FIMAP®

SERVICE MANUAL

BMG

Version: **AA**
Date: **May 9, 2019**
Document Number: **10088000**

Contents

I Product Introduction 4

1 General Info 5
- 1.1 Service Manual Purpose . . . 5
- 1.2 Configurations . . . 5
- 1.3 The Serial Number Plate . . . 6
- 1.4 Conventions . . . 6
- 1.5 General Safety Instructions . . . 7
- 1.6 How to move the machine . . . 7
- 1.7 Technical Data . . . 8
- 1.8 Diagnostic and necessary Service Tools . . . 13
- 1.9 Fastener Torque Specifications . . . 13
- 1.10 Scheduled Maintenance . . . 13
- 1.11 Main Components . . . 14
- 1.12 PDI . . . 15

II Anomalies Resolution Guide 16

2 Trouble-shooting 17
- 2.1 Electrical system: what to do if... . . . 17
- 2.2 Mechanical scrubbing system: what to do if... . . . 19
- 2.3 Drying system: what to do if... . . . 20
- 2.4 Frame and traction system: what to do if... . . . 22
- 2.5 Solution delivery system: what to do if... . . . 23

III Functional Groups 24

3 Electrical System 25
- 3.1 Description . . . 25
- 3.2 Location of Electrical Components . . . 26
- 3.3 List of Components . . . 27
- 3.4 Alarms Table . . . 34
- 3.5 Adjustments . . . 38
- 3.6 Programming . . . 41
- 3.7 Maintenance and Checks . . . 54

4 56 Washing Unit 57
- 4.1 Location on machine . . . 57
- 4.2 Main Components . . . 57
- 4.3 Lubrication Points . . . 58
- 4.4 Work requirements . . . 58
- 4.5 Operating mode . . . 59
- 4.6 Related electrical circuit . . . 60
- 4.7 Adjustments . . . 62
- 4.8 Disassembly . . . 63

5 65 Washing Unit **65**
5.1 Location on machine . . . 65
5.2 Main Components . . . 65
5.3 Lubrication Points . . . 66
5.4 Work requirements . . . 66
5.5 Operating mode . . . 67
5.6 Related electrical circuit . . . 68
5.7 Adjustments . . . 70
5.8 Disassembly . . . 71

6 50 BTO Washing Unit **73**
6.1 Location on machine . . . 73
6.2 Main Components . . . 73
6.3 Lubrication Points . . . 74
6.4 Work requirements . . . 74
6.5 Operating mode . . . 75
6.6 Related electrical circuit . . . 76
6.7 Adjustments . . . 78
6.8 Disassembly . . . 78

7 Vacuum Unit **80**
7.1 Location on machine . . . 80
7.2 Main Components . . . 81
7.3 Lubrication Points . . . 82
7.4 Work requirements . . . 82
7.5 Operating mode . . . 83
7.6 Related electrical circuit . . . 84
7.7 Adjustments . . . 86
7.8 Disassembly . . . 86

8 Frame and Traction Unit **88**
8.1 Location on machine . . . 88
8.2 Main Components . . . 88
8.3 Work requirements . . . 89
8.4 Operating mode . . . 89
8.5 Related electrical circuit . . . 90
8.6 Adjustments . . . 92
8.7 Disassembly . . . 92

9 Water Unit **95**
9.1 Location on machine . . . 95
9.2 Main Components . . . 95
9.3 Work requirements . . . 96
9.4 Operating mode . . . 96
9.5 Related electrical circuit . . . 98

10 Consumable and Recommended Spare Parts **100**
10.1 Consumable . . . 100
10.2 Recommended Spare Parts . . . 102

Part I

Product Introduction

Chapter 1

General Info

1.1 Service Manual Purpose

Good customer service requires in-depth training and well-structured training materials.
This service manual has been created to assist certified service technicians through instructions and reference guide. It is recommended to read it thoroughly before servicing your machine.

1.1.1 Other reference manuals

DOCUMENT	TYPE	DOC. NUMBER	VERS.	DESCRIPTION
SPARE PARTS CATALOGUE	RIC	10083825	AA	BMG PRO
SPARE PARTS CATALOGUE	RIC	10083827	AA	BMG PLUS
Electric Diagram	CIE	10078920	AA	BMG
Use and Maintenance Manual	UM	10082488	AA	BMG PRO
Use and Maintenance Manual	UM	10082114	AA	BMG PLUS

1.2 Configurations

BMG is a battery-powered ride-on scrubber-dryer, able to clean a wide range of floors and dirt types , collecting during its forward motion the removed dirt and the detergent solution not absorbed by the floor. The machine can be powered by 2 individual mono-block 12V batteries, to supply 24V DC to the motors and controls.
BMG is available in 2 models and 3 cleaning versions

56 PRO - Version with membrane control panel. The brushdeck of the 56 version is equipped with one disk brush.

56 PLUS - Advanced version with integrated touch screen display. The brushdeck of the 56 version is equipped with one disk brush.

65 PRO - Version with membrane control panel. The brushdeck of the 65 version is equipped with two disc counterrotating brushes with conveying to the center.

65 PLUS - Advanced version with integrated touch screen display. The brushdeck of the 65 version is equipped with two disc counterrotating brushes with conveying to the center.

50 BTO PRO - Version with membrane control panel. The brushdeck of the BTO version is equipped with a central oscillating rectangular pad consisting of a base on which a motor is fixed connected to an eccentric orbital flange, which in turn transmits the motion to a plate on which the pad is applied.

50 BTO PLUS - Advanced version with integrated touch screen display. The brushdeck of the BTO version is equipped with a central oscillating rectangular pad consisting of a base on which a motor is fixed connected to an eccentric orbital flange, which in turn transmits the motion to a plate on which the pad is applied.

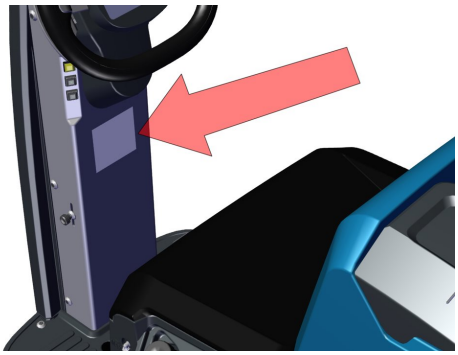
1.2.1 Products related to this Manual

109070	BMG 2018 56 PRO
109073	BMG 2018 56 PLUS
109071	BMG 2018 65 PRO
109074	BMG 2018 65 PLUS
109072	BMG 2018 50 PRO
109076	BMG 2018 50 PLUS

1.3 The Serial Number Plate

1 Part Number
2 Serial Number

The serial number plate is located on the back of the steering column, below the steering wheel.



1.4 Conventions

By convention, all forward and backward references, front and rear, right and left indicated in this manual, are intended to refer to the operator in the driving position with his hands on the control handlebar.

1.5 General Safety Instructions

Always wear the appropriate personal protective equipment at each intervention.

To avoid short-circuits when working in the vicinity of electrical components: avoid the use of non-insulated tools; do not place or allow metallic objects to fall upon the electrically powered components; remove rings, watches and/or clothing with metallic parts that might come into contact with the electrically powered components.

Do not work underneath the raised machine without adequate fixed safety supports.

Restore all electrical connections after any maintenance interventions.

When doing maintenance work, switch off the machine using the main switch. Remove the key from the block and disconnect the battery connector from the electrical system connector.

Avoid contact with moving parts. Do not wear loose clothing or jewellery, and tie long hair back.

Block the wheels before lifting the machine.

Lift the machine with equipment that can sustain the weight to be lifted.

Drain both tanks before transport.

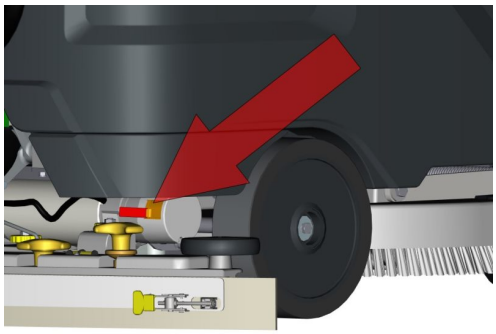
Bring both the squeegee and the brushes to a working position before securing the machine to the transport vehicle.

The ramp gradient must not be such as to cause damage to the machine as it moves up onto the vehicle.

Make sure the electric brake is correctly engaged after loading the machine onto the transport vehicle.

1.6 How to move the machine

The traction gearmotor is equipped with a built-in electrobrake that is activated when the key switch is deactivated or the pedal is released. You can manually override this brake, if necessary, by reaching the rear right side of the machine and turning the brake lever upwards. Perform this operation only if you need to push or pull the machine. Remember to reinsert the brake lever after moving the machine, turning it downwards. If the electric brake is not reactivated, an alarm will appear when the machine is switched on.



1.7 Technical Data

BMG Technical Data

TECHNICAL DESCRIPTION	U/M	56	65	50 BTO
Working capacity, up to	$\frac{m^2}{h}$ / $\frac{ft^2}{h}$	5400/58125	5400/58125	5400/58125
Total Power	W	3050	3250	3250
Disc Brushes *(Number - Ø External)*	Nr - mm/in	2-460/18.1	2-460/18.1	-
Pad *(Number - Length - Width)*	Nr - mm-mm Nr - in-in	- -	- -	1-508-355 1-20-14
Brush Motor *(Voltage - Nominal Power - Revolutions)*	V-W-rpm	36-750-180	36-750-180	36-750-180
Max weight on Brush	Kg/lb	150/331	150/331	150/331
Traction Motor *(Voltage - Nominal Power)*	V-W	24-450	24-450	24-450
Maximum Ramp Gradient (Transfer)[1]	%	18	18	18
Maximum forward speed (Transport) *(Default)*	Km/h / mph	9/5.6	9/5.6	9/5.6
Vacuum Motor *(Voltage - Nominal Power)*	V-W	36-650	36-650	36-650
Vacuum Motor Stages/Depression	mbar	2/190	2/190	2/190
Solution Tank	L/gal	190/50	190/50	190/50
Recovery Tank	L/gal	200/53	200/53	200/53
Detergent Tank	L/gal	15/4	15/4	15/4
Steering Ray	mm/in	986/38.8	986/38.8	986/38.8
Battery compartment *(length - width - height)*	mm in		190(2x)-350-310 7.5(2x)-13.7-12.2	
Usage Temperature *(Min - Max)*	˚C ˚f	0 - 40 32-104	0 - 40 32-104	0 - 40 32-104
Sound pressure level *(ISO 11201)*	LpA dB (A)	$\leq$ 70	$\leq$ 70	$\leq$ 70
Hand vibration level *(ISO 5349)*	$\frac{m}{s^2}$	$\leq$ 1,10	$\leq$ 1,10	$\leq$ 1,10

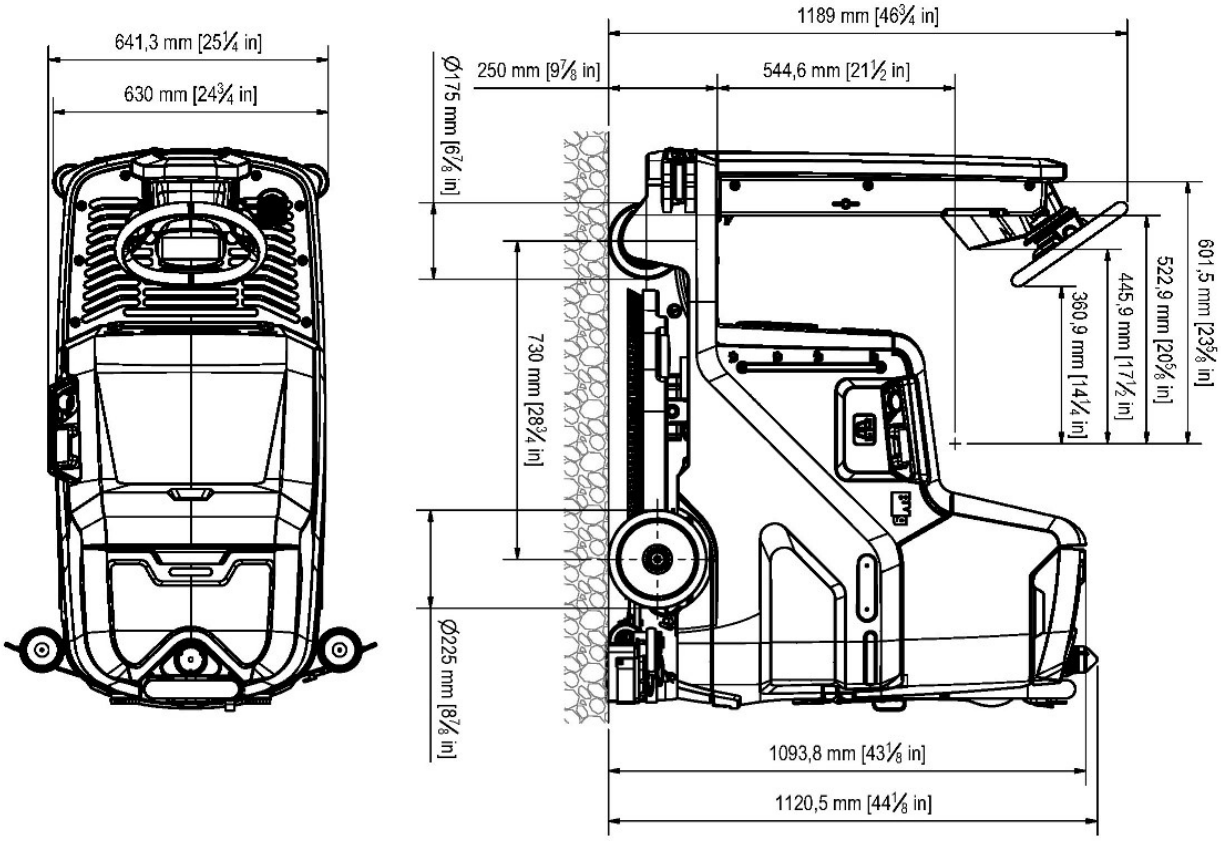
[1] "Transfer" setting and empty Tanks

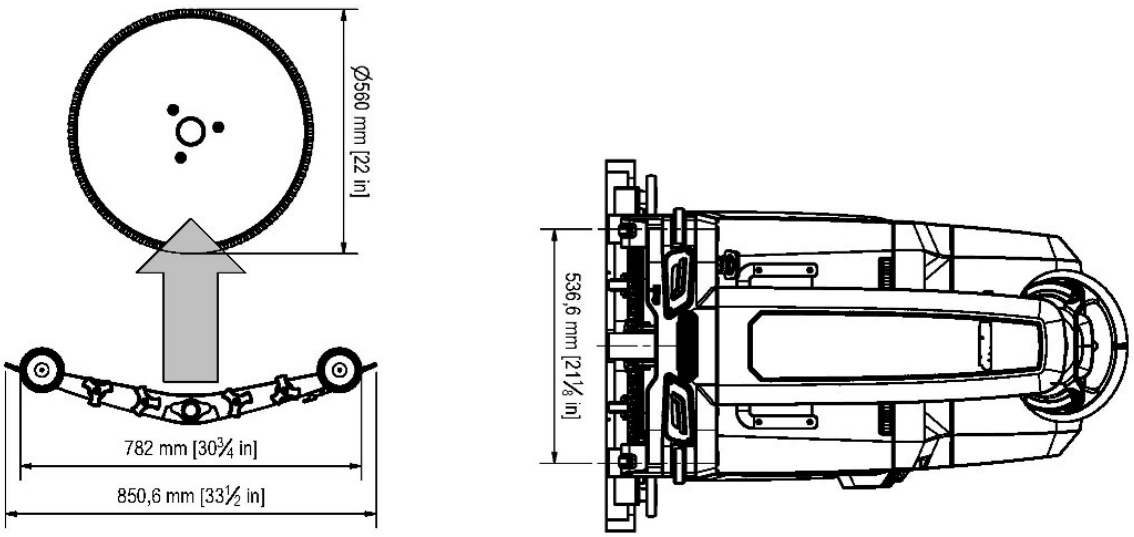
BMG Weights and Pressures[2]

TECHNICAL DESCRIPTION	U/M	56	65	50 BTO
Machine Weight *(empty and without batteries)*	kg/lb	450/992	460/1003	460/1003
Maximum weight of the battery box (recommended)	kg/lb	120/200	120/200	120/200
Machine Weight in transport *(machine + batteries)*	kg/lb	865/1907	875/1929	875/1929
Machine Weight in work conditions *(machine + batteries + water + operator)*	kg/lb	1055/2326	1065/2348	1065/2348
Weight front wheel	kg lb		171 ÷ 235 377 ÷ 518	
Front wheel pressure	$\frac{kg}{cm^3}$ PSI		3.69 ÷ 4.66 52.48 ÷ 66.28	
Weight rear right wheel	kg lb		333 ÷ 440 734 ÷ 970	
Rear right wheel pressure	$\frac{kg}{cm^2}$ PSI		8.91 ÷ 11.16 126.73 ÷ 158.73	
Weight rear left wheel	kg lb		326 ÷ 393 719 ÷ 866	
Rear left wheel pressure	$\frac{kg}{cm^2}$ PSI		8.05 ÷ 11.19 114.50 ÷ 159.16	

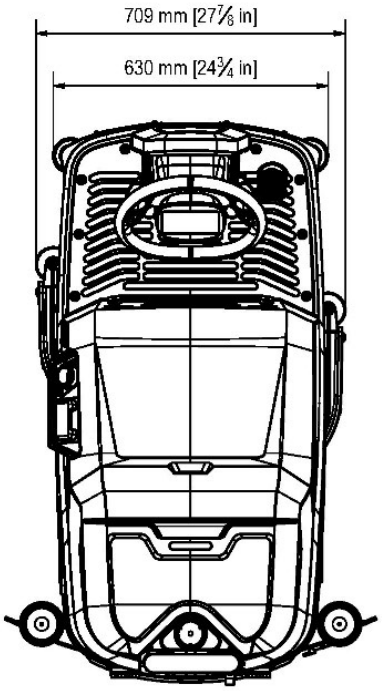
[2]Weight and Pressures depends on how much water there is in the tanks and on the type of battery the machine fits.

