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**ING. O. FIORENTINI S.p.A.**  
**INDUSTRIAL CLEANING MACHINES**

**SCRUBBER MACHINE**  
**Mod. ECOSMALL**



**OPERATING AND MAINTENANCE**  
**MANUAL**

## Congratulations on your choice!

Thank you for having chosen to purchase a product by **FIorentini S.p.A.**, a world-leading manufacturer and distributor of industrial cleaning machines.

Our long-standing experience and acquired know-how are the best guarantee of the technical quality of your purchase; all our products are built from top quality materials to ensure maximum reliability, sturdiness and functionality and to meet the requirements of even the most demanding customers. **FIorentini** was recently granted the quality system certificate to certify compliance with the requirements of **UNI EN ISO 9001**.

Feel free to contact us with any technical or commercial inquiry; we will be happy to supply any details and information that you may need.

## CONTENTS

<b>1. GENERAL INFORMATION</b>	
1.1. Symbols used.....page	4
1.2. Notes.....	4
1.3. Consulting the manual.....	4
1.4. Warranty.....	4
1.5. Declaration of Conformity.....	5
<b>2. MACHINE CHARACTERISTICS AND TECHNICAL DATA</b>	
2.1. Identification.....	7
2.2. Description and components.....	7
2.3. Technical data sheet.....	9
<b>3. SAFETY</b>	
3.1. Recommended machine use.....	10
3.2. Misuse.....	10
3.3. Recommended equipment.....	10
3.4. Operator qualifications.....	11
3.5. Safety and warning devices.....	11
3.6. Safety systems.....	12
3.7. Safety diagnostic signalling.....	12
3.8. Residual dangers.....	14
3.9. Safety signs.....	15
<b>4. START-UP AND OPERATION INSTRUCTIONS</b>	
4.1. Transport and handling.....	18
4.2. Storage.....	19
4.3. Machine unpacking.....	19
4.4. Unpacked machine handling.....	19
4.5. Installation.....	20
4.5.1. Battery installation.....	20
4.5.2. Battery charger installation.....	20
4.6. Control and monitoring devices.....	21
4.6.1. Control panel.....	21
4.7. Operation.....	22
4.7.1. Machine preparation and start-up.....	22
4.7.2. Choosing the right detergent.....	23
4.7.3. Control levers.....	23
4.7.4. Squeegee adjustment.....	24
4.7.5. Water draining.....	25
4.7.6. Brushes replacement.....	26
4.7.7. Squeegee replacement.....	27
4.7.8. Squeegee blades replacement (Machine with two brushes).....	29
4.7.9. Brush deck belt replacement (Machine with two brushes).....	30

**5. MAINTENANCE**

5.1. Routine maintenance table.....	31
5.2. Battery maintenance.....	31
5.2.1. Hydrometrics.....	32
5.2.2. Water topping-up .....	32
5.2.3. Charge limits.....	32
5.2.4. Standby or inactive batteries .....	32
5.2.5. Battery charger technical features.....	32
5.2.6. Battery disposal.....	33
5.3. Motor maintenance .....	33
5.3.1. Suction motor maintenance.....	33
5.3.2. Brush motor maintenance .....	35
5.3.3. Drive motor maintenance .....	36
5.4. Wiring system checks.....	37
5.5. Inspection summary table.....	37
5.6. Maintenance log.....	38

**6. TECHNICAL ASSISTANCE**

6.1. Technical assistance contact information.....	39
6.2. Claim report .....	39

## 1. GENERAL INFORMATION

### 1.1. SYMBOLS USED

	<i>This symbol is used to alert the operator to important procedures or precautions to be followed in order to prevent damages to users or the machine</i>
	<i>This symbol is used to alert the operator to important general information.</i>

### 1.2. NOTES

	<p><b>FIorentini S.p.A.</b> is the owner of this manual. The reproduction of all or part of this manual or its transmission to third parties by any mechanical or electronic system or otherwise is forbidden without a written authorisation by the manufacturer. This manual is supplied to the customers in a single original copy unless otherwise specified at the time of ordering.</p> <p><i>This manual is supplied as an integral part of the machine and if the machine is transferred to a new owner, this manual should also be transferred. This manual should be stored at a safe location throughout the machine working life. The purchaser is responsible for making this manual available to all users. If this manual is lost, a duplicate should be obtained from FIORENTINI.</i></p> <p><i>FIorentini S.p.a. will not be held responsible for any damages to persons and/or property resulting from failure to comply with the instructions in this manual.</i></p> <p><i>FIorentini reserves the right to introduce any required technical and commercial changes without giving any notice. Therefore, any data and information contained in this manual may be changed and/or updated.</i></p>
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### 1.3. CONSULTING THE MANUAL

This manual deals exhaustively with all the issues considered necessary for an easy and safe use of the machine, in compliance with European Directives on product safety.

We therefore suggest to all authorised operators to carefully read this manual throughout and contact FIORENTINI in case of any doubt. This manual should also be used for reference whenever there are doubts concerning a procedure or operation to carry out or to train new operators.

In print, pictures and drawings can look slightly different from actual machine parts, without however being perceived as confusing.

Special symbols and **bold** and/or *italic* fonts are used to highlight important information, particularly concerning safety.

The current revision code is indicated in the bottom left corner of every page.

### 1.4. WARRANTY

Warranty terms and conditions are stated here below unless otherwise specified in the order confirmation.

#### SCOPE OF THE WARRANTY

The machine has been designed and built for trouble-free use over several years. However, if any malfunctioning is observed during the warranty period, FIORENTINI undertakes to repair or replace free of charge any parts showing breaks and early wear due to faulty materials, working defects or incorrect assembly. The manufacturer warranty will not cover any parts whose early breaking or wear-and-tear are caused by:

- Failure to observe the instructions contained in this manual;
- Tampering or alterations introduced without Fiorentini's specific approval;
- Use of non-original spare parts;
- Wear parts for use as: brushes, blades, squeegee, etc...
- Use of equipment different from the recommended equipment.

For installed electrical parts and commercially available parts, FIORENTINI S.r.l. will extend to purchasers the same warranty terms granted to FIORENTINI itself by the parts' suppliers.

#### WARRANTY VALIDITY

The Ing.O.Fiorentini S.p.A. general terms conditions also apply to the warranty.

The manufacturer cannot be held responsible in any way for damages resulting from unauthorised modifications made to the appliance, from the use of unsuitable brushes and accessories and after use of the device other than that intended.

#### WARRANTY APPLICATION TERMS

Defective components must be returned to FIORENTINI S.p.a. in order to establish the causes of any observed defects and determine warranty applicability. Repairing and replacement under the warranty will be carried out on FIORENTINI's premises, by subcontractors or on customer's premises. For work carried out on site, the customer will have to provide power sources, special equipment and auxiliary personnel and cover travelling and accommodation expenses and meals.

#### PRODUCT RETURNS

In case of parts to be returned for replacement or repairs under the warranty, a written authorisation must be obtained in advance from FIORENTINI's Technical Assistance Department.

All defective parts must be carefully repacked in order to avoid damages during transport. Products must be returned on a free-on-board basis, complete with:

- Serial number read from the equipment ID plate (point 2.1);
- Item code and installation position of the returned parts, read from the spare part list (point 7.2);
- Detailed description of the observed defect and conditions under which it became apparent.

In case of defective electric or electronic components, please return the parts separately from other materials, so that waste containing dangerous substances can be separated and Waste Electrical and Electronic Equipment (WEEE) can be recycled according to the 2002/96/EC Directive.



Any parts acknowledged as being under the warranty will be returned on a free-on-board basis; replaced parts will remain the property of FIORENTINI.

#### EXCLUSIONS

The warranty will not cover materials and components exposed to normal wear and those whose working life cannot be established beforehand.



*A missing machine data plate will imply the immediate loss of any warranty rights.*

### **1.5. DECLARATION OF CONFORMITY**

The Declaration of Conformity is supplied with the purchased machine and the use and maintenance manual.

**DICHIARAZIONE CE DI CONFORMITA' - DECLARATION OF CONFORMITY  
DECLARATION DE CONFORMITE-EG-KONFORMITÄTSERKLÄRUNG-  
DECLARACION DE CONFORMIDAD**

(ai sensi dell'allegato II 1.A della Direttiva Macchine 2006/42/CE)

**La ING.O.FIORENTINI SPA**

con sede in Via Piancaldoli 1896 Firenzuola, 50033, (FI)

**DICHIARA/DECLARES/DECLARE/ERKLÄRT/ DECLARA**in qualità di costruttore sotto la propria responsabilità che la macchina  
As manufacturer under its own responsibility that the machine  
En tant que fabricant sous sa propre responsabilité que la machine  
Als Hersteller, erklären, in alleiniger Verantwortung, dass das Produkt  
Como fabricante, bajo su responsabilidad que la máquina**Modello/model/modèle/Typ/modelo****Matricola/serial number/numero de série/****Fabriknummer/ Número matricula****Anno di costruzione /****Year of production/ Année de production/****Baujahr/ Año de producción**

a cui la presente dichiarazione si riferisce è conforme alle prescrizioni  
which this declaration refers to, is in conformity with the requirements  
à laquelle se réfère cette déclaration, est en conformité avec les prescriptions  
Auf das sich diese Erklärung bezieht, mit der normativen übereinstimmt.  
que esta declaración se refiere, está en conformidad con los requisitos

della direttiva macchine 2006/42/CE/ Directive 2006/42/CE / de la Directive 2006/42/CE / der EG-Richtlinie 2006/42/EG über  
Maschinen / De la directiva máquinas 2006/42/CE

della direttiva compatibilità elettromagnetica 2014/30/EU/ the Electromagnetic Compatibility Directive 2014/30 / EU / de la Directive  
Compatibilité Electromagnétique 2014/30 / EU / elektromagnetische Verträglichkeit (EMV) 2014/30/EU / la directiva de  
compatibilidad electromagnetica 2014/30/EU

della direttiva sui rifiuti di apparecchiature elettriche ed elettroniche (RAEE) 2012/19/UE/ Directive on Waste of Electrical and  
Electronic Equipment (WEEE) 2012/19 / EU / de la directive relative aux déchets d'équipements électriques et électroniques (DEEE)  
2012/19 / UE / Elektrische und elektronische Geräte Abfälle (DEEE) 2012/19/UE Directiva sobre residuos de aparatos eléctricos y  
electrónicos (RAEE) 2012/19/UE/  
(ISCRIZIONE AL REGISTRO PRODUTTORI A.E.E.: N° IT1201000007391)

In particolare alle disposizioni normative  
In particular, the regulatory rules  
En particulier, les dispositions réglementaires  
Gemäß den Bestimmungen der Richtlinie  
En particular, las normas reguladoras

**EN ISO 12100, EN ISO 13857, EN ISO 13850, EN 60204-1, EN 349,  
EN 953, EN ISO 4413, EN 60335, EN 60335-1, EN 60335-2-69, EN 60335-2-72, EN 55014-1, EN 55014-2,  
EN 62233, EN 61000-6-2, EN 61000-6-4**

Il fascicolo tecnico è costituito da Ing.O.Fiorentini S.p.a. in qualità di persona giuridica- via Piancaldoli 1896 Firenzuola 50033 Fraz. Piancaldoli (FI) - Italia  
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**Piancaldoli***Luogo e data***Ing. O. Fiorentini S.p.a.**

Il Legale Rappresentante/president/gérant/ representante

Angelica Maria Cerutti

Firma

*Cerutti Angelica Maria*

## 2. MACHINE CHARACTERISTICS AND TECHNICAL DATA

### 2.1. MACHINE IDENTIFICATION

An adhesive machine identification label containing indelible “CE” marking details is affixed on the rear side of the machine next to the handle.



