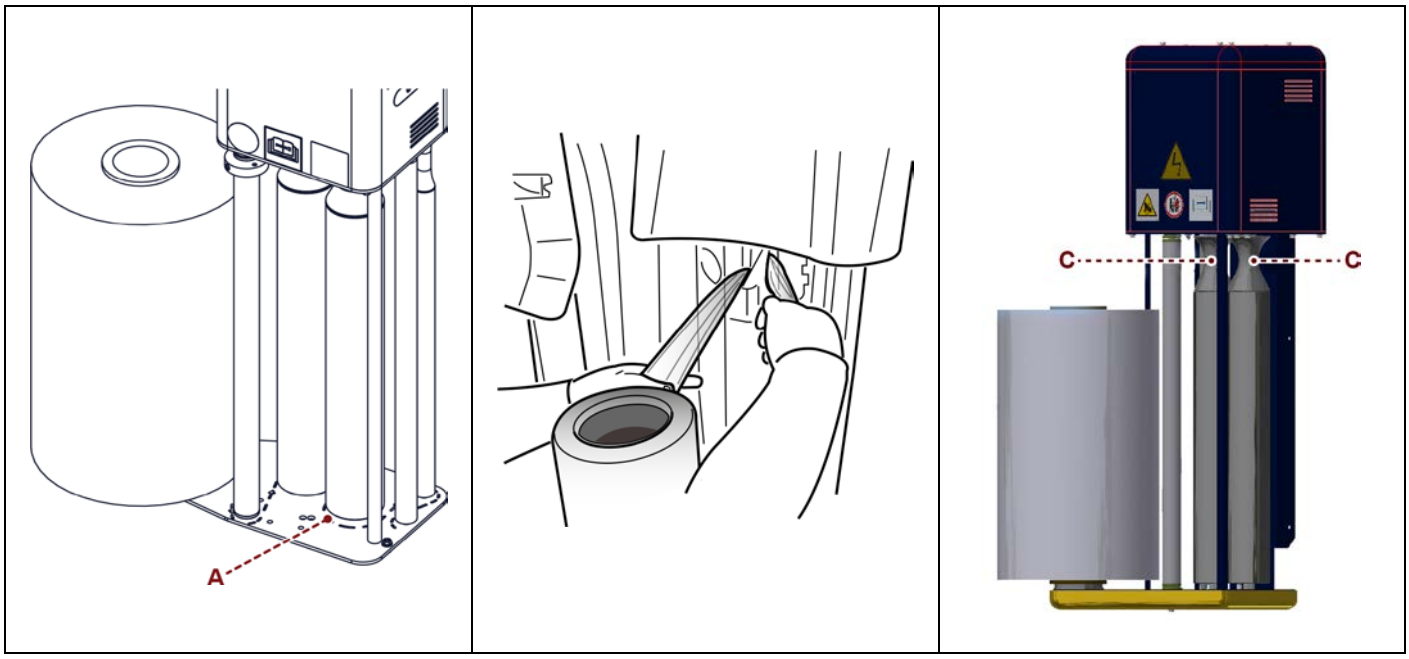
- When the machine stops in the pallet upper section, position the TOP sheet (do not cut the film).
- Press the "Cycle start" button (**C**).
  The machine performs the wrapping and, at the end of the set cycle, it stops at the pallet base.
  At the end of the wrapping phase, the machine may be stopped in "stand-by" mode or turned off.
- When the machine is in "stand-by" mode and is not used for over 15 minutes, it automatically switches to "energy saving" mode.
  To resume operation, touch the machine display.
  If the “Energy saving” function stays on for more than 60 minutes, the machine automatically turns off.
- Press the button (**D**) to turn off the machine.

## 6.17.FILM SPOOL FEEDING

**Danger - warning**
The operation should be carried out by one operator only.

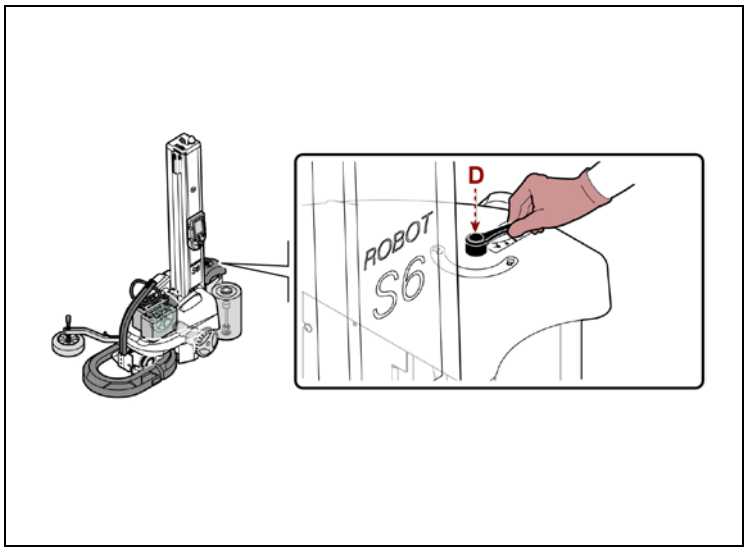
This operation must not be carried out by more than one operator.
Operating modes other than the ones described

1. Stop the machine (see paragraph “Machine safe stop”).
2. The operator must manually insert the film inside the rollers routing it in the roller conical area (**C**), following the path indicated on the carriage (**A**).



**Important**
Unwind the film following the path engraved on the spool carriage plate.
Spool carriage "**FRD** for mesh".
Unwind the film as shown on the relevant plate.

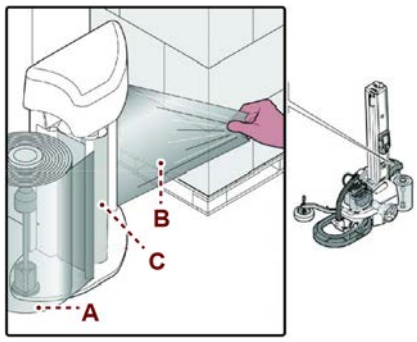
3. Pull the cord outwards.
   - The film automatically moves down to the roller and covers it over its entire length.
     To allow film or mesh routing between rollers and unwinding on “**FRD**” type carriages, it is necessary to unlock the brake by turning the handwheel (**D**) to pos. "**0**".



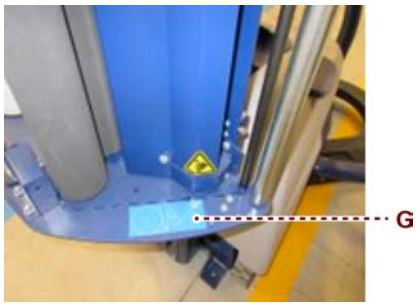
## 6.18.FILM SPOOL FEEDING (APPLICABLE TO “PVS” CARRIAGES ONLY)

1. In “MANUAL HANDLING” mode bring the carriage all down.
2. Extract the terminated film spool, insert the new film spool (**A**) in the relevant seat on the spool carriage.
3. In “MANUAL HANDLING” mode bring the carriage to a suitable height to insert the film. The base of the carriage should approximately be at a height between 850 and 1100 mm from the ground, according to the operator’s height.
4. Collect the film (**B**) until a thin cord is obtained and route it in the conical area (**F**) of the rollers (**C**).

**Important**
Unwind the film following the path engraved on the spool carriage plate.
Unwind the film as described on the relevant plate (**G**).








5. Pull the film outwards and press button (**E**) at the same time.
   If only button (**E**) is pressed or if only the film is pulled the motorised roller will not rotate.


**Danger - warning**
The operation should be carried out by one operator only.

This operation must not be carried out by more than one operator.
Operating modes other than the ones described can be harmful to the operator, and film insertion may prove more difficult.

## 6.19.CUT ADJUSTMENT

The table shows the values of the parameters **P9** and **P10** to be set for the automatic cutting of the film.
In order to change these parameters, you need to access as the person in charge of the machine.
(See page “password entry (user login)”).

| *Film thickness* | *Parameters* | |
|---|---|---|
| | **P9** | **P10** |
| 17µm | 80 | 75 |
| 23µm | 70 | 80 |
| 35µm | 65 | 80 |

## 6.20.BATTERY CHARGER MODE

When the battery level reaches the lower threshold, the machine stops automatically to protect the battery life.
The lower battery threshold is signalled on the battery display by a red bar blinking in the battery icon.
The current wrapping cycle is completed and then the display shows the alarm E90-battery low (flat battery).
When the alarm is displayed, the machine can only be moved to the recharging area.

**Important**
The battery is to be recharged in a place protected from weather conditions, well-ventilated and outside the working environment.

Follow the instructions carefully.

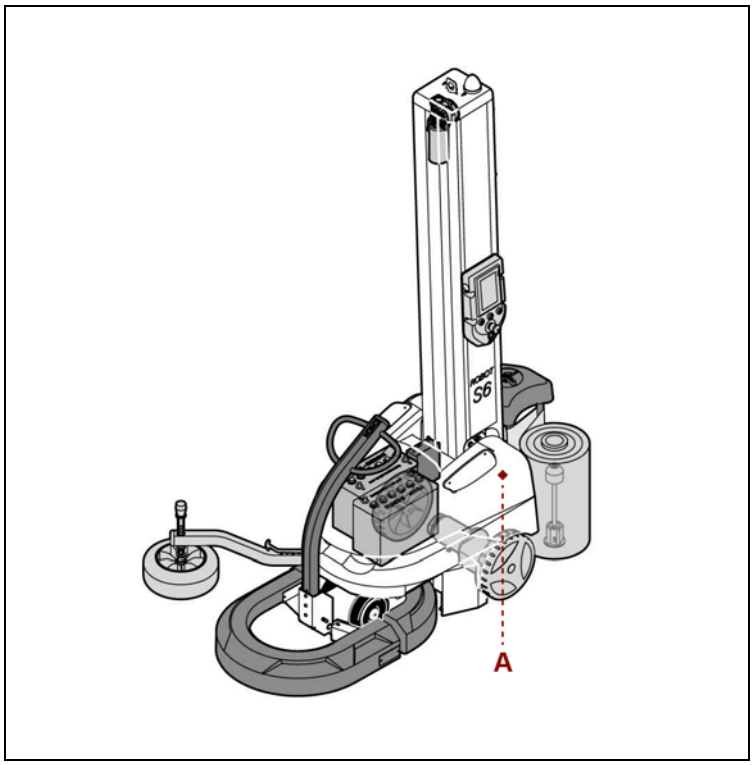
Use protective goggles

No smoking

Electrolyte is highly corrosive.
In case of contact with the electrolyte thoroughly wash yourself with running water and call the hospital or seek medical advice - Refer to the battery specific instructions.

Proceed as follows.

1. Switch the machine off.
2. Lift the battery cover (**A**).
   With the additional battery kit, simply replace the basket with empty batteries (see “Battery replacement”) with the basket containing the charged batteries.
3. Insert the plug into a socket.




**Important**
If the operation is performed when the machine is on, it will automatically turn off during the final charging stage.

It is advisable to carry out the operations with machine off (central button warning light off).

4. Perform the operation and check the charging cycle according to the instructions in the operation manual of the electronic battery charger.
   For further details, refer to the relevant manual.
   Upon completion of the recharge, disconnect the plug and close the battery cover.
5. Restart the machine only after checking that battery is completely charged (the green LED of battery charger is steady on).

**Caution - warning**
The battery is subject to a self-discharge process that may compromise its good operation in the long run.

Completely recharge the battery every two months in the event of periods of prolonged disuse.

**Important**
Wait for the end of the search before disconnecting the battery.

The interruption of the recharging cycle compromises the life of the batteries.
The complete charging time with standard battery charger **S.P.E.** is approximately **13** hours.
The complete charging time with boost battery charger **S.P.E.** is approximately **10** hours.
The complete charging time with battery charger **NORDELETTRONICA** is approximately **10** hours.

# 7. MAINTENANCE INFORMATION

## 7.1. RECOMMENDATIONS FOR MAINTENANCE

- Stop the machine (as indicated in paragraph “machine safe stop”).
- Proper maintenance will allow a longer life span and constant compliance with safety requirements.
- Before performing any operation, the authorised operator must make sure to have understood the “Instructions for use”.
- Pay attention to the safety warnings, do not misuse the machine and assess the possible residual risks.
- Carry out the interventions with all the safety devices enabled and wear the required PPE.
- Indicate the intervention areas and prevent access to the devices that, if activated, could cause unexpected hazards and compromise safety.
- Do not carry out interventions that are not described in the manual but contact an service centre authorised by the Manufacturer.
- Do not dispose of materials, polluting liquids and the waste generated during the interventions into the environment but dispose of them according to the standards in force.

## 7.2. PERIODICAL MAINTENANCE INTERVALS

The table below specifies the routine maintenance intervals to be followed to ensure top performances, a longer working life and constant compliance with the safety requirements.

### Maintenance interval table

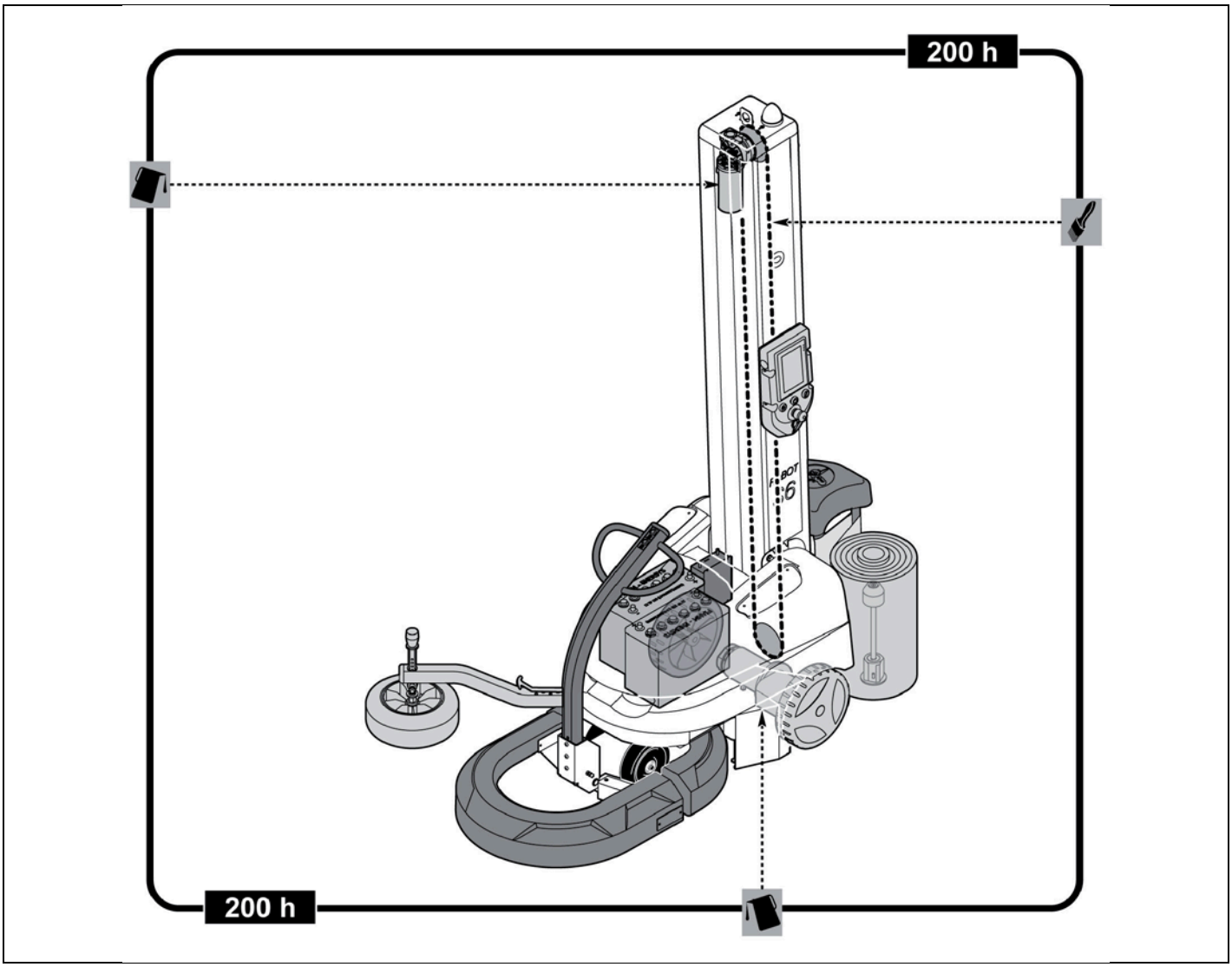
| Frequency | Component | Type of intervention | Intervention mode | Reference |
|---|---|---|---|---|
| Every 40 hours or 1000 cycles (*) | Machine operating areas | Clean | Use a cloth or compressed air | - |
| Every 200 hours or 5000 cycles (*) | Rubber rollers | Clean | Use a cloth dampened with alcohol | - |
| Every 200 hours or 5000 cycles (*) | Spool carriage | Lubricate | - | See “Lubrication point diagram” |
| | | Check chain tension | - | See “Spool carriage lifting chain adjustment” |
| Every 5000 hours or 50000 cycles (*) | Reduction units and gearmotors | Change lubricant[1] | - | See “Lubrication point diagram” |

[1] Do not top up and/or change in life-lubed reduction units and gearmotors.

* The frequency in cycles has been defined according to the standard cycle.
The cycle considered standard is the following: top film spool **500 mm**, top pallet **1500 mm**, pallet weight equal to **1500 kg**, total wrapping cycle two revolutions at the base, two revolutions at the top, rotation speed **12 rpm** or **80 m/min**, carriage upstroke and downstroke speed equal to **4 m/min**.