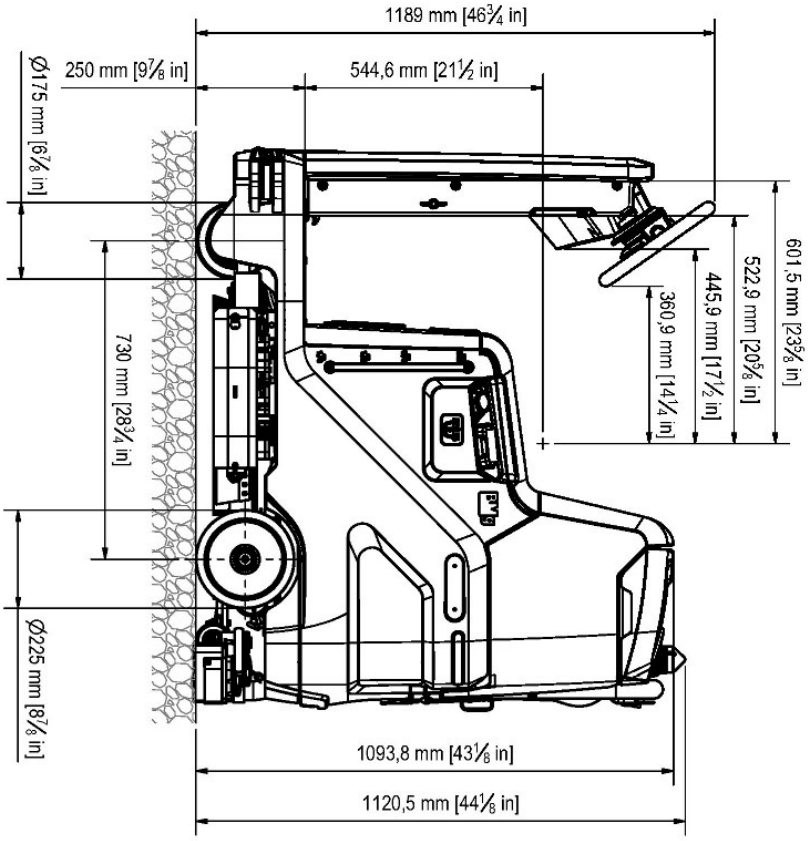
1.7.1 BMG 56

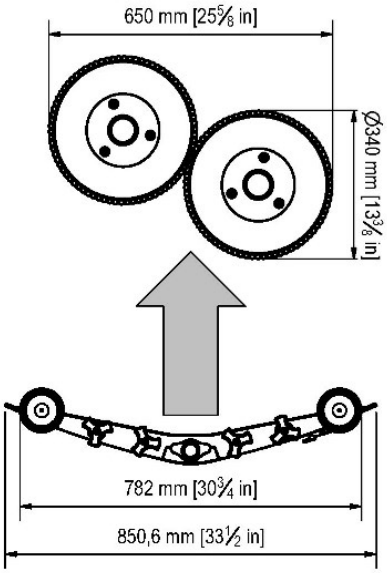

641,3 mm [25¼ in]
630 mm [24¾ in]
1189 mm [46¾ in]
250 mm [9⅞ in]
544,6 mm [21½ in]
Ø175 mm [6⅞ in]
730 mm [28¾ in]
601,5 mm [23⅝ in]
522,9 mm [20⅝ in]
445,9 mm [17½ in]
360,9 mm [14¼ in]
Ø225 mm [8⅞ in]
1093,8 mm [43⅛ in]
1120,5 mm [44⅛ in]

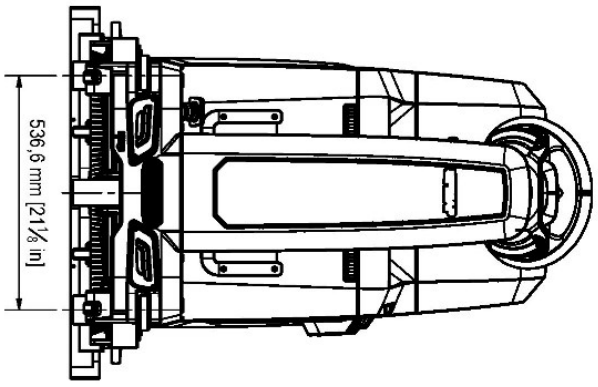

Ø560 mm [22 in]
782 mm [30¾ in]
850,6 mm [33½ in]
536,6 mm [21⅛ in]

1.7.2 BMG 65

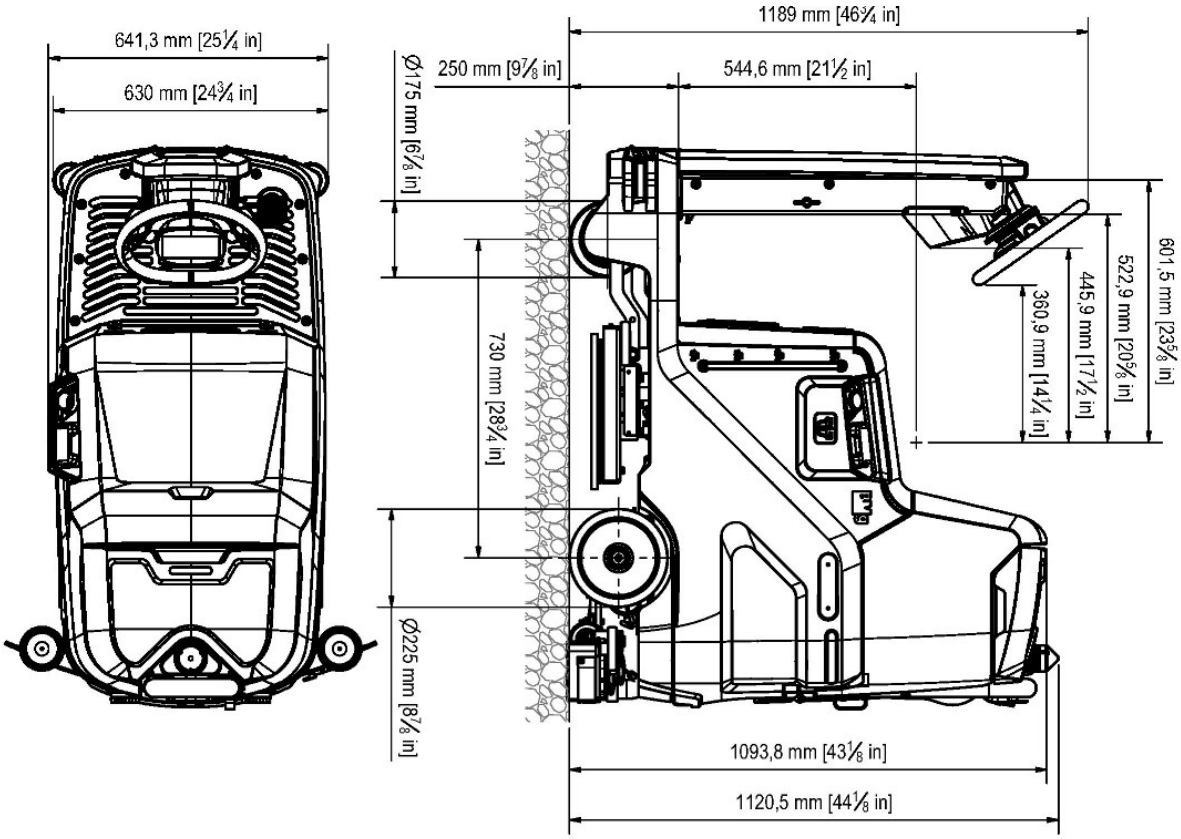

709 mm [27⅞ in]
630 mm [24¾ in]

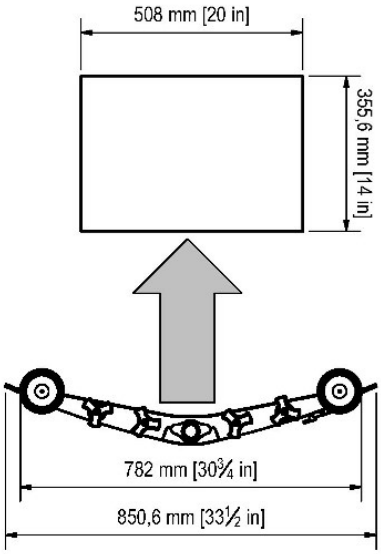

1189 mm [46¾ in]
250 mm [9⅞ in]
544,6 mm [21½ in]
Ø175 mm [6⅞ in]
730 mm [28¾ in]
Ø225 mm [8⅞ in]
601,5 mm [23⅝ in]
522,9 mm [20⅝ in]
445,9 mm [17½ in]
360,9 mm [14¼ in]
1093,8 mm [43⅛ in]
1120,5 mm [44⅛ in]

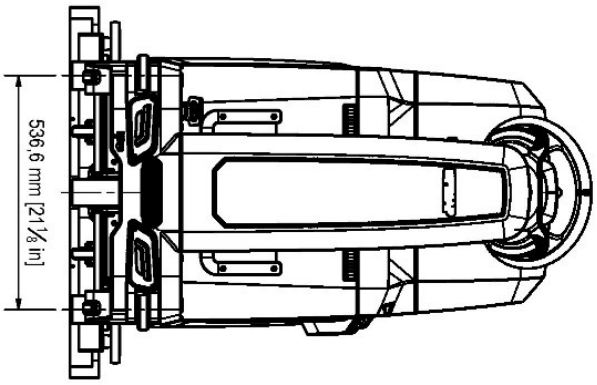

650 mm [25⅝ in]
Ø340 mm [13⅜ in]
782 mm [30¾ in]
850,6 mm [33½ in]


536,6 mm [21⅛ in]

1.7.3 BMG 50 BTO







1.8 Diagnostic and necessary Service Tools

In addition to a full set of metric and standard tools, the following items are required in order to successfully and quickly perform troubleshooting and repair.

- Digital voltmeter
- DC Current Probe with Full Scale 40-200A
- Densimeter
- Hydraulic Lift
- Charger Serial Data Cable, PN 435226

1.9 Fastener Torque Specifications

Nominal Diameter	Standard Screws	Stainless Steel Screws
M4	3.1 Nm - 27.4 lb/in	2.1 Nm - 18.6 lb/in
M5	6 Nm - 53.1 lb/in	4 Nm - 35.4 lb/in
M6	10.4 Nm - 92 lb/in	7 Nm - 62 lb/in
M8	24.6 Nm - 18.1 lb/ft	16.5 Nm - 12.2 lb/ft
M10	50.1 Nm - 37 lb/ft	33.5 Nm - 24.7 lb/ft
M12	84.8 Nm - 62.5 lb/ft	56.8 Nm - 42 lb/ft

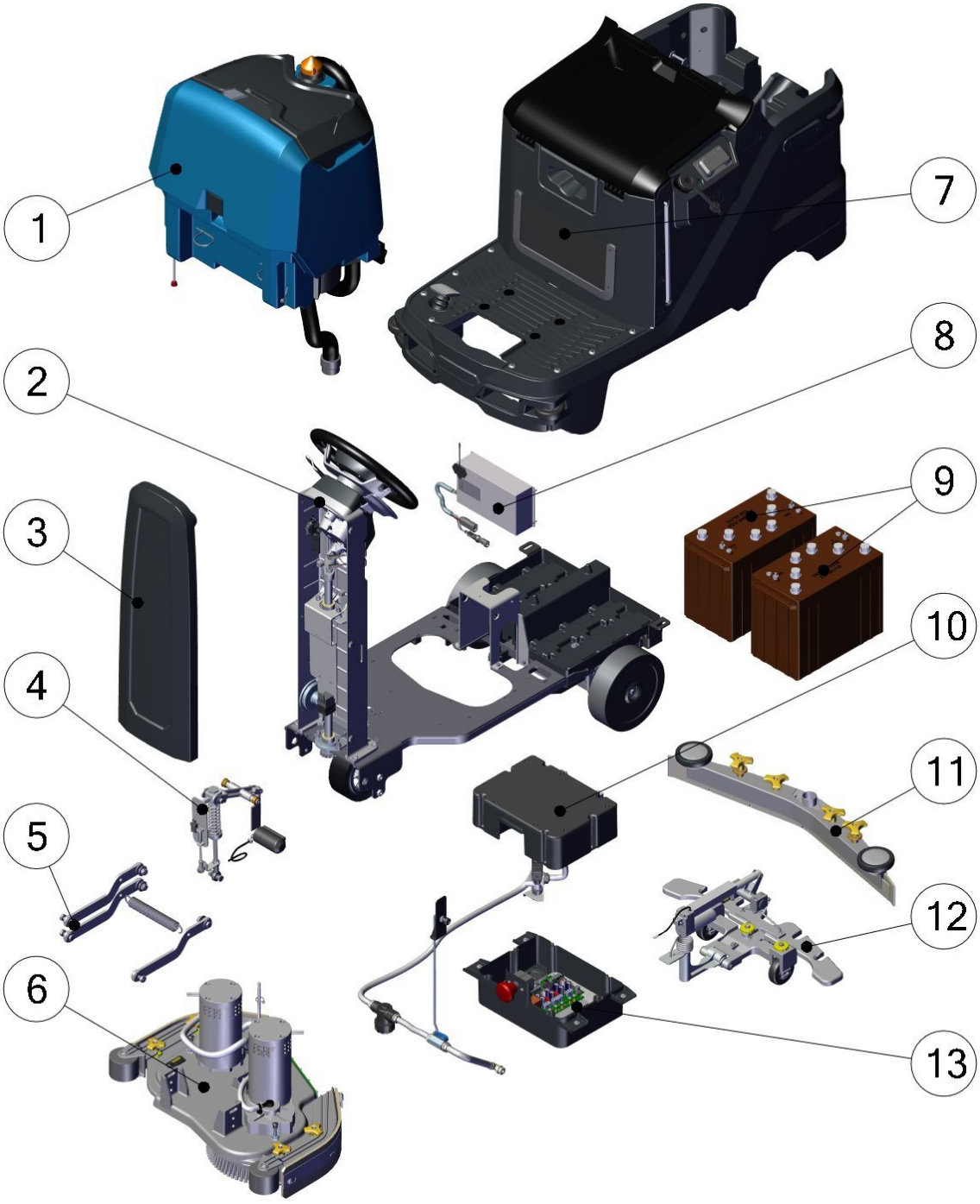
1.10 Scheduled Maintenance

Maintenance of	Daily	Weekly	Monthly	Yearly
Charge batteries	X			
Check/Clean Tanks & Hoses	X			
Check/Clean the Brushes/Pads	X			
Check/Clean the Squeegee	X			
Check/Clean Recovery Tank Float	X			
Empty/Clean Debris Catch Tray of Recovery Tank	X			
Check EACH Battery Cell(s) Water Level		X		
Check/Clean all the Splashguards		X		
Check/Clean Solution Filter		X		
Check/Clean Solution Tank and Water group		X		
Lubricate Machine			X	
*Check/Replace Carbon Brushes				X
**Check/Tightening Electrical Contacts				X

* The carbon brushes of the brush motor and traction motor must be checked every 500 hours or once a year.

** Perform the operation after each replacement of an electrical component or once a year.

1.11 Main Components



1	Recovery Tank	8	Vacuum Group
2	Brush Deck Control	9	Solution Tank
3	Brush Deck	10	Squeegee Control
4	Front Carter Group	11	Squeegee
5	Electrical Harness	12	Braking Group
6	Display Card	13	Water Group
7	Traction and Frame Group		

1.12 PDI

1.12.1 Before delivering the machine, carry out all the operations described below:

- Install the batteries and perform a complete recharge cycle (check the setting of the machine and of the battery charger)
- Install the clean water filter
- Fill the Solution Tank completely with water; check for eventual leaks and the correct water supply on the brushes
- Fill the Detergent Tank completely with water (if available); check for eventual leaks and the correct chemical outlet
- Check the Washing function (brushdeck movement, water supply and brush rotation)
- Check the Drying function (movement of the squeegee, operation of the suction motor and the sealing of the recovery tank)
- Check the Traction (Forward, Backward and Braking)
- Proceed with on-site adjustments (brushdeck and Squeegee adjustment)
- Check the functioning of the Optional if present:
  - Rear camera
  - Anti-collision sensors
  - Front lights
  - Service lights
  - Wand Kit
  - Gun Kit
- Once the demo has been completed, immediately perform the daily maintenance (see the Use and Maintenance manual).

1.12.2 Demo Tips:

Squeegee

You need to have a complete squeegee with a length different from the original (wider or narrower) if available.
You need to have an alternative squeegee rubber kits in PARA and Polyurethane with different hardness (see section 10.1 at page 100).

Brushes

You need to have alternative brushes in PPL of different thickness (see section 10.1 at page 100).
You need to have a pad holder and various PAD at different hardness (see section 10.1 at page 100).

Chemical

You Always need to have the detergent available.
You need to have the Anti-foaming liquid (in case the customer uses his chemical).

Part II

Anomalies Resolution Guide

Chapter 2

Trouble-shooting

2.1 Electrical system: what to do if...

The machine doesn't switch on			
1.	The emergency button is pressed	⇒	*Release the emergency button.*
2.	The key is in position 0	⇒	*Rotate the key in position I.*
3.	The key switch is not properly connected	⇒	*Restore the proper connections.*
4.	The key switch doesn't work	⇒	*Replace the key switch* *(see section 3.3 at page 27).*
5.	The batteries don't work properly	⇒	*Check the proper section* *(see section 2.1 at page 17).*
6.	The machine is powered properly	⇒	*Check the battery charge level and if necessary perform a recharge cycle or replace it.*

The machine has a very limited working autonomy			
1.	The BDI (Battery Discharge Indicator) is not properly adjusted	⇒	*Verify the type of battery used on the machine and adjust properly the BDI* *(see section 3.6.1 at page 41)* *.*
2.	The batteries have been working for several cycles	⇒	*Replace the batteries.*

The display shows an alarm message			
1.	The display shows an alarm message	⇒	*Check what alarm message is shown and solve the related issue by following the proper instructions* *(see section 3.4.1 at page 34).*

The batteries don't work properly			
1.	The batteries are not properly connected	⇒	*Connect the loop wire and the output cables correctly.*
2.	The batteries are discharged	⇒	*Perform a complete charge cycle.*
3.	Battery terminal are oxidized	⇒	*Disconnect the batteries, clean the batteries terminals and reconnect properly the batteries, protecting the connections with grease.*
4.	With the machine in working conditions one battery has a voltage lower (difference higher than 2 V) than the other ones	⇒	*Replace the battery with lower voltage.*
5.	The fuse on the loop wire is damaged	⇒	*Check for possible short circuits, If not present replace the loop wire.*
6.	The power wires are damaged	⇒	*Replace the damaged wires.*
7.	The battery charger is not properly adjusted	⇒	*Adjust the battery charger properly* (see section 3.5.2 at page 39).
8.	The battery charger doesn't work	⇒	*Check the proper section* (see section 2.1 at page 18).