FIGURE N. 2.1



*The label must never be removed and should always be kept legible. If the label is damaged a duplicate should be ordered. The machine may be sold without the label.*

### 2.2. DESCRIPTION AND COMPONENTS

The scrubber machine Ecosmall has been designed to clean flat surfaces by means of washing followed by washing water suction. The electric drive system is equipped with a set of batteries supplying power to the brushes motor and to the suction motor.

The machine can be equipped with either two brushes or one brush which can be operated to scrub the floor with water and detergent. When the machine moves forwards, the squeegee or back brush, in contact with the floor, takes up any water by suction for its subsequent delivery to the recovery tank.

Through the control panel, all the main machine functions can be activated. In particular, it is possible to:

- Adjust the forward movement speed via the special potentiometer;
- Select the forward or backward movement direction;
- Display the battery charge;
- Activate brush rotation (controlled simultaneously with machine movement);
- Start vacuum suction;
- Turn the machine on and off.

The main components of the machine are:

- Washing fluid PPL plastic tank with draining hose;
- Washing effluent plastic PPL recovery tank with one suction hose and one draining hose;
- Set of batteries located in the solution tank compartment;
- Right side and left side scrubbing brushes (for two-brush versions);
- Single scrubbing brush (for single brush version);
- Squeegee (floor wiping unit);
- Two front drive wheels with an electric motor with integrated differential;
- Two rear idle pivoting wheels.

In consideration of recent EU concerns regarding product safety, FIORENTINI designed and built this machine in compliance with the safety and health requirements provided by applicable Directives. The high quality of the materials used, the applied advanced technology and FIORENTINI's long-standing experience are a guarantee of the performance and reliability of this machine. Each machine is submitted to rigorous testing during construction and to a thorough final test.

**2.3. TECHNICAL DATA SHEET**
**SPECIFICATIONS**

	<b>ECOSMALL 55</b>	<b>ECOSMALL 65</b>
Power supply	4 x 12V – 49.2 Ah / 5h GEL 4 x 12V – 54 Ah / 5h ACID	
Drive system	200W 48V differential gearmotor	
Scrubbing width	550	650
Squeegee width	790	890
Brushes	1 x Ø 500mm	2 x Ø 330mm
Brush pressure	25 kg	30 kg
Max hourly output	2750 sq.m/h	3250 sq.m/h
Max working range	2.5-3 h	
Solution tank	70 litres	
Recovery tank	70 litres	
Water lift	135 mBar	
Forward speed	0-5 Km/h	

**ENGINE & MOTOR SPECIFICATIONS**

Drive motor	200W 48V differential gearmotor
Suction motor	48V 500W
Brush motor	One 400W - 48V - 130rpm

**DIMENSIONS AND WEIGHTS**

Length	1200 mm	
Width	790 mm	890 mm
Height	1100 mm	
Weight without load	110 kg	120 kg
Battery weight	4 x 20Kg	
Drive	Walk-behind operator	
Max. gradient at full load	10 %	
Noise level	73 dB	



*The above-mentioned specifications are not binding on the manufacturer and may therefore be changed without notice. FIORENTINI can be contacted at any time for further information (point 7.1.).*

**UNIT OF MEASURE CONVERSION TABLE**

<b>Length</b>	1 inch = 1" = 25.4 mm	<b>Power</b>	1 kW = 1.36 CV = 1.34 BHP
<b>Temperature</b>	T (K) = t (°C) + 273 / t (°F) = 1.8 t (°C) + 32	<b>Pressure</b>	1 bar = 100 kPa = 14.5 psi

### 3. SAFETY

#### 3.1. RECOMMENDED USE



*This is a floor scrubbing machine designed and built for use in industrial environments, to carry out wet scrubbing, drying and effluent collection on flat horizontal surfaces or surfaces with a gradient not exceeding 10% at speeds not exceeding 3 km/h. U-turns are prohibited on any gradient slopes.*

#### 3.2. MISUSE



- *machine operation by unauthorised personnel;*
- *scrubbing uneven and/or bumpy surfaces;*
- *scrubbing sloping surfaces;*
- *scrubbing surfaces whose gradient exceeds 10%;*
- *doing U-turns on any (even minimal) gradient slopes;*
- *using the machine in environments containing dangerous substances, and in particular, in explosive atmospheres or inadequate microclimatic conditions;*
- *cleaning machine surfaces in the presence of flammable substances;*
- *the machine may not be used as a means of transport for people or other vehicles;*
- *altering or tampering with safety devices;*
- *charging batteries at not sufficiently ventilated locations;*
- *failure to comply with applicable safety standards currently in force;*
- *fitting equipment/devices likely to interfere with machine operation;*
- *introducing changes or alterations not authorised by FIORENTINI;*
- *using acid solutions likely to damage the machine;*
- *failing to comply with use and maintenance manual specifications.*



*The informative labels provided on the machine should be carefully read and should not be covered for any reason. FIORENTINI shall not be liable in any case for any of the above not recommended uses of the machine (instances of misuse).*

#### 3.3. SUGGESTED EQUIPMENT

To make the best use of your machine, equipment specially designed and tested by Fiorentini and original spare parts should be used. The Design Department of FIORENTINI S.p.A. is willing to meet any design requirements concerning parts and components for personalised applications.

### 3.4. OPERATOR QUALIFICATIONS

The table here below specifies the operator qualifications required for each operation to carry out.

<b>OPERATION</b>	<b>OPERATOR QUALIFICATIONS</b>
Machine operation/control	Trained operator
Installation/removal	Fiorentini technician
Mechanical parts maintenance	Fiorentini technician
Electrical part maintenance	Fiorentini technician
Cleaning maintenance	Trained operator
Dismantling and scrapping	Fiorentini technician

The personnel in charge of operating the machine should be specifically trained, particularly in regard to safety issues; machine operators must have read and become familiar with this manual.



*FIorentINI declines all responsibility for accidents involving persons or property caused by not adequately skilled, unauthorised operators.*

### 3.5. SAFETY AND WARNING DEVICES



- *It is strictly forbidden to tamper with, remove or deactivate safety and warning devices while the machine is in operation.*
- *The efficiency of safety and warning devices should be regularly checked (see point 5.1.).*

<b>Filter</b>	The machine is equipped with an anti-foam filter
<b>Solenoid valve (OPTIONAL):</b>	The machine is equipped with a solenoid valve preventing water from flowing out before brushes power-on.

### 3.6 SAFETY SYSTEMS

The machine is equipped with the following safety systems:

- **Float:** The recovery tank is equipped with a float which prevents suction in case of overfilling, warning the operator via a sound alarm; in this case, to restart the machine the tank must be emptied first (see section **4.7.5 WATER DRAINING**);
- **Solenoid valve (OPTIONAL):** The machine is equipped with a solenoid valve letting scrubbing water out only after the brushes have been powered on, to prevent accidental leaking;
- **Voltage input buzzer (OPTIONAL):** The machine is equipped with an input voltage buzzer causing the machine to go off when the battery charge goes below a certain value, preventing the battery from going fully flat and preserving its long-term life.

### 3.7 SAFETY DIAGNOSTIC SIGNALLING

The scrubbing machine is equipped with a system that ensures that all the errors detected by the machine function control electronic board are signalled by a flashing LED.

Each error can be identified by counting the number of flashes before the first long pause. Flashing stops when the fault is corrected and in certain cases, when the machine is turned off and then on again.

The damages and faults identified by the board prevent the operation relay closure and cause its opening - ensuring safe operating conditions.

The diagnostic LED is located on the electronic board itself, therefore, to obtain access to it the control panel must be removed (fig. 3.7).



**FIGURE 3.7**

The following table shows the number of diagnostic LED flashes and the corresponding errors:

No. of flashes	Description
1	Motor not at a stop upon start
2	Motor not at a stop upon start
3	Battery voltage too low
4	Battery voltage too high
5	Potentiometer not at zero setting upon start
6	Potentiometer cutout
7	Overtemperature
9	Eeprom programming error
10	Control power error

*Electronic system by Energy:*

1 flash	Anomaly to traction micro-switches at the start. It signals that one of the traction micro-switches is already active at the start
2 flashes	Battery voltage too low, not enough for a correct use of the machine
3 flashes	Inactive code
4 flashes	Open motor circuit
5 flashes	Motor control failure or earthing motor fail
6 flashes	Anomaly to the potentiometer. This alarm is not working with 2-wire potentiometers
7 flashes	Overheated mosfets, this alarm is activated when the temperature gets to 75°C +/- 5°C. This alarm is on until the temperature is high and reduces the maximum motor current
8 flashes	Motor already running at machine start. Example: controller switching on when going down from a slope
9 flashes	Software anomaly



Only for machine with Energy control card: when the direction selector is released with the machine going backward, the scrubber goes a little bit forward in order to avoid any risk of crushing

In order to limit the likelihood of electronic board failures, the following points should be observed:

- It is strictly forbidden to disconnect the battery during running operation;
- It is strictly forbidden to turn the key switch off and then back on during machine operation;
- Do not operate the key switch while pushing the machine manually or going downhill;
- Check that the key switch electrical contact is perfectly efficient to prevent bounces or false contacts;
- Check that the contact between connectors is steady; check that power connections are tight and use deoxidizer spray between connectors;
- It is forbidden to leave the key switch on during battery charging;
- During cleaning operations, disconnect the battery; never wash the electronic board with water and solvents, avoid pressurised jets and before restarting the machine, ensure that it is perfectly dry.

### 3.8 RESIDUAL DANGERS

Ever since the design phase, FIORENTINI has analysed all the possible dangers related to machine use in order to eliminate or at the very least minimise the risk of injuries for machine operators. In order to minimise the risk associated with residual dangers, danger signs and indications of accident-prevention systems and procedures have been provided for machine operators.

#### **DANGER OF CRUSHING**

Crushing risks are possible:

- during scrubbing brushes adjustment;
- during battery charging due to possible tank falling risks.