## 7.3. LUBRICATION POINT DIAGRAM

The diagram shows the main parts concerned by the lubrication interventions and their intervals.




| | |
|---|---|
|  | Spread grease over it. |
|  | Check the lubricant level.<br>Do not top up and/or change in life-lubed reduction units and gearmotors. |

**Follow the lubrication frequency to obtain top machine performance and a longer operating life.**
**Use lubricants (oils and greases) recommended by the Manufacturer or with similar chemical-physical features.**

## 7.4. LUBRICANT TABLE

The table below lists the specifications of the lubricants recommended by the Manufacturer for each component and/or areas of
reference.
**Use lubricants (oils and greases) recommended by the Manufacturer or with similar chemical-physical features.**

**Lubricant characteristics**

| Lubricant type | Code | Parts to be lubricated |
|---|---|---|
| Mineral oil | 23°C / 50°C - 320 CST 40°C<br>MELLANA OIL 320 IP<br>SPARTAN EP 320 ESSO<br>BLASIA 320 AGIP<br>MOBILGEAR 632 MOBIL<br>OMALA EP 320 SHELL<br>ENERGOL GR-XP 320 BP | Gear reduction unit |
| Mineral oil | 32°C / 50°C - 460 CST 40°C<br>MELLANA OIL 460 IP<br>SPARTAN EP 460 ESSO<br>BLASIA 460 AGIP<br>MOBILGEAR 634 MOBIL<br>OMALA EP 460 SHELL<br>ENERGOL GR-XP 460 BP | Worm screw reduction unit |
| Grease | TELESIA COMPOUND B IP<br>STRUCTOVIS P LIQUID KLUBER<br>TOTALCARTER SYOO TOTAL | Gear reduction unit and worm screw reduction unit |
| Synthetic oil | TELESIA OIL IP<br>SYNTHESO D 220 EP KLUBER<br>BLASIA S 220 AGIP | Gear reduction unit and worm screw reduction unit |
| Lithium grease | ALVANIA R2 SHELL<br>HL 2 ARAL<br>ENERGREASE LS2 BP<br>BEACON 2 ESSO<br>MOBILIX MOBIL | Bearings with support |
| Synthetic oil | +5°C / +5°C VG 68 (SAE 20)<br>+5°C / +25°C VG 100 (SAE 30) | Spool carriage chain |

**Important**
Do not mix together oils of different brands or having different characteristics.

# 8. FAULT INFORMATION

## 8.1. ALARM MESSAGES

In the event of a breakdown during operation the machine stops automatically and alarm messages appear on the display.
The table lists the displayed messages, the type of problem, the causes and possible solutions.

**Important**
For these operations a precise technical expertise or ability is required; therefore, these operations must be exclusively performed by qualified personnel with certified experience acquired in the specific field of intervention.

**List of alarms**

| Code | Alarm | Problem | Cause | Solution |
|---|---|---|---|---|
| E01 | – EMERGENCY STOP | Emergency stop alarm. | The emergency button is in locked position. | Reset the button and press the “Reset” button. |
| E02 | – BUMPER | Emergency bumper alarm. | The bumper hit an obstacle in the working area. | Remove the obstacle and press the “Reset” button. |
| E12 | – RUDDER DOWN | Only manual operations are possible. | Rudder in low position. | Raise the rudder. Check the sensor operation and consult the wiring diagram. |
| E30 | – TRACTION DRIVER OVERTEMP<br>– TRACTION DRIVER SHORT CIRCUIT<br>– TRACTION DRIVER UNDERVOLT<br>– TRACTION HEAT SINK OVERTEMP<br>– TRACT. CURRENT LIMIT | Drive motor alarm. | Drive motor failure. | Check the motor and refer to the wiring diagram. |
| E35 | – TRACTION OVERCURRENT. | Overcurrent alarm at the drive motor. | The motor has been working heavily for an exceedingly long period. | Check the motor operation, ensure the machine is free to move and refer to the relevant wiring diagram. |
| E36 | – CARR. OVERCURRENT. | Overcurrent alarm at the carriage motor. | The motor has been working heavily for an exceedingly long period. | Check the motor operation, ensure the carriage is free to move and refer to the relevant wiring diagram. |
| E60 | – AL. BROKEN FILM. | Film end/breakage alarm. | The film has broken or spool is finished | Insert the film or replace spool. |
| E61 | – AL. COUNTER CORNER. | Corner counter malfunction alarm. | Corner counter sensor malfunction. | Check the conditions of the corner counter sensor. |
| E62 | – AL. ENCODER CARR. | Carriage lifting encoder alarm. | Carriage lifting encoder malfunction. | Check the operation of the motor and/or sensor and refer to the relevant wiring diagram. |

| Code | Alarm | Problem | Cause | Solution |
|---|---|---|---|---|
| E65 | – AL. CREASING BLOCKED | Blocked creasing head alarm. | The motor has been working heavily for an exceedingly long period. | Check the operation of the motor, make sure that the creasing head is free to move and consult the wiring diagram. |
| E80 | – AL. BATTERY CHARGER. | Battery charger alarm. | Battery charger malfunction. | Check the battery charger and refer to the wiring diagram. |
| E81 | – H.M.I. COMMUNIC. FAULT. | Communication alarm at the touch-screen panel. | The cable is unplugged or the touch screen panel is faulty. | Check the panel operation and refer to the wiring diagram. |
| E82 | – PRE-STRETCH COMMUNIC. FAULT. | Faulty serial communication with pre-stretch board alarm. | The cable is unplugged or the board is faulty. | Check the operation of the board and refer to the relevant wiring diagram. |
| E84 | – WRONG SETUP PARAMETERS CHECKSUM | Wrong setup parameters alarm. | Machine setup parameter list is corrupted. | To bring the setup parameters to the factory ones insert the pendrive supplied with the machine in the USB socket behind the HMI and press button (**A**)*.<br>You can also set the parameters manually by pressing the button (**B**)**. |
| E85 | – CREASING COMMUNIC. FAULT. | Creasing head communication alarm. | The cable is unplugged or the board is faulty. | Check the operation of the board and refer to the relevant wiring diagram. |
| E90 | – BATTERY LOW. | Battery low alarm. | The battery is flat and has reached the safety threshold; the machine will stop. | Move the machine to the closest recharge point using the manual Forward/Backward buttons placed on the rudder.<br>See “Control description”. |

*(**A**)

**(**B**)

# 9. REPLACEMENT INFORMATION

## 9.1. RECOMMENDATIONS FOR REPLACING MACHINE PARTS

- **Before performing any operation, the authorised operator must make sure to have understood the "Instructions for use".**
- **Carry out the interventions with all the safety devices enabled and wear the required PPE.**
- **Demarcate the surrounding areas and put in place adequate safety measures, as provided for by the standards on workplace safety, in order to prevent and minimise the risks.**
- **Do not carry out interventions that are not described in the manual but contact an service centre authorised by the Manufacturer.**
- **Do not dispose of materials, polluting liquids and the waste generated during the interventions into the environment but dispose of them according to the standards in force.**
- **Replace the components only with original spare parts or parts with similar design and construction features. The use of similar but non-original spare parts may result in improper repairs, altered performance and economic damage.**
- **Safety components and/or devices must be replaced only with original spare parts to preserve the safety level required.**

**Important**

Before performing any maintenance operation, activate all safety devices provided and evaluate whether it is necessary to inform the personnel operating on the machine and the personnel nearby.
In particular, demarcate the neighbouring areas to prevent access to the devices that could, if activated, cause unexpected hazardous conditions posing a risk for people's safety and health.
When replacing worn parts, use only original spare parts.
The Manufacturer is not responsible for any damage to property or injuries to people caused by the use of non-genuine spare parts or which may result from repairs not authorised by the Manufacturer.
When ordering new spare parts, follow the instructions given in the spare parts catalogue.

## 9.2. BATTERY REPLACEMENT

1. Lift the battery cover (**A**).
2. Remove the connector (**B**) from the socket.
3. Disconnect the terminals (**C-D-E-F**).

**Caution - warning**
First disconnect the negative terminal (**-**).

4. Remove and replace the batteries (**G**).
5. Connect again the terminals (**C-D-E-F**).

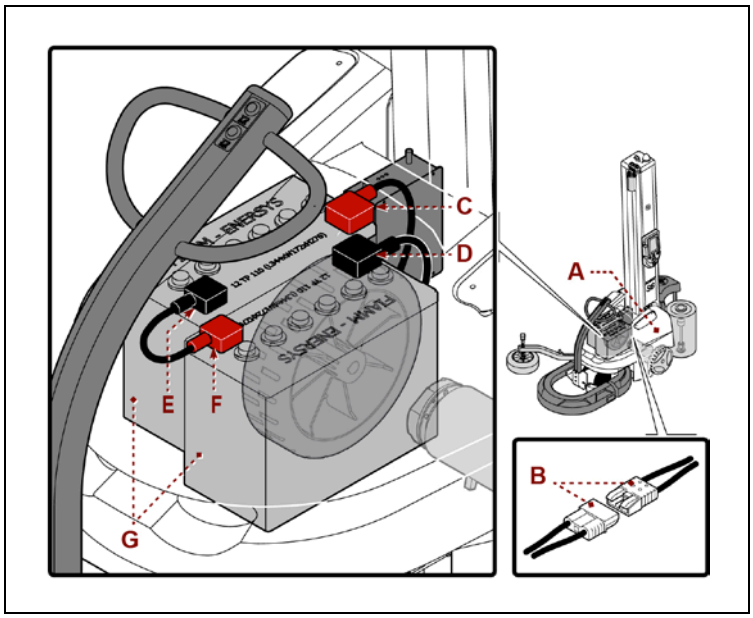
**Caution - warning**
When connecting the terminals, ensure the polarity is respected.
Cover with grease the positive terminal (**+**) and connect it first.

6. Plug the connector (**B**) to the socket.
7. Close the battery cover (**A**).

**Important**
Do not dispose of used batteries in the environment.
Dispose of the same in compliance with the applicable current regulations (See documentation enclosed).

**Danger - warning**
Caution: heavy batteries.
The removal operation should be carried out by two people or by using suitable lifting means.

**Danger - warning**
Caution: risk of hand crushing during the removal and feet crushing in case of falling to the ground.
Wear suitable PPE (gloves and protective shoes).



## 9.3. RECOMMENDED SPARE PARTS LIST

List of the spare parts that wear easily and that should be always available to avoid long machine downtimes:

- Braked roller pad (Only for spool carriages of "**FRD**" type).
- Carriage clutch (Only for spool carriages of "**PDS**" type)
- Drive belt (Only for spool carriages of "**PDS** "- and "**PVS**" type).
- Batteries.
- Front wheels.
- Rear wheels

To order them, contact your local dealer and refer to the spare parts catalogue.

## 9.4. MACHINE DECOMMISSIONING AND SCRAPPING

### 9.4.1. MACHINE DECOMMISSIONING

- Cut off any supply to the machine (power, pneumatic, etc.) so that it cannot be restarted and position it in a place that cannot be easily accessed.
- Empty the systems, which contain hazardous substances, in a proper manner and in compliance with the laws in force at workplaces and with those on environmental protection.

### 9.4.2. MACHINE SCRAPPING

- Scrapping must be performed by authorised centres with experienced personnel and by using the appropriate equipment for safe operating conditions.
- The person who performs the scrapping must identify any possible residual energies and implement a “safety plan” to eliminate unexpected risks.
- The components must be selected according to the chemical and physical features of the material and disposed of separately, in accordance with the applicable laws.
- Empty the systems, which contain hazardous substances, in a proper manner and in compliance with the laws in force at workplaces and with those on environmental protection.

# 10. ANNEXES

## 10.1.WARRANTY CONDITIONS

**Robopac S.p.A.** commits, within the limits described herein, to replace or repair, free of charge, the parts that are defective during the 12 (twelve) months following the date indicated on the company's shipping documents.
To utilise the warranty, the user must immediately notify the company of the detected fault, always referring to the machine serial number.
**Robopac S.p.A.**, in its final judgement, will decide whether to replace the defective part or request it to be shipped for tests and/or repair.
By replacing or repairing the defective part, **Robopac S.p.A.** fully complies with its warranty obligations and will be released from all liabilities and obligations relative to transport, travel and lodge expenses for technicians and installers.
**Robopac S.p.A.** will in no case be held responsible for any losses due to lack of production or injuries to persons or damage to things caused by malfunctions or forced downtime of the machine covered by the warranty.

THE WARRANTY DOES NOT COVER:

- Transport failures.
- Damage due to incorrect installation.
- Improper use of the machine or negligence.
- Tampering with or repairs by unauthorised personnel.
- Lack of maintenance.
- Parts subject to normal wear and tear.

For purchased components and parts, **Robopac S.p.A.** offers the user the same warranty conditions that the company obtains from the suppliers of the aforementioned components and/or parts.
**Robopac S.p.A.** does not guarantee the conformity of machines to current standards in countries that are not part of the European Union.
Any adjustment to the regulations in force in the Country in which the machine is installed, will fall under the full responsibility of the user, who will be responsible also for the changes made, releasing **Robopac S.p.A.** from any obligation and/or liability relative to any claim that may be submitted by third parties due to non-compliance with the referenced standards.

## 10.2.S.P.E. BATTERY CHARGER OPERATION MANUAL

Shown below are the directions for use provided directly by the manufacturer of the commercial device, standard or optional, installed on the machine.
The language of such documentation may not correspond to that in which the machine's directions for use are written.

# CBHD1● CBHD2 ● HF1-IP ● HF2-IP

## ELECTRONIC BATTERY CHARGER

OPERATING MANUAL

**Attention: read carefully the operating manual before using the battery charger**

S.P.E. ELETTRONICA INDUSTRIALE

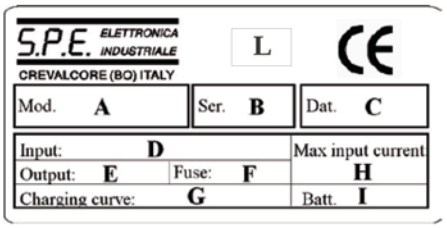
| | Model | Voltage | Current | Charging Curve | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | IUIa ACD | IUIa GEL | IUIa AGM | IUUo GEL | OTHER |
| | CBHD1 | 12V | 2A | | | | | |
| | CBHD1 | 12V | 4A | | | | | |
| | CBHD1 | 12V | 5A | | | | | |
| | CBHD1 | 12V | 6A | | | | | |
| | CBHD1 | 12V | 8A | | | | | |
| | CBHD1 | 12V | 9A | | | | | |
| | CBHD1 | 12V | 10A | | | | | |
| | CBHD1 | 12V | 11A | | | | | |
| | | | | | | | | |
| | CBHD1 | 24V | 2A | | | | | |
| | CBHD1 | 24V | 4A | | | | | |
| | CBHD1 | 24V | 5A | | | | | |
| | CBHD1 | 24V | 6A | | | | | |
| | CBHD1 | 24V | 8A | | | | | |
| | CBHD1 | 24V | 9A | | | | | |
| | CBHD1 | 24V | 10A | | | | | |
| | CBHD1 | 24V | 11A | | | | | |
| | | | | | | | | |
| | CBHD1 | 36V | 2A | | | | | |
| | CBHD1 | 36V | 6A | | | | | |
| | | | | | | | | |
| | CBHD2 | 12V | 13A | | | | | |
| | CBHD2 | 12V | 15A | | | | | |
| | CBHD2 | 12V | 18A | | | | | |
| | CBHD2 | 12V | 20A | | | | | |
| | | | | | | | | |
| | CBHD2 | 24V | 13A | | | | | |
| | CBHD2 | 24V | 15A | | | | | |
| | CBHD2 | 24V | 18A | | | | | |
| | CBHD2 | 24V | 20A | | | | | |
| | | | | | | | | |
| | CBHD3 | 12V | 15A | | | | | |
| | CBHD3 | 12V | 20A | | | | | |
| | CBHD3 | 12V | 25A | | | | | |
| | | | | | | | | |
| | CBHD3 | 24V | 15A | | | | | |
| | CBHD3 | 24V | 20A | | | | | |
| | CBHD3 | 24V | 25A | | | | | |
| | | | | | | | | |
| | HF1-IP | 12V | 10A | | | | | |
| | HF1-IP | 12V | 11A | | | | | |
| | HF1-IP | 12V | 13A | | | | | |
| | | | | | | | | |
| | HF1-IP | 24V | 10A | | | | | |
| | HF1-IP | 24V | 11A | | | | | |
| | HF1-IP | 24V | 13A | | | | | |

**Other**

| | Model | Voltage | Current | Charging Curve | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | IUIa ACD | IUIa GEL | IUIa AGM | IUUo GEL | OTHER |
| | | | | | | | | |

– Storage temperature: from -20°C to +50°C
– Relative humidity: 0 - 80% up to 50°C
– Operating temperature : from 0°C to 40°C

## BATTERY CHARGER IDENTIFICATION LABEL




| | |
|---|---|
| A | Model |
| B | Battery charger serial number |
| C | Battery charger manufacture date |
| D | Input voltage |
| E | Output voltage and current |
| F | Mains fuse value |
| G | Charging curve |
| H | Mains absorption |
| I | Battery capacity range |
| L | Product certification stamps |

Important safety instruction. Keep these instructions. This manual contains important instructions for the safety of the user and operation of the device.

GENERAL WARNINGS

1) Before each use of the battery charger the instructions set out below must be carefully read and abided by.
2) The failure to follow these instructions and /or errors in installing or using the battery charger, could lead to endangering the operator and /or damaging the device, voiding the manufacturer's guarantee.
3) The battery charger cannot be used as a component in systems which provide life support and/or medical devices, without explicit written authorisation from S.P.E. ELETTRONICA INDUSTRIALE.
4) The battery charger must not be used by persons with reduced physical, sensory and mental capabilities or with lack of experience and/or knowledge, unless they are properly supervised and instructed by a person responsible for their safety.

CHILDREN

5) The battery charger must not be used by children. The battery charger is not a toy and must not be treated as such.