The battery charger doesn't work			
1.	The battery charger is not connected to the power supply	⇒	*Connect the charger to a supplied electric socket.*
2.	The battery charger is not connected to the batteries	⇒	*Connect the charger to the batteries.*
3.	The battery charger is not properly adjusted	⇒	*Adjust the battery charger properly* (see section 3.5.2 at page 39).
4.	The battery charger has one or more lights (or LEDs) blinking continuously	⇒	*The battery charger is in error conditions, verify the alarm tables and solve the issue by following the related instructions* (see section 3.5.2 at page 39).
5.	The battery charger is properly connected but it doesn't switch on	⇒	*Replace the battery charger.*

2.2 Mechanical scrubbing system: what to do if...

The machine doesn't clean well			
1.	The machine is switched off	⇒	*Switch on the machine.*
2.	The machine doesn't switch on	⇒	*Refer to the proper section* (see section 2.1 at page 17).
3.	The machine is in "Standard" mode	⇒	*Set the machine in Extrapressure mode.*
4.	The machine is not in working condition	⇒	*Switch on the machine.* *Set the Wash/Dry mode.* *Press the traction pedal.*
5.	The recovery tank is full	⇒	*Empty the recovery tank completely.*
6.	The brush rotates in opposite way	⇒	*Check the motor connections.*
7.	The microswitch of the traction pedal doesn't work	⇒	*Replace the traction pedal* (see section 3.3 at page 27).
8.	The brush is not properly engaged	⇒	*Release and engage properly the brush.*
9.	The brushdeck is not properly adjusted	⇒	*Check and proceed to a proper adjustment of the brushdeck by following the instructions* (see section 4.7.1 at page 62).
10.	The machine does not clean properly	⇒	*Verify / use the brushdeck extra pressure control.*
11.	The solution flow rate is not correct or not enough	⇒	*Refer to the proper section* (see section 2.5 at page 23).

The brush motor doesn't work properly			
1.	The brush motor is Off	⇒	*Activate the brush motor with the Wash mode.*
2.	The brush motor is not powered properly	⇒	*Check the power connections of the brush motor and the correct functioning of the main card and if necessary replace it* (see section 3.3 at page 27) (see section 4.6.1 at page 60)(see section 5.6.1 at page 68)(see section 6.6.1 at page 76).
3.	The display shows an alarm message	⇒	*Check what alarm message is shown and solve the related issue by following the proper instructions* (see section 3.4.1 at page 34).
4.	The carbon brushes are worn out	⇒	*Replace the carbon brushes* (see section 4.8.2 at page 63)(see section 5.8 at page 71)(see section 6.8 at page 78).
5.	The brush motor is not working even if powered	⇒	*Replace the motor* (see section 3.3 at page 27).

The Brushdeck doesn't move			
1.	The display shows an alarm message	⇒	*Check what alarm message is shown and solve the related issue by following the proper instructions* (see section 3.4.1 at page 34).
2.	The brush deck is lowered but it doesn't touch the ground	⇒	*Check the settings of the actuator* (see section 4.7.2 at page 62).
3.	The brush deck does not lift properly	⇒	*Check the adjustments of the actuator* (see section 4.7.2 at page 62).
4.	The brush deck does not move	⇒	*Verify the actuator connections to the main card and the max pressure microswitch* (see section 3.3 at page 27).

2.3 Drying system: what to do if...

The machine doesn't dry well			
1.	The machine is switched off	⇒	*Switch on the machine.*
2.	The machine doesn't switch on	⇒	*Refer to the proper section* (see section 2.1 at page 17).
3.	The machine is not in working condition	⇒	*Switch on the machine.* *Set the Wash/Dry mode.* *Press the traction pedal.*
4.	The recovery tank is full	⇒	*Empty the recovery tank completely.*
5.	The vacuum motor doesn't work properly	⇒	*Refer to the proper section* (see section 2.3 at page 21).
6.	The squeegee is lifted up from the floor	⇒	*Lower down the squeegee.*
7.	The squeegee rubber blades are worn out or broken	⇒	*Rotate or replace the squeegee rubber blades.*
8.	The squeegee is not properly adjusted	⇒	*Adjust the squeegee properly following the proper procedure* (see section 7.7.1 at page 86).
9.	The vacuum system - vacuum chamber & adapter - vacuum hose - filter & holder is dirty or stuck	⇒	*Clean the vacuum system.*
10.	The vacuum cover is not well positioned	⇒	*Position properly the vacuum cover.*
11.	The vacuum cover gasket doesn't adhere properly	⇒	*Replace the vacuum cover gasket.*

The vacuum motor doesn't work properly			
1.	The vacuum motor is Off	⇒	*Activate the brush motor with the Drying mode.*
2.	The vacuum motor is not powered properly	⇒	*Check the power connections of the vacuum motor and the correct functioning of the Main card and, if necessary, replace it* *(see section 3.3 at page 27) (see section 7.6 at page 84).*
3.	The display shows an alarm message	⇒	*Check what alarm message is shown and solve the related issue by following the proper instructions* *(see section 3.4.1 at page 34).*
4.	The vacuum motor carbon brushes are worn out	⇒	*Replace the vacuum motor carbon brushes.*
5.	The vacuum motor is not working even if powered	⇒	*Replace the motor.*

The squeegee doesn't move			
1.	The display shows an alarm message	⇒	*Check what alarm message is shown and solve the related issue by following the proper instructions* *(see section 3.4.1 at page 34).*
2.	The squeegee is lowered but it doesn't touch the ground	⇒	*Check the settings of the actuator.*
3.	The squeegee does not lift properly	⇒	*Check the adjustments of the actuator.*
4.	The squeegee does not move	⇒	*Verify the actuator connections to the main card* *(see section 3.3 at page 27).*

2.4 Frame and traction system: what to do if...

The traction motor doesn't work properly			
1.	The machine is switched off	⇒	*Switch on the machine.*
2.	The machine doesn't switch on	⇒	*Check the proper section* (see section 2.1 at page 17).
3.	The display shows an alarm message	⇒	*Check what alarm message is shown and solve the related issue by following the proper instructions* (see section 3.4.1 at page 34).
4.	The operator is not sitting on the seat	⇒	*The operator must sit on the seat.*
5.	The operator is sitting on the seat	⇒	*Check and/or replace the seat* (see section 3.3 at page 27).
6.	The pedal is not pressed	⇒	*Press the pedal depending on the required speed.*
7.	The pedal is pressed	⇒	*Check and / or replace the traction pedal* (see section 3.3 at page 27).
8.	The traction motor is not supplied	⇒	*Check the power connections of the motor* (see section 8.5 at page 90).
9.	The traction motor carbon brushes are worn out	⇒	*Replace the carbon brushes* (see section 8.7.3 at page 93).
10.	The traction motor is not working even if powered	⇒	*Replace the motor* (see section 3.3 at page 27).
11.	The electrobrake doesn't disengage	⇒	*Check the connections of the electrobrake.*

2.5 Solution delivery system: what to do if...

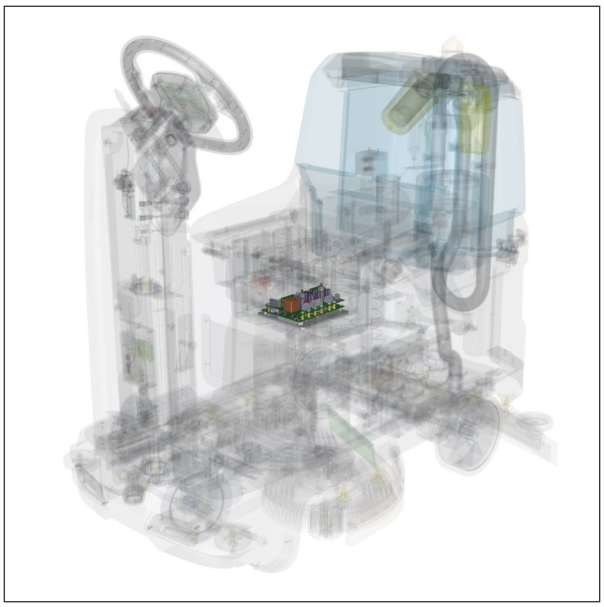
The delivered solution is not correct or not enough			
1.	The machine is switched off	⇒	*Switch on the machine.*
2.	The machine doesn't switch on	⇒	*Refer to the proper section* *(see section 2.1 at page 17).*
3.	The solution tank is empty	⇒	*Fill up the solution tank.*
4.	(FSS) The chemical tank is empty	⇒	*Fill up the chemical tank.*
5.	The flow control water valve is closed	⇒	*Fully open the water valve.*
6.	The display shows an alarm message	⇒	*Check what alarm message is shown and solve the related issue by following the proper instructions* *(see section 3.4.1 at page 34).*
7.	The water pump doesn't work	⇒	*Check the flojet pump connections and, if necessary, replace it* *(see section 3.3 at page 27).*
8.	(FSS) The water pump or the chemical pump doesn't work	⇒	*Check the pump connections and, if necessary, replace the non working one.*
9.	The solenoid valve doesn't work	⇒	*Check the solenoid valve connections and, if necessary, replace it* *(see section 3.3 at page 27).*
10.	The hose that connects the solution tank to the filter is stuck	⇒	*Clean the hose.*
11.	The solution filter is stuck	⇒	*Clean the solution filter.*
12.	The solution distributor is stuck	⇒	*Clean the distributor.*
13.	The detergent doesn't fit the type of dirt	⇒	*Replace the detergent with a proper one.*
14.	(FLR) The flojet pump doesn't work	⇒	*Check the flojet pump connections and, if necessary, replace it.*
15.	(FLR) The solenoid valve doesn't work	⇒	*Check the solenoid valve connections and, if necessary, replace it.*
16.	(FLR) The recycle filter is stuck	⇒	*Clean the recycle filter.*

Part III

Functional Groups

Chapter 3

Electrical System



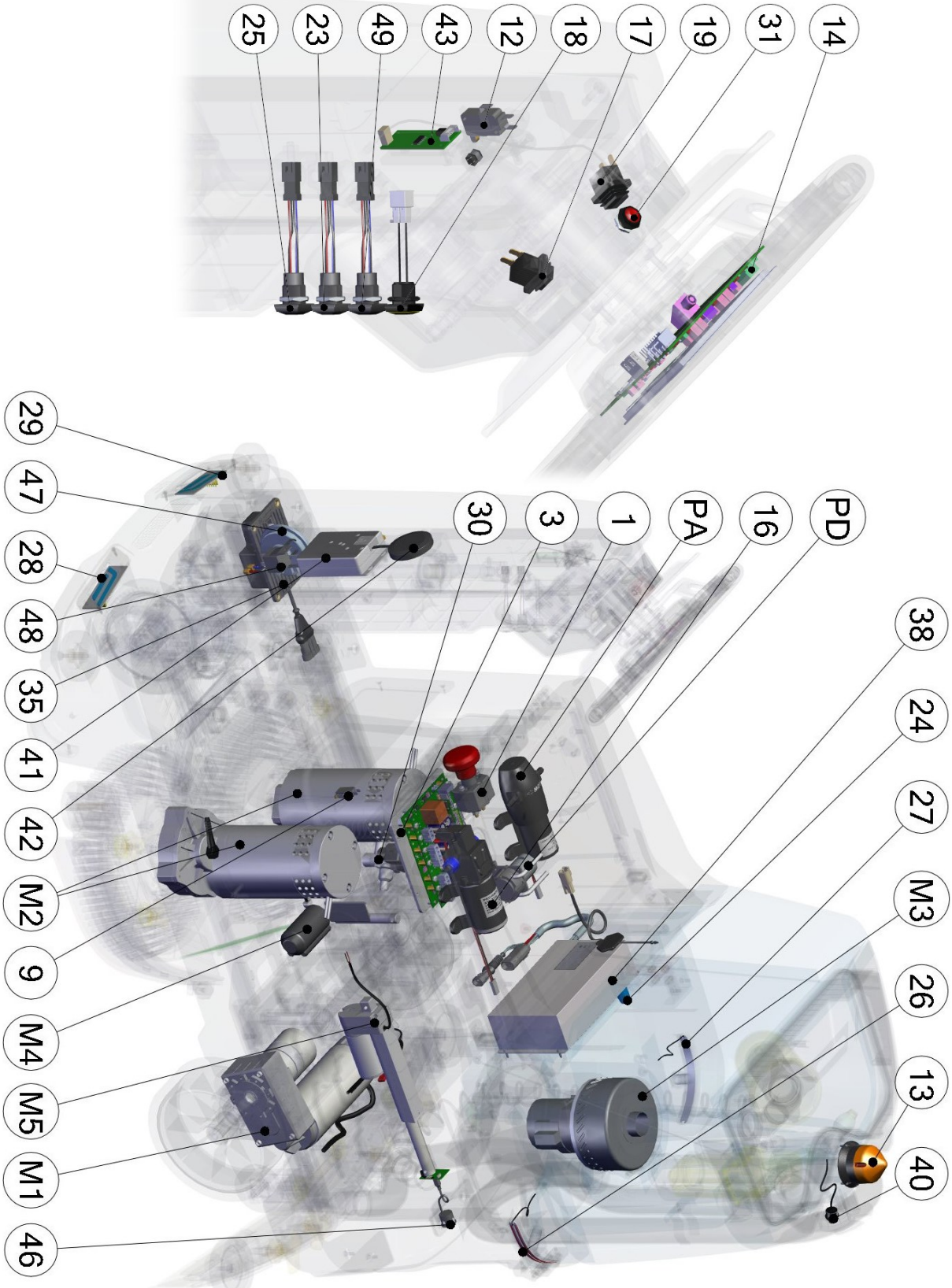
3.1 Description

A main card runs all the functions of the machine, traction, braking, washing and drying.

The main card receive as input, all the information from the micro switches and all the electronic devices of the machine.
These signals are translated from the main card to run correctly the scrubber dryer and to prevent any safety problem to the operator.

The Dashboard with membrane controls **(BMG PRO)** and the Dashboard with Touch Screen Display **(BMG PLUS)** allows to set the main operation of the machine parameters.

3.2 Location of Electrical Components



3.3 List of Components

1 Emergency button

3 Main Control Card

9 Max Pressure microswitch

12 Key switch

13 Blinking Light

14 Touchscreen Display

17 Extrapressure Switch

18 Horn button

19 Backward Switch

23 Wand activation Switch

24 Full recovery tank Float

24B Reserve solution tank Float

25 Spray Gun activation Switch

26 Rear Left Light

27 Rear Right Light

28 Front Left Light

29 Front Right Light

30 Solenoid Valve

31 SOS button

34 Electrobrake

35 Traction Pedal

38 Battery charger

40 Rear Camera

41 FFM card

42 GSM-GPS Aerial

43 RFID Card

46 Anticollision Sensor

47 Horn

48 Horn Relay

49 FSS/FLR activation Switch

M1 Traction Motor

M2-M2A Brush Deck Motors

M3 Vacuum Motor

M4 Brush Deck Actuator

M5 Squeegee Actuator

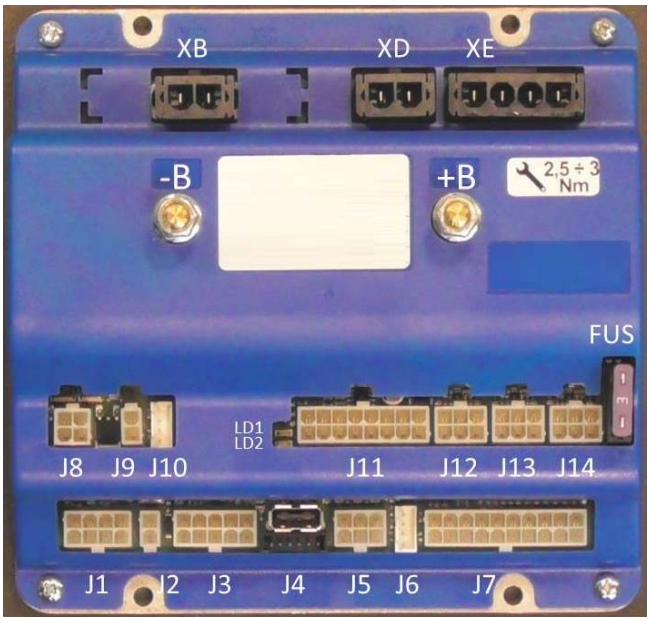
PA Water Pump

PD Recycle Pump (FLR)

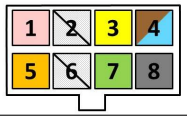
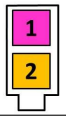
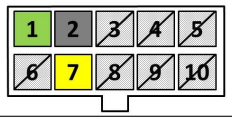
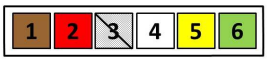
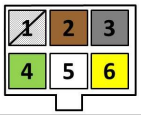
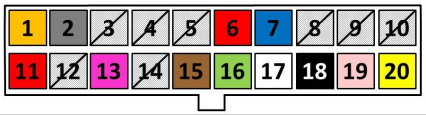
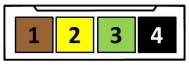
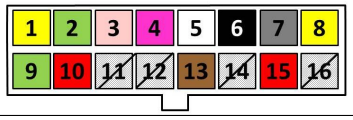
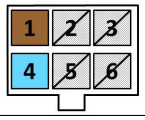
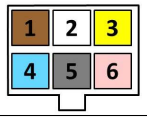
PDS Chemical Pump (FSS)

3.3.1 Main Card

The Main Card (see section 3.3 at page 27) is the heart of the machine and, depending of the input information, decides how to use the devices of the machine during normal work. On the table here below, is possible to identify the input/output signals of the card.