During side brush adjustment, the operator must ensure that the ignition key is not in its slot in the control panel, to prevent unwanted machine starts. During battery charging, the operator must keep all body parts out of the battery compartment.



#### **DANGER OF CRUSHING AND SHEARING**

Crushing and shearing risks are possible:

- during squeegee adjustment.

During squeegee adjustment, ensure that no-one close to the machine could operate the device up- and down-stroke controls.

#### **DANGER OF OVERTURNING**

Machine overturning is possible:

- during normal machine operation when going over slopes with a higher gradient than the recommended value and when the machine is used to clean uneven/bumpy surfaces (see 3.2).



- **Do not use the machine to scrub surfaces with gradients exceeding 10% at speeds exceeding 3 km/h or bumpy or uneven surfaces likely to affect the stability of the machine.**



*FIORENTINI declines all responsibility for accidents involving persons or property caused by machine use on stability-affecting floors. The buyer must provide suitable signage to inform the user about the condition of the working surfaces.*

**3.9. SAFETY SIGNS**

The safety signs include signs indicating:

<b>DANGERS</b>		Danger signs are triangular with black pictograms on yellow background
<b>PROHIBITIONS</b>		Prohibition signs are round with black pictograms on white background and a red stripe

	<b>What is it?</b>	This sign warns that it is forbidden to remove safety guards from around moving parts.
	<b>What to do?</b>	During installation/maintenance, before removing guards always ensure that the starter key is not in its slot in the control panel. Keep all body parts out of the machine during work.



	<b><i>If any signs become damaged, the purchaser must replace them with identical signage. It is strictly forbidden to remove or tamper with these signs.</i></b>
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	<b>What is it?</b>	This sign shows that there is a risk of fire caused by the presence of batteries.
	<b>What to do?</b>	Be extremely careful during battery charging or tank filling.



	<b>What is it?</b>	This sign indicates a general danger
	<b>What to do?</b>	Be extremely careful during battery charging or tank filling and do not place any body parts below the lifted tank.

 ***If any signs become damaged, the purchaser must replace them with identical signage. It is strictly forbidden to remove or tamper with these signs.***

	<b>What is it?</b>	Explosion risk during battery charging due to the released hydrogen.
	<b>What to do?</b>	During battery charging, ensure that the machine is under a suction hood or in a ventilated area and keep it away from heat sources and corrosive substances.



	<b>What is it?</b>	Danger of crushing caused by suction tank overturning.
	<b>What to do?</b>	During battery charging or tank filling, ensure that accidental impacts are avoided.


***If any signs become damaged, the purchaser must replace them with identical signage. It is strictly forbidden to remove or tamper with these signs.***

## 4. START-UP AND OPERATION INSTRUCTIONS

### 4.1. TRANSPORT AND HANDLING

The machine is delivered to the purchaser fully assembled and contained in a special package, the characteristics of which are shown in figure 4.1. A black arrow on the package indicates the centre of gravity. Truck or pallet truck forks must be inserted so as to ensure that the black arrow is centred between the forks. The package must be handled carefully. Do not stack packaged items.

If agreed with the purchaser, the machine can be delivered unpacked, on a pallet and secured with straps.



*The purchaser should check upon delivery that the machine has not been damaged during transport and that all the material listed in the shipping documentation has been received; otherwise, the forwarders and manufacturer should be promptly informed. Unless otherwise agreed, purchased goods will travel at the purchaser's own risk.*

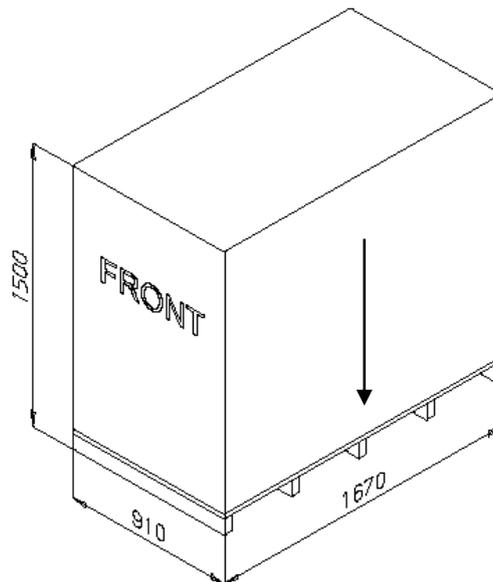


FIGURE 4.1

Handling should be carried out with suitable lifting equipment, as shown in the following table. Always ensure that the forks of the lift truck, or the harness straps, are positioned so as to ensure that the arrow printed on the package is centrally positioned on the lifting equipment. The anchoring and/or harnessing points are arranged so as to ensure that, during lifting, the machine is always steady and well balanced.

TYPE OF PACKAGING	HANDLING EQUIPMENT	FIG.
Paperboard or plywood box on a pallet	Fork lift truck	N. 4.2
None	Fork lift truck or truck crane with a two-strap balance harness	N. 4.3

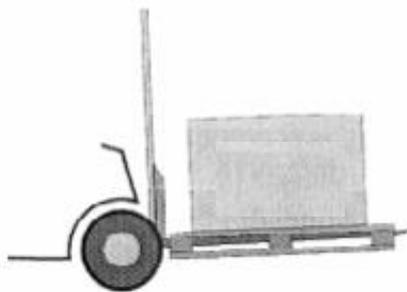


*The harness straps used must be suitable for the load to lift. All handling operations should be carried out at very slow speed to prevent load swinging and loss of stability. Any operation performed incorrectly may damage the machine and expose operators to dangers.*



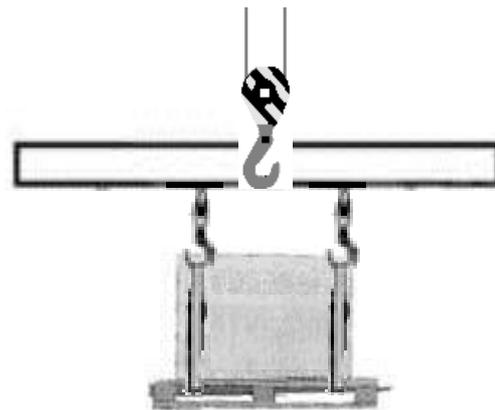
*Refer to point 2.3 for machine dimensions and weight. Machine handling should be carried out by authorised personnel trained for lifting equipment use only.*

#### LOADING DIAGRAM



**FIGURE N. 4.2**

SI



**FIGURE N. 4.3**

#### **4.2. STORAGE**

If not immediately installed, the machine should be stored at a covered, dry location to ensure the perfect efficiency of all its parts. Relative humidity must be below 80% and the storage temperature must be between  $3^{\circ}\text{C} \leq$  and  $\leq + 45^{\circ}\text{C}$ .

#### **4.3. MACHINE UNPACKING**

- Cut the straps bearing in mind that they might spring back
- Remove the staples fixing the carton to the pallet
- If the crate is made of plywood, remove the staples from each side and the base of each panel
- Cut the straps that secure the machine
- Place the machine on the floor

#### **4.4 UNPACKED MACHINE HANDLING**

- Inspect the machine and install the batteries if not already installed
- To prepare the machine for short distance handling after use, disconnect the battery cables and remove the brushes and the squeegee; for longer-distance transport, the machine should be repacked in its original packaging.

**4.5. INSTALLATION**

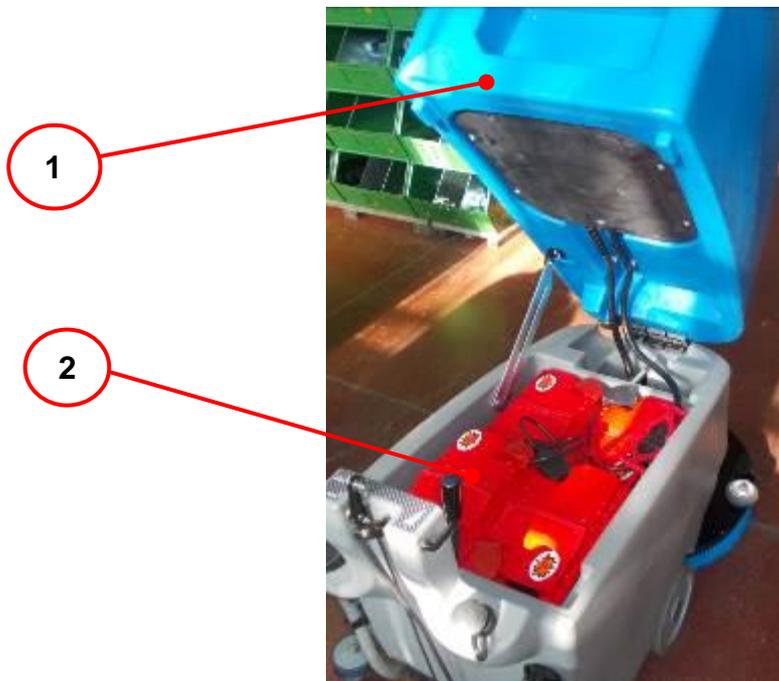


*Installation must be carried out by authorised personnel aware of the instructions contained in this manual.*

**4.5.1 BATTERY INSTALLATION**

Follow these instructions for battery installation:

- Remove the key from the control panel to prevent an unwanted machine power-on;
- Disconnect the squeegee hose from the recovery tank and lift it to obtain access to the battery compartment (detail 1 fig. 4.4);
- Install the batteries in their special compartment (see detail 2 fig. 4.4.) and make sure that there are no cracks in the battery cases;
- Never add distilled water after charging the batteries;
- Clean the surfaces for connection;
- Handles are provided on the top surface to make battery handling easier.



**FIGURE N. 4.4**

**4.5.2 BATTERY CHARGER INSTALLATION**

The battery charging area must be provided with an efficient suction system for the gases released during charging. Alternatively, batteries must be charged in a dry, ventilated place, away from heat sources and corrosive environments.

Protect the factory power grid with a time-delay type switch or a fuse with a load exceeding the battery charger maximum load.

Plug the battery charger into the machine outlet.  
Observe the correct polarity of the battery outlet.



**FIGURE N. 4.5**

4.6. CONTROL AND MONITORING DEVICES

4.6.1. CONTROL PANEL

The electro-mechanic control board has several functions that can be activated/deactivated by means of the corresponding switch levers. Each pictogram is uniquely associated with a specific function. The switch panel is pictured in figure 4.6, while the operation of each switch is described in the table here below.