WHERE TO INSTALL

6) Never place the battery charger in the immediate vicinity of the battery in order to prevent gases produced and/or emitted by the actual battery during charging corroding and/or damaging the battery charger. Place the battery charger as far away from the battery as the length of cables permits.
7) Do not install the battery charger in a closed space or in such a way as to somehow prevent ventilation. For units equipped with fans, at least 30 mm clearance must be left around the vents. In order to facilitate the heat exchange of the battery charger it must be positioned vertically, exploiting the fixture holes (where provided).
8) Do not use the battery charger outdoors.
9) Do not expose the battery charger to rain, water splashes or steam.
10) Do not install the battery charger in caravans and / or similar vehicles.
11) Do not install the battery charger near any heat sources or in areas with high concentrations of dust.
12) Do not install the battery charger near any potential sources of flammable material, for example methane gas pipes or fuel depots (petrol, kerosene, ...).
13) Do not place and/or fit the battery charger onto surfaces manufactured out of combustible materials, like wooden shelves or walls.

BATTERIES

14) Follow the specific safety instructions provided by the battery manufacturer carefully, for example, whether or not to remove cell caps during charging and the recommended charge rates.
15) Working in the vicinity of a lead-acid battery is dangerous, as batteries generate explosives gases during charging. Therefore smoking and/or generating open flames and/or sparks must be avoided.
16) Never charge a frozen battery.
17) Batteries must be charged in specific, well-ventilated areas.
18) In order to reduce risk of injury only charge Lead–Acid, GEL or AGM type, Lithium Polymer or Lithium Ion batteries. Do not charge other types of rechargeable or non-rechargeable batteries as they could explode causing damage and/or injury.

FURTHER SPECIFICATIONS FOR LITHIUM BATTERIES

19) In order to charge Lithium Polymer and Lithium Ion batteries, a BMS (Battery Management System) must always be used, comprising an active and passive safety system, in compliance with safety regulations in force.
20) The possibility of the BMS acting directly on the battery charger operation during cell balancing phases rules out, for any reason whatsoever, that the battery charger is held directly responsible should damage caused to the battery, or even a fire or an explosion, be due to an error in the BMS software.
21) The faculty offered by the materials produced by S.P.E. ELETTRONICA INDUSTRIALE to select different levels of voltage for charging, is entrusted to the control and supervision of the end user and S.P.E. ELETTRONICA INDUSTRIALE is not liable for any consequences resulting from the selection of the incorrect level of voltage. If in doubt, the user should ask a qualified professional for clarification.

22) The battery charger tolerance thresholds, as far as levels of over-voltage and overcharging are concerned, are used only for the safeguarding of the systems of the same and have no safety functions for the battery itself, the safety of which depends solely on the BMS, even when the battery charger is connected to the battery, whether the latter is being charged or not.
23) Should the client want to use the battery charger on a specific on-board system and in general in any cases of special usage, it is the client's responsibility to inform S.P.E. ELETTRONICA INDUSTRIALE, so that the latter can draw up any necessary recommendations. In this case, the client must provide S.P.E. ELETTRONICA INDUSTRIALE with all designs, diagrams and descriptive material necessary. S.P.E. ELETTRONICA INDUSTRIALE cannot be held responsible for any damage resulting from the use of the battery charger after opening it and/or modifying it and/or inserting it into other systems.
24) Under no circumstances can S.P.E. ELETTRONICA INDUSTRIALE be held responsible for the malfunctioning of the batteries or the incineration/explosion of these, in so much as the safety of the battery is the task of the BMS and not of the battery charger.

CHECKING CABLES, GRID, EARTHING
25) Do not transport the battery charger by pulling on the cables as they could be damaged.
Use the handles, if provided.
26) Before using the battery charger, check that the sleeving on the mains cable and battery cables is in good condition. Should one of the cables be damaged, have it replaced by a S.P.E. ELETTRONICA INDUSTRIALE qualified technician.
27) Check that the input voltage of the battery charger given on the data plate is in line with the voltage available.
28) Check the compatibility of the mains plug supplied with the battery charger: the use of adaptors is not recommended (in Canada it is against the law).
29) The battery charger must be plugged into a socket fitted with an earth wire. Should the socket not be equipped with an earth connection, do not use the device before having a suitable socket installed by a qualified technician.
30) The power socket to which the battery charger is to be connected must be protected by an electrical device by law (fuse and/or automatic cut-out), capable of absorbing an electrical current equalling the absorption of current stated on the matriculation number of the battery charger, increased by 10%.
31) Do not open the battery charger as there are no parts which can be serviced and/or replaced by the user. Only specialised personnel, authorised by S.P.E. ELETTRONICA INDUSTRIALE may carry out servicing which involves opening the actual device. Electrical/electronic components inside may cause electric shocks even if the device is not plugged in.

CHECKING BATTERY CHARGER OPERATION and CURVE
32) Before charging, make sure that the battery charger is in line with the voltage of the battery, that the charging current suits the capacity of the battery and that the selected charging curve (for lead-acid batteries, or for airtight GEL or AGM type batteries, Lithium Polymer or Lithium Ion batteries) is correct for the type of battery to be charged.
33) We recommend fitting a fuse between battery charger and battery. The fuse must be installed along the connection to the positive terminal of the battery. The rating of the fuse must be proportionate to the nominal output current of the battery charger, the diameter of cable used and the environment in which it is to be installed.
34) We recommend unplugging it from the mains supply before connecting and disconnecting batteries.
35) During normal operation of the battery charger, the external surface may become hot and may remain so for a certain period of time after it has been switched off.
36) The battery charger needs no special maintenance, only regular cleaning procedures, to be carried out according to the type of working environment. Cleaning procedures should only be carried out on the external surface of the battery charger. Before starting any cleaning procedures, the mains supply cable and battery cables must be unplugged. Do NOT use water and/or detergents in general and/or pressure washers of any kind when carrying out cleaning.

LACK OF USE
37) If safe operation of the battery charger can no longer be ensured, stop the device and ensure that it cannot be put back into operation.
38) The specifications set out in this manual are subject to change without any notice. This publication replaces any previously supplied information.

# ELECTRONIC BATTERY CHARGER OPERATING MANUAL

## *TECHNICAL FEATURES OF THE CBHD1 – CBHD2 - CBHD3 - HF1-IP*

The innovative characteristics of the *CBHD1 – CBHD2 – CBHD3 - HF1-IP* range of battery chargers are the following:

1. Advanced technology **High frequency** system.
2. Charging process fully controlled by microprocessor.
3. Universal input voltage: 100-240 Vac
4. Charging process start in the "soft start" mode.
5. Available on request automatic Reset on insertion of a new battery and automatic charge cycle start.
6. Protection against polarity inversions, short-circuits, over-voltages or anomalies by means of an output relay.
7. Battery to battery charger connection without sparks on the output terminals with obvious advantages for the active safety, thanks to the recognition of the battery voltage downstream the normally open output relay.
8. Signaling of possible anomalies by red LED flashing.
9. Insensitive charge parameters in case of ±10% network voltage oscillations.
10. Efficiency > 85%.
11. Output ripple at maximum charge lower than 100mV.
12. Start of the charge cycle even with 2V batteries.

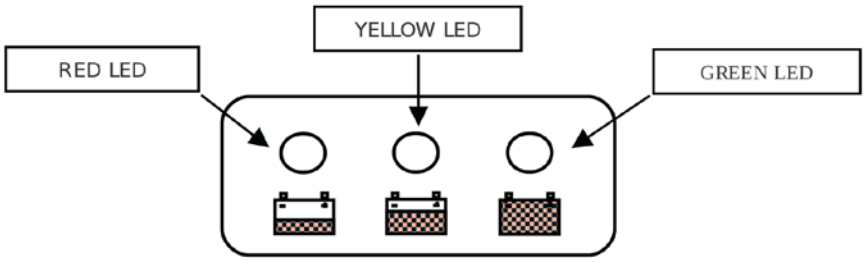
## *OPERATING PRINCIPLE OF THE CBHD1 – CBHD2 – CBHD3 - HF1-IP*

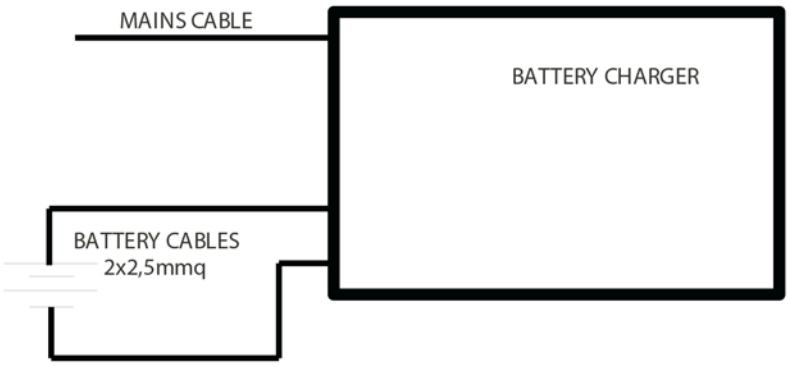
On switching on a new battery charger of the CBHD1 – CBHD2 – CBHD3 – HF1-IP series, the charger will check the battery voltage and decide whether to start the charging process. If the battery is not connected to the battery charger, the yellow LED will flash. If the result of the test is positive after 1 second the charging of the battery can start, with the red LED on. The output relay closes and the current of the first phase rises slowly till the nominal value programmed is reached. If during the battery charge process the user disconnects the actual battery from the battery charger, after a few seconds the battery charger will reset and get ready to start a new charge process (available on request). The progress of the charging process is shown by three LED's: red, yellow and green, as in the whole range of the battery chargers. The green LED shows the end of the charging or the last phase in case of deep charging process; in the former case, the relay is opened to disconnect galvanically the battery from the battery charger.

## *VISUAL SIGNALS*

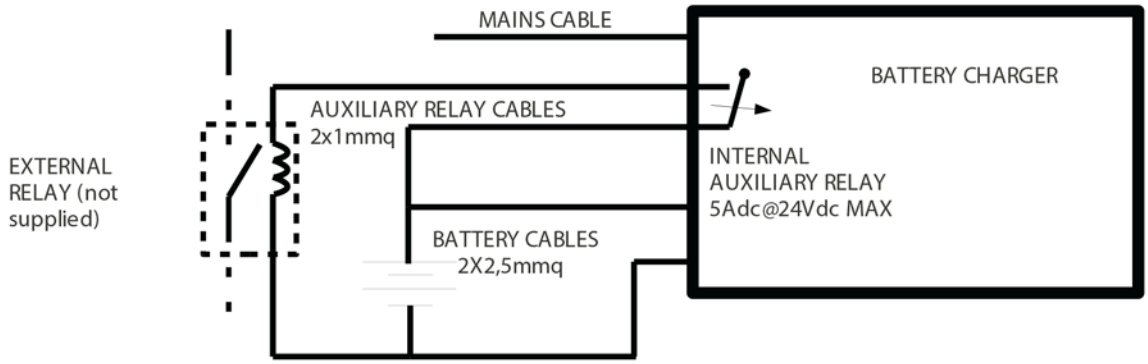
Please find in the following table a list of the visual signals of the CBHD1 – CBHD2 – CBHD3 - HF1-IP.

| SIGNAL (LED) | MEANING |
|---|---|
| Red LED flashing (twice) | Battery charger set to charge Lead-Acid batteries |
| Green LED flashing (twice) | Battery charger set to charge GEL and/or AGM batteries |
| | |
| Red LED on | First phase of charge in progress |
| Yellow LED on | Second phase of charge in progress |
| Green LED on | End of charge or maintenance phase |
| **ANOMALIES** | |
| Yellow LED flashing | UNSUITABLE BATTERY OR BATTERY NOT CONNECTED OR OUTPUT SHORT CIRCUIT |
| Red LED flashing | SAFETY TIMER EXCEEDED<br>INTERNAL SHORT CIRCUIT |






Example diagram of connection between battery charger and battery.




Example diagram of connection with use of battery charger internal auxiliary relay.
The auxiliary relay is Normally Off and switches on when the battery charger is turned on.
The internal auxiliary relay can be used with maximum voltages of 5Adc to 24Vdc.

CE S.P.E. ELETTRONICA INDUSTRIALE

# CE DECLARATION OF CONFORMITY

According to: **UNI CEI EN ISO/IEC 17050-1:2005**

We

**S.P.E. ELETTRONICA INDUSTRIALE** di Poletti Sergio
Via di Mezzo Ponente, 383 – 40014 Crevalcore (Bologna) ITALY

Declare under our sole responsibility that the product:

ELECTRONIC AUTOMATIC BATTERY CHARGER MODEL:

to which this declaration applies, complies with the provisions of the Directives of the Council of the European Union on the approximation of the laws of the members states:

Relating to Electromagnetic Compatibility (EMC) Directive 2004/108/EC of the European Parliament and of the council of 15 December 2004 on the approximation of the laws of the member states relating to electromagnetic compatibility and repealing directive 89/336/EEC, conformity is proven by compliance with the following standard:

- ✔ EN 55014-1 (Emission)
- ✔ EN 55014-2+A1+A2 (Immunity – Category II)

Relating to Extra Low Voltage (LVD) Directive 2006/95/EC of the European parliament and of the council of 12 December 2006 on the harmonisation of the laws of member states relating to electrical equipment designed for use within certain voltage limits, conformity is proven by compliance with the following standard:

- ✔ EN 60335-2-29:

"Safety of household and similar electrical appliance – Part 2: Particular requirements for battery chargers".

- ✔ EN 62233:

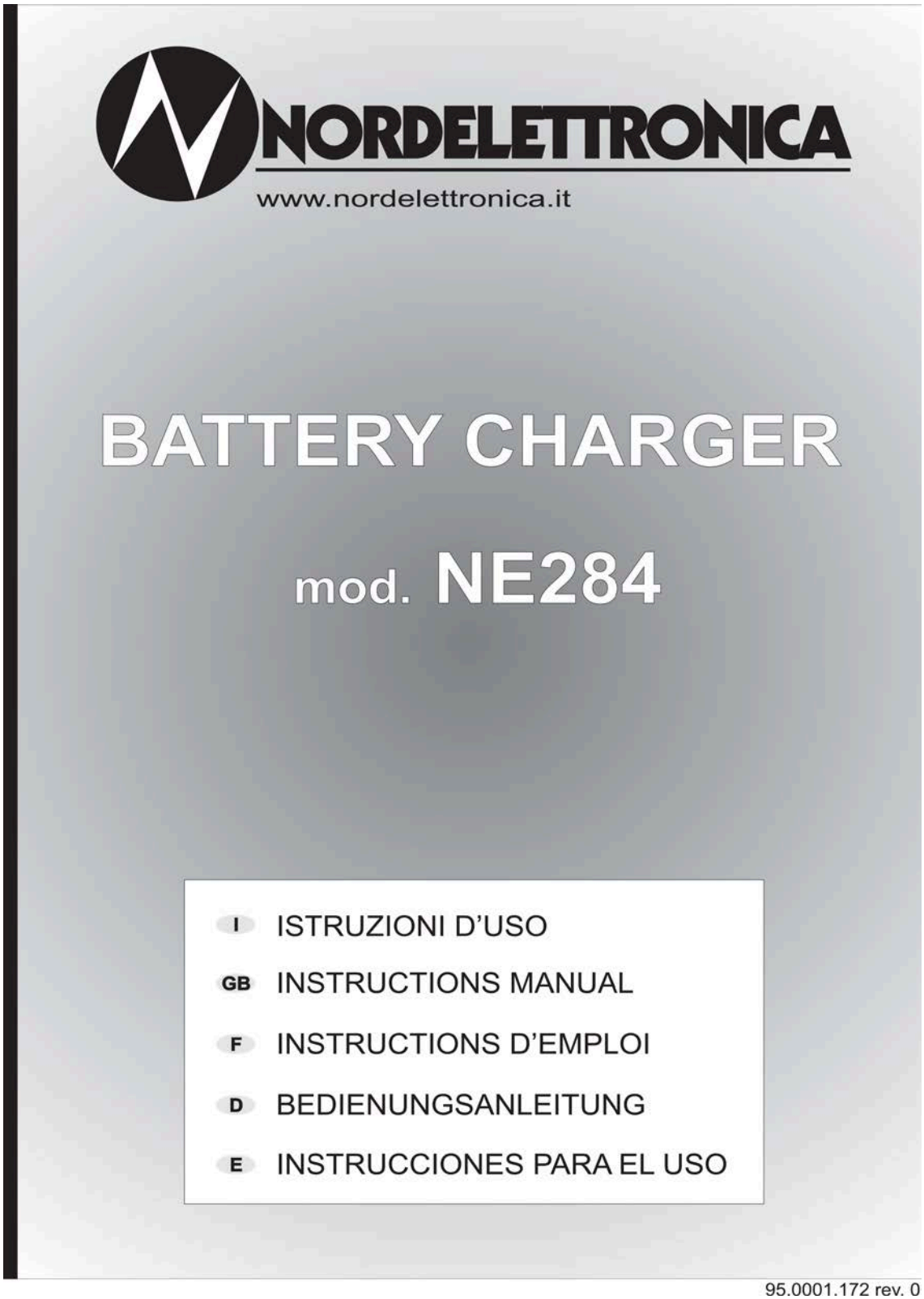
"Measurement methods for electromagnetic fields of household appliances and similar apparatus with regard to human exposure"

Crevalcore 01-12-2009

Signature

## 10.3.NORDELETTRONICA BATTERY CHARGER OPERATION MANUAL

Shown below are the directions for use provided directly by the manufacturer of the commercial device, standard or optional, installed on the machine.
The language of such documentation may not correspond to that in which the machine's directions for use are written.




95.0001.172 rev. 0

# GB BATTERY CHARGER NE284 GB

***DESCRIPTION:***

NE284 is a charger for gel, AGM and lead acid batteries. The batteries must have a nominal voltage of 24V and capacity within the limits given in the technical characteristics.