Card Cables Detail

J1		J2	
J3		J4	
J5		J7	
J8		J10	
J11		J13	
J14			

J1

1	Key OUT / Charger	11	Pink	
3	Display (Rx)	17	Yellow	Receiving
4	Displ/Blink/Chemical switch (Tx)	17	Brown	Negative
5	Key IN / Charger	13	Orange	
7	Display (Tx)	17	Green	Transmitting
8	Display / SprayGun/Wand activation Switch / FSS switch /Recycle (PRO)	17	Gray	Positive

J2

1	Electrobrake	15	Violet	Negative
2	Electrobrake Micro	11	Orange	Positive

J3

1	FFM (Rx)		Green	Receiving
2	FFM (Tx)		Gray	Transmitting
7	FFM (Gnd)		Yellow	Negative

J4

1	Encoder	31	Brown	Negative
2	Blink light	18	Red	Positive
4	Encoder	31	White	
5	Encoder	31	Yellow	
6	Encoder	31	Brown	Positive

J5

2	Potentiometer	16	Brown	Positive
3	Traction pedal micro	16	Gray	Positive
4	Potentiometer	16	Green	Negative
5	Potentiometer	16	White	Central Potentiometer
6	Traction pedal micro	16	Yellow	Input

J7

1	Micro common	11	Black	Negative
6	Multimode Micro	12	Red	
7	extra pressure Lever	11	Blue	
11	Positive	11	Red	
13	Recycle Reserve sensor	14	Violet	
15	Seat Micro	13	Brown	
16	Backward Lever	11	Green	
17	Dosing/Recycle switch (PRO)	14	Pink	
18	Wand activation switch	14	Black	
19	Wand activation switch	14	Pink	

J8

1	Water Pump		Black	Positive
2	Gun Pump		Blue	Common Positive
3	Water Pump		Red	Negative
4	Gun Pump		Orange	Negative

J10

1	Anticollision (Vcc)	31	Brown	Positive
2	Anticollision (In)	31	Yellow	Input
3	Anticollision (trigger)	31	Green	
4	Anticollision (Gnd)		Black	Negative

J11

1	Horn	23	Yellow	Negative
2	Position Lights	23	Yellow	Negative
3	Recovery Recycle Solenoid Valve	22	Pink	Negative
4	Backward Light	16	Purple	Negative
5	Solenoid Valve	15	White	Negative
6	Solution Recycle Solenoid Valve	15	Black	Negative
7	Front Light	23	Green	Negative
8	Chemical Pump		Green	Negative
9	Micro common		Green	Positive
10	Micro common	22	Red	Positive
13	Solenoid Valve	15	Brown	Positive
15	Micro common	23	Red	Positive

J13

1	Squeegee Actuator	19	Brown	Positive
4	Squeegee Actuator	19	Light Blue	Negative

J14 Disc

1	Brush Actuator Micro	20	Brown	
2	Max pressure Micro	12	Green	Input
4	Brush Actuator Micro	20	Light Blue	
6	Max pressure Micro	20	Gray/Pink	Input

J14 BTO

1	Brush Actuator Micro	20	Brown	
2	Pressure Lev. 1	20	White	
3	Pressure Lev. 3	20	Yellow	
4	Brush Actuator Micro	20	Light Blue	
5	Pressure Lev. 2		Gray	
6	Pressure Micro common	20	Gray/Pink	Input

Power Contacts	
XB	Traction Motor
XD	Vacuum Motor
XE	Brush Motor
Fus	Main Fuse
B+	Battery Positive
B-	Battery Negative

3.3.2 Emergency button

The machine is equipped with an emergency button near the seat (see section 3.3 at page 27), aimed at the protection of the operator in case of sudden critical conditions. A press of the button switches off the power to the Main card and the machine stops immediately.

3.3.3 Membrane Dashboard (PRO)

The machine is equipped with a membrane panel with a display (see section 3.3 at page 27) that allows to check the machine's devices and change the operating parameters.

3.3.4 Display Touchscreen (Plus)

The machine is equipped with a touchscreen display (see section 3.3 at page 27)which allows to control the devices of the machine and to change the operating parameters.

3.3.5 Key switch

The key switch (see section 3.3 at page 27) provides the power supply to the whole machine.

3.3.6 Extra pressure Lever

The lever allows the switch (see section 3.3 at page 27) to increase the pressure exerted on the central brushes. With extra pressure activated, a warning light is displayed on the steering column (PRO), or on the display (PLUS).

3.3.7 Backward Lever

The lever allows the switch (see section 3.3 at page 27) to activate the reverse traction and the acoustic signal.

3.3.8 Horn button

Positioned on the steering column (see section 3.3 at page 27), allows to activate the acoustic signal.

3.3.9 Recycle button (Base, Optional)

Positioned on the steering column (see section 3.3 at page 27), activates the recycling function of the recovery water. The activation is confirmed by a LED under the button.

3.3.10 Safety switch (Seat)

The seat safety switch (see section 3.3 at page 27) molded into the seat, disables the machine functions if the operator is not seated.

3.3.11 Lights

The machine is equipped with Front and Rear position lights (see section 3.3 at page 27). BMG Plus is equipped with front working lights and can be activated and deactivated from the display.

3.3.12 Traction Encoder

The Encoder is located inside the traction motor and transfers information on the speed of the machine to the Main card.

3.3.13 Electrobrake

The Electrobrake (see section 3.3 at page 27) is assembled on the traction motor. With the machine off it is always activated, is unlocked only when the machine is running and pedal pressed. It can be unlocked manually.

3.3.14 Traction Pedal

The traction pedal (see section 3.3 at page 27) contains an activation microswitch and a non-adjustable electronic potentiometer. With the pedal pressed and micro-closed, traction is enabled.

3.3.15 Battery charger (Optional)

The machine is available with the optional battery charger (see section 3.3 at page 27). To access to the battery charger and the battery compartment is sufficient to lift the recovery tank. On the batteries is present a bridge cable with general protection fuse 80 Ampere.
Once the recovery tank is placed on the gas spring, the charger allows a quick connection of the power cord.

3.3.16 Rear Camera (Plus)

The rear view camera (see section 3.3 at page 27) positioned on the hose support allows to move the machine in reverse avoiding the operator to twist the back and neck.

3.3.17 Reverse sensor (Plus)

The reverse sensor (see section 3.3 at page 27) positioned at the center of the rear bumper emits an intermittent acoustic signal that speeds up close to an obstacle.

3.3.18 Microswitches

The machine is provided with a series of microswitches to enable/disable certain functions or to send signals to the traction card. In particular:

- **Max pressure Micro** (see section 3.3 at page 27). The micro is mounted on a plate integral with the base of the brushdeck. In case the motors have a too low absorption, it avoids that the deck actuator continues to push. If the rod goes over its limit, the micro opens and stops the actuator.
- **Curve speed reduction Microswitch** (see section 3.3 at page 27). It is positioned below the platform. After a predetermined angle of rotation of the steering, the microswitch opens and the curve speed reduction function is activated. The percentage of the speed reduction is an adjustable parameter.
- **Electrobrake Microswitch** (see section 3.3 at page 27). The micro is assembled externally to the traction motor, and can be disabled by a lever. **If enabled**, when the machine is switched OFF the traction is inhibited, when the machine is ON the traction is enabled. **If disabled**, when the machine is switched OFF the machine is not braked, when the machine is ON the traction is inhibited and the display gives an alarm.

3.3.19 Batteries

The power supply is 24V with two batteries 12V each, in series. Below is the list of available batteries.

Number	Model	Type	Voltage [V]	Capacity [Ah]
2	12 TP 110	WET	12	110
2	12 MFP 105	GEL	12	105

The function board transforms the voltage value of the batteries into percentage. This value is then used for operation as a percentage of charge with respect to the maximum capacity. The conversion depends on the type of battery (settable by parameter). In the following table the percentage values according to the voltage value of the batteries where **Vb** is the voltage read on the battery

Display	Vb	Pb60	Gel60	Pure Lead	Pb80	Gel80
100 %	≥	24.3	24.3	24.5	24.3	24.3
90 %	≤	24.3	24.3	24.5	24.3	24.3
80 %	≤	24.1	24.0	24.3	24.0	24.0
70 %	≤	23.5	23.7	24.2	23.5	23.6
60 %	≤	23.0	23.4	24.1	22.9	23.2
50 %	≤	22.5	23.1	23.9	22.3	22.8
40 %	≤	22.1	22.8	23.8	21.7	22.4
30 %	≤	21.7	22.5	23.6	21.1	22.0
20 %	≤	21.2	22.2	23.4	20.5	21.6
10 %	≤	20.8	21.9	23.2	20.1	21.2
0 %	≤	20.4	21.6	23.0	19.8	20.9

Alert Threshold 1: when the 20% battery level is reached, the brushes function is disabled (central brush plus any lateral brush(es).
Alert Threshold 2: when the 10% battery level is reached, the machine moves to transfer mode, regardless of the selected operating mode.

3.4 Alarms Table

3.4.1 General Alarms

Id Alarm	Meaning	Solution
AL_1 General	EEPROM failure	Detected an Error in the internal memory of the card. Turn off and on again. If the error persists, replace the card.
AL_2 General	Key-off failure	Return on the key signal. Turn off the machine, wait at least 2 seconds, and then turn it on again. If the problem persists, replace the key block.
AL_3 General	Undervoltage	Detected supply voltage less than 15V (even instantly). Check the batteries and their connection and the connection between the batteries and the main card. If the error persists, replace the card.
AL_4 General	Overvoltage	Detected supply voltage more than 35V (even instantly). Check the batteries and their connection and the connection between the batteries and the main card. If the error persists, replace the card.
AL_5 General	Battery not connected	Detected no voltage on the battery poles but present on the key input (disabled for this machine).
AL_6 General	Keyboard Communication	No communication between display and main board. Check the connection between the cards. If the problem persists, replace the main card or the display card.
AL_7 General	Communication FFM	Lack of communication between the BB and the main card. Check the connection between the cards. If the problem persists, replace the main card or the BB.
AL_8 General	Communication 1	Internal error in the main card BUS data, turn off and on again. If the problem persists, replace the main card.
AL_9 General	Communication 2	Internal error in the main card BUS data, turn off and on again. If the problem persists, replace the main card.
AL_10 General	Insert Tag	One of the enabled TAGs is not inserted. Enter one of the enabled TAGs in the Slot.
AL_11 General	Invalid Tag	The inserted TAG is not enabled. Enter one of the enabled TAGs in the Slot.
AL_12 General	Update in progress...	The machine is updating the parameter list. Wait for the end of the operation.
AL_13 General	Restart the Machine	After updating the parameters (AL_12) indicates that is necessary to restart the machine.

3.4.2 Function Alarms

Id Alarm	Meaning	Solution
AL_41 Function	Overtemperature	The temperature of the functions power mosfets exceeds 90°C. Switch off the machine, wait for the cooling and then switch on again.
AL_42 Function	Powerstage failure	Verify the machine model setting, turn it off and on again. If the problem persists, replace the main card.
AL_43 Function	Main fuse failure	Check the Function fuse. If the problem persists, replace the main card.
AL_44 Function	Main relay failure	Replace the main card.
AL_45 Function	Main relay failure CC	Replace the main card.
AL_46 Function	Overcurrent brush motor 1-2-3	Brushes Short Circuit. Check the connections, if the problem persists, replace the main card.
AL_47 Function	Overcurrent vacuum motor 1-2	Vacuum Short Circuit. Check the connections, if the problem persists, replace the main card.
AL_48 Function	Overcurrent pump	Pumps Short Circuit. Check the connections, if the problem persists, replace the main card.
AL_49 Function	Brushes motor 1 Ammeter	Overcurrent of the Brush Motor (BMG 56)
AL_50 Function	Brushes motor 2 Ammeter	Overcurrent of the Left Brush Motor (BMG 65)
AL_52 Function	Vacuum motor 1 Ammeter	Overcurrent of the Vacuum Motor.
AL_54 Function	Brush Motor 1 not connected	Detected Motor Brush XE1 not connected, check the connections, if the problem persists, replace the function card.
AL_55 Function	Brush Motor 2 not connected	Detected Motor Brush XE2 not connected, check the connections, if the problem persists, replace the function card.
AL_57 Function	Suction Motor not connected	Detected Motor Aspiration XD not connected, check the connections, if the problem persists, replace the function card.
AL_59 Function	Unbalanced Brush Deck	On 65 version, if the current difference absorbed by Brushes 1 and 2 remains greater than 8A for 10 seconds.

3.4.3 Function Alarms

Id Alarm	Meaning	Solution
AL_60 Function	Brush Actuator timeout	Only with external limit switches, if the actuator does not come into position within a preset time (disabled for this machine).
AL_61 Function	Brush Actuator Ammeter	Overcurrent of the Central brushdeck Actuator.
AL_62 Function	Brush Actuator Overcurrent	Brushes Actuator Short Circuit. Check the connections, if the problem persists, replace the main card.
AL_63 Function	Brush Actuator endsw failure	Anomaly of the actuator microswitches. Check the connections and adjust the micros, if the problem persists replace the actuator.
AL_68 Function	Squeegee Actuator timeout	Only with external limit switches, if the actuator does not come into position within a preset time (disabled for this machine).
AL_69 Function	Squeegee Actuator Ammeter	Overcurrent of the Squeegee Actuator.
AL_70 Function	Squeegee Actuator Overcurrent	Squeegee Actuator Short Circuit. Check the connections, if the problem persists, replace the main card.
AL_71 Function	Squeegee Actuator endsw failure	Anomaly of the actuator microswitches. Check the connections and adjust the micros, if the problem persists replace the actuator.

3.4.4 Traction Alarms

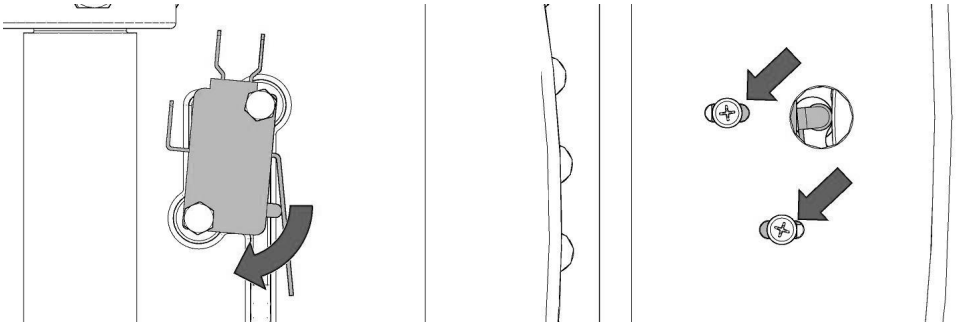
Id Alarm	Meaning	Solution
AL_80 Traction	Overtemperature	The temperature of the traction power mosfets exceeds 90°C. Switch off the machine, wait for the cooling and then switch on again.
AL_81 Traction	Powerstage failure	Turn it off and on again. If the problem persists, replace the main card.
AL_82 Traction	Main fuse failure	Check the Traction fuse. If the problem persists, replace the main card.
AL_83 Traction	Main relay failure	Replace the main card.
AL_84 Traction	Main relay failure CC	Replace the main card.
AL_85 Traction	Traction Overcurrent	Traction Motor Short Circuit. Check the connections, if the problem persists, replace the main card.
AL_86 Traction	Traction Ammeter	Overcurrent of the Traction Motor.
AL_87 Traction	Motor data reading	Abnormal traction motor Output current. Check the traction motor and its connections. If the problem persists, replace the main card.
AL_88 Traction	Electrobrake failure	No current on the electrobrake output. Verify that the electrode is activated, check its connections. If the problem persists, replace the electrobrake.
AL_89 Traction	Pedal adjustment issue	Abnormal traction pedal Output voltage. Check the traction pedal and its connections. If the problem persists, replace the traction pedal.
AL_90 Traction	Pedal pressed	The traction pedal is pressed while the key is switching on. Check the traction pedal and its connections. If the problem persists, replace the traction pedal.
AL_91 Traction	Encoder failure	The encoder provides non-coherent information. Verify the Encoder and its Connections. If the problem persists, replace the Encoder.

3.5 Adjustments

3.5.1 Microswitches

Check functionality and conditions of the microswitches. Check that with microswitch pressed, remains about 0.5 mm clearance between the lever and the body of the microswitch. Make sure the lever of the micro is working properly. Otherwise, proceed as follows:

- Unscrew the fixing screws.
- Move the microswitches using the loop adjustment.
- Fix the screws to lock the microswitches taking care not to over tighten in order not to ruin the devices.
- When the setting is finished, verify the correct functionality of the microswitches.



3.5.2 Battery Charger (CB)

The battery charger is mounted on the recovery tank behind the operator seat. At the start of the charging cycle, the charger indicates the selected charging algorithm by the LED flashing.
A Proper Charging cycle follows the below phases order.

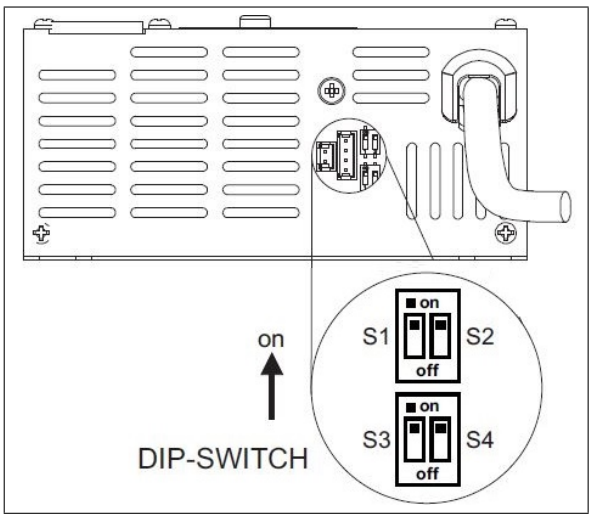
Charging cycle		
Phase	LED	Description
A	Green	Flashes, confirms Charge Curve Setting
B	Red	First charging phase
C	Yellow	Second charging phase
D	Green	Charged battery

Check if the charger is properly set according to the installed batteries.

Charger Set up

To set up the charger, follow the instructions:

- Remove the charger from the machine.
- Set-up the internal dipswitches according to the following table



The dipswitches are divided in two couples.
The higher couple are the dipswitches 1 and 2, the low couple are the dipswitches 3 and 4.

The dipswitches 1, 2 4 are enabled
The dipswitch 3 is disabled.
The following table shows how to setup the dipswitches.

Set-up of Charging Curve					
DP1	DP2	DP4	Set Up	Yellow LED	Green LED Flashes
OFF	OFF	OFF	IUI0-Pb Flooded	OFF	1
ON	ON	OFF	IUoU-Gel Trojan	OFF	2
OFF	ON	OFF	IUoU-AGM GEL	OFF	3
ON	OFF	OFF	IUI0-Gel Sonnenschein	OFF	4
OFF	OFF	ON	IUIa-Pb Flooded	ON	1
ON	ON	ON	IUI0-AGM EV-Discover	ON	2
OFF	ON	ON	IUa-AGM Zenith	ON	3
ON	OFF	ON	IUIa-Gel Sonnenschein	ON	4

Error Codes of Charger

The charger have an alarm system through successive flashes of the yellow LED.