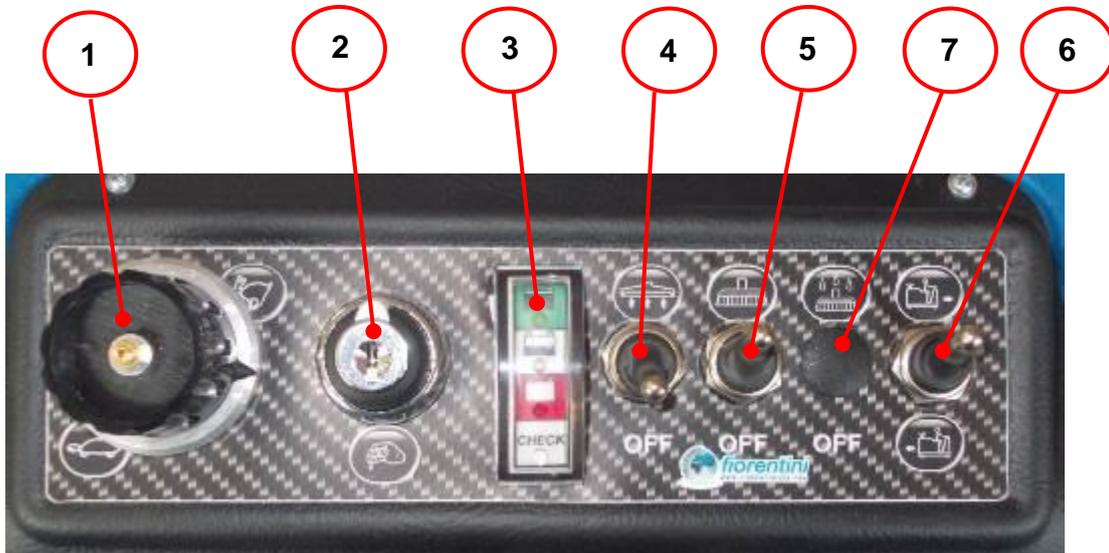
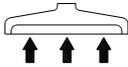
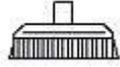


FIGURE N. 4.6

N.	DESCRIPTION	FUNCTION
1	<b>Forward speed potentiometer</b>	Used to adjust the machine movement speed: if the indicator is set to "tortoise" the machine will move at its minimum forward speed, while if it is set to "hare" it will move at its maximum forward speed.
2	<b>Key switch</b>	Machine power-on/power-off.
3	<b>Battery charge indicator</b>	It indicates the level of battery charge.
4	<b>Suction switch</b>	If set to its top position (indicated by the symbol) it activates the squeegee liquid suction function. If set to OFF, the suction function is turned off.
5	<b>Scrubbing brush switch</b>	If set to its top position (indicated by the symbol) it activates the scrubbing brush rotation during machine forward movement; when the machine stops, the brushes will also stop; when the machine forward movement is controlled, brush rotation will also start. If set to OFF, the brush rotation is turned off.
6	<b>Movement direction selector switch</b>	When this selector is set to its standby position (top), the machine will move forwards. To reverse the movement direction, pull down and hold the switch during manoeuvring; when the switch is released, the machine will move forwards again.
7	<b>Detergent dosing potentiometer (OPTIONAL)</b>	It is used to adjust the amount of detergent to add to the washing water

Below are the symbols on the control panel with a short description of the corresponding function:

	Min speed		Max speed
	Key switch		Suction on/off
	Fwd/Reverse movement		Scrubbing brushes on/off

**4.7. OPERATION**

Scrubbing operations are highly critical and specific experience will help you choose the right type of scrubbing brush and detergent and determine whether or not a double cleaning cycle is necessary.

Carry out scrubbing in the following steps:

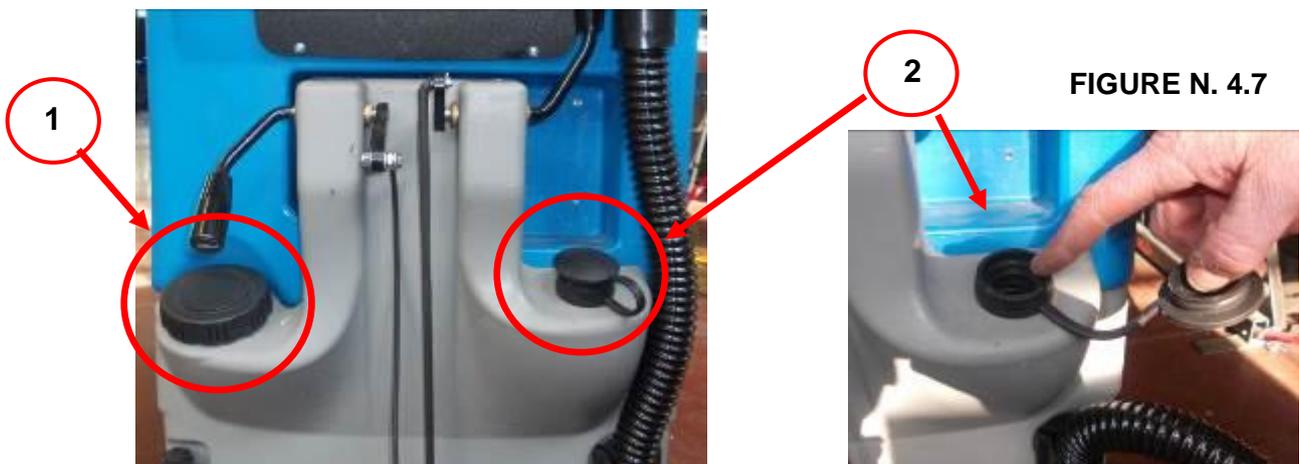
- Power on the machine (figure 4.6 detail 2);
- Start the scrubbing brushes (figure 4.6 detail 5) and lower the brush plate with the special lever;
- Start liquid suction via the squeegee (figure 4.6 detail 4);
- Lower the squeegee with the special lever (figure 4.8 detail 2);
- Control the machine forward movement with the special lever (figure 4.8 detail 1); during work the forward movement speed is lower with respect to the idle phase, however, it is possible to adjust the machine forward movement speed via the special potentiometer (figure 4.6 detail 1).

After scrubbing completion, before drying completion, turn the water tap off with the special lever (figure 4.8 detail 3)

**4.7.1 MACHINE PREPARATION AND START-UP**

If the machine battery charger is plugged in, unplug the battery charger connected to the machine battery and connect the battery plug to the machine power plug (fig 4.5).

Fill the machine with water through one of the two filler plugs in the rear part of the machine (figure 4.7); if filling is done through a pipe, it is advisable to use the plug located on the right side (figure 4.7 detail 2), as its inside cross-section is specially sized to enable efficient connection to the top-up pipes and to ensure secure fastening during tank filling.



**FIGURE N. 4.7**

#### 4.7.2 CHOOSING THE RIGHT DETERGENT

Choosing the right detergent is very important for efficient floor cleaning. Too strong a detergent could cause damages. Low-foaming detergents or foam preventing additives should be used to prevent damages to the suction motor; if these products cannot be procured, try adding 50cc of common wine vinegar to the recovery tank before starting the cleaning cycle.



*Make sure that the detergent used is suitable for the surface to clean. Fiorentini S.p.A. will not accept any responsibility for damages caused by too aggressive detergents.*

#### 4.7.3 CONTROL LEVERS

- **Forward movement lever (detail 1 fig. 4.8):** actuating it will control the machine forward movement; the movement speed and direction can be adjusted from the control panel (figure 4.6).
- **Squeegee lifting lever (detail 2 fig. 4.8):** by moving down the lever the squeegee will be lowered, by moving up the lever the squeegee will be lifted off the floor.
- **Solution tap adjustment lever (detail 3 fig. 4.8):** to adjust the water flow set the lever to your required position: with the lever all the way forwards, the tap will be turned off; with the lever all the way back, the tap will be turned fully on.
- **Brush plate lifting foot control (detail 4 fig. 4.8):** the pedal is in the rear lower part of the machine. When moved out of its seat, the pedal will go all the way up to the end of its stroke and the brush plate will be rested on the floor; conversely, to lift the plate off the floor, control the pedal back into its original seat.
- **Parking brake (detail 5 fig. 4.8):** the machine is equipped with a parking brake in the right lower side of the machine, next to the driving wheel. This brake will act on the wheel, preventing its rotation.

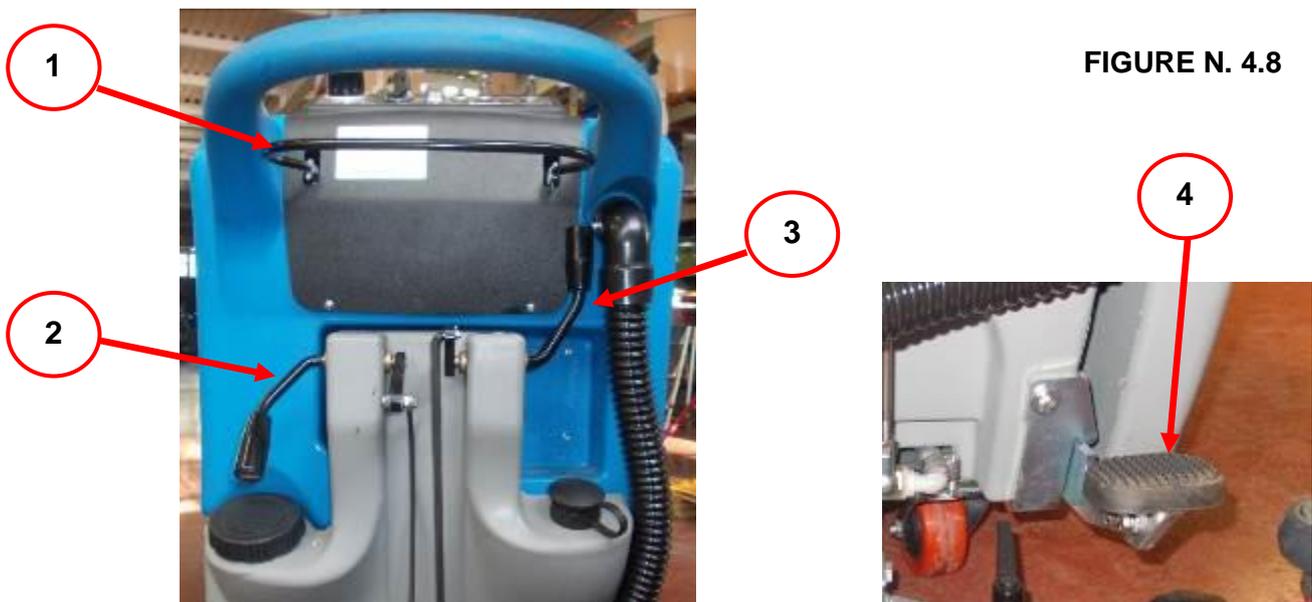
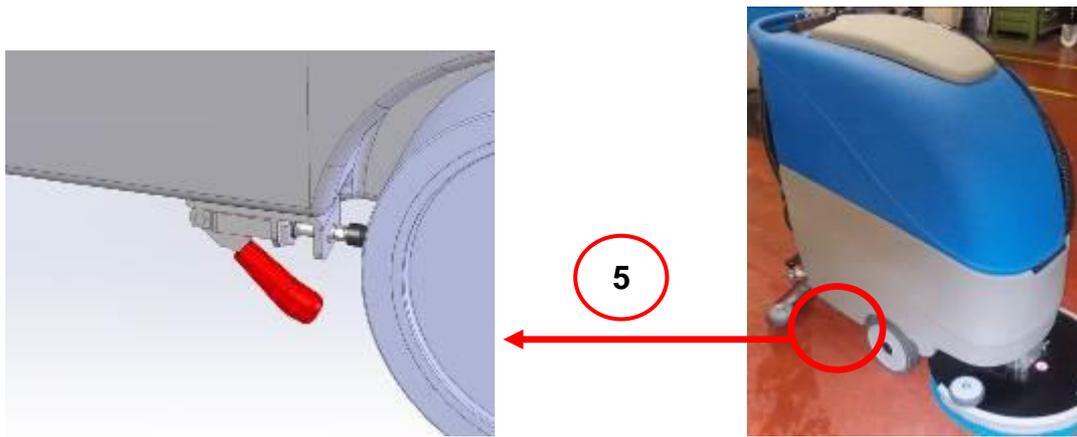