***OPERATION:***

The battery charger uses a combination of charge at constant current and constant voltage. This makes possible a significant reduction of the charging time and prevents permanent damage to the battery.
Use the dip switches to choose the charging algorithm according to the type of battery. At switch on, the green led flashes to indicate which algorithm is selected via dip switches (see table page 7).

***VISUAL SIGNALS:***

- Flashing Red: Verification phase of battery status
- Red: First phase of charge
- Yellow: Second phase of charge
- Green: Battery charged - Maintenance phase

Alarms

- 1 flashing yellow LED: Battery disconnected or reverse polarity or output short circuit (1)
- 2 flashing yellow LED: Alarm time-out: damaged battery or battery capacity is too high (2)
- 3 flashing yellow LED: Faulty battery charger (2)
- 4 flashing yellow LED: Overtemperature (3)

(1) Verify the battery connection.
(2) The alarm is reset disconnecting the main supply. If it persists consult your service.
(3) The alarm will be reset itself when the charger cools. Verify the ventilation.

***TECHNICAL CHARACTERISTICS:***

- Input: 100-240Vac 5A - 2A 50/60Hz
- Output: 24Vdc - 15A
- Battery: 100 ÷ 160Ah (C5) / 120 ÷ 180Ah (C20)

***PROTECTIONS:***

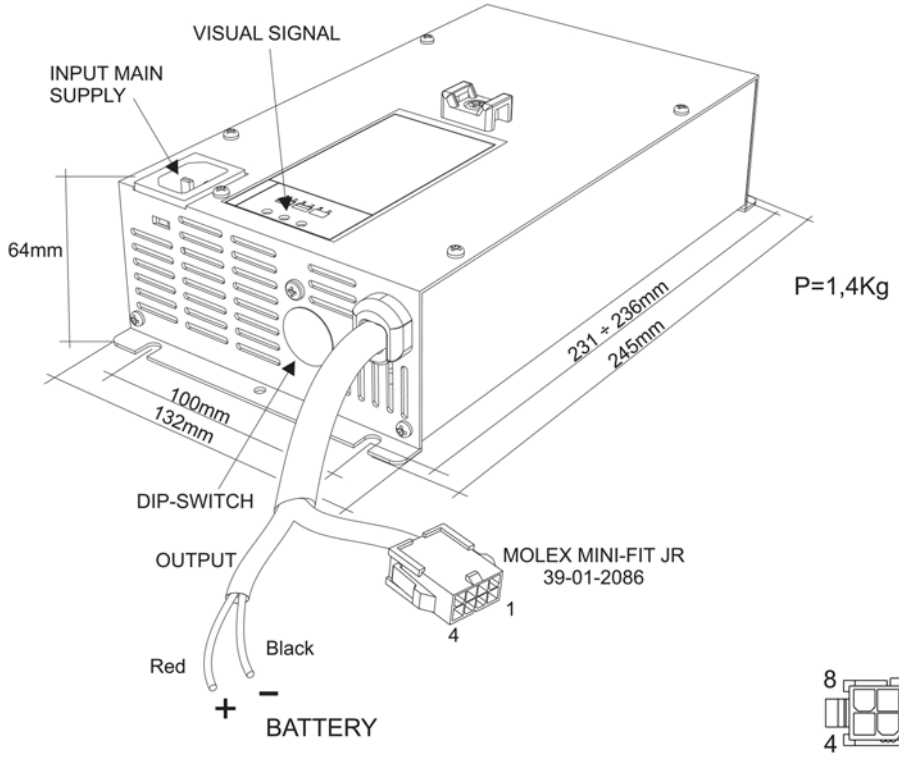
- Input fuse : 10A 250V delayed (internal fuse)
- Reverse polarity
- Short circuit
- Overcurrent
- Overvoltage
- Overtemperature

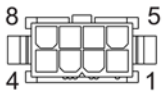
***CONNECTIONS:***

- Input: Connector 3-way IEC EN60320 C14
- Output: Red cable AWG12: **+ Battery**
  Black cable AWG12: **- Battery**
  Connector 8-way Mini-FIT JR (MOLEX 39-01-2086): see table page 7

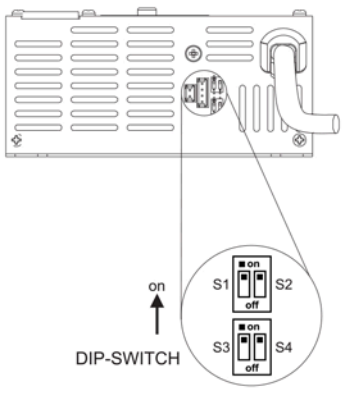
***IMPORTANT SAFETY INSTRUCTIONS. SAVE THESE INSTRUCTIONS.***

- Failure to install and operate the charger in accordance with these instructions may result in damage to the charger or injury to the operator
- Working in the vicinity of a lead-acid battery is dangerous, batteries generate explosive gases during normal battery operation. For this reason it is of the utmost importance that each time before using the charger, you read and follow the instructions provided exactly.
- To reduce the risk of battery explosion, follow these instructions and those marked on the battery.
- To reduce the risk of injury, charge only lead-acid, AGM or gel batteries (be sure that the selected charging curve is suitable for the type of batteries that have to be charged). Do not attempt to charge any other type of chargeable or non-chargeable battery; these batteries may burst, causing personal injury and damage.
- Lead-acid batteries produce internal explosive gases during charging: prevent flames and sparks and provide adequate ventilation.
- Never charge a frozen battery.
- Study all battery manufacturer's specific precautions such as removing cell caps while charging and recommended rates of charge.
- Never place the charger directly above or below the battery being charged; gases or fluids from the battery will corrode and damage the charger. Locate the charger as far away from the battery as DC cable permit.
- Do not attempt to open the charger. There is risk of electric shock even if the charger is unplugged. No user serviceable components inside.
- Charger surface may be hot while plugged in and for a period of time thereafter.
- Do not expose the charger to the rain. For indoor use only.
- A minimum of 30mm clearance should be provided at each end of the charger. Install the battery charger in a dry and well aired place
- If the cables or output connectors are damaged contact the service center.
- Disconnect the power supply before connecting or disconnecting the battery connection.
- This appliance can be used by children aged from 8 years and above and persons with reduced physical, sensory or mental capabilities or lack of experience and knowledge if they have been given supervision or instruction concerning use of the appliance in a safe way and understand the hazards involved. Children shall not play with the appliance. Cleaning and user maintenance shall not be made by children without supervision.
- For the charging of automobile batteries:
  - The battery terminal non connected to the chassis has to be connected first. The other connection is to be made to the chassis, remote from the battery and fuel line. The battery charger is then to be connected to the supply mains.
  - After charging, disconnect the battery charger from supply mains. Then remove the chassis connection and then the battery connection.




| | |
|---|---|
| 1 | no connect |
| 2 | no connect |
| 3 | COM Relay contact |
| 4 | NC Relay contact |
| 5 | NO Relay contact |
| 6 | RS485-A |
| 7 | RS485-B |
| 8 | no connect |




| S1 | S2 | S4 | Reference Dip-switch | Algorithm | Status of yellow LED at switch on | Number of flashes of the green LED at switch on |
|---|---|---|---|---|---|---|
| OFF | OFF | OFF | 1 | IUI0-Pb Flooded | OFF | 1 |
| ON | ON | OFF | 2 | IUI0-Pb Flooded-EnerSys | OFF | 2 |
| OFF | ON | OFF | 3 | IUoU-AGM-GEL | OFF | 3 |
| ON | OFF | OFF | 4 | IUI0-Pb Flooded-Midac | OFF | 4 |
| OFF | OFF | ON | 5 | IUIa-Pb Flooded | ON | 1 |
| ON | ON | ON | 6 | IUIa-Pb Flooded-EnerSys | ON | 2 |
| OFF | ON | ON | 7 | IUa-AGM-GEL | ON | 3 |
| ON | OFF | ON | 8 | IUIa-Pb Flooded-Midac | ON | 4 |

| S3 | Output current |
|---|---|
| ON | 13A |
| OFF | 15A |

IEC IECEE CB SCHEME

Ref. Certif. No.

DE 2-018758

IEC SYSTEM FOR MUTUAL RECOGNITION OF TEST CERTIFICATES FOR ELECTRICAL EQUIPMENT (IECEE) CB SCHEME

SYSTEME CEI D'ACCEPTATION MUTUELLE DE CERTIFICATS D'ESSAIS DES EQUIPEMENTS ELECTRIQUES (IECEE) METHODE OC

## CB TEST CERTIFICATE
## CERTIFICAT D'ESSAI OC

| | |
|---|---|
| Product<br>Produit | Battery Charger |
| Name and address of the applicant<br>Nom et adresse du demandeur | NORDELETTRONICA S.r.l.<br>Viale delle Industrie 6/A<br>31018 Albina di Gaiarine TV, Italy |
| Name and address of the manufacturer<br>Nom et adresse du fabricant | NORDELETTRONICA S.r.l.<br>Viale delle Industrie 6/A<br>31018 Albina di Gaiarine TV, Italy |
| Name and address of the factory<br>Nom et adresse de l'usine<br>Note: When more than one factory, please report on page 2<br>Note: Lorsque il y plus d'une usine, veuillez utiliser la 2ème page | NORDELETTRONICA S.r.l.<br>Viale delle Industrie 6/A<br>31018 Albina di Gaiarine TV, Italy |
| Ratings and principal characteristics<br>Valeurs nominales et caractéristiques principales | Input : AC 100-240V ; 50/60Hz ; 5A-2A ; Class I<br>Output :DC 24V ; 15A |
| Trade mark (if any)<br>Marque de fabrique (si elle existe) | NORDELETTRONICA |
| Model/type Ref.<br>Ref. de type | NE284 |
| Additional information (if necessary may also be reported on page 2)<br>Les Information complémentaire (si nécessaire, peuvent être indiqués sur la 2ème page) | |
| A sample of the product was tested and found to be in conformity with<br>Un échantillon de ce produit a été essayé et a été considéré conforme à la | **PUBLICATION** **EDITION**<br>IEC 60335-1:2010+A1<br>IEC 60335-2-29:2002+A1+A2<br>for national deviations see test report |
| As shown in the Test Report Ref. No. which forms part of this Certificate<br>Comme indiqué dans le Rapport d'essais numéro de référence qui constitue une partie de ce Certificat | 28107255 001 |

This CB Test Certificate is issued by the National Certification Body
Ce Certificat d'essai OC est établi par l'Organisme National de Certification

TÜVRheinland®

Date: 30.03.2015

TÜV Rheinland LGA Products GmbH
Tillystraße 2 · 90431 Nürnberg, Germany
Phone + 49 221 806-1371
Fax + 49 221 806-3935
Mail: cert-validity@de.tuv.com
Web: www.tuv.com

Signature: F. Ceriani

TÜV Rheinland LGA Products GmbH TÜVRheinland® Zertifizierungsstelle

# Certificate

TÜVRheinland

**Certificate no.** CU 72150618 01

**License Holder:**
NordElettronica S.r.l.
Viale Delle Industrie 6/A
31018 Albina di Gaiarine (TV)
Italy

**Manufacturing Plant:**
NordElettronica S.r.l.
Viale Delle Industrie 6/A
31018 Albina di Gaiarine (TV)
Italy

**Test report no.:** USA-CW 31580665 001 **Client Reference:** Gianni Bressan

**Tested to:** UL 1564:2006 R3.13
CAN/CSA-C22.2 NO. 60335-1:11
CAN/CSA-E60335-2-29-06 (R2011)

**Certified Product:** Battery Charger **License Fee - Units**

Model Designation: NE284 7

Rated Voltage: AC 100-240V, 50/60Hz
Rated Current: 5A at 100V
2A at 240V
Protection Class: I
Output Ratings DC: 24V/15A

Special Remarks: To be installed according to the licensee's installation instructions.

7

Appendix: 1, 1-9

**Licensed Test mark:**

TÜVRheinland
C US

**Date of Issue (day/mo/yr)**
15/06/2015

TUV Rheinland of North America, Inc., 12 Commerce Road, Newtown, CT 06470, Tel (203) 426-0888 Fax (203) 426-4009

## 10.4.ENERSYS BATTERY DOCUMENTATION

Shown below are the directions for use provided directly by the manufacturer of the commercial device, standard or optional, installed on the machine.
The language of such documentation may not correspond to that in which the machine's directions for use are written.

EnerSys
Power/Full Solutions

# Operation and maintenance instructions powerbloc dry

ENGLISH

Motive power batteries for small traction
XP series: AGM technology

Sealed gas recombination monoblocs
MFP series: Gel technology

## Rating data :

| | |
|---|---|
| 1. Nominal capacity $C_5$ | : see type |
| 2. Nominal voltage | : see type |
| 3. Discharge current | : $C_5$/5h |
| 4. Rated temperature | : 30°C |

Powerbloc dry batteries, XP and MFP series are valve-regulated lead-acid batteries. Unlike conventional batteries with liquid electrolyte these batteries have immobilised electrolyte (gelled sulphuric acid : MFP series or AGM : XP series). Instead of a vent plug, a valve is used to regulate the internal gas pressure, preventing the ingress of oxygen from the air and allowing the escape of excess charging gasses. When operating valve-regulated lead-acid batteries the same safety requirements as for vented batteries apply, to protect against hazards from electric current, from explosion of electrolytic gas and - with some limitations - from the corrosive electrolyte.
Battery valves should never be removed. These batteries do not require topping – up with distilled or demineralized water

SAFETY PRECAUTIONS

- Pay attention to the operating instructions and keep them close to the battery.
- Work on batteries must only be carried out by skilled personnel!

- Use protective glasses and wear safety clothing when working on batteries.
- Adhere to the current accident prevention rules in the country where the battery is used or DIN EN 50272-3, DIN EN 50110-1.

- Keep children away from batteries!

- No smoking!
- Do not expose batteries to naked flames, glowing embers or sparks, as it may cause the battery to explode
- Avoid sparks from cables or electrical apparatus as well as electrostatic discharges.

- Acid splashes into the eyes or on the skin must be washed immediately with an abundance of clean water. After abundant flushing consult a doctor immediately!
- Clothing contaminated by acid should be washed in water.

- Risk of explosion and fire
- Avoid short circuits: do not use non-insulated tools, do not place or drop metal objects on top of the battery. Remove rings, wristwatches and articles of clothing with metal parts that might come into contact with the battery terminals.

- Electrolyte is highly corrosive.
- In the normal operation of this battery a contact with acid isn't possible. If the cell containers are damaged, the immobilised electrolyte (gelled sulphuric acid or absorbed in the separator for AGM technology) is corrosive like the liquid electrolyte.

- Batteries and monoblocs are heavy. Ensure installation! Use only suitable handling equipment.
- Lifting hooks must not damage the blocs, c secure or cables.
- Do not place batteries in direct sunlight without connectors protection.
- Discharged batteries can freeze. For that reason, always store in a frostfree zone.

- Dangerous electrical voltage!
- Avoid contact and short circuits.
- Caution - metal parts of the battery are always live: do not place tools or other objects on the battery!

- Pay attention to the hazards that can be caused by batteries

Ignoring the operating instructions, repair with non-original parts will render the warranty void.
All failures, malfunctions or defaults of the battery, the charger or any other accessories, must be notified to our After Sales Service.

## 1. Commissionning

The XP and MFP series monoblocs are supplied in a charged condition.The battery should be inspected to ensure it is in perfect physical condition. Check

1. the battery cleanliness. Before installing, the battery compartment has to be cleaned.
2. the battery end cables have a good contact to terminals and the polarity is correct. Otherwise battery, vehicle or charger could be destroyed.

Use special coding systems for maintenance free batteries for the charging plug- and- socket devices to prevent accidental connection to the wrong type of charger. Never directly connect an electrical appliance ( for example : warning beacon) to a part of the battery. This could lead to an imbalance of the cells during the recharge, i.e. a loss of capacity, the risk of insufficient discharge time, damage to the cells and this may EFFECT THE WARRANTY OF THE BATTERY.

Charge the battery (see 2.2) before commissioning.
Only blocs with the same state of discharge (the same voltage, tolerance like the following table) should be connected together.

| Bloc voltage (V) | Max. tolerance from average value - $\Delta U_{bloc}$ |
|---|---|
| 6 | ± 0.035 |
| 12 | ± 0.049 |

After connecting, the terminals must be covered with grease as protection against external corrosion.
The specified torque loading for the bolts/screws of the end cables and connectors are:

| Flat pole M6 | DIN conic post |
|---|---|
| 6 ± 1 Nm | 8 ± 1 Nm |
| Type of monobloc | Specific value |
| 12XP51-12XP73 | 8 to 10 Nm |
| 6XP180 | 11 to 13 Nm |

## 2. Operation

DIN EN 50272-3 " Traction batteries for industrial trucks" is the standard which applies.
The nominal operating temperature is 30°C.
The optimum lifetime of the battery depends on the operating conditions (temperature and depth of discharge)
The temperature range of use for the battery is between +15°C and +35 °C. Any use outside of this range must be approved by a Service Technician.
Optimal battery life is obtained with the battery at a temperature of 25-30°C
Higher temperatures shorten the life of the battery (according to IEC 1431 technical report), lower temperatures reduce the available capacity. 45°C is the upper temperature limit and batteries should not be operated above this temperature.
The capacity of the battery changes with temperature and falls considerably under 0 °C.
The optimum lifetime of the battery depends on the operating conditions (moderate temperature and discharges equal to or lower than 80% of the nominal capacity $C_5$).
The battery obtains its full capacity after about 10 charging and discharging cycles.

### 2.1. Discharging

The valves on the top of the battery must not be sealed or covered.
Electrical connections (e.g. plugs) must only be made or broken in the open circuit condition.
Discharges over 80% of the rated capacity are deep discharges and are not acceptable. They reduce considerably the life expectancy of the battery Discharged batteries must be recharged immediately and must not be left in a discharged condition.:

| Discharge | Recharge |
|---|---|
| >40% | Every day |
| <40% | Every second day |

This also applies to partially discharged batteries.
Discharged batteries can freeze.
Limit the discharge to 80% DOD. The presence of a discharge limiter is imperative with an energy cut-off set at 1.90Volts per cell.