Error code	
Flash	Description
1	Battery not connected or reverse polarity or output short circuit. Verify the battery connection.
2	Alarm time-out: damaged battery or battery capacity is too high The alarm is reset disconnecting the main supply. If it persists consult your service.
3	Faulty battery charger The alarm is reset disconnecting the main supply. If it persists consult your service.
4	Overtemperature The alarm will be reset itself when the charger cools. Verify the ventilation.

Charger Cables Detail

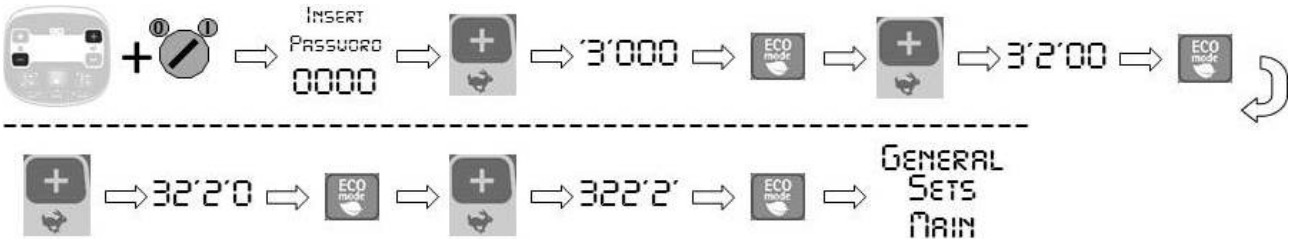
1 Batteria -
2 Batteria +

1 Contatto COM Relè
2 Contatto NC Relè

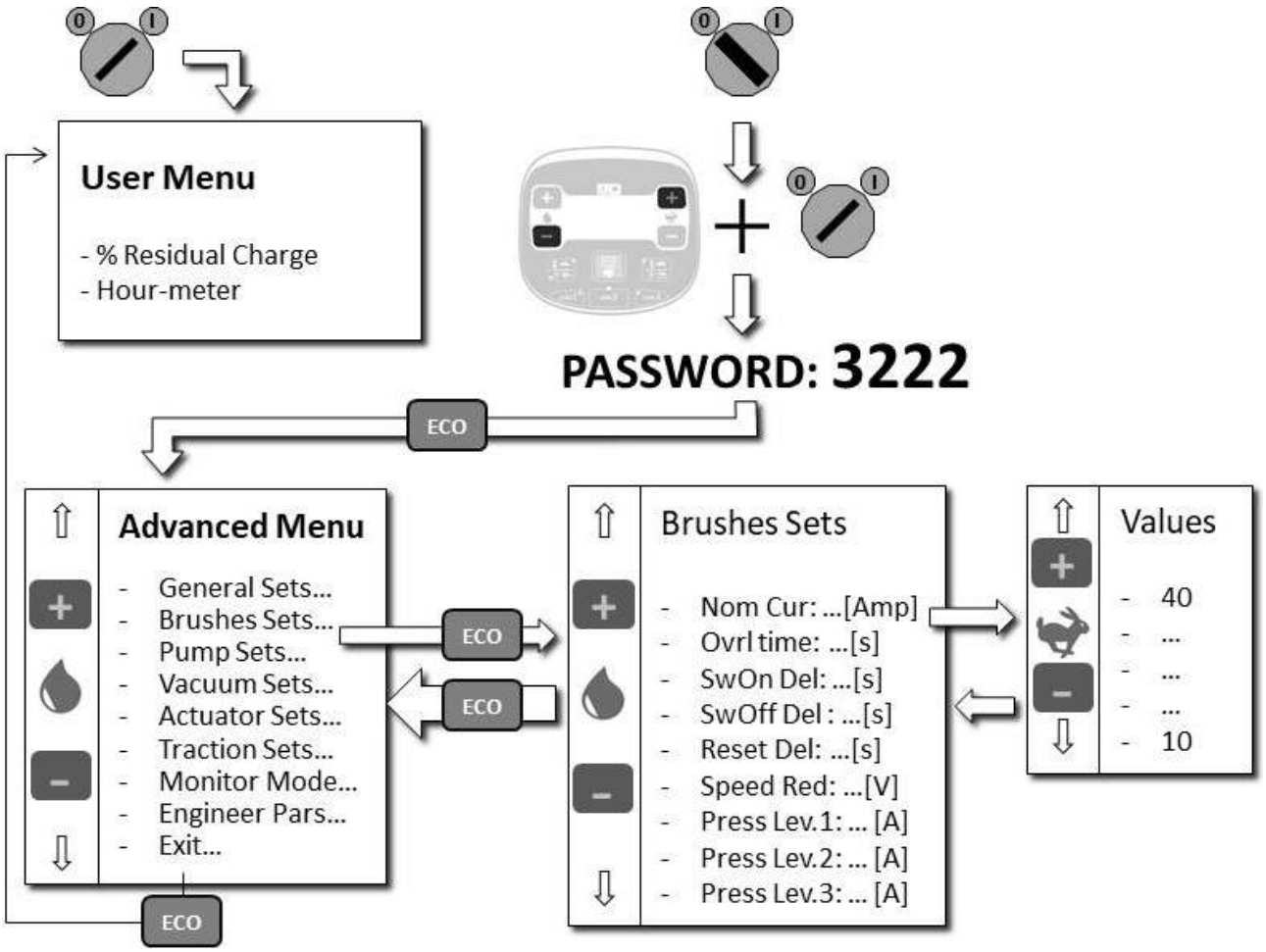
3.6 Programming

3.6.1 BMG PRO

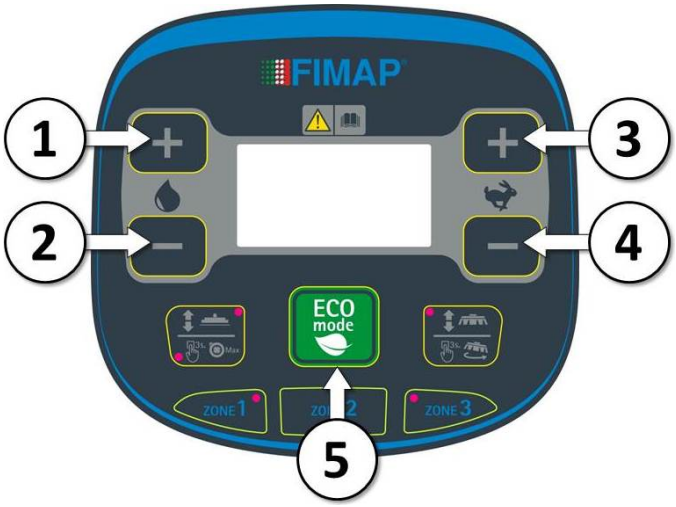
The Display allows the access to basic settings with free access and to the parameter list protected by Password (**3222**). The structure of the menu can be shown in the following image.



The menu structure can be schematically summarized in the following image. Turn on the machine and access the menus by following the icons in the diagram.



3.6.2 Buttons Overview



	Function of the buttons in Programming Mode
1	SCROLL UP (Scroll up)
2	SCROLL DOWN (Scroll down)
3	SCROLL UP (Increase the Value)
4	SCROLL DOWN (Decrease the Value)
5	ENTER (Confirm/Exit)

3.6.3 How to access the Menu

To entry the *Menu* proceed as follows:

- With the machine off, press in the same time button 2 & 3
- Turn on the key, with the three buttons pressed
- Waiting the upload of the –**ID check**– interface for the Password entering.
- Release the buttons and enter the Password (**3222**)
- With button 3 enter the **first** number of the password (**3**) and confirm with button 5.
- With button 3 enter the **second** number of the password (**2**) and confirm with button 5.
- With button 3 enter the **third** number of the password (**2**) and confirm with button 5.
- With button 3 enter the **fourth** number of the password (**2**) and confirm with button 5.

To move inside of the menu, use the buttons 1 & 2.
To access a group of parameters use the button 5.
To modify a parameter, use button 3 e 4.
To exit a group of parameters scroll to the item **EXIT** and confirm with button 5.

3.6.4 How to Change a Parameter

For example, to modify the battery set from GEL60 to Pb60

- Access the Menu entering the password (**3222**).
- Use button 1 and 2 until you find the Battery parameter and access with button 5.
- Use the 3 & 4 keys to scroll through the values for battery type selection until the Pb60 value is found.
- Exit the Parameter group with button 5.
- Scroll through the values the buttons 1 & 2 until you find **exit** and confirm by pressing button 5.

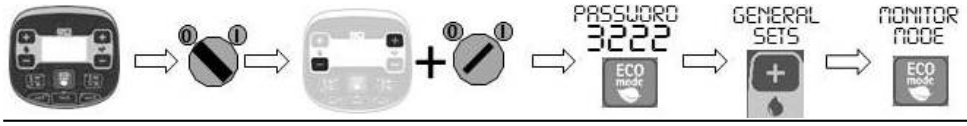
3.6.5 Use of the Monitor Mode Function

The Check / Monitor function allows to check
- The battery status
- The motors absorption

The motors absorption can be viewed while the machine is in working condition. To view the values, following the instruction:

- Access the Advanced Menu by entering the password.
- Press the button 1 & 2 to select the Monitor Mode sub-menu and confirm by pressing 5.
- Press the button 3 & 4 to select the parameter you want to check during normal work and confirm by pressing 5.
- Once confirmed, scroll through the parameters with the button 1 & 2 until you find **exit** and confirm with key 5.
- The display will return to normal working mode, but in the upper part it will be displayed the value of the selected parameter.
- To exit form the Monitor Sets function, turn OFF and ON the machine.

Monitor Mode Parameters

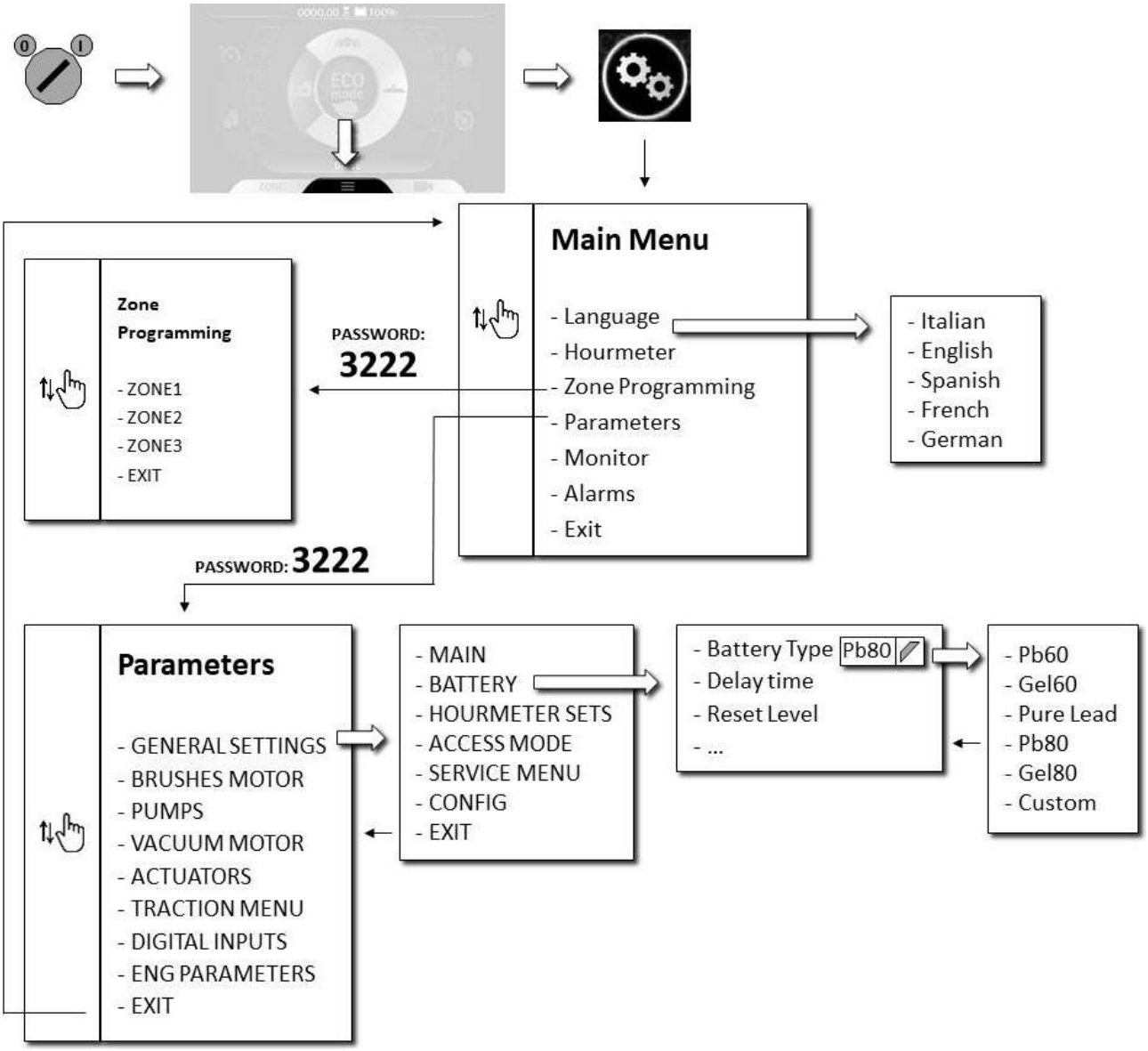


Parameter	Default	Description
No Monitor		Neutral situation, no entry required.
Function Inputs:	Pedal= 0,5V	Voltage range of the traction pedal potentiometer.
Keyboard		Test of membrane handlebar buttons
Functions Temp.	## C°	Main board temperature
Traction Temp.	## C°	Traction motor temperature
Vacuum Current	## A	Vacuum motor current
Brushes Current	## A	Brush motor current
Traction Ammeter	## %	Max Traction motor current
Traction Current	## A	Traction motor current
Traction Voltage	## V	Traction motor voltage
Battery	## V	Battery voltage

3.6.6 BMG PLUS

The Display allows the access to basic settings with free access and to the parameter list protected by Password (3222). The structure of the menu can be shown in the following image.

Turn on the machine and access the menus by following the icons in the diagram

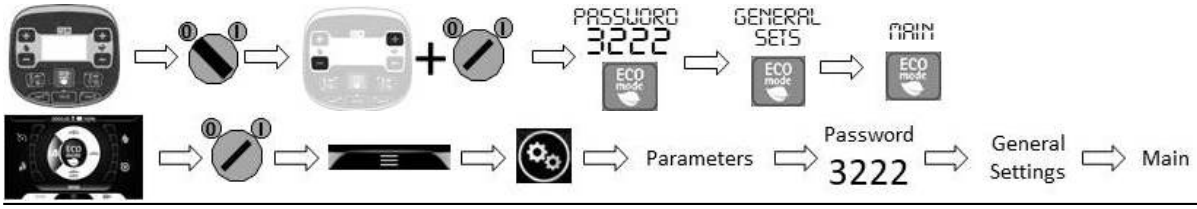


3.6.7 Parameters

Parameters Menu

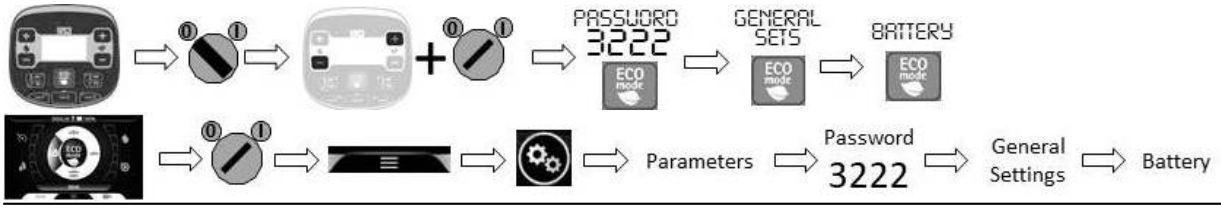
MENU'	DESCRIPTION
GENERAL SETTINGS	Access to the general parameters (main, battery, hourmeter, accessibility, setting).
BRUSHES MOTOR	Access to the parameters of the brushdeck function.
PUMPS	Access to the parameters of the water pump and chemical pump function.
VACUUM MOTOR	Access to the parameters of the vacuum function.
ACTUATORS	Access to the parameters of the actuators function.
TRACTION MENU	Access to the parameters of the traction function.
DIGITAL INPUTS	Factory parameters and settings.
ENG PARAMETERS	Factory parameters and settings.
EXIT	Return to the Home screen.