FIGURE N. 4.8

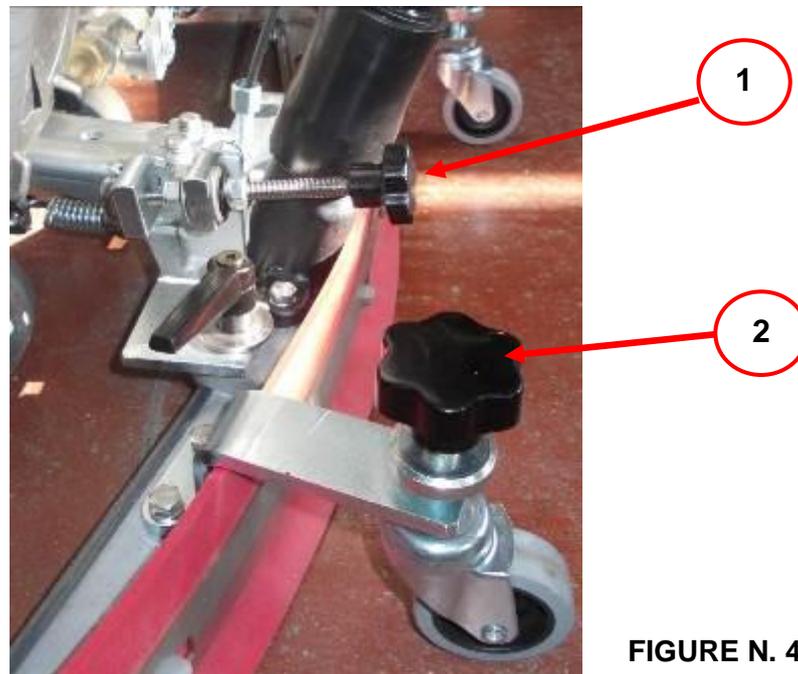


#### 4.7.4 SQUEEGEE ADJUSTMENT

To guarantee efficient drying, it is essential for the squeegee to be perfectly adjusted. This type of squeegee is very efficient in collecting water to facilitate pipe suction, but very sensitive to parallelism with the ground.

To ensure correct squeegee adjustment, follow the steps here below:

- Remove the key from the control panel to prevent unwanted machine starts.
- Adjust the squeegee angle, by working the adjustment knob (detail 1 figure 4.9). The right pressure is achieved when the edge of the blade touches the floor with an inclination of 45° - 60° to the ground.
- To adjust the height of the blades turn the knobs on the two guiding wheels - tightening or loosening them (detail 2 figure 4.9)



**FIGURE N. 4.9**



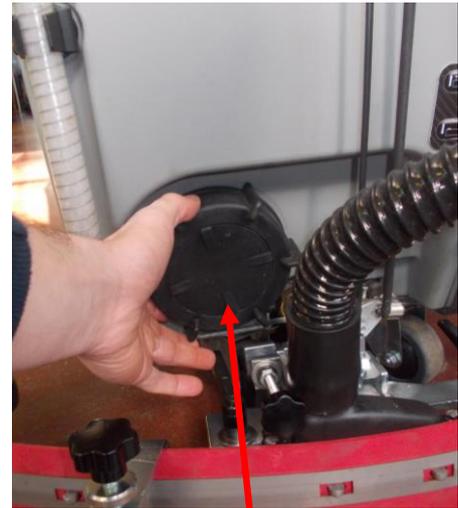
*It is very important that the two wheels are adjusted so as to ensure that the squeegee blades are parallel and rest firmly on the ground.*

#### 4.7.5 WATER DRAINING

The Ecosmall floor scrubber is equipped with the following draining systems:

- Recovery tank drain pipe (detail 1 figure 4.10);
- Solution tank drain pipe (detail 2 figure 4.10);
- Solution tank draining and/or inspection plug (detail 3 figure 4.10);
- Squeegee hose (detail 4 figure 4.10).

To drain water from the tanks, position the machine over a sewer hole, disconnect the hose from the tank to drain and remove the rubber plug at the end of the hose.



1

4

2

3

FIGURE N. 4.10

To **clean the recovery tank** lift the top cover and clean the inside of the tank (fig.4.11).

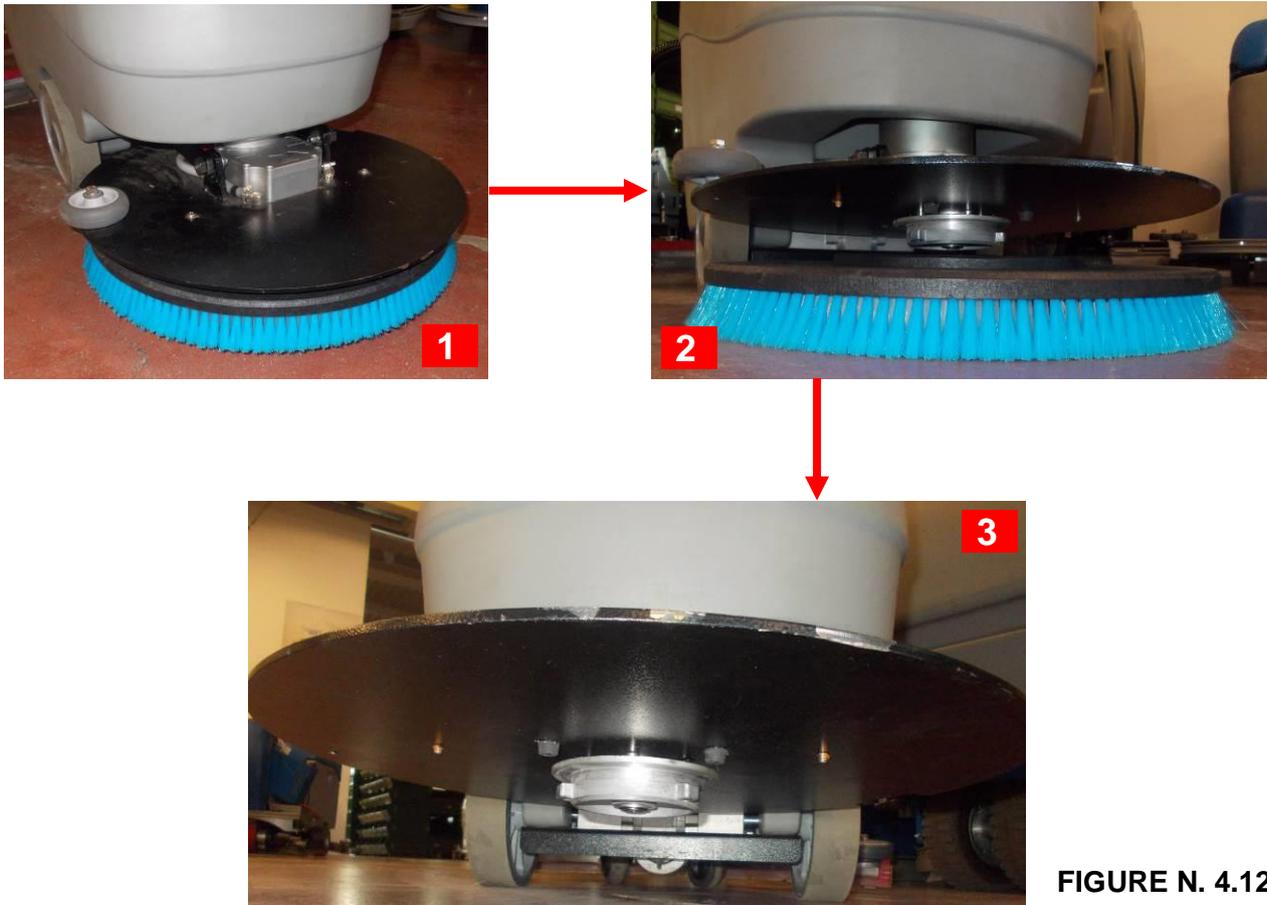


**FIGURE N. 4.11**

**4.7.6 BRUSHES REPLACEMENT**

Proceed as follows to replace the scrubbing brushes (figure 4.12):

- Remove the key from the control panel to prevent unwanted ignition;
- Release the brush by turning it clockwise (fig. 4.12 detail 1) and then remove it (fig. 4.12 detail 2);
- To insert a new brush, position it under the flange (fig. 4.12 detail 3) and then lift it until it is inserted in the flange and rotate it clockwise.