### 2.2. Charging

Powerbloc dry batteries can be recharged with 50 Hz or HF chargers.
If you wish to use an existing charger with WUIa or IUIa profile, you should check that the profile is approved by our Technical Department.
Only connect the battery to the correctly assigned charger, which is suitable for the battery type.

After any changing of cables on the charger, our Technician must visit the site to check the charger setting.
XP and MFP batteries have a low gas emission.
Nevertheless, when charging, correct provision must be made for venting of the charging gases. Battery container lids and the covers of battery compartments must be opened or removed.
With the charger switched off connect up the battery, ensuring that the polarity is correct. (Positive to positive, negative to negative). Now switch on the charger.
When charging the temperature of the battery rises by about 10°C, so charging should only begin if the battery temperature is below 35°C.
The electrolyte temperature of the battery should be at least +15 °C before charging, otherwise a full charge will not be achieved without specific settings of the charger.
Use the correction factor according to DIN VDE 0510-1 (draft) with –0.005 Vpc per °C.

### 2.3. Equalising Charge

Equalising charges are used to safeguard the life of the battery and to maintain its capacity. Equalising charges are carried out following normal charging. They are necessary after deep discharges and repeated incomplete recharges. For the equalising charges, only the chargers prescribed by the battery manufacturer can be used.

## 3. Maintenance

The electrolyte is immobilised. The density of the electrolyte can not be measured.
Never remove the safety valves from the monobloc.
In case of accidental damage to the valve, contact our After Sales Service for replacement.

### 3.1. Daily

- Recharge the battery after every discharge of more than 40% $C_5$.
- check: the condition of the plugs, cables and that all insulation covers are in place and in good condition.

### 3.2. Weekly

Visual inspection after recharging for signs of dirt and mechanical damage.

### 3.3. Quarterly

At the end of the charge, carry out end of charge voltage readings, measure and record :
- the voltage of the battery
- the voltages of each cell

If significant changes from earlier measurements or differences between the monoblocs are found, please contact our Service.
If the discharge time of the battery is not sufficient, check:
- that the required work is compatible with the battery capacity
- the settings of the charger
- the settings of the discharge limiter.

### 3.4. Annually

Internal dust removal from the charger.
Electrical connections: test all connections (sockets, cables, and contacts).
Monoblocs having terminals with insert :
Check the torque loading of the bolts/screws.:
According to DIN EN 1175-1 when necessary, but at least once a year, the insulation resistance of the truck and of the battery must be checked by an electrical specialist.
The test on the insulation resistance of the battery must be conducted in accordance with DIN EN 1987-1. The average insulation resistance of the battery must not be lower than 50 Ω per Volt nominal voltage (DIN EN 50272-3)
For batteries up to 20 V nominal voltage the minimum value is 1000 Ω.

## 4. Storage and Transportation

Store the battery in a fully charged condition in a dry, clean and frost free area.
Always disconnect the battery from the electric vehicle before storage.
For easy recharge of the batteries, it is advised not to store without recharge for more than 3 months at 20°C and 2 months at 30°C.
To ensure the battery is always ready for use a choice of charging methods can be made :
- monthly equalising charge according to 2.3.
- float charge with 2.27 V x number of cells

Always recharge before putting the battery into service.
The storage time should be taken into account when considering the life of the battery.

Back to the manufacturer!
Batteries with this sign must be recycled.
Batteries wich are not returned for the recycling prozess must be disposed of as hazardous waste!

Pb

www.enersys-emea.com

## NORMES POUR L'UTILISATION ET L'ENTRETIEN DES BATTERIES **FORCEblock** — FR

**Normes de référence:**
EN 50272-3 - CONDITIONS DE SÉCURITÉ REQUISES POUR LES BATTERIES D'ACCUMULATEURS ET LEUR INSTALLATION.

**Données de la batterie**

1. Tension nominale (V): voir étiquette
2. Capacité nominale $C_5$: voir étiquette
3. Courant nominal de décharge: $C_5/5$
4. Tension de fin de décharge: 1,70 Vpc
5. Température nominale: 30°C


**1. Installation de batteries chargées**
Vérifier la connexion correcte (polarité) des câbles et le serrage des vis: 10 +/- 1 Nm.
Recharger la batterie (voir point 3).

**2. Utilisation**
S'assurer que les fentes d'aération ne sont pas obstruées durant l'utilisation. Ne pas ouvrir ni ne fermer les contacts durant les phases de charge ou de décharge. Éviter les décharges profondes de plus de 80% de la capacité nominale. Les décharges profondes compromettent le bon fonctionnement et la durée de vie de la batterie. Après la phase de décharge, la batterie doit être rechargée dans les plus brefs délais.

**3. Charge**
À la fin de la période de travail, charger la batterie de la façon suivante:
- effectuer la charge dans des endroits exclusivement prévus à cet effet et bien aérés, conformément à la norme EN 50272-3;
- ouvrir le couvercle de l'emplacement réservé à la batterie.
  Les capots des différents éléments doivent rester fermés.
- charger les batteries exclusivement avec le chargeur défini à l'avance;
- brancher la batterie au chargeur en respectant les polarités et lancer la charge.

**3.1. Charge d'égalisation**
La charge d'égalisation, qui doit être effectuée **au moins deux fois par mois** à la fin de la charge normale, contribue à préserver l'efficacité de la batterie. Cette charge est particulièrement indiquée après des utilisations caractérisées par des décharges importantes ou des recharges incomplètes.

**4. Électrolyte (batteries ouvertes - VLA)**
La densité nominale de l'électrolyte, à 30°C, est de 1,29 +/- 0,01 kg/l.

N.B.: Les températures supérieures à 30°C réduisent la densité de l'électrolyte et les températures inférieures l'augmentent. Le facteur de correction est de 0,0007 kg/l par degré °C.

Ex.: à une densité de 1,26 kg/l. mesurée à la température de 45°C, correspond une densité de 1,27 kg/l à 30°C.

**5. Températures**
La température nominale est de 30°C et, sauf évaluation préalable spécifique, elle doit rester comprise entre 5°C et 45°C au cours du fonctionnement.
**N.B.: les hautes températures raccourcissent la durée de vie de la batterie tandis que les basses températures en réduisent l'efficacité.**

**6. Entretien**

**6.1. Quotidien**
Après une phase de décharge, recharger la batterie.

**Batteries ouvertes - VLA:** seulement après une période de recharge, vérifier le niveau de l'électrolyte et, si nécessaire, remettre à niveau avec de l'eau déminéralisée.

**6.2. Hebdomadaire**
Effectuer une inspection visuelle de la batterie et exécuter une charge d'égalisation.

**6.3. Trimestriel**
Vérifier le couple de serrage des vis des bornes comme expliqué dans le paragraphe 1.

**Batteries ouvertes - VLA:**
Au terme d'une phase de charge d'égalisation, contrôler et noter la tension et la densité de chaque élément de la batterie. Vérifier le niveau de l'électrolyte de tous les éléments.

**Batteries VRLA:**
Au terme d'une phase de charge d'égalisation, vérifier et noter la tension de chaque élément de la batterie.

En cas de fortes variations par rapport à la vérification précédente, contacter le service après-vente. Nettoyer soigneusement la batterie (voir point 7).

Vérifier le bon état de l'isolation.

**7. Nettoyage**
Le nettoyage de la batterie est particulièrement important pour son bon fonctionnement. Il est donc nécessaire de nettoyer et de sécher soigneusement les couvercles et toutes les parties externes.

**8. Batteries stockées**
Les batteries non utilisées doivent être stockées dans un endroit couvert, à l'abri de l'humidité, de la poussière et du gel. Effectuer des contrôles et des recharges périodiques, au moins une fois par mois. Il est recommandé de ne jamais laisser les batteries déchargées plus de 2 jours avec une tension inférieure à 2,05 Vpc, et d'effectuer des charges complètes avant de longues périodes d'inactivité.

**9. Mauvais fonctionnements et défauts**
En cas de mauvais fonctionnements ou de défauts de la batterie, contacter immédiatement le service après-vente. Les valeurs de tension et de densité relevées (voir point 6.3) seront utiles afin d'identifier l'anomalie.

**LA GARANTIE EST ANNULÉE EN CAS DE/D':**

Non-respect des présentes instructions pour l'utilisation et l'entretien.
Interventions effectuées par du personnel non autorisé.
Utilisation de composants non d'origine.
Batteries ouvertes: adjonctions de substances chimiques dans l'électrolyte autres que l'eau déminéralisée.
Batteries VRLA: enlèvement des vannes (ouverture de la batterie).


## NORMAS DE USO Y MANTENIMIENTO DE BATERÍAS TIPO **FORCEblock** — ES

**Referencias normativas:**
EN 50272-3 - REQUISITOS DE SEGURIDAD PARA BATERÍAS DE ACUMULADORES Y SUS INSTALACIONES.

**Datos batería**

1. Tensión nominal (V): ver etiqueta
2. Capacidad nominal $C_5$: ver etiqueta
3. Corriente nominal de descarga: $C_5/5$
4. Tensión de fin de descarga: 1.70 Vpc
5. Temperatura nominal: 30°C


**1. Instalación de baterías cargadas**
Verificar la correcta conexión (polaridad) de los cables terminales y el apriete de los tornillos: 10± 1 Nm.
Proceder a la carga de la batería (ver el punto 3).

**2. Uso**
Asegurarse de que durante el uso las aberturas de aireación no estén obstruidas. No abrir o cerrar contactos durante las fases de carga y descarga. Evitar las descargas profundas, superiores al 80% de la capacidad nominal. Las descargas profundas perjudican el buen funcionamiento y la duración de la batería. Después de la descarga, la batería se debe recargar cuanto antes.

**3. Carga**
Al finalizar el turno de trabajo, cargar la batería de la siguiente manera:
- efectuar la carga en lugares destinados exclusivamente para tal fin y bien aireados, de conformidad con la norma EN 50272-3;
- abrir la tapa del alojamiento de la batería.
  Los tapones deben permanecer cerrados;
- efectuar la carga exclusivamente con el cargador previamente definido;
- conectar la batería al cargador respetando las polaridades y comenzar la carga.

**3.1. Carga de ecualización**
La carga de ecualización, que debe efectuarse al **menos dos veces al mes** al terminar la fase de carga normal, contribuye a mantener la eficiencia de la batería y es particularmente indicada después del uso con descargas profundas o con recargas incompletas.

**4. Electrolito (baterías de tipo abierto - VLA)**
La densidad nominal del electrolito a 30°C es 1.29 ± 0,01 kg/L.

Nota: Las temperaturas superiores a 30°C reducen la densidad del electrolito y las temperaturas inferiores la aumentan. El factor de corrección es de 0,0007 kg/L por grado °C.

Ej.: a una densidad de 1,26 kg/L detectada a una temperatura de 45°C corresponde una densidad de 1,27 kg/L a 30°C.

**5. Temperaturas**
La temperatura nominal es de 30°C y debe estar comprendida entre +5°C y +45°C durante el funcionamiento.
**Nota: Las temperaturas demasiado elevadas acortan la duración de la batería y las temperaturas demasiado bajas reducen su eficiencia.**

**6. Mantenimiento**

**6.1. Diario**
Después de una fase de descarga, recargar la batería.

**Baterías de tipo abierto - VLA:** sólo después de una fase de recarga, verificar el nivel del electrolito y, si es necesario, rellenar con agua desmineralizada.

**6.2. Semanal**
Realizar una inspección visual de la batería y efectuar una carga de ecualización.

**6.3. Trimestral**
Controlar el par de apriete de los tornillos de los terminales tomando como referencia el apartado 1.

**Baterías de tipo abierto - VLA:**
al final de una fase de carga de ecualización verificar y anotar la tensión y la densidad de cada elemento de la batería. Verificar el nivel del electrolito de todos los elementos.

**Baterías tipo VRLA:**
al final de una fase de carga de ecualización verificar y anotar la tensión de cada elemento de la batería.

En caso de variaciones considerables respecto de la verificación anterior, contactar con el servicio de asistencia. Limpiar bien la batería (ver el punto 7).

Verificar la integridad del aislamiento.

**7. Limpieza**
La limpieza de la batería es particularmente importante para su buen funcionamiento. Por lo tanto, es necesario secar y limpiar bien las tapas y todas las partes externas.

**8. Baterías en almacén**
Las baterías no utilizadas se deben guardar en un ambiente cubierto, seco, no polvoriento y protegido de las heladas. Realizar controles y recargas periódicamente, al menos cada mes. Se recomienda no dejar las baterías más de 2 días descargadas o con una tensión inferior a 2.05 Vpc y efectuar cargas completas antes de largos períodos de inactividad.

**9. Desperfectos de funcionamiento y defectos**
En caso de desperfectos de funcionamiento o defectos en la batería, contactar inmediatamente con el servicio de asistencia. Los valores de tensión y densidad observados (ver el punto 6.3) serán útiles para identificar el fallo.

**LA GARANTÍA QUEDA SIN EFECTO EN CASO DE:**

Incumplimiento de estas instrucciones de uso y mantenimiento.
Intervenciones de personal no autorizado.
Empleo de componentes no originales.
baterías VLA: añadido al electrolito de cualquier sustancia química que no sea agua desmineralizada;
baterías VRLA: desmontaje de las válvulas (apertura de la batería).


**FORCEblock**

IT
EN
DE
FR
ES

5011690

ROBOPAC

## NORME PER L'UTILIZZO E LA MANUTENZIONE DI BATTERIE TIPO **FORCEblock** — IT

**Riferimenti normativi:**
EN 50272-3 - REQUISITI DI SICUREZZA PER BATTERIE DI ACCUMULATORI E LORO INSTALLAZIONI.

**Dati batteria**

| | | | |
|---|---|---|---|
| 1. Tensione nominale (V): | vedi etichetta | 4. Tensione di fine scarica: | 1.70 Vpc |
| 2. Capacità nominale $C_5$: | vedi etichetta | 5. Temperatura nominale: | 30°C |
| 3. Corrente nominale di scarica: | $C_5/5$ | | |


**1. Installazione di batterie cariche**
Verificare il corretto collegamento (polarità) dei cavi terminali ed il serraggio delle viti: 10±1 Nm.
Procedere alla carica della batteria (vedi punto 3).

**2. Utilizzo**
Accertarsi che durante l'utilizzo le aperture d'areazione non siano ostruite. Non aprire o chiudere contatti durante le fasi di carica o scarica. Evitare scariche profonde, oltre l'80% della capacità nominale. Le scariche profonde pregiudicano il buon funzionamento e la durata della batteria. Dopo la fase di scarica la batteria deve essere quanto prima ricaricata.

**3. Carica**
Al termine del turno lavorativo, caricare la batteria come segue:
- effettuare la carica in luoghi esclusivamente a ciò destinati e ben areati, in conformità alla norma EN 50272-3;
- aprire il coperchio del vano batteria.
  I tappi dei singoli elementi devono rimanere chiusi;
- eseguire la carica esclusivamente con il carica batteria preventivamente definito;
- collegare la batteria al caricabatteria rispettando le polarità ed iniziare la carica.

**3.1. Carica di equalizzazione**
La carica di equalizzazione, che deve essere eseguita **almeno due volte al mese** al termine della normale fase di carica, contribuisce a mantenere efficiente la batteria ed è particolarmente indicata dopo utilizzi con scariche profonde o ricariche incomplete.

**4. Elettrolito (batterie tipo aperto - VLA)**
La densità nominale dell'elettrolito, riferita a 30°C è 1,29 ± 0.01 kg/L.

N.B.: Temperature superiori a 30°C riducono la densità dell'elettrolito e temperature inferiori la aumentano. Il fattore di correzione è di 0,0007 kg/L per grado °C.

Es. ad una densità di 1,26 kg/L, rilevata alla temperatura di 45°C, corrisponde una densità di 1,27 kg/L a 30°C.

**5. Temperature**
La temperatura nominale è di 30°C e, salvo specifica valutazione preventiva, deve rimanere compresa tra +5°C e +45°C durante l'esercizio.
**N.B.: Temperature elevate accorciano la durata della batteria e temperature basse ne diminuiscono l'efficienza.**

**6. Manutenzione**

**6.1. Giornaliera**
Dopo una fase di scarica, ricaricare la batteria.

**Batterie tipo aperto - VLA:** esclusivamente dopo una fase di ricarica, verificare il livello dell'elettrolito e solo se necessario rabboccare con acqua demineralizzata.

**6.2. Settimanale**
Procedere ad un ispezione visiva della batteria ed eseguire una carica di equalizzazione.

**6.3. Trimestrale**
Controllare la coppia di serraggio sulle viti dei terminali in riferimento al paragrafo 1.

**Batterie tipo aperto - VLA:**
alla fine di una fase di carica di equalizzazione verificare ed annotare la tensione e la densità di ogni singolo elemento della batteria. Verificare il livello dell'elettrolito, di tutti gli elementi.

**Batterie tipo VRLA:**
alla fine di una fase di carica di equalizzazione verificare ed annotare la tensione di ogni singolo elemento della batteria.

In caso di considerevoli variazioni rispetto alla verifica precedente, contattare il servizio assistenza. Eseguire un'accurata pulizia della batteria (vedi punto 7.).

Verificare l'integrità dell'isolamento.

**7. Pulizia**
La pulizia della batteria è particolarmente importante per il suo buon funzionamento ed è pertanto necessario asciugare e pulire con cura i coperchi e tutte le parti esterne.

**8. Batterie a magazzino**
Le batterie non utilizzate devono essere mantenute in ambiente coperto, asciutto, non polveroso ed al riparo del gelo. Eseguire dei controlli e delle ricariche periodicamente, con frequenza almeno mensile. Si raccomanda di non lasciare mai per più di 2 giorni le batterie scariche, con tensione inferiore a 2,05 Vpc, e di eseguire cariche complete prima di lunghi periodi di inattività.