General Main Parameters



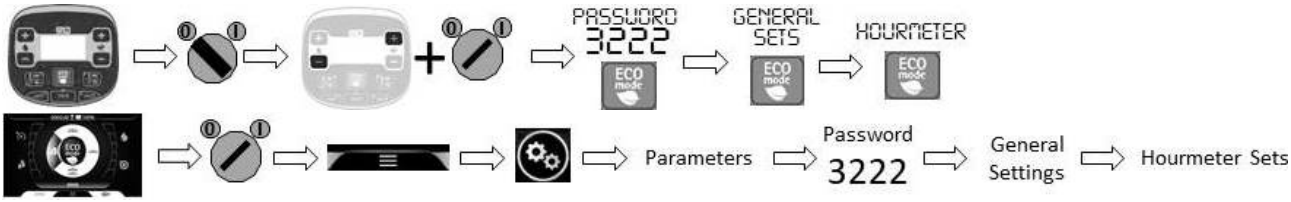
Parameter	Default	Min ÷ Max	Description
General - Main Reset	No	No ÷ Yes	Reset to factory settings.
General - Main Language	ENG	÷	Language (ENG; ITA; FRA; GER; ESP) .
General Setup: Display Tune (PRO)	15	0-50	Display contrast
General Setup: Display Brightness (PRO)	0	0-10	Display Brightness

General Battery Parameters



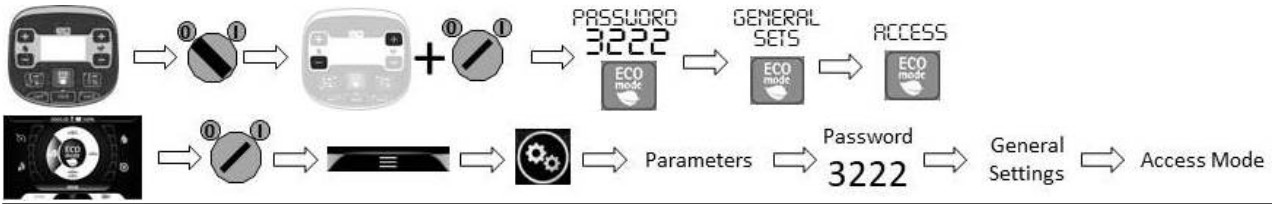
Parameter	Default	Min ÷ Max	Description
General - Battery Battery Type	Gel60	÷	Battery Type (Pb60; Gel60; Pure Lead; Pb80; Gel80; Custom).
General - Battery Delay Time #sec	30	5 ÷ 300	Battery status refresh rate.
General - Battery Reset Level #%	80	10 ÷ 100	The charge level necessary to reset the hourmeter.
General - Battery Brushes off Level #%	20	0 ÷ 100	Charge threshold beyond which the Brush Motor is inhibited.
General - Battery Vacuum off Level #%	10	0 ÷ 100	Charge threshold beyond which the Vacuum Motor is inhibited.
General - Battery Traction off Level #%	0	0 ÷ 100	Charge threshold beyond which the Traction Motor is inhibited.
General - Battery Custom Level 5/5 #V	23.5	15.0 ÷ 40.0	Valid on Custom Battery Parameter: Battery Level 100%.
General - Battery Custom Level 4/5 #V	23.0	15.0 ÷ 40.0	Valid on Custom Battery Parameter: Battery Level 80%.
General - Battery Custom Level 3/5 #V	22.5	15.0 ÷ 40.0	Valid on Custom Battery Parameter: Battery Level 60%.
General - Battery Custom Level 2/5 #V	22.0	15.0 ÷ 40.0	Valid on Custom Battery Parameter: Battery Level 40%.
General - Battery Custom Level 1/5 #V	21.5	15.0 ÷ 40.0	Valid on Custom Battery Parameter: Battery Level 20%.
General - Battery Custom Level 0/5 #V	21.0	15.0 ÷ 40.0	Valid on Custom Battery Parameter: Battery Level 0%.

General Hourmeter Parameters



Parameter	Default	Min ÷ Max	Description
General - Hourmeter Partial Hourmeter display	Tr	÷	Available hourmeters (Key; Tr; Br; Vac).
General - Hourmeter Reset Partial Hourmeter	No	÷	Reset of the single hourmeters (No; Key; Tr; Br; Vac; All).

General Access Parameters

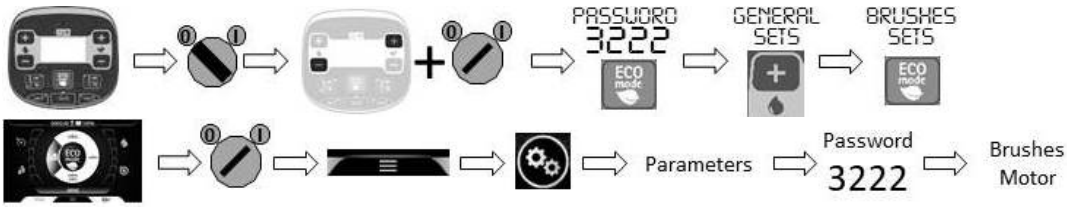


Parameter	Default	Min ÷ Max	Description
General - Access Mode Password 2 (Dealer)	3222	3000 ÷ 3999	Dealer Password.
General - Access Mode Password 3 (Customer)	2234	2000 ÷ 2999	Customer Password.
General - Access Mode Password 4 (User)	1000	1000 ÷ 1999	User Password.
General - Access Mode Password 5 (PIN)	123	100 ÷ 999	PIN.
General - Access Mode Password Enable: User	1	0 ÷ 1	User Password Enable; 0=OFF; 1=ON
General - Access Mode Password Enable: PIN	0	0 ÷ 1	PIN Enable; 0=OFF; 1=ON

General Setting Parameters

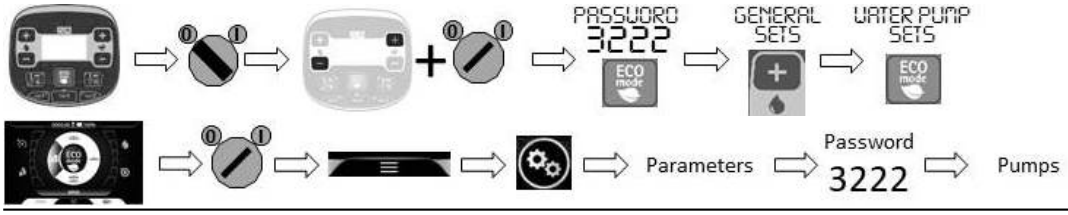
Parameter	Default	Min ÷ Max	Description
General - Config Model		PRO ÷ Plus	Machine Model; (PRO; PLUS).
General - Config Base version	2Brush	÷	Machine Version (2BRUSH; BRUSH; ORBITAL).
General - Config No Logo Model	No	No ÷ Yes	No Logo Model; NO=OFF; YES=ON
General - Config Worklight Enable	Yes	No ÷ Yes	Work Light enable; NO=OFF; YES=ON
General - Config Solution Management	None	÷	Dosing System enable; None; FSS; FLR
General - Config Wand	Yes	No ÷ Yes	Vacuum wand enable; NO=OFF; YES=ON
General - Config Spray gun	Yes	No ÷ Yes	Solution gun enable; NO=OFF; YES=ON
General - Config Anticollision	1	0 ÷ 1	Park assistant sensors enable; NO=OFF; YES=ON
General - Config Rear camera	Yes	No ÷ Yes	Back Camera enable; NO=OFF; YES=ON
General - Config Manual Op. Enable	Yes	No ÷ Yes	Manual version enable; NO=OFF; YES=ON
General - Config Zone Op. Enable	Yes	No ÷ Yes	Zone enable; NO=OFF; YES=ON

Brushes Parameters



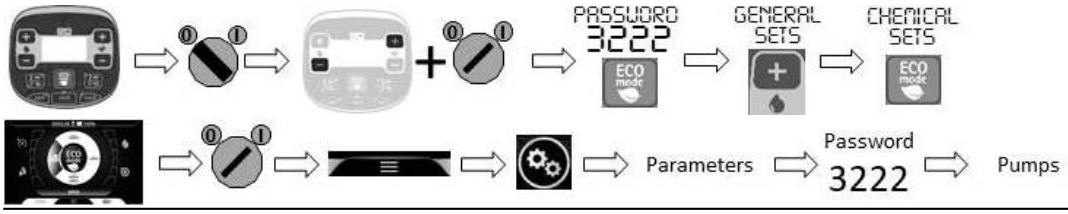
Parameter	Default	Min ÷ Max	Description
Brush - Brush Motor Nominal Current # Amp.	22	10 ÷ 40	Brush Motor Rated current; with T_ Nom manages the amperometric protection (alarm + stop brush motor).
Brush - Brush Motor Overload Time # sec.	30	5 ÷ 60	Brush Motor Rated Timer; with I_ Nom manages the amperometric protection (alarm + stop brush motor).
Brush - Brush Motor Switch-On Delay # sec.	1.5	0.1 ÷ 10.0	Brush Motor Switch on Delay when the traction pedal is pressed.
Brush - Brush Motor Switch-Off1 Delay # sec.	0.1	0.1 ÷ 10.0	Brush Motor Switch off Delay when the traction pedal is released.
Brush - Brush Motor Reset Delay # sec.	20	1 ÷ 300	Reset Timing from amperometric protection.
Brush - Brush Motor Speed Reduction # V	24	15 ÷ 24	Reset Voltage from amperometric protection.
Brush - Brush Motor Pressure Level #1 - # Amp.	15	10 ÷ 40	(Sum) Pressure Level 1 setting.
Brush - Brush Motor Pressure Level #2 - # Amp.	25	10 ÷ 40	(Sum) Pressure Level 2 setting.
Brush - Brush Motor Pressure Level #3 - # Amp.	35	10 ÷ 40	(Sum) Pressure Level 3 setting.
Brush - Brush Motor Pressure Range # Amp.	2.0	1.0 ÷ 4.0	Maximum allowed current range for each level before the amperometric protection intervention.

Water Pump Parameters



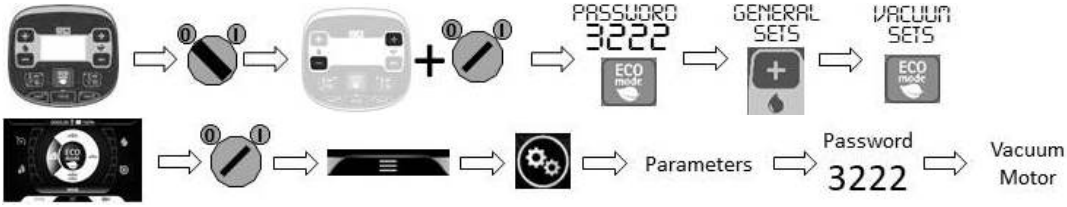
Parameter	Default	Min ÷ Max	Description
Pump - Water EV Switch-On Delay # sec.	0.2	0.1 ÷ 5.0	Solenoid Valve activation Delay.
Pump - Water EV Switch-Off Delay # sec.	0.5	0.1 ÷ 5.0	Solenoid Valve deactivation Delay.
Pump - Water Pump Sw-On Delay # sec.	0.5	0.1 ÷ 5.0	Water Pump activation delay when the traction pedal is pressed.
Pump - Water Pump Sw-Off Delay # sec.	0.2	0.1 ÷ 5.0	Water Pump deactivation delay when the traction pedal is released.
Pump - Water Pump level #1 #%	20	0 ÷ 100	Setting of the First dispensing level.
Pump - Water Pump level #2 #%	40	0 ÷ 100	Setting of the Second dispensing level.
Pump - Water Pump level #3 #%	60	0 ÷ 100	Setting of the Third dispensing level.

Chemical Pump Parameters



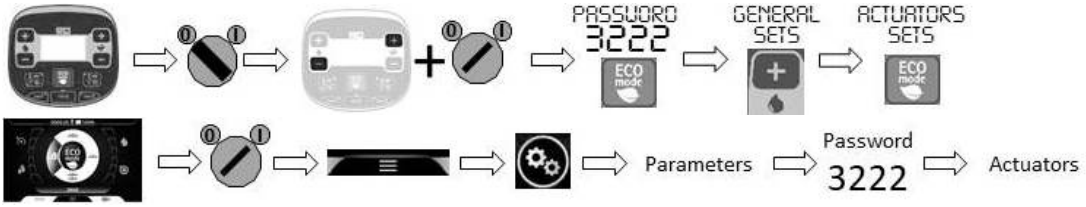
Parameter	Default	Min ÷ Max	Description
Pump - Water Pump Sw-On Delay # sec.	0.5	0.1 ÷ 5.0	Chemical Pump activation delay when the traction pedal is pressed.
Pump - Water Pump Sw-Off Delay # sec.	0.5	0.1 ÷ 5.0	Chemical Pump deactivation delay when the traction pedal is released.
Pump - Water Pulses Length # msec.	50	10 ÷ 2000	Pulse length of the pump.
Pump - Water Pulses Max Frequency # Hz	600	10 ÷ 3000	Parameter not used.
Pump - Water Percent. chemical %	2	0.5 ÷ 3.0	Percentage of chemical dilution.

Vacuum Parameters



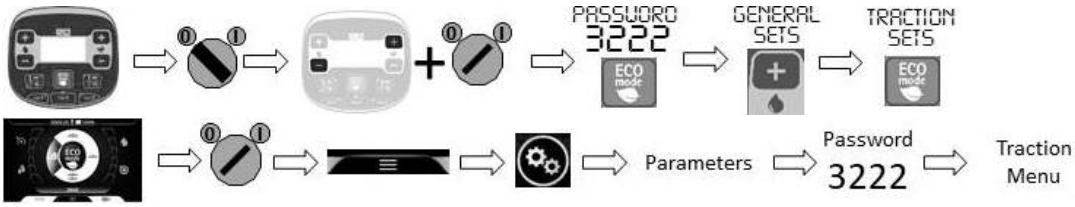
Parameter	Default	Min ÷ Max	Description
Vacuum - Vac.Motor Nominal Current # Amp.	25	10 ÷ 40	Vacuum Motor Rated current; with T_ Nom manages the amperometric protection (alarm + stop brush motor).
Vacuum - Vac.Motor Overload Time # sec.	30	1 ÷ 60	Vacuum Motor Rated Timer; with I_ Nom manages the amperometric protection (alarm + stop brush motor).
Vacuum - Vac.Motor Switch-On Delay # sec.	0.2	0.1 ÷ 5.0	Brush Motor Switch on Delay when the traction pedal is pressed.
Vacuum - Vac.Motor Switch-Off1 Delay # sec.	10	1 ÷ 300	(Off function) Brush Motor Switch off Delay when the traction pedal is released.
Vacuum - Vac.Motor Reset Delay # sec.	300	1 ÷ 300	Reset Timing from amperometric protection.
Vacuum - Vac.Motor Vacuum Noise Level 1 # V	17	12 ÷ 24	Motor working Voltage, Level 1.
Vacuum - Vac.Motor Vacuum Noise Level 2 # V	20	12 ÷ 24	Motor working Voltage, Level 2.
Vacuum - Vac.Motor Vacuum Noise Level 3 # V	24	12 ÷ 24	Motor working Voltage, Level 3.

Actuators Parameters



Parameter	Default	Min ÷ Max	Description
Actuator - Brushes Timeout # sec.	10	0 ÷ 30	Max working time of the brushdeck Actuator.
Actuator - Brushes Overload Level # Amp.	5.0	2.0 ÷ 10.0	Brushdeck Actuator Rated current; with T_ Nom manages the amperometric protection (alarm + stop Actuator).
Actuator - Brushes Overload Time # sec.	2.0	0.1 ÷ 5.0	Brushdeck Actuator Rated Timer; with I_ Nom manages the amperometric protection (alarm + stop Actuator).
Actuator - Squeegee Timeout # sec.	5	0 ÷ 30	Max working time of the Squeegee Actuator.
Actuator - Squeegee Overload Level # Amp.	5.0	2.0 ÷ 10.0	Squeegee Actuator Rated current; with T_ Nom manages the amperometric protection (alarm + stop Actuator).
Actuator - Squeegee Overload Time # sec.	2.0	0.1 ÷ 5.0	Squeegee Actuator Rated Timer; with I_ Nom manages the amperometric protection (alarm + stop Actuator).
Actuator - Squeegee Traction reverse Delay # sec.	1.0	0.0 ÷ 10.0	With reverse gear, Time after which the Actuator lifts the Squeegee.

Traction Parameters



Parameter	Default	Min ÷ Max	Description
Traction - Speed Sets Acceleration Ramp 1 - # sec.	3.0	0.5 ÷ 5.0	In Transfer Mode, Time to reach the max speed.
Traction - Speed Sets Acceleration Ramp 2 - # sec.	4.0	0.5 ÷ 5.0	In Working Mode, Time to reach the max speed.
Traction - Speed Sets Deceleration Ramp 1 - # sec.	1.0	0.3 ÷ 5.0	During the transfer, decreasing the pressure on the traction pedal, time interval to pass from the previous speed to the set speed.
Traction - Speed Sets Deceleration Ramp 2 - # sec.	2.0	0.3 ÷ 5.0	During the work, decreasing the pressure on the traction pedal, time interval to pass from the previous speed to the set speed.
Traction - Speed Sets Deceleration Ramp Stop - # sec.	0.7	0.3 ÷ 5.0	When the traction pedal is released, time interval to stop the machine completely.
Traction - Speed Sets Reverse Ramp 1 - # sec.	1.0	0.3 ÷ 5.0	In Transfer Mode, Time to pass from forward way to reverse way and viceversa.
Traction - Speed Sets Reverse Ramp 2 - # sec.	2.0	0.3 ÷ 5.0	In Working Mode, Time to pass from forward way to reverse way and viceversa.
Traction - Speed Sets Forward Max Speed # %	100	50 ÷ 100	Maximum speed in forward way (in % of the max reachable speed).
Traction - Speed Sets Backward Max Speed # %	50	10 ÷ 100	Maximum speed in reverse way (in % of the forward way set speed).
Traction - Speed Sets Minimum Speed # %	10	0 ÷ 50	Speed at the minimum pressure of the traction pedal.
Traction - Speed Sets Mode1 Speed # %	30	10 ÷ 100	Speed setting for the curve speed reduction microswitch.
Traction - Speed Sets Mode1 Current # Amp.	50	10 ÷ 100	Max Current setting with activated curve speed reduction microswitch.
Traction - Speed Sets Mode2 Speed # %	80	10 ÷ 100	In Working Mode, Maximum speed in forward way (in % of the max reachable speed).
Traction - Speed Sets Speed level #1 %	40	0 ÷ 100	Max forward speed, Level 1.
Traction - Speed Sets Speed level #2 %	65	0 ÷ 100	Max forward speed, Level 2.
Traction - Speed Sets Speed level #3 %	100	0 ÷ 100	Max forward speed, Level 3.

Parametro	Default	Min ÷ Max	Descrizione
Traction - Speed Ref Signal Range	0	0 ÷ 1	(0="0-5"; 1="0-15") Pedal type setup.
Traction - Speed Ref Signal Min Position # V	0.7	0.0 ÷ 10.0	Minimum voltage of the released potentiometer.
Traction - Speed Ref Signal Max Position # V	3.3	0.0 ÷ 15.0	Max voltage of the active potentiometer.
Traction - Speed Ref Signal Dead Band # mV	50	0 ÷ 500	Potentiometer dead band
Traction - Speed Ref Signal Mid Pos # V	2.0	0.0 ÷ 10.0	Mid voltage of the potentiometer.
Traction - Motor Sets Boost Current # Amp.	100	40 ÷ 140	Boost Current.
Traction - Motor Sets Boost Time # Amp.	20	0 ÷ 20	Boost time.
Traction - Motor Sets Nominal Current # Amp.	18	10 ÷ 50	Traction motor Rated current; with T_ Nom manages the amperometric protection (alarm + stop brush motor).
Traction - Motor Sets Overload Time # sec.	60	10 ÷ 60	Traction motor Rated Timer; with I_ Nom manages the amperometric protection (alarm + stop brush motor).
Traction - E-Brake Switch-Off Delay # sec.	1.0	0.0 ÷ 10.0	Electrobrake release delay.
Traction - E-Brake E-Brake Check # sec.	1	0 ÷ 1	Electrobrake operation Check (1=enable).