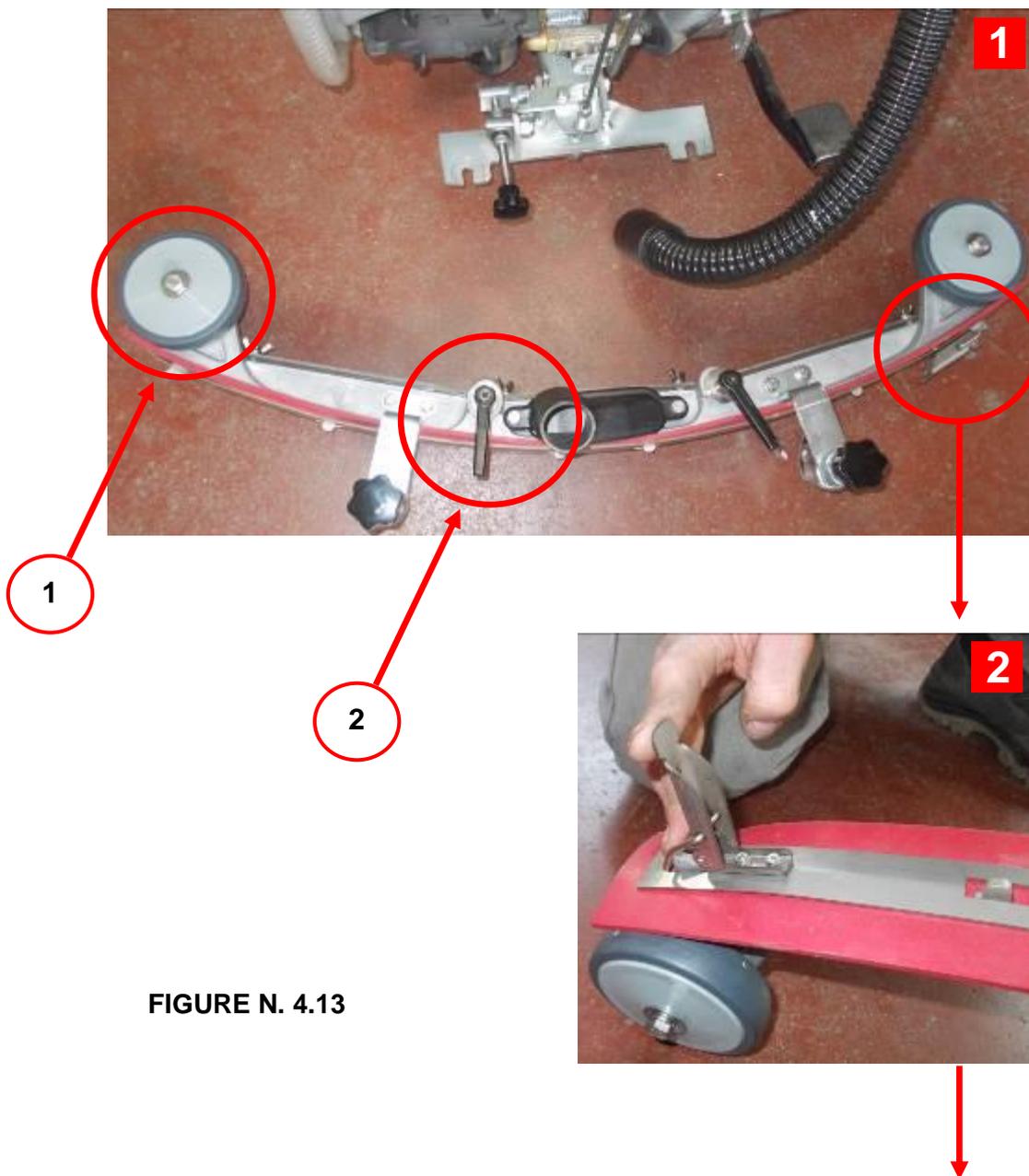
**FIGURE N. 4.12**

**4.7.7 SQUEEGEE BLADES REPLACEMENT**

The squeegee blades (figure 4.13) must be replaced when the edges become worn; the blade edges must be sharp to ensure perfect drying.

To replace the squeegee blades proceed as follows:

- Remove the squeegee from the machine by loosening the two knobs fixing it to the support (fig. 4.13 photo 1 detail 2);
- Release the clip as shown in the figure (fig. 4.13 photo 2) and remove the strip and rear blade (fig. 4.13 photo 3);
- Unscrew the 4 wing nuts (fig. 4.13 photo 4) and remove the strip and front blade (fig. 4.13 photo 5);
- Insert the new blades and proceed by reversing the order of the operations.
- If worn out, change the bumper wheels by removing the hex head screw (fig. 4.13 photo 1 detail 1).



**FIGURE N. 4.13**

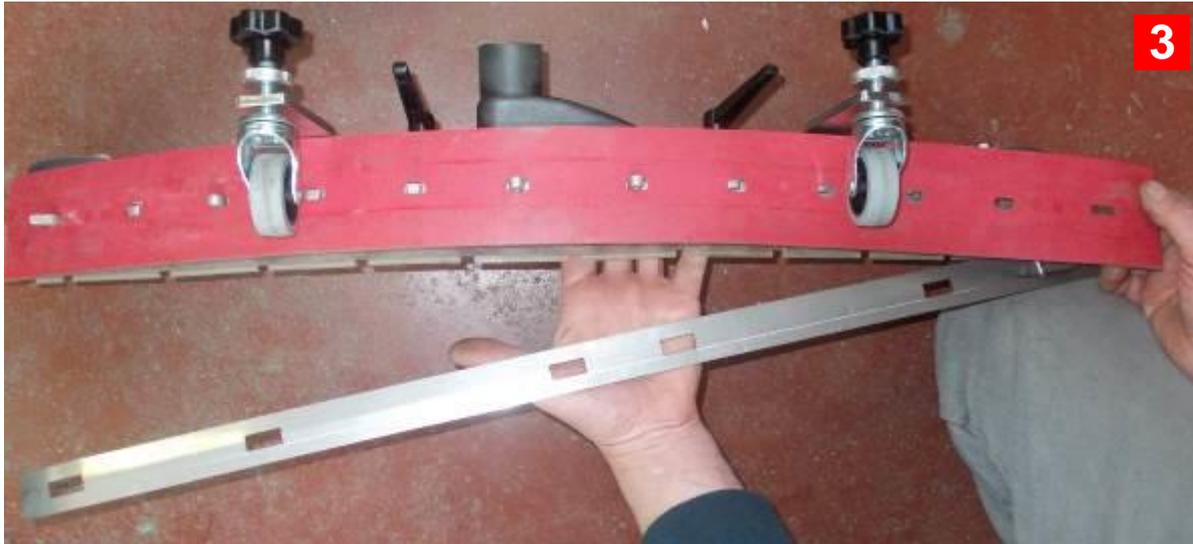
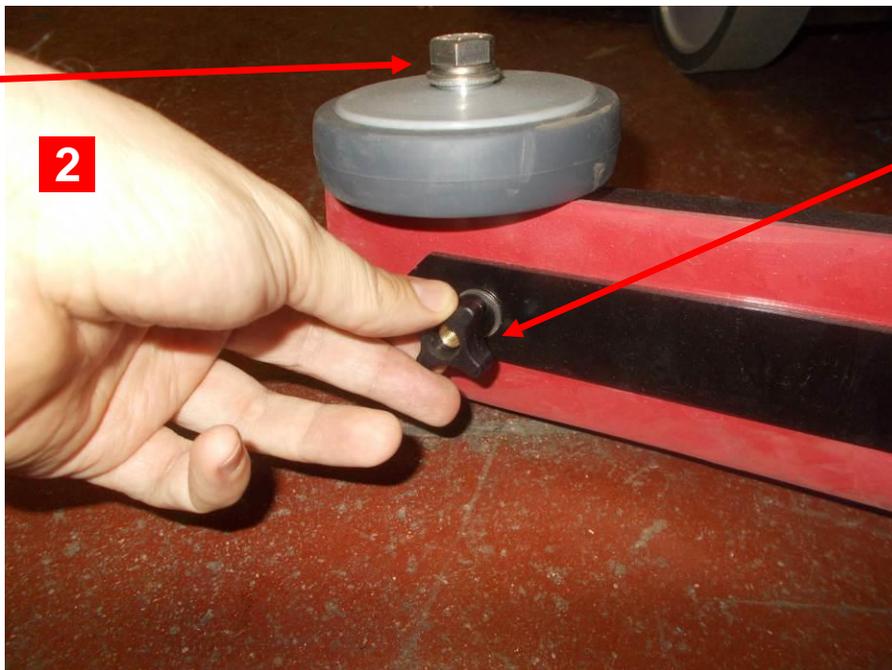
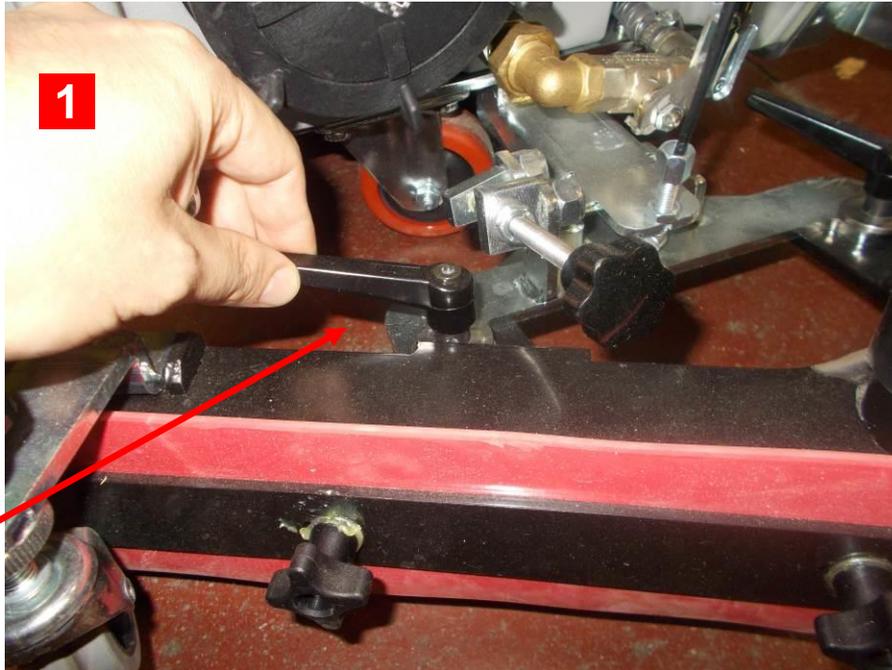


FIGURE N. 4.13

**4.7.8 SQUEEGEE BLADES REPLACEMENT (Machine with two brushes)**

To replace the squeegee blades proceed as follows:

- Remove the squeegee from the machine by loosening the two knobs fixing it to the support (fig. 4.14 photo 1);
- Loose the knobs and remove the old blade both at the front and at the rear part (fig.4.14 photo 2)
- Insert the new blades and proceed by reversing the order of the operations
- If worn out, change the bumper wheels by removing the hex head screw (fig.4.14 photo 2)



**FIGURE N° 4.14**

**4.7.9 BRUSH DECK BELT REPLACEMENT (Machine with two brushes).**

To replace the brush deck belt proceed as follows:

- Remove the screws that secure the brush cover (figure 4.15)
- Release the spring from the pin with a screwdriver (figure 4.16)
- Replace the worn belt.
- Proceed by reversing the order of the operations

**FIGURE N° 4.15****FIGURE N° 4.16**

## 5. MAINTENANCE

### 5.1. ROUTINE MAINTENANCE

Carrying out maintenance at regular intervals is extremely important to ensure the floor scrubber efficiency and prolong its working life to the end of the warranty time. The performed services should be logged in writing by using the special form contained in this manual.