**9. Malfunzionamenti e difetti**
Qualora fossero riscontrati malfunzionamenti o difetti nella batteria, contattare immediatamente il servizio assistenza. I valori di tensione e densità rilevati (vedi punto 6.3) saranno utili per individuare il guasto.

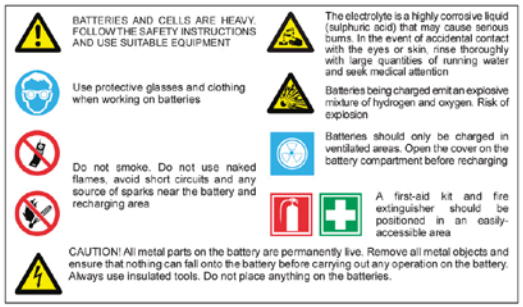
**LA GARANZIA DECADE NEL CASO DI:**
Mancato rispetto delle presenti istruzioni d'uso e manutenzione.
Interventi effettuati da personale non autorizzato.
Impiego di componenti non originali.
batterie VLA: aggiunte all'elettrolito di qualsiasi sostanza chimica ad eccezione di acqua demineralizzata;
batterie VRLA: rimozione delle valvole (apertura della batteria).


## INSTRUCTIONS FOR THE USE AND MAINTENANCE OF **FORCEblock** BATTERIES — EN

**Reference standards:**
EN 50272-3 - SAFETY REQUIREMENTS FOR BATTERIES AND BATTERY INSTALLATIONS.

**Battery specifications**

| | | | |
|---|---|---|---|
| 1. Nominal voltage (V): | see label | 4. End of discharge votage: | 1.70 Vpc |
| 2. Nominal capacity $C_5$: | see label | 5. Nominal temperature: | 30°C |
| 3. Nominal discharge current: | $C_5/5$ | | |




**1. Installing charged batteries**
Check that the terminal cables are correctly connected (polarity), and that the bolts are tightened: 10±1 Nm.
Start charging the battery (see point 3).

**2. Use**
Make sure the air vents do not become obstructed during use. Do not open or close the contacts during charging or discharging. Avoid deep discharges greater than 80% of nominal capacity. Deep discharges compromise battery operation and shorten battery life. The battery should be recharged as soon as possible following discharge.

**3. Charging**
At the end of the work shift, charge the battery as follows:
- only charge the batteries in well ventilated areas dedicated to this purpose, in compliance with Standard EN 50272-3;
- open the cover of the battery compartment.
  The caps on the individual cells should be left closed;
- only charge the batteries using the battery charger defined in advance;
- connect the battery to the battery charger observing the correct polarity and begin charging.

**3.1. Equalize charge**
The equalize charge should be carried out **at least twice a month** following the normal charging cycle. It contributes to maintaining the battery's efficiency and is particularly recommended following use with deep discharges or incomplete recharging cycles.

**4. Electrolyte (open batteries - VLA)**
The nominal density of the electrolyte at 30°C is 1.29 ± 0.01 kg/L.

N.B. Temperatures higher than 30°C reduce the density of the electrolyte and lower temperatures increase it. The correction factor is 0.0007 kg/L per degree °C.

E.g. a density of 1.26 kg/L, measured at a temperature of 45°C, corresponds with a density of 1.27 kg/L at 30°C.

**5. Temperature**
The nominal temperature of the electrolyte is 30°C and should remain between +5°C and +45°C during operation, except in the event of a specific prior assessment.
**N.B. High temperatures shorten battery life and low temperatures reduce battery efficiency.**

**6. Maintenance**

**6.1. Daily**
Recharge the battery following a discharge cycle.

**Open batteries - VLA:** check the electrolyte level only following a charge cycle, top up with demineralised water only if necessary.

**6.2. Weekly**
Visually inspect the battery and carry out an equalize charge.

**6.3. Quarterly**
Check the tightening torque of all the terminal bolts as described in paragraph 1.

**Open batteries - VLA:**
Check and note down the voltage and density of each individual battery cell at the end of an equalize charge cycle. Check the electrolyte level of all cells.

**VRLA batteries:**
Check and note down the voltage of each individual battery cell at the end of an equalize charge cycle.

Contact the assistance service in the event of significant variations with respect to the previous inspection. Thoroughly clean the battery (see point 7.).

Check the condition of the insulation.

**7. Cleaning**
Cleaning the battery is particularly important for good battery operation. All external parts and covers should therefore be dried and cleaned with care.

**8. Storing batteries**
Batteries not being used should be stored in a covered environment that is dry, free of dust and protected against frost. Carry out periodical checks and recharge cycles, at least once a month. Never leave batteries discharged or with the voltage lower than 2.05 Vpc for more than 2 days. Always carry out a full charging cycle before any long periods of inactivity.

**9. Malfunctions and faults**
Contact the assistance service immediately in the event of battery malfunctions or faults. Take voltage and electrolyte density readings (see point 6.3) to help identify the fault.

**THE WARRANTY IS INVALIDATED IN THE EVENT OF:**
Failure to comply with these instructions for use and maintenance.
Operations carried out by unauthorised personnel.
The use of non-original components.
VLA batteries: the addition to the electrolyte of any chemical substances other than demineralised water;
VRLA batteries: removal of the valves (opening the battery).


## BETRIEBS- UND WARTUNGSANLEITUNG FÜR BATTERIEN DES TYPS **FORCEblock** — DE

**Normenbezug:**
DIN EN 50272-3 - SICHERHEITSANFORDERUNGEN AN BATTERIEN UND BATTERIEANLAGEN.

**Kennwerte der Batterie**

| | | | |
|---|---|---|---|
| 1. Nennspannung (V): | Siehe Typenschild | 4. Entladeschlussspannung: | 1.70 Vpc |
| 2. Nennkapazität $C_5$: | Siehe Typenschild | 5. Nenntemperatur: | 30°C |
| 3. Nennentladestrom: | $C_5/5$ | | |


**1. Inbetriebnahme gefüllter Batterien**
Den polrichtigen Anschluss der Endkabel und den Festsitz der Schrauben von Steckern und Anschlussklemmen nachweisen: 10 ± 1 Nm.
Die Batterie laden (siehe Punkt 3).

**2. Betrieb der Batterie**
Bei Betrieb stets sicherstellen, dass die Lüftungsöffnungen nicht verschlossen oder verdeckt werden. Die Kontakte nur in stromlosem Zustand öffnen und schließen. Tiefentladungen von mehr als 80 % der Nennkapazität vermeiden. Tiefentladungen beeinträchtigen den störungsfreien Betrieb und die Lebensdauer der Batterie. Nach einer Entladephase muss die Batterie so rasch wie möglich wieder aufgeladen werden.

**3. Laden der Batterie**
Die Batterie nach jeder Arbeitsschicht wie folgt aufladen:
- Den Ladevorgang ausschließlich an einem dafür vorgesehenen, gut belüfteten Ort ausführen; siehe hierzu die Vorgaben der Norm DIN EN 50272-3.
- Den Deckel des Batteriefachs öffnen, die Verschlüsse der einzelnen Batteriezellen jedoch geschlossen halten.
- Die Batterie ausschließlich mit der dafür vorgesehenen Batterieladestation laden.
- Die Batterie polrichtig an das Ladegerät anschließen und den Ladevorgang starten.

**3.1 Ausgleichsladung**
Die Ausgleichsladung der Batterie muss **mindestens zweimal pro Monat** nach dem normalen Ladevorgang vorgenommen werden. Dies hilft, die Leistungsfähigkeit der Batterie zu erhalten und ist vor allem nach einem Betrieb mit Tiefentladungen oder unvollständigen Ladezyklen sehr sinnvoll.

**4. Elektrolyt (offene Batterie - VLA)**
Die Nenndichte des Elektrolyten bei 30 °C beträgt 1,29 ± 0,01 kg/l.

HINWEIS: Bei Temperaturen über 30 °C ist die Dichte des Elektrolyten geringer, bei Temperaturen unter 30 °C sie höher. Der Korrekturfaktor beträgt 0,0007 kg/l pro Grad Celsius.

Zum Beispiel entspricht eine bei 45 °C gemessene Dichte von 1,26 kg/l einer Dichte bei 30 °C von 1,27 kg/l.

**5. Temperatur**
Die Nenntemperatur des Elektrolyten beträgt 30 °C. Außer in Sonderfällen, die vorab vom Hersteller beurteilt und genehmigt werden, muss die Temperatur bei Betrieb im Bereich von +5 °C bis +45 °C liegen.
**HINWEIS: Hohe Temperaturen verkürzen die Lebensdauer der Batterie, niedrige Temperaturen mindern ihre Leistung.**

**6. Wartung**

**6.1. Tägliche Wartung**
Die Batterie nach einer Entladephase wieder aufladen.

**Offene Batterie - VLA:** Den Elektrolytstand stets nach einer Entladephase prüfen und nur bei Bedarf entmineralisiertes Wasser nachfüllen.

**6.2. Wöchentliche Wartung**
Eine Sichtprüfung der Batterie vornehmen und eine Ausgleichsladung durchführen.

**6.3. Vierteljährliche Wartung**
Den einwandfreien Festsitz der Schrauben an den Anschlussklemmen nachweisen; siehe hierzu Abschnitt 1.

**Offene Batterie - VLA:**
Nach einer Ausgleichsladung die Spannung und Elektrolytdichte jeder einzelnen Batteriezelle messen und notieren. Den Elektrolytstand sämtlicher Batteriezellen überprüfen.

**Batterien vom Typ VRLA:**
Nach einer Ausgleichsladung die Spannung jeder einzelnen Batteriezelle messen und notieren.

Im Fall erheblicher Abweichungen gegenüber der vorausgegangenen Überprüfung den Kundendienst kontaktieren. Die Batterie gewissenhaft säubern (siehe Punkt 7).

Prüfen, ob die Isolierung unbeschädigt ist.

**7. Reinigung**
Sauberkeit ist für einen einwandfreien Betrieb der Batterie äußerst wichtig. Daher den Deckel und sämtliche äußeren Komponenten der Batterie säubern und anschließend abtrocknen.

**8. Lagerung von Batterien**
Nicht verwendete Batterien staub- und frostfrei in einem geschlossenen und trockenen Raum lagern. Die erforderlichen Kontrollen und Nachladungen in monatlichen Abständen durchführen. Entladene Batterien, deren Spannung geringer als 2,05 Vpc ist, möglichst nicht länger als 2 Tage lagern. Vor längeren Standzeiten sind jeweils Volladungen durchzuführen.

**9. Störungen und Defekte**
Bei Störungen oder Defekten der Batterie umgehend den Kundendienst kontaktieren. Die aufgezeichneten Spannungs- und Dichtewerte (siehe Punkt 6.3) erleichtern und verkürzen die Fehlersuche.

**DER GARANTIEANSPRUCH ERLISCHT IN FOLGENDEN FÄLLEN:**
Nichteinhaltung dieser Betriebs- und Wartungsanleitung.
Eingriffe, die von nicht autorisiertem Personal vorgenommen werden.
Verwendung von Nicht-Original-Ersatzteilen.
Batterien des Typs VLA: Zugabe chemischer Stoffe zum Elektrolyten mit Ausnahme von entmineralisiertem Wasser.
Batterien des Typs VRLA: Entfernen der Ventile (Öffnen der Batterie).


ROBOPAC

## 10.5.EXIDE BATTERY DOCUMENTATION

Shown below are the directions for use provided directly by the manufacturer of the commercial device, standard or optional, installed on the machine.
The language of such documentation may not correspond to that in which the machine's directions for use are written.

81700679

# Classic drysafe

Sonnenschein

EXIDE TECHNOLOGIES INDUSTRIAL ENERGY

## Lead acid bloc batteries with positive flat plates (GiS) and positive tubular plates (PzS)
## Range: FF and FT
## Maintenance free lead acid bloc batteries with positive flat plates (GiV)
## Range: GF-V, GF-Y, AF-X, AF-Z, AS, df-V und df-Y
## Operating Instructions
## Traction batteries

**Rating data**

- Nominal capacity $C_5$ :see type plate
- Nominal voltage $U_N$ :see type plate
- Nominal current $I_N=I_5$ :$C_N$/5h
- Nominal S.G. of electrolyte*
  - Type GiS-Bloc :1,28 kg/l
  - Type PzS-Bloc :1,29 kg/l
  - Type GiV-Bloc :the electrolyte is immobilised, the density of the electrolyte can not be measured
- Rated temperature :30° C
- Nominal electrolyte level** :up to electrolyte level mark "max." or cover at least the separators

* Will be reached within the first 10 cycles.

** GiV batteries are valve-regulated batteries (VRLA) with an immobilised electrolyte, where a water refilling isn't permitted during the whole battery life. Instead of vent plugs, valves are used, which will be destroyed when they are opened. When operating valve-regulated lead-acid batteries the same safety requirements as for vented cells apply to protect against hazards from electric current, from explosion of electrolytic gases and, in case of the cell container is damaged, from the corrosive electrolyte.

- Pay attention to the "instructions for use" and fix them close to the battery.
- Work on the battery should only be carried out by qualified personnel.

- Use protective glasses and clothes when working on batteries. Pay attention to the accident prevention rules as well as EN 50272-3, EN 50110-1.

- No smoking! Do not expose batteries to naked flames, glowing embers or sparks, as it may cause the battery to explode.

- Keep children away from batteries!

- Acid splashes in the eyes or on the skin must be washed with water. In case of accident consult a doctor immediately.
- Clothing contaminated by acid should be washed in water

- Risk of explosion and fire, avoid short circuits.

- Electolyte is highly corrosive.
- In the normal operation of GiV batteries a contact with acid isn't possible. If the cell containers are damaged, the immobilised electrolyte (gelled sulphuric acid) is corrosive like the liquid electrolyte.

- Do not spin battery!
- Ensure secure installation. Use only suitable handling equipment e.g. lifting gear in accordance with VDI 3616. Avoid damage to the batteries, connectors or end cables with the lifting equipment.

- Dangerous electrical voltage! Caution! Metal parts of the battery are always alive. Do not place tools or other metal objects on the battery.

**Ignoring the operation instructions, repair with non-original parts or using additives for the electrolyte will render the warranty void.**

Spent batteries have to be collected and recycled separately from normal household wastes (EWC 160601). The handling of spent batteries is described in the EU Battery Directive (91/157/EEC) and their national transitions (UK: HS Regulation 1994 No. 232, Ireland: Statory Instrument No. 73/2000). Contact your supplier to agree upon the recollection and recycling of your spent batteries or contact a local and authorized Waste Management Company.

### 1. Commissioning filled and charged batteries

The battery should be inspected to ensure it is in perfect physical condition. Before installing the battery compartment has to be cleaned. Only blocks with the same state of discharge (the same voltage, tolerance like the following table) have to be connected together.

| Nominal bloc voltage [V] | Max. tolerance from average value – $\Delta U_{Bloc}$ [V] |
|---|---|
| 2 | ±0.020 |
| 4 | ±0.028 |
| 6 | ±0.035 |
| 8 | ±0.040 |
| 12 | ±0.049 |

The battery end cables must have a good contact to terminals, check that the polarity is correct. Otherwise battery, vehicle or charger could be destroyed. After connecting cover the end poles with grease as external corrosion protection.

The level of the electrolyte must be checked. If it is below the electrolyte level mark " min." or the top of the separator, it must first be topped up to this height with purified water ***(only GiS/ PzS-batteries)***.

The battery is then charged as in item 2.2.

The electrolyte should be topped up to the specified level with purified water (DIN 43530 part 4). ***(only GiS/ PzS-batteries)***.

The specified torque loading for the pole screws of the end cables and connectors are:

| Terminal | Nomen-clature | Tightening Torque Value |
|---|---|---|
| EN (A) conical | - | 8 ± 1Nm |
| Flat M5 (G5) / M6 (G6) | F / G | 5 / 6 ± 1Nm |
| Screw type (male) M8 / M10 | M / N | 11 / 17 ± 1Nm |
| Screw type (female) M6 / M8 / M10 | O / P* / Q | 8 / 20 / 20 ± 1Nm |
| WNT 3/8˝-16 , 5/16˝-18 | W | 16 ± 1Nm |
| Combination of EN (A) conical and Stud 3/8˝ | R | 8 ± 1 Nm<br>16 ± 1Nm |

*Exception GF 06 095 V P4:
➪ Tightening Torque = 12 ± 1Nm

Example for description: GF 06 180 V P
➪ Screw type terminal (female) M8
➪ Tightening Torque = 20 ± 1Nm

**For commissioning of unfilled GiS/PzS-batteries see separate instructions.**

## 2. Operation

EN 50272-3 "Traction batteries for industrial trucks" is the standard, which applies to the operation traction batteries in industrial trucks.

### 2.1 Discharging

Ventilation openings must not be sealed or covered.
Electrical connections (e.g. plugs) must only be made or broken in the open circuit condition.
To achieve the optimum life for the battery, operating discharges of more than 80% of the rated capacity should be avoided (deep discharge).
This corresponds to an electrolyte specific gravity of 1.13 kg/l at the end of the discharge ***(only GiS/ PzS-batteries)***.
To measure the state of discharge use only the battery manufacturer recommended discharge indicators.
Discharged batteries must be recharged immediately and must not be left discharged. This also applies to partially discharged batteries. Otherwise the life of battery will be reduced.