3.7 Maintenance and Checks

3.7.1 Electrical System

Check *(to perform every **150h**)*
Check the functions and the proper connections of the switches, microswitches, motors, main card. Check periodically, the wiring connections status. To get access to the electrical system, remove the screws and lift the water system box.

3.7.2 Batteries

Check *(to perform every **150h**)*
Check the proper connection of the Loop wire on the batteries and the cleanliness of the contacts. Verify that there is no rust on the battery connections.

3.7.3 Checking the acid batteries

TEST OF DENSITY OF ELECTROLYTE

1. Do not add water
2. Using the electrolyte, rinse the density meter at least 3 times before taking a sample
3. Fill the densimeter so that the oscillating part of it is completely supported by the liquid
4. Repeat the operation on all cells
5. Compare the readings of the various cells and check the charge condition of the batteries with the table

The readings should all be at the value of the following table ±0.007. If any reading is lower, proceed as follows:

1. Check the battery voltage
2. Fully charge the battery
3. Repeat the electrolyte density reading

If the measured density is even lower, an equalization cycle can be attempted (if the charger allows it). If in any case the measured density of all or some of the cells is less than the value 1.227 it means that:

1. The battery is probably at the end of its life
2. The battery was left without charge for too long
3. Part of the electrolyte was lost during a refill
4. A cell is defective or has leaks
5. The addition of water was excessive just before the test

	Reported density			
Charge %	**16°C/61°F**	**21°C/70°F**	**27°C/80°F**	**33°C/91°F**
100	1,269	1,273	1,277	1,281
90	1,250	1,254	1,258	1,262
80	1,230	1,234	1,238	1,242
70	1,209	1,213	1,217	1,221
60	1,187	1,191	1,195	1,199
50	1,164	1,168	1,172	1,176
40	1,140	1,144	1,148	1,152
30	1,116	1,120	1,124	1,128
20	1,090	1,094	1,098	1,102
10	1,065	1,069	1,073	1,077

OPEN CIRCUIT VOLTAGE TEST

For a correct verification by voltage measurement the batteries must remain unused (ie not be charged or used) for at least 6 hours, it is preferable however that the hours are 24.

1. Disconnect all loads from the battery
2. Measure the DC voltage with a multimeter
3. Check the charge status using the table
4. If the battery charge is in a range between 0% and 70% charge the battery

If the battery has lower values than those in the table the possibilities are:

1. The battery has been left without charge for too long
2. One or more battery cells are damaged

VERIFICATION OF THE LEVEL OF ELECTROLYTE

It is very important to check that the electrodes are always immersed in the electrolyte because their exposure to air leads to a rapid and progressive degeneration due to corrosion.
The drop in the electrolyte level is physiological in acid batteries, so it is very important to periodically check the electrolyte level and possibly add water if necessary.
When adding water it is very important to use distilled water and be very careful not to cause the liquid to leak out due to excessive addition.
It is sufficient to add water so that the electrolyte level is sufficient to completely cover the plates.
To add water, proceed as follows:

1. Check the electrolyte level in the various cells
2. If necessary, add water to cover the plates
3. Fully charge the battery
4. At the end of the charge, check the level again
5. Add (if necessary) water so that the liquid level is 3-4mm (0.15in) below the cell cap.

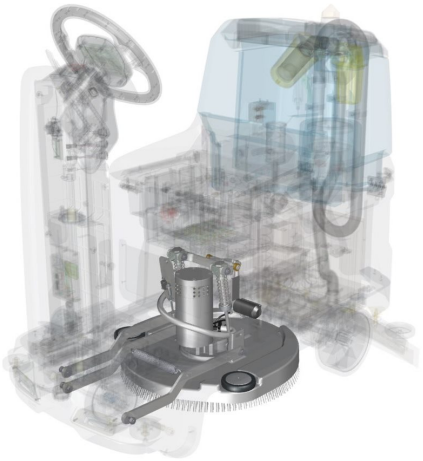
WARNING: The electrolyte is a solution of sulfuric acid, therefore corrosive and extremely dangerous for health, be very careful in all the steps described and use the precautions indicated in the battery manual.

Chapter 4

56 Washing Unit

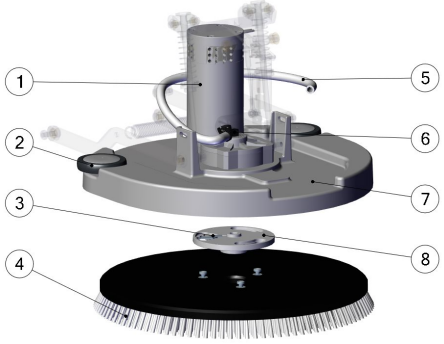
4.1 Location on machine

The washing unit is located under the machine body in a central position.
The washing unit control is assembled above it

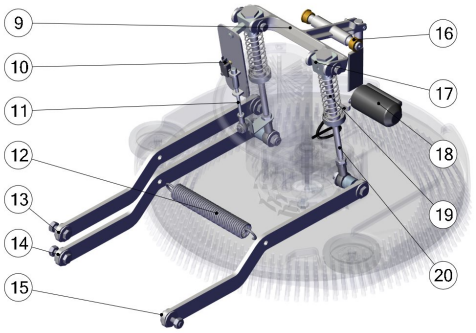


4.2 Main Components

1 Brush Gearmotor
2 Bumper Wheel
3 Brush coupling Spring
4 Brush
5 Water Hose
6 Water Distributor
7 Brush Deck Body
8 Brush coupling Flange
9 Brush Deck Lifting Arm



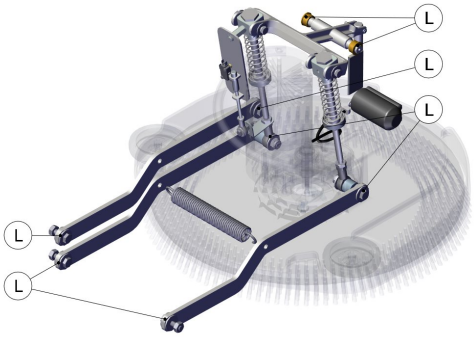
10 Max Pressure Microswitch
11 Microswitch activation Rod
12 Brush Deck Arm compression Spring
13 Upper Lifting Arm
14 Lower Right Lifting Arm
15 Left Lifting Arm
16 Lifting Arm Bushings
17 Brush Deck lifting Pin Guide
18 Brushdeck Actuator
19 Brush Deck compensating Spring
20 Brush Deck lifting Pin



4.3 Lubrication Points

For lubrication use standard grease.

- Lifting Arms
- Bushings



4.4 Work requirements

The washing unit only works if the following conditions are met:

1. The batteries are not discharged.
2. The operator is seated on the machine so as to press the seat safety switch (1).
3. The machine is on (2).
4. The electrobrake is activated.
5. The functions setting on the display is Washing or Washing + Drying (3).
6. The accelerator pedal is pressed(4).

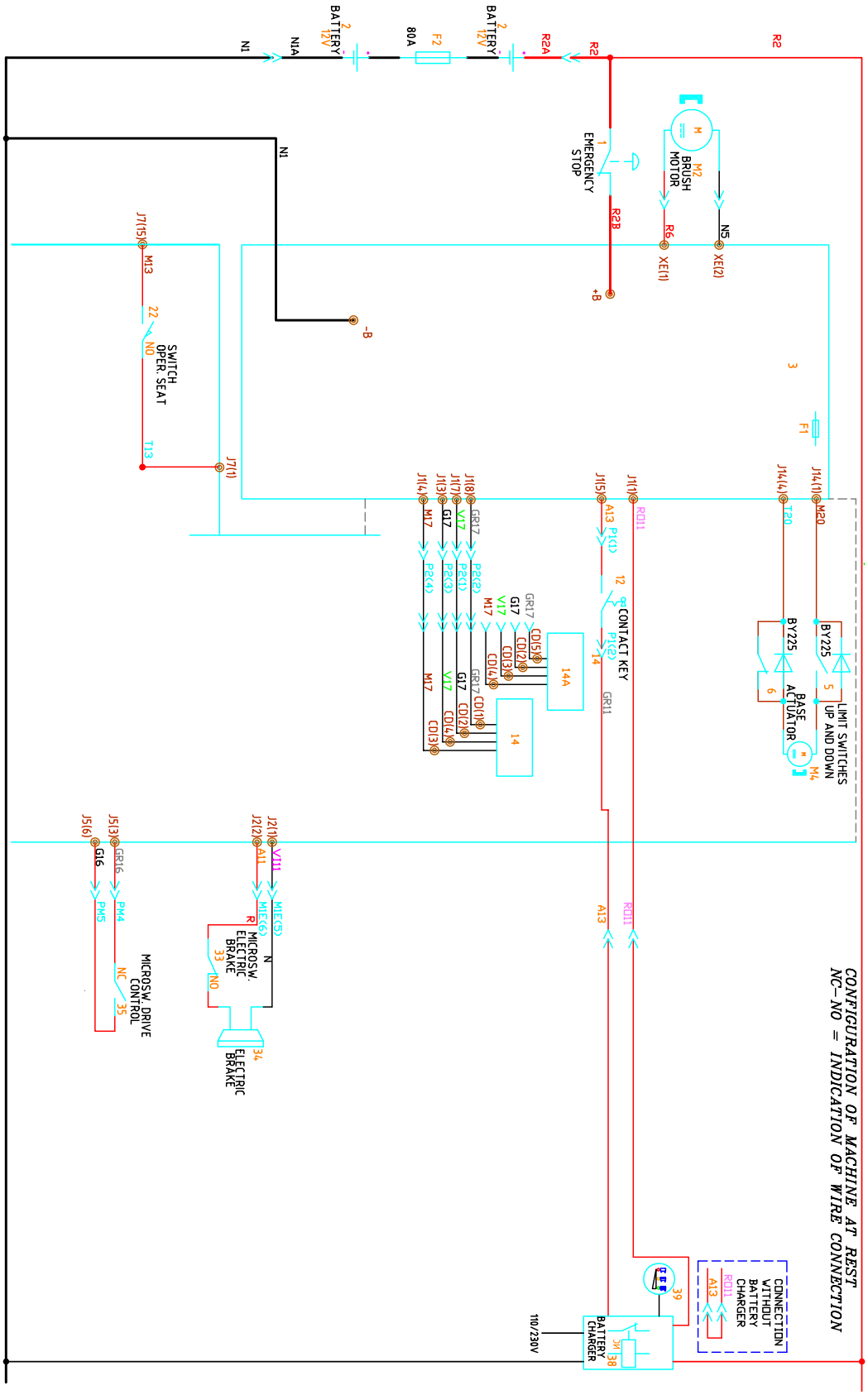
4.5 Operating mode

WASHING

Operator	Seat Microsw.	Action	Result
Sitting	Closed	Washing Enabled Forward pedal pressed	Brushdeck Actuator goes down (+24V to M4) Brush Motor ON after 1,5 seconds (+24V to M2) Solution Pump ON if water level is different than 0 (+24V to Pa) Solenoid Valve ON if water level is different than 0 (+24V to J11-13 to J11-5)
Sitting	Closed	Dosing system enabled during work	Chemical Pump ON if water level is different than 0 (+24V to Pd)
Sitting	Closed	Backward function enabled during work	Brushdeck Actuator goes down (+24V to M4) Brush Motor ON (+24V to M2) Solution Pump OFF Solenoid Valve OFF Chemical Pump OFF (if available)
Sitting	Closed	Traction Pedal not pressed during work	Brushdeck Actuator rises after 10 seconds (-24V to M4) Brush Motors OFF Solution Pump OFF Solenoid Valve OFF Chemical Pump OFF (if available)
Sitting	Closed	Washing disabled during work	Brushdeck Actuator rises (-24V to M4) Brush Motors OFF Solution Pump OFF Solenoid Valve OFF Chemical Pump OFF (if available)

4.6 Related electrical circuit

4.6.1 BMG 56



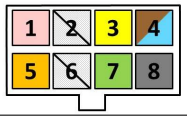
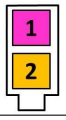
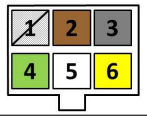
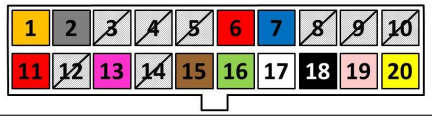
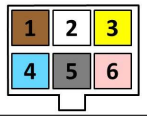
Functionality Check - 56 Disc Brush Deck

Conventions:

- $+V_b$: Positive voltage of the battery.
- $-V_b$: Negative voltage of the battery.
- The emergency button is not pressed, the key contact is closed and the charger is not connected to the mains.
- **The Brush Deck is in working condition**.

Input/output:

Satisfied condition	Pin	V at work	V at rest
Brush Motor Activated	XE(1) ref to XE(2)	$+V_b$	$-V_b$
Display Negative	J1(4) ref to B-	$-V_b$	$-V_b$
Display Transmission	J1(7) ref to B-	$+V_b$	$-V_b$
Display Receiving	J1(3) ref to B-	$+V_b$	$-V_b$
Display Positive	J1(8) ref to B-	$+V_b$	$+V_b$
Electrobrake Activated	J2(1) ref to J2(2)	$+V_b$	$-V_b$
Traction pedal pressed	J5(3) ref to J5(6)	$+V_b$	$-V_b$
Operator Seated	J7(15) ref to J7(1)	$+V_b$	$-V_b$
Brushes Actuator in motion	J14(1) ref to J14(4)	$+V_b$	$-V_b$

J1		J2	
J5		J7	
J14			

4.6.2 Relative electrical Components

Brush Gearmotor

The brush gear motor is a DC type with permanent magnets, connected directly to the function board via a connector.
With a constant 24 V DC supply (full battery) the single brush motor (M2) draws 2.6 Amps ± 0.1. With a constant 21 V DC supply (low battery) the absorption is 2.4 Amps ± 0.1.

Actuator

The brush deck lifting actuator, by means of the lever and the tie rod, lowers and pushes the brushes to the ground, according to the preset pressure.

Pressure Control Microswitch

The pressure control microswitch is mounted on a bracket. It intervenes if the motors have a too low absorption to prevent the scrubdeck actuator from continuing to push. If the pin falls below its limit, the micro opens and stops the actuator.

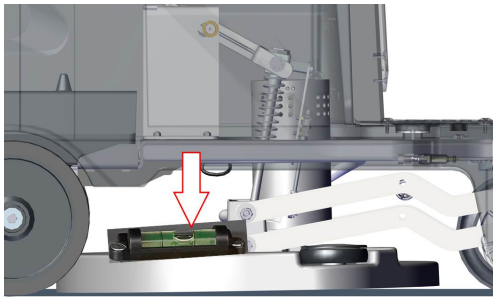
4.7 Adjustments

4.7.1 56 Brush Deck

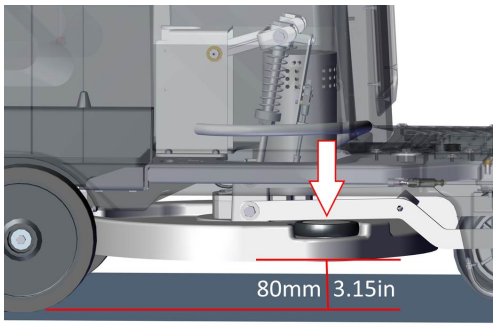
The scrub deck is tilted in the transverse direction and should be adjusted longitudinally inclined to the machine so that the brushes have a distance of about 3-5 mm from the floor, larger on the front than on the rear side. This allows the brush to evenly lean to the ground and perform its function properly.

Procedure:

- Remove the brush from the brush deck.
- Insert a 3-5 mm spacer (0.2 in) under the front part of the brushdeck.
- Loosen the adjustment nuts and use a bubble to check that it is close to the front notch.
- Tighten the fixing nut of the upper arms.

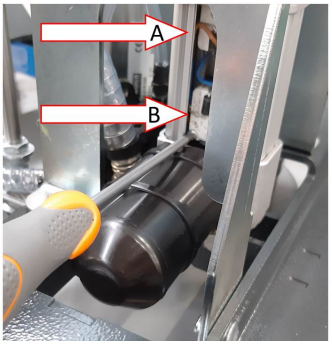


Check that by lifting the brushdeck, at the height of the bumping wheel, the distance between the edge and the ground is 80mm (3.15in).



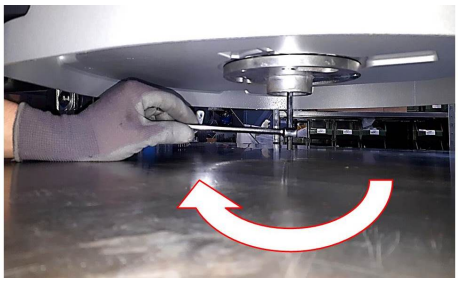
4.7.2 56 Brush Deck Actuator

Adjust the microswitches inside the actuator using the relative adjusting screws.
Remove the black plastic cover from the actuator.
Adjust the microswitches by positioning them as shown in the picture.



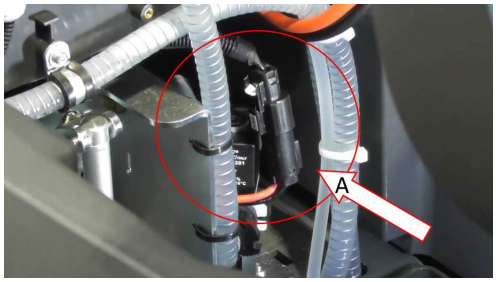
4.8 Disassembly

4.8.1 Brush Flange

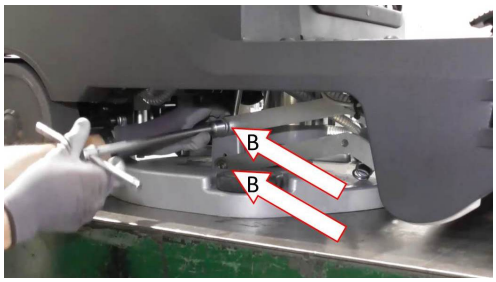


Remove the brush.
Insert the Allen key and unscrew it in the opposite direction of the working brush.
Then proceed with the removal of the flange

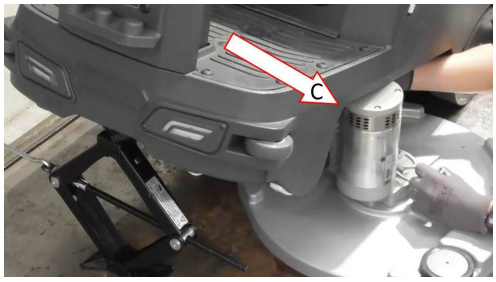
4.8.2 56 Brush Deck



Remove the brush, close the water, lower the brushdeck and turn the machine Off.
Remove the batteries, and disconnect the brush motor power connector (A).