- *Trained personnel only may service the machine and in particular, its electric and electromechanical parts. Specific tools and equipment should be used according to the type of service.*
- *For servicing and spare part requirements exclusively contact Fiorentini S.p.A. (point 7.1. / 7.2.).*

Cleaning	Clean the recovery tank and the suction motor filter	 <ul style="list-style-type: none"> <li>• <b>Do not use corrosive substances.</b></li> <li>• <b>Do not use pressurised water jets.</b></li> </ul>	Daily
	➤ Check the cleanness of the suction pipes and squeegee		Weekly
	Checks	<ul style="list-style-type: none"> <li>➤ Check the condition of the squeegee rubber suction blades</li> <li>➤ Check the battery water level</li> </ul>	
Check the clean water tank filter			Monthly
Check and adjust the braking system			Every 3 months
Check battery cable connections			Every 6 months
Check the brushes of each motor			Yearly
<ul style="list-style-type: none"> <li>➤ Check the safety devices</li> <li>➤ Check the wiring system</li> </ul>			Yearly

### 5.2 BATTERY MAINTENANCE

The operator is expected to check the battery state of charge while the machine is in operation via the battery charge indicator on the dashboard. Battery state can be checked via the specially provided three LEDs:

- Top LED: battery fully charged
- Middle LED: battery partly charged
- Bottom LED: battery flat



- Leave the battery compartment open during charging*
- *Do not use naked flames or smoke near batteries*
  - *Warning: battery acid is corrosive*
  - *Do not produce sparks near batteries*
  - *Battery gases are explosive*
  - *Do not reverse battery polarity*

### **5.2.1 HYDROMETRY**

The battery charge state should be checked while the batteries are charging by using a hydrometer. Proceed as follows:

- By using a syringe hydrometer draw a small quantity of electrolyte to cause the float to rise to the surface;
- Make sure that its top does not touch the rubber bulb or stick to the glass walls under the effect of capillarity.
- For hydrometric measurements, after adding distilled water wait for density to become homogeneous throughout the volume of liquid contained in the element.

### **5.2.2 WATER TOP-UPS**

- Add distilled water to each battery cell before charging to bring liquid level to 6 mm above the plates.
- This operation should be repeated whenever the level goes down, or in any case, at no more than one week's intervals.

### **5.2.3 CHARGE LIMITS**

Battery charging is not necessary if, at end of a day's work, hydrometric values have not gone below 1.24 (28 Bè). The highest recommended temperature is 45°C. If the electrolyte temperature is 10/12 °C higher than the environment temperature, the batteries could overcharge regardless of the actually reached temperature.

### **5.2.4 STANDBY OR INACTIVE BATTERIES**

Inactive batteries will lose their charge spontaneously (self discharge). If a battery inactivity period is expected, carry out the following operations:

- Charge the batteries once a month by selecting a "charge end" current intensity, until considerable gas development is observed in all the cells, and voltage and specific gravity readings remain constant for 3-4 hours;
- This should also be done if specific gravity measurements are high. Store inactive batteries in a dry place

### **5.2.5 BATTERY CHARGER TECHNICAL FEATURES**

The battery charger must have the characteristics listed below and be up to the following standards and regulations:

<b>INPUT</b>	<b>V230, Hz50, 5A</b>
<b>OUTPUT</b>	<b>V48, 15A</b>

Directive:

Electromagnetic compatibility 2004/108/EEC

Low voltage 2006/95/EEC

**N.B.** The operator must refer to the battery charger user manual for maintenance and inspection instructions in case of any problems experienced with batteries.



[Check recommended battery specifications in section 2.3 TECHNICAL DATA SHEET.](#)

### 5.2.6 BATTERY DISPOSAL

Batteries are classified as "toxic and hazardous" waste. For disposal purposes, they should be committed to specialised, specifically authorised companies whose qualifications must be ascertained by the battery owners. Temporary battery storage before collection by a specialised disposal company must be in line with the following legal requirements:

- A temporary storage authorisation must be obtained
- The batteries must be sealed in plastic containers having capacities not lower than the volume of the electrolyte contained in the batteries, or in any case, stored in such a way as to prevent rainwater seeping into the storage containers.

### 5.3 MOTOR MAINTENANCE

#### 5.3.1 MAINTENANCE OF THE SUCTION MOTOR

The suction motor must be checked and cleaned. Every six months, the brushes should be checked and replaced, too - if necessary. Suction motor maintenance should be carried out as follows:

- Remove the key from the control panel to prevent unwanted ignition;
- Disconnect the squeegee hose from the recovery tank and lift it (detail 1 figure 5.1);
- Unscrew the four Allen screws on the lid and remove the lid (detail 2 figure 5.1);
- Unplug the motor connection cable (detail 3 fig. 5.1)
- Loosen the three knobs fastening the suction motor (detail 4 fig. 5.1) To check the brushes (detail 5 figure 5.1) remove the plastic cover and remove them from their seat;
- To re-assemble all the parts, perform the same operations in reverse order.

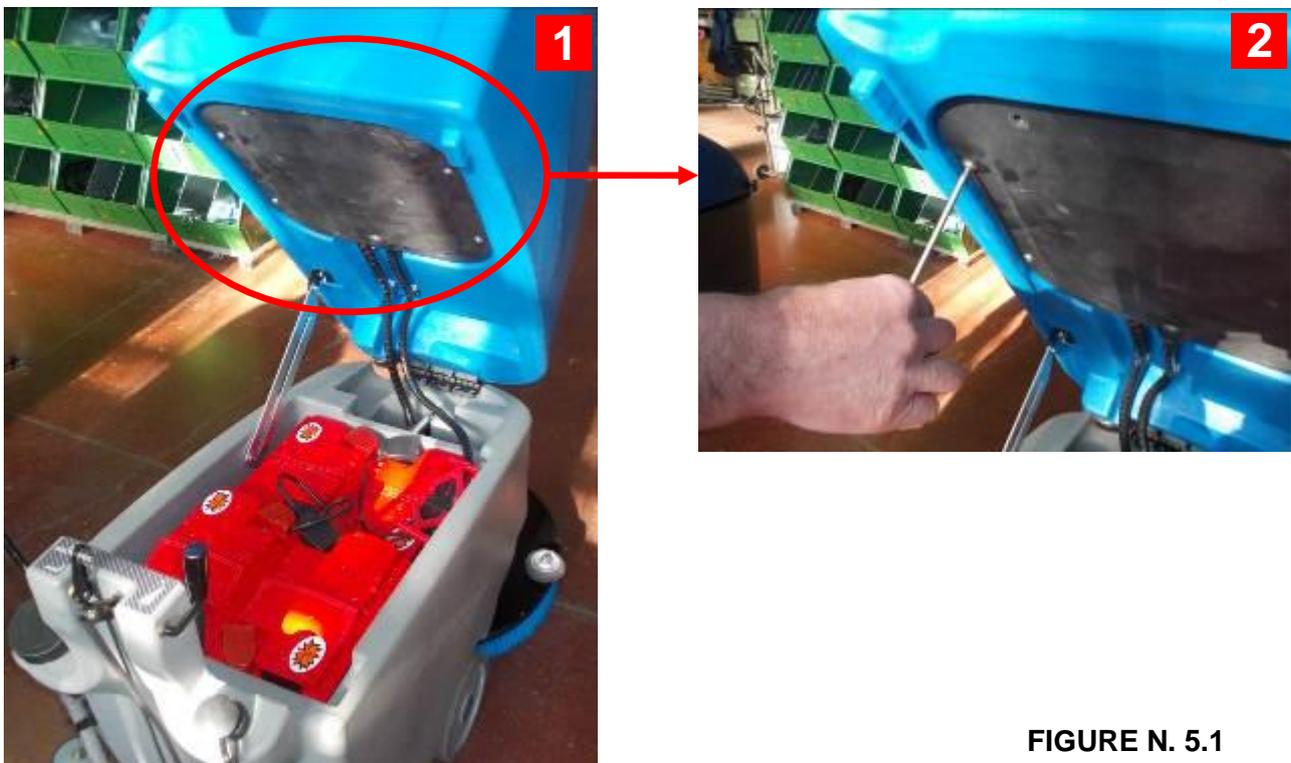


FIGURE N. 5.1

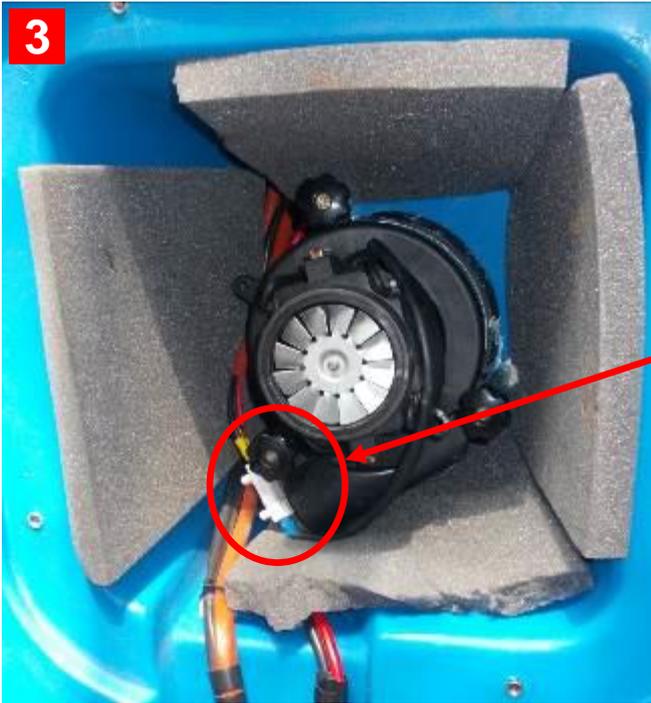


FIGURE N. 5.1

### 5.3.2 BRUSH MOTOR MAINTENANCE

To ensure scrubbing brush motor perfect efficiency, the motor brush wear should be checked yearly and the motor brushes should be replaced, if necessary.

Brush motor maintenance should be carried out as follows:

- Remove the key from the control panel to prevent unwanted ignition;
- Disconnect the squeegee hose from the recovery tank and lift it (detail 1 figure 5.1);
- Remove the spring from the motor by screwing out the screw (fig. 5.2 detail 1) and unplug the power connector (fig. 5.2 detail 2);
- Remove the two screws fixing the brush plate and remove it from the machine (fig. 5.2 detail 3);
- Remove the motor cover unscrewing the two screws;
- Release the spring fixing the brushes and remove them from their special housing (fig. 5.2 detail 4);
- To re-assemble all the parts, perform the same operations in reverse order.