### 2.2 Charging

Only direct current must be used for charging. All charging procedures in accordance with DIN 41773 and DIN 41774 are permitted.
For ***GiV-batteries*** these charging procedures must only be applied in the manufacturer approved modifications. Therefore only battery manufacturer approved chargers must be used.
Only connect the battery assigned to a charger, suitable for the size of battery, in order to avoid overloading of the electric cables and contacts and unacceptable gassing of the cells.
**GiV-batteries have a low gas emission.**
In the gassing stage the current limits given in EN 50272-3 must not be exceeded. If the charger was not purchased together with the battery it is best to have its suitability checked by the manufacturers service department.
When charging, proper provision must be made for venting of the charging gases. Battery container lids and the covers of battery compartments must be opened or removed. The vent plugs should stay on the cells and remain closed.
With the charger switched off connect up the battery, ensuring that the polarity is correct (positive to positive, negative to negative). Now switch on the charger.
When charging the temperature of the battery rises by about 10 K, so charging should only begin if the battery temperature is below 35° C ***(GiV)*** or 45° C ***(GiS/PzS)***. The electrolyte temperature of batteries should be at least + 15° C ***(GiV)*** or +10° C ***(GiS/PzS)*** before charging. Otherwise a full charge will not be achieved.
For ***GiS/PzS-batteries*** a charge is finished when the specific gravity of the electrolyte and the battery voltage have remained constant for two hours.
For ***GiV-batteries*** only regulated chargers are permitted. These chargers switch off automatically. Are the temperatures a longer time higher than 40° C or lower than 15° C, so the chargers need a temperatures regulated voltage. (Attend to instructions of battery manufacturer).

### 2.3 Equalising charge

Equalising charges are used to safeguard the life of the battery and to maintain its capacity. They are necessary after deep discharges, repeated incomplete recharges and charges to an IU characteristic curve. Equalising charges are carried out following normal charging.
For equalising charge of ***GiV-batteries*** only battery manufacturer approved chargers must be used.
For ***GiS/PzS-batteries*** the charging current must not exceed 5 A/100 Ah of rated capacity (end of charge – see point 2.2).
**Watch the temperature!**

### 2.4 Temperature

An electrolyte temperature of 30° C is specified as the rated temperature. Higher temperatures shorten the life of the battery, lower temperatures reduce the capacity available.
45° C ***(GiV)*** or 55° C ***(GiS/PzS)*** is the upper temperature limit and is not acceptable as an operating temperature.
Therefore the batteries should not be left in directly sunlight.

### 2.5 Electrolyte

***GiV-Batteries:*** The electrolyte is immobilised. The density of the electrolyte cannot be measured.
***GiS/PzS-Batteries:*** The rated specific gravity (S. G.) of the electrolyte is related to a temperature of 30° C and the nominal electrolyte level in the cell in fully charged condition.
Higher temperatures reduce the specified gravity of the electrolyte, lower temperatures increase it. The temperature correction factor is -0.0007 kg/l per K, e.g. an electrolyte specific gravity of 1.28 kg/l at 45° C corresponds to an S.G. of 1.29 kg/l at 30° C. The electrolyte must conform to the purity regulations in DIN 43530-2.

## 3. Maintenance

**Do not refill with water in *GIV-Batteries!***

### 3.1 Daily

Charge the battery immediately after every discharge.

***GIS/PzS-batteries:*** Towards the end of charge the electrolyte level should be checked and if necessary topped up to the specified level with purified water. The electrolyte level must not fall below the top of the separator or the electrolyte "min" level mark.

### 3.2 Weekly

Visual inspection after recharging for signs of dirt and mechanical damage. If the battery is charged regularly with an IU characteristic curve an equalising charge must be carried out (see point 2.3).

### 3.3 Monthly *(only GiS/PzS-batteries)*

At the end of the charge the voltages of all cells or bloc batteries should be measured with the charger switched on, and recorded.
After charging has ended the specific gravity and the temperature of the electrolyte in all cells should be measured and recorded. If significant changes from earlier measurements or differences between the cells or bloc batteries are found further testing and maintenance by the service department should be requested.

### 3.4 Quarterly *(only GiV-batteries)*

After the end of the charge and a rest time of 5 h following should be measured and recorded:
- the voltages of the battery
- the voltages of every cells or blocs

If significant changes from earlier measurements or differences between the cells or bloc batteries are found, further testing and maintenance by the service department should be requested.

### 3.5 Annually (only for batteries in steel trays)

In accordance with EN 1175-1 at least once per year, an electrical specialist must check the insulation resistance of the truck and the battery.
The tests on the insulation resistance of the battery must be conducted in accordance with EN 1987-1.
The insulation resistance of the battery thus determined must not be below a value of 50 Ω per Volt of nominal voltage, in compliance with EN 50272-3.
For batteries up to 20 V nominal voltage the minimum value is 1000 Ω.

## 4. Care of the battery

The battery should always be kept clean and dry to prevent tracking currents. Cleaning must be done in accordance with the ZVEI code of practice "The Cleaning of Vehicle Traction batteries".

## 5. Storage

If batteries are taken out of service for a lengthy period they should be stored in the fully charged condition in a dry, frost-free room. To ensure the battery is always ready for use a choice of charging methods can be made:
- a quarterly ***(GiS/PzS)*** or a yearly ***(GiV)*** full charging like charge as in point 2.2. If any consumer is connected with, e.g. measure or controlling systems, it can be, that this charging is necessary every 14 days.
- float charging at a charging voltage of 2.25 V ***(GiS/PzS)*** or 2,3 V ***(GiV)*** x the number of cells.

The storage time should be taken into account when considering the life of the battery.

## 6. Malfunctions

If malfunctions are found on the battery or the charger our service department should be called without delay. The measurements taken in point 3.3 will facilitate fault finding and their elimination.
A service contract with us will make it easier to detect and correct faults in good time.

MXEBBOE00000304 · Hellersche Druckerei · Printed in Germany · Subject to change
81700679 2 II .05

State: September 2004

Deutsche EXIDE GmbH
Im Thiergarten
63654 Büdingen – Germany

Tel.: +49 (0) 60 42 / 81 454
Fax: +49 (0) 60 42 / 81 398

www.industrialenergy.exide.com

EXIDE TECHNOLOGIES
INDUSTRIAL ENERGY

# Operating Instructions

## Traction Batteries with Dry-Charged Cells

### ■ OPERATION

a) Open plugs.

b) Pour in the electrolyte at a temperature between 15° and 30° C, at a density of 1.270 1.280 kg/l. Make sure the level of the electrolyte is between 5 _ 7 mm above the height of the separators in each cell.

c) After approximately one hour, if necessary, top up the electrolyte level again, as it may have been partially absorbed by the plates.

d) Connect positive and negative poles to the rectifier. Make sure the polarity is correct.

e) Let the battery rest for about 4 hours, then charge at a current intensity about 1/10 of the rated capacity of battery, proceeding for the time required to reach a voltage of about 2,7 V in each cell, and a density of 1.280 1.290 kg/l at 25° C (approximately, from 5 to 15 hours, at most. For example: 24V - 480 Ah battery charging current 48 A).

f) The battery temperature must never exceed 45° C during charging. If this threshold is exceeded, gradually reduce the current intensity until an acceptable temperature is reached (around 30° C).

g) When charging is finished, the density of the electrolyte must be the same for each cell, and be between 1,280 1,290 kg/l, at 30° C.

h) Leave the plugs open during charging of the battery in order to allow any gasses to dissipate (oxygen and hydrogen).

i) Close the plugs and clean the upper part of the battery carefully.

l) The temperature of the environment affects the density of the electrolyte.

m) The temperature of the environment affects the Ah capacity supplied by the battery. Every increase or decrease with respect to 30° C affects the performance of the battery.

## 10.6.MIDAC BATTERY DOCUMENTATION

Shown below are the directions for use provided directly by the manufacturer of the commercial device, standard or optional, installed on the machine.
The language of such documentation may not correspond to that in which the machine's directions for use are written.

## NORMES POUR L'UTILISATION ET L'ENTRETIEN DES BATTERIES **FORCEblock** — FR

**Normes de référence:**
EN 50272-3 - CONDITIONS DE SÉCURITÉ REQUISES POUR LES BATTERIES D'ACCUMULATEURS ET LEUR INSTALLATION.

**Données de la batterie**

1. Tension nominale (V): voir étiquette
2. Capacité nominale $C_5$: voir étiquette
3. Courant nominal de décharge: $C_5/5$
4. Tension de fin de décharge: 1,70 Vpc
5. Température nominale: 30°C


**1. Installation de batteries chargées**
Vérifier la connexion correcte (polarité) des câbles et le serrage des vis: 10 +/- 1 Nm.
Recharger la batterie (voir point 3).

**2. Utilisation**
S'assurer que les fentes d'aération ne sont pas obstruées durant l'utilisation. Ne pas ouvrir ni ne fermer les contacts durant les phases de charge ou de décharge. Éviter les décharges profondes de plus de 60% de la capacité nominale. Les décharges profondes compromettent le bon fonctionnement et la durée de vie de la batterie. Après la phase de décharge, la batterie doit être rechargée dans les plus brefs délais.

**3. Charge**
À la fin de la période de travail, charger la batterie de la façon suivante:
- effectuer la charge dans des endroits exclusivement prévus à cet effet et bien aérés, conformément à la norme EN 50272-3:
- ouvrir le couvercle de l'emplacement réservé à la batterie.
  Les capots des différents éléments doivent rester fermés.
- charger les batteries exclusivement avec le chargeur défini à l'avance;
- brancher la batterie au chargeur en respectant les polarités et lancer la charge.

**3.1. Charge d'égalisation**
La charge d'égalisation, qui doit être effectuée **au moins deux fois par mois** à la fin de la charge normale, contribue à préserver l'efficacité de la batterie. Cette charge est particulièrement indiquée après des utilisations caractérisées par des décharges importantes ou des recharges incomplètes.

**4. Électrolyte (batteries ouvertes - VLA)**
La densité nominale de l'électrolyte, à 30°C, est de 1,29 +/- 0,01 kg/l.

N.B.: Les températures supérieures à 30°C réduisent la densité de l'électrolyte et les températures inférieures l'augmentent. Le facteur de correction est de 0,0007 kg/l par degré °C.

Ex.: à une densité de 1,26 kg/l. mesurée à la température de 45°C, correspond une densité de 1,27 kg/l à 30°C.

**5. Températures**
La température nominale est de 30°C et, sauf évaluation préalable spécifique, elle doit rester comprise entre 5°C et 45°C au cours du fonctionnement.
**N.B.: les hautes températures raccourcissent la durée de vie de la batterie tandis que les basses températures en réduisent l'efficacité.**

**6. Entretien**

**6.1. Quotidien**
Après une phase de décharge, recharger la batterie.

**Batteries ouvertes - VLA:** seulement après une période de recharge, vérifier le niveau de l'électrolyte et, si nécessaire, remettre à niveau avec de l'eau déminéralisée.

**6.2. Hebdomadaire**
Effectuer une inspection visuelle de la batterie et exécuter une charge d'égalisation.

**6.3. Trimestriel**
Vérifier le couple de serrage des vis des bornes comme expliqué dans le paragraphe 1.

**Batteries ouvertes - VLA:**
Au terme d'une phase de charge d'égalisation, contrôler et noter la tension et la densité de chaque élément de la batterie. Vérifier le niveau de l'électrolyte de tous les éléments.

**Batteries VRLA:**
Au terme d'une phase de charge d'égalisation, vérifier et noter la tension de chaque élément de la batterie.

En cas de fortes variations par rapport à la vérification précédente, contacter le service après-vente. Nettoyer soigneusement la batterie (voir point 7).

Vérifier le bon état de l'isolation.

**7. Nettoyage**
Le nettoyage de la batterie est particulièrement important pour son bon fonctionnement. Il est donc nécessaire de nettoyer et de sécher soigneusement les couvercles et toutes les parties externes.

**8. Batteries stockées**
Les batteries non utilisées doivent être stockées dans un endroit couvert, à l'abri de l'humidité, de la poussière et du gel. Effectuer des contrôles et des recharges périodiques, au moins une fois par mois. Il est recommandé de ne jamais laisser les batteries déchargées plus de 2 jours avec une tension inférieure à 2,05 Vpc, et d'effectuer des charges complètes avant de longues périodes d'inactivité.

**9. Mauvais fonctionnements et défauts**
En cas de mauvais fonctionnements ou de défauts de la batterie, contacter immédiatement le service après-vente. Les valeurs de tension et de densité relevées (voir point 6.3) seront utiles afin d'identifier l'anomalie.

**LA GARANTIE EST ANNULÉE EN CAS DE/D':**

Non-respect des présentes instructions pour l'utilisation et l'entretien.
Interventions effectuées par du personnel non autorisé.
Utilisation de composants non d'origine.
Batteries ouvertes: adjonctions de substances chimiques dans l'électrolyte autres que l'eau déminéralisée.
Batteries VRLA: enlèvement des vannes (ouverture de la batterie).


## NORMAS DE USO Y MANTENIMIENTO DE BATERÍAS TIPO **FORCEblock** — ES

**Referencias normativas:**
EN 50272-3 - REQUISITOS DE SEGURIDAD PARA BATERÍAS DE ACUMULADORES Y SUS INSTALACIONES.

**Datos batería**

1. Tensión nominal (V): ver etiqueta
2. Capacidad nominal $C_5$: ver etiqueta
3. Corriente nominal de descarga: $C_5/5$
4. Tensión de fin de descarga: 1.70 Vpc
5. Temperatura nominal: 30°C


**1. Instalación de baterías cargadas**
Verificar la correcta conexión (polaridad) de los cables terminales y el apriete de los tornillos: 10±1 Nm.
Proceder a la carga de la batería (ver el punto 3).

**2. Uso**
Asegurarse de que durante el uso las aberturas de aireación no estén obstruidas. No abrir o cerrar contactos durante las fases de carga y descarga. Evitar las descargas profundas, superiores al 80% de la capacidad nominal. Las descargas profundas perjudican el buen funcionamiento y la duración de la batería. Después de la descarga, la batería se debe recargar cuanto antes.

**3. Carga**
Al finalizar el turno de trabajo, cargar la batería de la siguiente manera:
- efectuar la carga en lugares destinados exclusivamente para tal fin y bien aireados, de conformidad con la norma EN 50272-3;
- abrir la tapa del alojamiento de la batería.
  Los tapones deben permanecer cerrados;
- efectuar la carga exclusivamente con el cargador previamente definido;
- conectar la batería al cargador respetando las polaridades y comenzar la carga.

**3.1. Carga de ecualización**
La carga de ecualización, que debe **efectuarse al menos dos veces al mes** al terminar la fase de carga normal, contribuye a mantener la eficiencia de la batería y es particularmente indicada después del uso con descargas profundas o con recargas incompletas.

**4. Electrolito (baterías de tipo abierto - VLA)**
La densidad nominal del electrolito a 30°C es 1,29 ± 0,01 kg/L.

Nota: Las temperaturas superiores a 30°C reducen la densidad del electrolito y las temperaturas inferiores la aumentan. El factor de corrección es de 0,0007 kg/L por grado °C.

Ej.: a una densidad de 1,26 kg/L detectada a una temperatura de 45°C corresponde una densidad de 1,27 kg/L a 30°C.

**5. Temperaturas**
La temperatura nominal es de 30°C y debe estar comprendida entre +5°C y +45°C durante el funcionamiento.
**Nota: Las temperaturas demasiado elevadas acortan la duración de la batería y las temperaturas demasiado bajas reducen su eficiencia.**

**6. Mantenimiento**

**6.1. Diario**
Después de una fase de descarga, recargar la batería.

**Baterías de tipo abierto - VLA:** sólo después de una fase de recarga, verificar el nivel del electrolito y, si es necesario, rellenar con agua desmineralizada.

**6.2. Semanal**
Realizar una inspección visual de la batería y efectuar una carga de ecualización.

**6.3. Trimestral**
Controlar el par de apriete de los tornillos de los terminales tomando como referencia el apartado 1.

**Baterías de tipo abierto - VLA:**
al final de una fase de carga de ecualización verificar y anotar la tensión y la densidad de cada elemento de la batería. Verificar el nivel del electrolito de todos los elementos.

**Baterías tipo VRLA:**
al final de una fase de carga de ecualización verificar y anotar la tensión de cada elemento de la batería.

En caso de variaciones considerables respecto de la verificación anterior, contactar con el servicio de asistencia. Limpiar bien la batería (ver el punto 7).

Verificar la integridad del aislamiento.

**7. Limpieza**
La limpieza de la batería es particularmente importante para su buen funcionamiento. Por lo tanto, es necesario secar y limpiar bien las tapas y todas las partes externas.

**8. Baterías en almacén**
Las baterías no utilizadas se deben guardar en un ambiente cubierto, seco, no polvoriento y protegido de las heladas. Realizar controles y recargas periódicamente, al menos cada mes. Se recomienda no dejar las baterías más de 2 días descargadas o con una tensión inferior a 2,05 Vpc y efectuar cargas completas antes de largos períodos de inactividad.

**9. Desperfectos de funcionamiento y defectos**
En caso de desperfectos de funcionamiento o defectos en la batería, contactar inmediatamente con el servicio de asistencia. Los valores de tensión y densidad observados (ver el punto 6.3) serán útiles para identificar el fallo.

**LA GARANTÍA QUEDA SIN EFECTO EN CASO DE:**

Incumplimiento de estas instrucciones de uso y mantenimiento.
Intervenciones de personal no autorizado.
Empleo de componentes no originales.
baterías VLA: añadido al electrolito de cualquier sustancia química que no sea agua desmineralizada;
baterías VRLA: desmontaje de las válvulas (apertura de la batería).


**FORCEblock MIDAC**

IT EN DE FR ES

5011690

ROBOPAC

## NORME PER L'UTILIZZO E LA MANUTENZIONE DI BATTERIE TIPO **FORCEblock** — IT

**Riferimenti normativi:**
EN 50272-3 - REQUISITI DI SICUREZZA PER BATTERIE DI ACCUMULATORI E LORO INSTALLAZIONI.

**Dati batteria**

| | | | |
|---|---|---|---|
| 1. Tensione nominale (V): | vedi etichetta | 4. Tensione di fine scarica: | 1.70 Vpc |
| 2. Capacità nominale $C_5$: | vedi etichetta | 5. Temperatura nominale: | 30°C |
| 3. Corrente nominale di scarica: | $C_5/5$ | | |


**1. Installazione di batterie cariche**
Verificare il corretto collegamento (polarità) dei cavi terminali ed il serraggio delle viti: 10±1 Nm.
Procedere alla carica della batteria (vedi punto 3).

**2. Utilizzo**
Accertarsi che durante l'utilizzo le aperture d'areazione non siano ostruite. Non aprire o chiudere contatti durante le fasi di carica o scarica. Evitare scariche profonde, oltre l'80% della capacità nominale. Le scariche profonde pregiudicano il buon funzionamento e la durata della batteria. Dopo la fase di scarica la batteria deve essere quanto prima ricaricata.

**3. Carica**
Al termine del turno lavorativo, caricare la batteria come segue:
- effettuare la carica in luoghi esclusivamente a ciò destinati e ben areati, in conformità alla norma EN 50272-3;
- aprire il coperchio del vano batteria. I tappi dei singoli elementi devono rimanere chiusi;
- eseguire la carica esclusivamente con il carica batteria preventivamente definito;
- collegare la batteria al caricabatteria rispettando le polarità ed iniziare la carica.

**3.1. Carica di equalizzazione**
La carica di equalizzazione, che deve essere eseguita **almeno due volte al mese** al termine della normale fase di carica, contribuisce a mantenere efficiente la batteria ed è particolarmente indicata dopo utilizzi con scariche profonde o ricariche incomplete.

**4. Elettrolito (batterie tipo aperto - VLA)**
La densità nominale dell'elettrolito, riferita a 30°C è 1,29 ± 0.01 kg/L.

N.B.: Temperature superiori a 30°C riducono la densità dell'elettrolito e temperature inferiori la aumentano. Il fattore di correzione è di 0,0007 kg/L per grado °C.

Es. ad una densità di 1,29 kg/L, rilevata alla temperature di 45°C, corrisponde una densità di 1,27 kg/L a 30°C.

**5. Temperature**
La temperatura nominale è di 30°C e, salvo specifica valutazione preventiva, deve rimanere compresa tra +5°C e +45°C durante l'esercizio.
**N.B.: Temperature elevate accorciano la durata della batteria e temperature basse ne diminuiscono l'efficienza.**

**6. Manutenzione**

**6.1. Giornaliera**
Dopo una fase di scarica, ricaricare la batteria.

**Batterie tipo aperto - VLA:** esclusivamente dopo una fase di ricarica, verificare il livello dell'elettrolito e solo se necessario rabboccare con acqua demineralizzata.

**6.2. Settimanale**
Procedere ad un ispezione visiva della batteria ed eseguire una carica di equalizzazione.

**6.3. Trimestrale**
Controllare la coppia di serraggio sulle viti dei terminali in riferimento al paragrafo 1.

**Batterie tipo aperto - VLA:**
alla fine di una fase di carica di equalizzazione verificare ed annotare la tensione e la densità di ogni singolo elemento della batteria. Verificare il livello dell'elettrolito, di tutti gli elementi.

**Batterie tipo VRLA:**
alla fine di una fase di carica di equalizzazione verificare ed annotare la tensione di ogni singolo elemento della batteria.

In caso di considerevoli variazioni rispetto alla verifica precedente, contattare il servizio assistenza. Eseguire un'accurata pulizia della batteria (vedi punto 7.).

Verificare l'integrità dell'isolamento.

**7. Pulizia**
La pulizia della batteria è particolarmente importante per il suo buon funzionamento ed è pertanto necessario asciugare e pulire con cura i coperchi e tutte le parti esterne.

**8. Batterie a magazzino**
Le batterie non utilizzate devono essere mantenute in ambiente coperto, asciutto, non polveroso ed al riparo del gelo. Eseguire dei controlli e delle ricariche periodicamente, con frequenza almeno mensile. Si raccomanda di non lasciare mai per più di 2 giorni le batterie scariche, con tensione inferiore a 2,05 Vpc, o di eseguire cariche complete prima di lunghi periodi di inattività.

**9. Malfunzionamenti e difetti**
Qualora fossero riscontrati malfunzionamenti o difetti nella batteria, contattare immediatamente il servizio assistenza. I valori di tensione e densità rilevati (vedi punto 6.3) saranno utili per individuare il guasto.

**LA GARANZIA DECADE NEL CASO DI:**
Mancato rispetto delle presenti istruzioni d'uso e manutenzione.
Interventi effettuati da personale non autorizzato.
Impiego di componenti non originali.
batterie VLA: aggiunte all'elettrolito di qualsiasi sostanza chimica ad eccezione di acqua demineralizzata;
batterie VRLA: rimozione delle valvole (apertura della batteria).

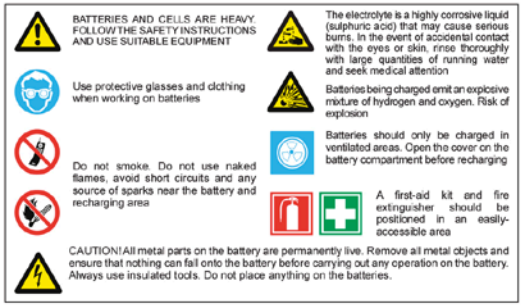
Pb

## INSTRUCTIONS FOR THE USE AND MAINTENANCE OF **FORCEblock** BATTERIES — EN

**Reference standards:**
EN 50272-3 - SAFETY REQUIREMENTS FOR BATTERIES AND BATTERY INSTALLATIONS.

**Battery specifications**

| | | | |
|---|---|---|---|
| 1. Nominal voltage (V): | see label | 4. End of discharge voltage: | 1.70 Vpc |
| 2. Nominal capacity $C_5$: | see label | 5. Nominal temperature: | 30°C |
| 3. Nominal discharge current: | $C_5/5$ | | |




**1. Installing charged batteries**
Check that the terminal cables are correctly connected (polarity), and that the bolts are tightened: 10±1 Nm.
Start charging the battery (see point 3).

**2. Use**
Make sure the air vents do not become obstructed during use. Do not open or close the contacts during charging or discharging. Avoid deep discharges greater than 80% of nominal capacity. Deep discharges compromise battery operation and shorten battery life. The battery should be recharged as soon as possible following discharge.

**3. Charging**
At the end of the work shift, charge the battery as follows:
- only charge the batteries in well ventilated areas dedicated to this purpose, in compliance with Standard EN 50272-3;
- open the cover of the battery compartment. The caps on the individual cells should be left closed;
- only charge the batteries using the battery charger defined in advance;
- connect the battery to the battery charger observing the correct polarity and begin charging.

**3.1. Equalize charge**
The equalize charge should be carried out **at least twice a month** following the normal charging cycle. It contributes to maintaining the battery's efficiency and is particularly recommended following use with deep discharges or incomplete recharging cycles.

**4. Electrolyte (open batteries - VLA)**
The nominal density of the electrolyte at 30°C is 1.29 ± 0.01 kg/L.

N.B. Temperatures higher than 30°C reduce the density of the electrolyte and lower temperatures increase it. The correction factor is 0.0007 kg/L per degree °C.

E.g. a density of 1.26 kg/L, measured at a temperature of 45°C, corresponds with a density of 1.27 kg/L at 30°C.

**5. Temperature**
The nominal temperature of the electrolyte is 30°C and should remain between +5°C and +45°C during operation, except in the event of a specific prior assessment.
**N.B. High temperatures shorten battery life and low temperatures reduce battery efficiency.**

**6. Maintenance**

**6.1. Daily**
Recharge the battery following a discharge cycle.

**Open batteries - VLA:** check the electrolyte level only following a charge cycle, top up with demineralised water only if necessary.

**6.2. Weekly**
Visually inspect the battery and carry out an equalize charge.

**6.3. Quarterly**
Check the tightening torque of all the terminal bolts as described in paragraph 1.

**Open batteries - VLA:**
Check and note down the voltage and density of each individual battery cell at the end of an equalize charge cycle. Check the electrolyte level of all cells.

**VRLA batteries:**
Check and note down the voltage of each individual battery cell at the end of an equalize charge cycle.

Contact the assistance service in the event of significant variations with respect to the previous inspection. Thoroughly clean the battery (see point 7.).

Check the condition of the insulation.

**7. Cleaning**
Cleaning the battery is particularly important for good battery operation. All external parts and covers should therefore be dried and cleaned with care.

**8. Storing batteries**
Batteries not being used should be stored in a covered environment that is dry, free of dust and protected against frost. Carry out periodical checks and recharge cycles, at least once a month. Never leave batteries discharged or with the voltage lower than 2.05 Vpc for more than 2 days. Always carry out a full charging cycle before any long periods of inactivity.

**9. Malfunctions and faults**
Contact the assistance service immediately in the event of battery malfunctions or faults. Take voltage and electrolyte density readings (see point 6.3) to help identify the fault.

**THE WARRANTY IS INVALIDATED IN THE EVENT OF:**
Failure to comply with these instructions for use and maintenance.
Operations carried out by unauthorised personnel.
The use of non-original components.
VLA batteries: the addition to the electrolyte of any chemical substances other than demineralised water;
VRLA batteries: removal of the valves (opening the battery).

Pb

## BETRIEBS- UND WARTUNGSANLEITUNG FÜR BATTERIEN DES TYPS **FORCEblock** — DE

**Normenbezug:**
DIN EN 50272-3 - SICHERHEITSANFORDERUNGEN AN BATTERIEN UND BATTERIEANLAGEN.

**Kennwerte der Batterie**

| | | | |
|---|---|---|---|
| 1. Nennspannung (V): | Siehe Typenschild | 4. Entladeschlussspannung: | 1,70 Vpc |
| 2. Nennkapazität $C_5$: | Siehe Typenschild | 5. Nenntemperatur: | 30°C |
| 3. Nennentladestrom: | $C_5/5$ | | |


**1. Inbetriebnahme gefüllter Batterien**
Den polrichtigen Anschluss der Endkabel und den Festsitz der Schrauben von Steckern und Anschlussklemmen nachweisen: 10 ± 1 Nm.
Die Batterie laden (siehe Punkt 3).

**2. Betrieb der Batterie**
Bei Betrieb stets sicherstellen, dass die Lüftungsöffnungen nicht verschlossen oder verdeckt werden. Die Kontakte nur in stromlosem Zustand öffnen und schließen. Tiefentladungen von mehr als 80 % der Nennkapazität vermeiden. Tiefentladungen beeinträchtigen den störungsfreien Betrieb und die Lebensdauer der Batterie. Nach einer Entladephase muss die Batterie so rasch wie möglich wieder aufgeladen werden.

**3. Laden der Batterie**
Die Batterie nach jeder Arbeitsschicht wie folgt aufladen:
- Den Ladevorgang ausschließlich an einem dafür vorgesehenen, gut belüfteten Ort ausführen; siehe hierzu die Vorgaben der Norm DIN EN 50272-3.
- Den Deckel des Batteriefachs öffnen, die Verschlüsse der einzelnen Batteriezellen jedoch geschlossen halten.
- Die Batterie ausschließlich mit der dafür vorgesehenen Batterieladestation laden.
- Die Batterie polrichtig an das Ladegerät anschließen und den Ladevorgang starten.

**3.1 Ausgleichsladung**
Die Ausgleichsladung der Batterie muss **mindestens zweimal pro Monat** nach dem normalen Ladevorgang vorgenommen werden. Dies hilft, die Leistungsfähigkeit der Batterie zu erhalten und ist vor allem nach einem Betrieb mit Tiefentladungen oder unvollständigen Ladezyklen sehr sinnvoll.

**4. Elektrolyt (offene Batterie - VLA)**
Die Nenndichte des Elektrolyten bei 30 °C beträgt 1,29 ± 0,01 kg/l.

HINWEIS: Bei Temperaturen über 30 °C ist die Dichte des Elektrolyten geringer, bei Temperaturen unter 30 °C ist sie höher. Der Korrekturfaktor beträgt 0,0007 kg/l pro Grad Celsius.

Zum Beispiel entspricht eine bei 45 °C gemessene Dichte von 1,26 kg/l einer Dichte bei 30 °C von 1,27 kg/l.

**5. Temperatur**
Die Nenntemperatur des Elektrolyten beträgt 30 °C. Außer in Sonderfällen, die vorab vom Hersteller beurteilt und genehmigt werden, muss die Temperatur bei Betrieb im Bereich von +5 °C bis +45 °C liegen.
**HINWEIS: Hohe Temperaturen verkürzen die Lebensdauer der Batterie, niedrige Temperaturen mindern ihre Leistung.**

**6. Wartung**

**6.1. Tägliche Wartung**
Die Batterie nach einer Entladephase wieder aufladen.

**Offene Batterie - VLA:** Den Elektrolytstand stets nach einer Entladephase prüfen und nur bei Bedarf entmineralisiertes Wasser nachfüllen.

**6.2. Wöchentliche Wartung**
Eine Sichtprüfung der Batterie vornehmen und eine Ausgleichsladung durchführen.

**6.3. Vierteljährliche Wartung**
Den einwandfreien Festsitz der Schrauben an den Anschlussklemmen nachweisen; siehe hierzu Abschnitt 1.

**Offene Batterie - VLA:**
Nach einer Ausgleichsladung die Spannung und Elektrolytdichte jeder einzelnen Batteriezelle messen und notieren. Den Elektrolytstand sämtlicher Batteriezellen überprüfen.

**Batterien vom Typ VRLA:**
Nach einer Ausgleichsladung die Spannung jeder einzelnen Batteriezelle messen und notieren.

Im Fall erheblicher Abweichungen gegenüber der vorausgegangenen Überprüfung den Kundendienst kontaktieren. Die Batterie gewissenhaft säubern (siehe Punkt 7).

Prüfen, ob die Isolierung unbeschädigt ist.

**7. Reinigung**
Sauberkeit ist für einen einwandfreien Betrieb der Batterie äußerst wichtig. Daher den Deckel und sämtliche äußeren Komponenten der Batterie säubern und anschließend abtrocknen.

**8. Lagerung von Batterien**
Nicht verwendete Batterien staub- und frostfrei in einem geschlossenen und trockenen Raum lagern. Die erforderlichen Kontrollen und Nachladungen in monatlichen Abständen durchführen. Entladene Batterien, deren Spannung geringer als 2,05 Vpc ist, möglichst nicht länger als 2 Tage lagern. Vor längeren Standzeiten sind jeweils Volladungen durchzuführen.

**9. Störungen und Defekte**
Bei Störungen oder Defekten der Batterie umgehend den Kundendienst kontaktieren. Die aufgezeichneten Spannungs- und Dichtewerte (siehe Punkt 6.3) erleichtern und verkürzen die Fehlersuche.

**DER GARANTIEANSPRUCH ERLISCHT IN FOLGENDEN FÄLLEN:**
Nichteinhaltung dieser Betriebs- und Wartungsanleitung.
Eingriffe, die von nicht autorisiertem Personal vorgenommen werden.
Verwendung von Nicht-Original-Ersatzteilen.
Batterien des Typs VLA: Zugabe chemischer Stoffe zum Elektrolyten mit Ausnahme von entmineralisiertem Wasser.
Batterien des Typs VRLA: Entfernen der Ventile (Öffnen der Batterie).

Pb

ROBOPAC

# EC DECLARATION OF CONFORMITY

(Annex IIA DIR. 2006/42/EC)

**Robopac S.p.A.**
Via Fabrizio da Montebello, 81 - 47892
Gualdicciolo Republic of San Marino

## DECLARES THAT THE MACHINE

ROBOPAC

**ROBOPAC MACHINERY**
**Robopac** S.p.A.
Via Fabrizio da Montebello, 81
47892 – Gualdicciolo
Repubblica di San Marino
http://www.robopac.com/

CE

| | | |
|---|---|---|
| DENOMINAZIONE<br>DENOMINATION | | |
| MODELLO<br>MODEL | | |
| MATRICOLA<br>SERIAL NUMBER | | |
| DATA<br>DATE OF MANUF. | | |
| ALIMENTAZIONE<br>SUPPLY VOL. | | [V] |
| FREQUENZA<br>FREQUENCY | | [HZ] |
| N° FASI<br>PHASE | | |
| ASSORBIMENTO<br>ABSORPTION | | [A] |
| POTENZA TOT.<br>TOTAL POWER | | [kW] |
| CONSUMO ARIA<br>AIR CONSUMPTION | | [nl/min] |
| PRESSIONE MAX<br>MAX PRESSURE | | [bar] |
| PESO<br>WEIGHT | | [kg] |

## IS IN CONFORMITY WITH DIRECTIVES

DIRECTIVE 2006/42/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 17 May 2006 on machinery, and amending Directive 95/16/EC.
DIRECTIVE 2014/30/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 26 February 2014 on the harmonisation of the laws of the Member States relating to electromagnetic compatibility.

**Reference to harmonised standards and their annexes, at the applicable points:**
EN ISO 12100:2010, EN 60204-1:2006/A1:2009, EN 415-5:2010, EN 415-6:2013, EN 415-10:2014.

## THE PERSON AUTHORISED TO DRAFT THE TECHNICAL BOOKLET IS

**Ing. Pierangelo Laghi - R&D Manager** — **c/o Aetna Group S.p.A.**

**S. P. Marecchia, 59** — **47826 Villa Verucchio** — **Rimini, Italy**

**Document date and place** — **Ing. Pierangelo Laghi - R&D Manager**

**San Marino,** — **Signature**

ROBOPAC MACHINERY
**Robopac S.p.A.**
Via Fabrizio da Montebello, 81
47892 Gualdicciolo
Repubblica di San Marino

tel. (+378) 0549 910511
robopacmachinery@robopac.com
www.robopac.com

Decreto Riconoscimento del 05/12/1983
Capitale Sociale € 1.000.000 Cod. Op. Ec. 02346