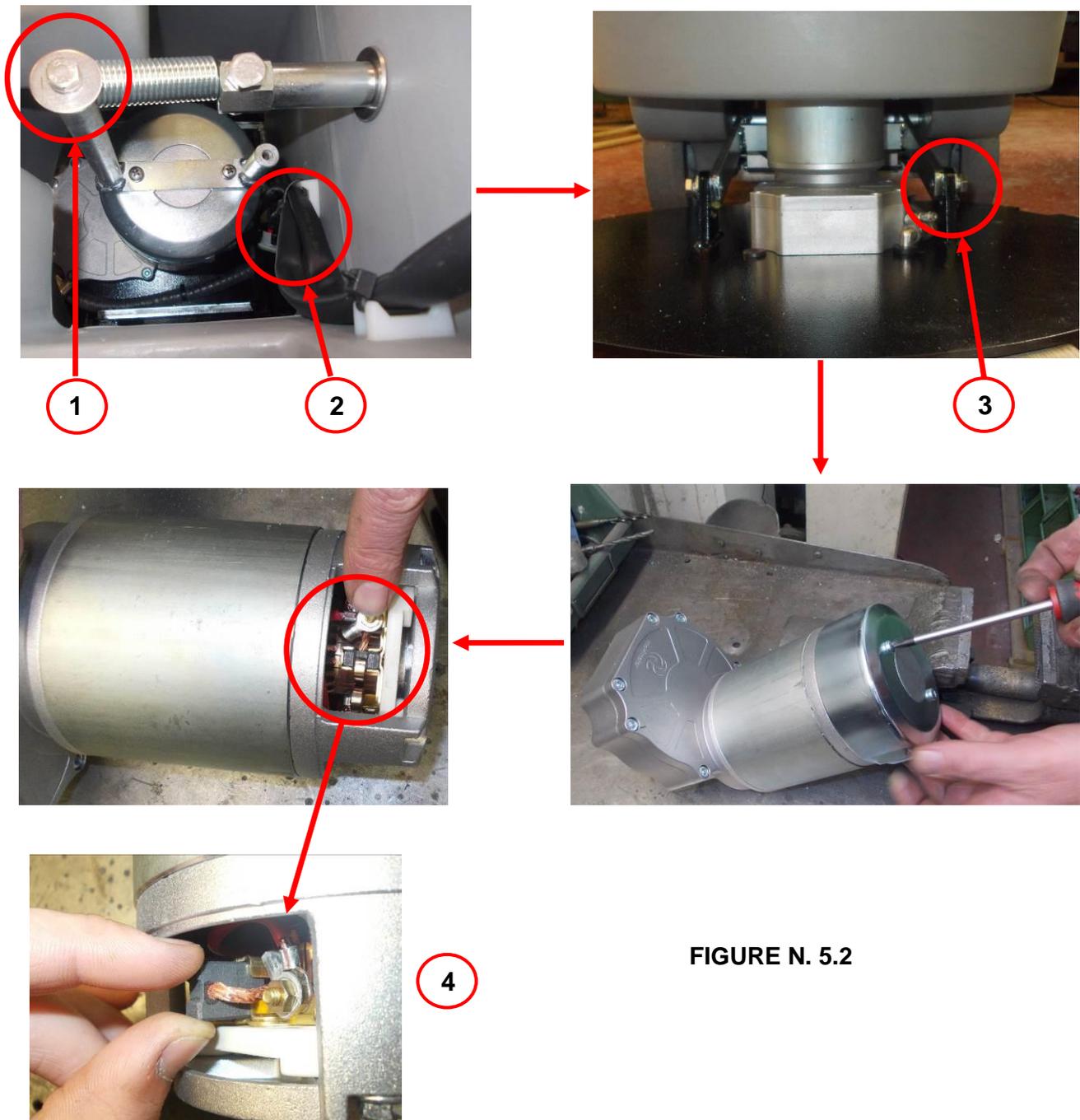


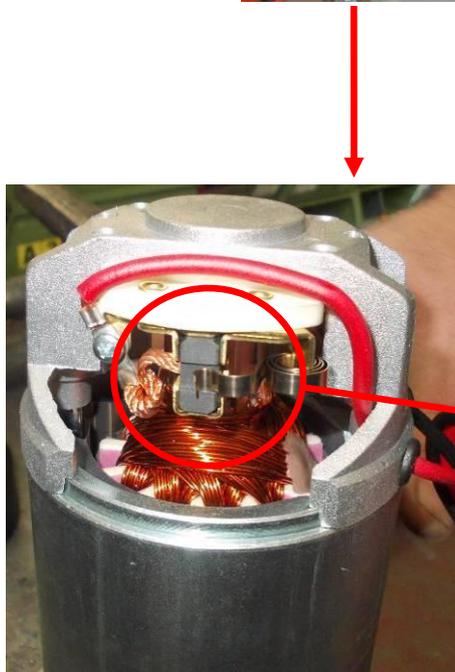
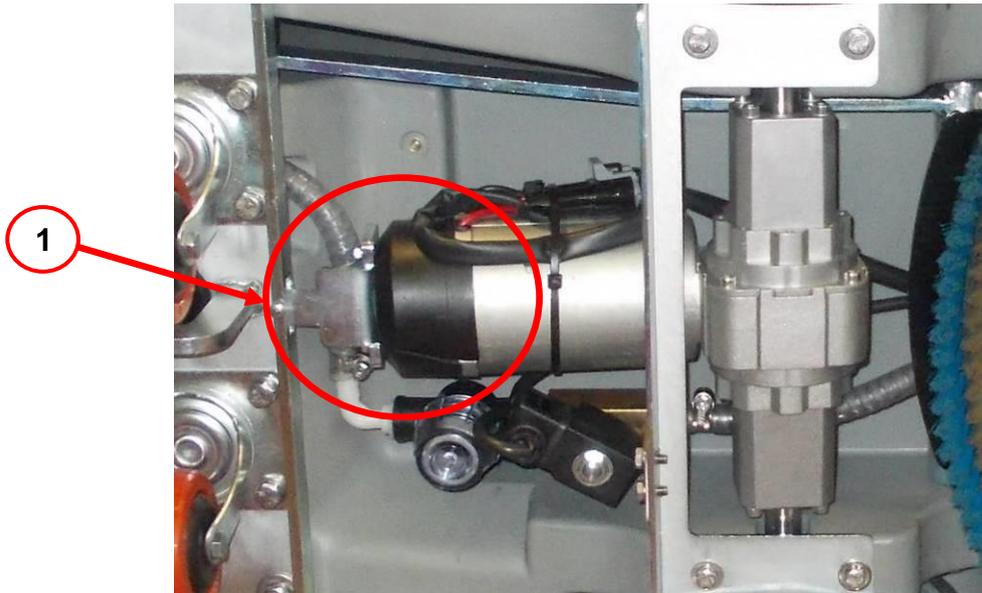
FIGURE N. 5.2

### 5.3.3 DRIVE MOTOR MAINTENANCE

To ensure scrubbing drive motor perfect efficiency, the motor brush wear should be checked yearly and the motor brushes should be replaced, if necessary.

Drive motor maintenance should be carried out as follows:

- Remove the key from the control panel to prevent unwanted ignition;
- Drain all machine tanks and rest the machine on one side;
- Remove the motor cover and the bracket fixed to it by unscrewing the two screws (fig. 5.3 detail 1);
- Release the spring fixing the motor brushes and remove them from their housing (fig. 5.3 detail 2);
- To re-assemble all the parts, perform the same operations in reverse order.



**5.4 WIRING SYSTEM CHECKS**

The machine wiring system should be inspected and examined every 2 years. It is very important to immediately correct any defects, e.g. disconnected wires or burnt cables.



Any service on the wiring system should be carried out by a skilled technician.  
 Any maintenance or repair not described as routine maintenance should be carried out by specialised personnel authorised by FIORENTINI.

**5.5 INSPECTION SUMMARY TABLE**

	FREQUENCY	REQUIRED TECHNICIAN
<b>INSPECTIONS</b>		
Safety devices	2 years	Skilled technician
Electrical wiring system	2 years	FIORENTINI technician
Braking system	3 months	Skilled technician
Complete overhauling	5 years	FIORENTINI technician
<b>MAINTENANCE</b>		
Recovery tank cleaning	Daily	operator
Suction motor filter	Daily	operator
Clean water tank filter	Monthly	operator
Suction pipe lines cleaning	Weekly	operator
Squeegee cleaning	Weekly	operator
State of blades inspection	Weekly	operator
Battery fluid level inspection	Weekly	operator
Battery cable fixing	6 months	Skilled technician
Motor brush level in each motor inspection	Yearly	Skilled technician



## 6. TECHNICAL ASSISTANCE

### 6.1. TECHNICAL ASSISTANCE CONTACT INFORMATION

For services under the warranty and/or to request maintenance or repairs, or for any inquiries, please contact the Technical Assistance Department of FIORENTINI S.p.A. at:

## ING. O. FIORENTINI S.p.A.

“THE BEST IN FLOOR MACHINES”

#### BRANCH OFFICES:

20132 MILAN – Fax. +39 02/2592779

Via Palmanova 211/a – Tel. + 39 02/27207783 - 2564810

00012 Guidonia Montecelio (ROME) – Fax. +39 0774 353419 - 353314

Via B. Pontecorvo 20 – Tel. + 39 0774 357184 - 378827

#### PRODUCTION FACTORY:

50033 PIANCALDOLI (FI) – Fax. +39 055/817144

Via Piancaldoli 1896 – Tel. + 39 055/8173610

Most technical problems can be sorted with minor services. Before contacting our Technical Assistance Dept. we therefore advise to carefully read this manual.

If specialist service is required, please clearly specify the type and circumstances of the observed defect to help us find the best solution.

### 6.2 CLAIM REPORT

Fiorentini S.p.A., wishing to meet its customer requirements in the most effective manner and to constantly improve its products on the basis of valuable feedback obtained from customers themselves, has prepared a claim form to report any defects observed during use of its Ecosmile floor scrubber and dryer.

**Form completed by:**

Company: \_\_\_\_\_

Writer's name: \_\_\_\_\_

Position within the  
company: \_\_\_\_\_

Date: \_\_\_\_\_

Signature: \_\_\_\_\_

**Machine description:**

Machine: \_\_\_\_\_

Model: \_\_\_\_\_

Purchase date: \_\_\_\_\_

S.N.: \_\_\_\_\_

Applicable  
Warranty:

YES

NO

Worked hours: \_\_\_\_\_

Machine work  
environment: \_\_\_\_\_**Fault Description:**Code of the faulty  
component: \_\_\_\_\_Component  
name: \_\_\_\_\_

Fault type:

Short fault description:

- Faulty Mechanical component
- Faulty operation
- Wiring system failure
- Motor/Engine failure
- Missing component
- Excessively noisy operation
- Water leak
- Other

**Customer remarks:**

Please write below your comments and suggestions regarding the products and services supplied by Ing. O. Fiorentini Spa

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Mat no.  
Serial no. \_\_\_\_\_  
Nr. de série

Data di spedizione  
Date of shipment \_\_\_\_\_  
Date d'expédition

Distributed by:

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