Release the compensation spring.
Unscrew the right and left screws (B).
At the base of the gear, disconnect the water flow tube.

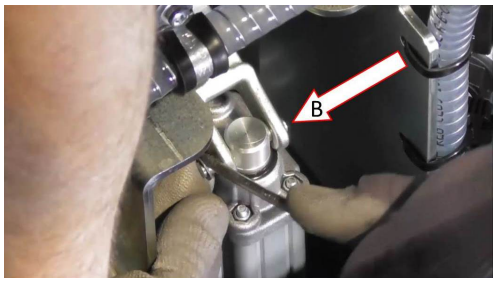


Lift the front of the machine with a suitable lifting system.
At this point remove the base (C) from the left side.

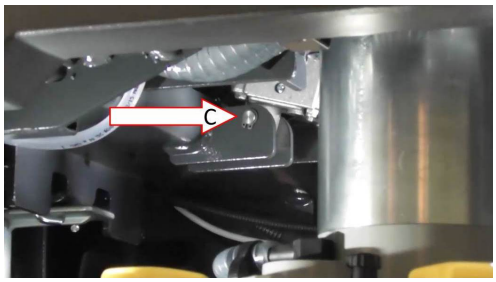
4.8.3 Brush Deck Actuator

Lower the base and turn off the machine.
Lift the seat and remove the water system screws (A) to access the actuator connector.

Disconnect the actuator connector and remove the batteries. Then remove the seegers and the upper pin of the actuator (B).



Then remove the seegers and the lower pin of the actuator (C) and remove it.

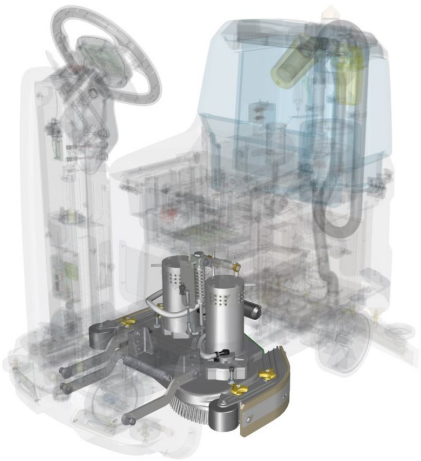


Chapter 5

65 Washing Unit

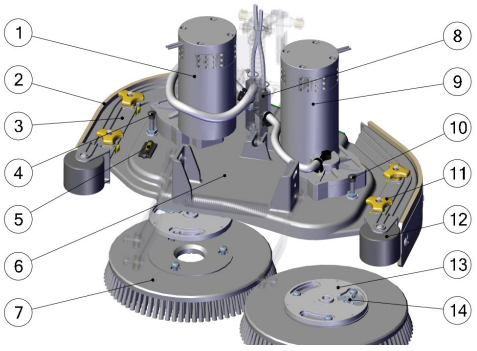
5.1 Location on machine

The washing unit is located under the machine body in a central position.
The washing unit control is assembled above it.

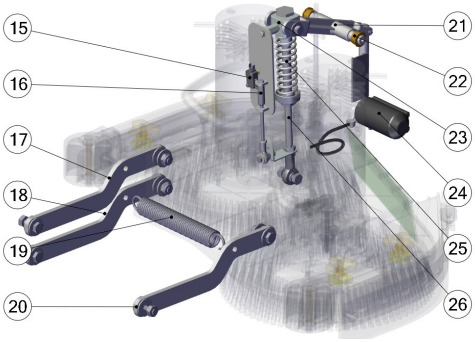


5.2 Main Components

1 Right Brush Gearmotor
2 Right Splashguard Rubber
3 Right Splashguard Body
4 Right Brush uncoupling Pin
5 Adjustment Bushing
6 Brush Deck Body
7 Right Brush
8 Water Distributor
9 Left Brush Gearmotor
10 Left Brush uncoupling Pin
11 Splashguards fixing Knob
12 Bumping Wheel
13 Brush coupling Flange
14 Brush coupling Spring



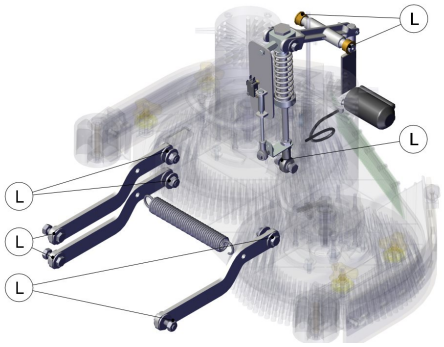
15 Max Pressure Microswitch
16 Microswitch activation Rod
17 Upper Lifting Arm
18 Lower Right Lifting Arm
19 Brush Deck Arm compression Spring
20 Brush Deck Left Lifting Arm
21 Brush Deck Lifting Arm
22 Lifting Arm Bushings
23 Brush Deck lifting Pin Guide
24 Brushdeck Actuator
25 Brush Deck compensating Spring
26 Brush Deck lifting Pin



5.3 Lubrication Points

For lubrication use standard grease.

- Lifting Arms
- Bushing



5.4 Work requirements

The 65 side brush unit only works if the following conditions are met:

1. The batteries are not discharged.
2. The operator is seated on the machine so as to press the seat safety switch (1).
3. The machine is on (2).
4. The electrobrake is activated.
5. The functions setting on the display is Washing or Washing + Drying (3) with side brush function enabled.
6. The accelerator pedal is pressed(4).

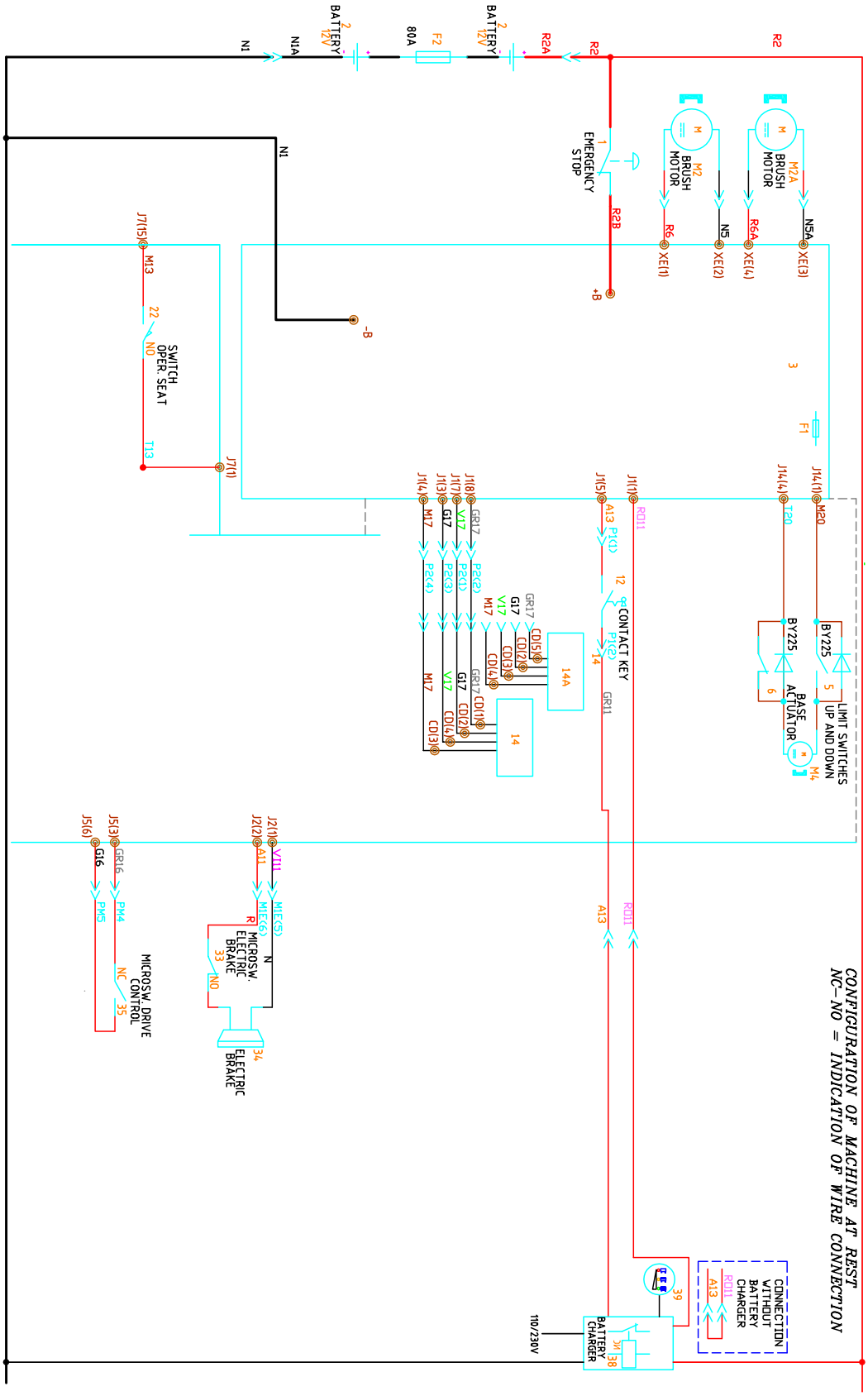
5.5 Operating mode

WASHING

Operator	Seat Microsw.	Action	Result
Sitting	Closed	Washing Enabled Forward pedal pressed	Brushdeck Actuator goes down (+24V to M4) Brush Motors ON after 1,5 seconds (+24V to M2a-M2) Solution Pump ON if water level is different than 0 (+24V to Pa) Solenoid Valve ON if water level is different than 0 (+24V to J11-13 to J11-5)
Sitting	Closed	Dosing system enabled during work	Chemical Pump ON if water level is different than 0 (+24V to Pd)
Sitting	Closed	Backward function enabled during work	Brushdeck Actuator goes down (+24V to M4) Brush Motors ON (+24V to M2a-M2) Solution Pump OFF Solenoid Valve OFF Chemical Pump OFF (if available)
Sitting	Closed	Traction Pedal not pressed during work	Brushdeck Actuator rises after 10 seconds (-24V to M4) Brush Motors OFF Solution Pump OFF Solenoid Valve OFF Chemical Pump OFF (if available)
Sitting	Closed	Washing disabled during work	Brushdeck Actuator rises (-24V to M4) Brush Motors OFF Solution Pump OFF Solenoid Valve OFF Chemical Pump OFF (if available)

5.6 Related electrical circuit

5.6.1 BMG 65



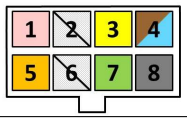
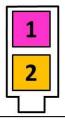
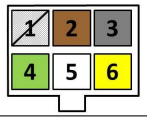
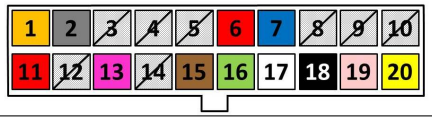
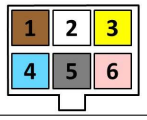
Functionality Check - 65 Disc Brush Deck

Conventions:

- $+V_b$: Positive voltage of the battery.
- $-V_b$: Negative voltage of the battery.
- The emergency button is not pressed, the key contact is closed and the charger is not connected to the mains.
- **The Brush Deck is in working condition**.

Input/output:

Satisfied condition	Pin	V at work	V at rest
Brush Motor Activated	XE(1) ref to XE(2)	$+V_b$	$-V_b$
Brush Motor Activated	XE(1) ref to XE(2)	$+V_b$	$-V_b$
Display Negative	J1(4) ref to B-	$-V_b$	$-V_b$
Display Transmission	J1(7) ref to B-	$+V_b$	$-V_b$
Display Receiving	J1(3) ref to B-	$+V_b$	$-V_b$
Display Positive	J1(8) ref to B-	$+V_b$	$+V_b$
Electrobrake Activated	J2(1) ref to J2(2)	$+V_b$	$-V_b$
Traction pedal pressed	J5(3) ref to J5(6)	$+V_b$	$-V_b$
Operator Seated	J7(15) ref to J7(1)	$+V_b$	$-V_b$
Brushes Actuator in motion	J14(1) ref to J14(4)	$+V_b$	$-V_b$

J1		J2	
J5		J7	
J14			

5.6.2 Relative electrical Components

Brush Gearmotor

The brush gear motor is a DC type with permanent magnets, connected directly to the function board via a connector.
With a constant 24 V DC supply (full battery) the single brush motor (M2) draws 2.6 Amps ± 0.1. With a constant 21 V DC supply (low battery) the absorption is 2.4 Amps ± 0.1.

Actuator

The actuator, by means of the lever and the tie rod, lowers the brush deck, moves it sideways and pushes to the ground.

Pressure Control Microswitch

The pressure control microswitch is mounted on a bracket. It intervenes if the motors have a too low absorption to prevent the scrubdeck actuator from continuing to push. If the pin falls below its limit, the micro opens and stops the actuator.

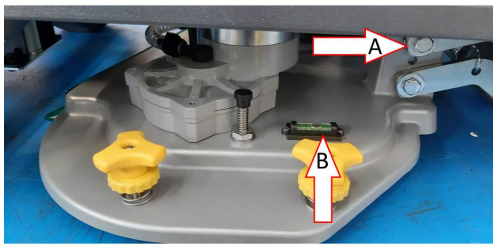
5.7 Adjustments

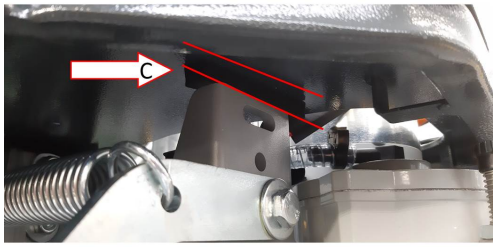
5.7.1 65 Brush Deck

The scrub deck is tilted in the transverse direction and should be adjusted longitudinally inclined to the machine so that the brushes have a distance of about 3-5 mm from the floor, larger on the front than on the rear side. This allows the brush to evenly lean to the ground and perform its function properly. The side brush enlarge the the working capacity of the scrubber-dryer machine.

Procedure:

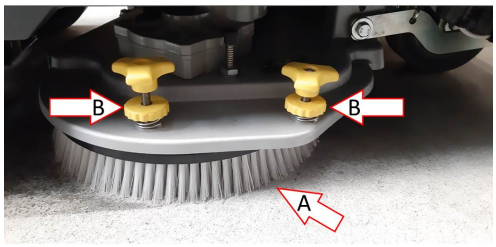
- Remove the brushes and the splash guards from the brush deck.
- Lower the brush deck to the floor and turn off the machine.
- Act on the hexagonal fixing screws (A) of the upper arms.
- Tighten the fixing nut of the upper arms.
- Check that the bubble (B) on the brush deck body is close to the front notch.





Check that by lifting the brush deck, the sponge (C) on the deck body touches the machine frame without crushing.
To check the correct adjustment, check that the brush deck does not move.

5.7.2 Splashguard



The splashguard must be adjusted so that the rubber touches the floor and remains slightly inclined towards the outside.
Act on the two height adjustment knobs

Detail of the correct inclination of the rubber

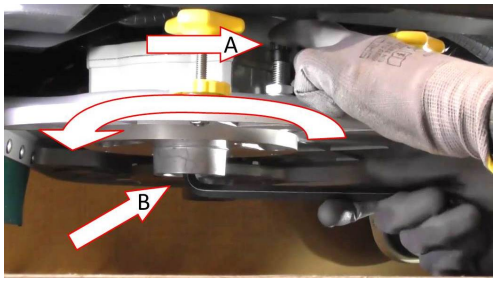
5.7.3 65 Brush Deck Actuator

(see section 4.7.2 at page 62)

5.8 Disassembly

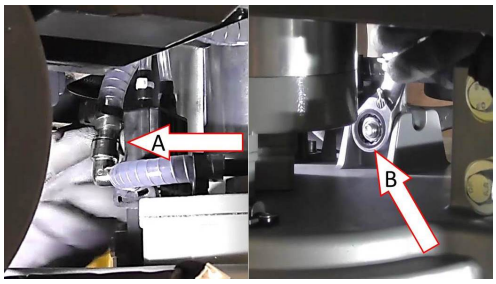
5.8.1 Brush Flange

Remove the splash guards by unscrewing the wing nuts and remove the brush.
Press flange stop rod (A) to lock the flange. With the rod lowered, insert the Allen key (B) and unscrew it in the opposite direction of the working brush.
Then proceed with the removal of the flange.
Perform the same operation with the other flange, paying attention to turn it in the opposite direction.

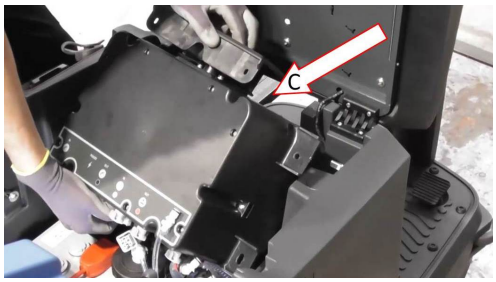


5.8.2 65 Brush Deck

Remove both brushes, close the water, lower the brush deck and turn off the machine.
Remove the water supply hose from the distributor (A) and unscrew the central support screw (B).

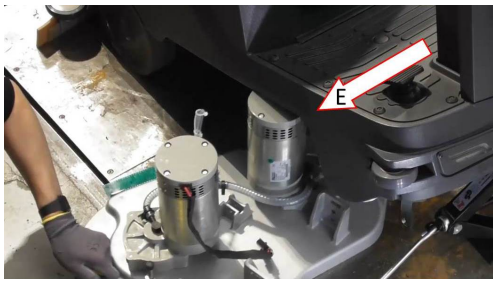


Release the compensation spring, remove the screw that holds the left arm to the brush deck and the screws of the right arms to the brush deck, paying attention to preserve washers and bushings.
Lift the recovery tank and remove the seat screws.
Disconnect the hoses from the water system box, remove the box screws and reposition it tilted (C).



Between the water system box and the seat, disconnect the power connectors of both motors (D).
Turn the machine On, let the actuator of the brush deck stand up, turn the machine Off.

Lift the front of the machine with a suitable lifting system.
At this point remove the brush deck from the right side (E).



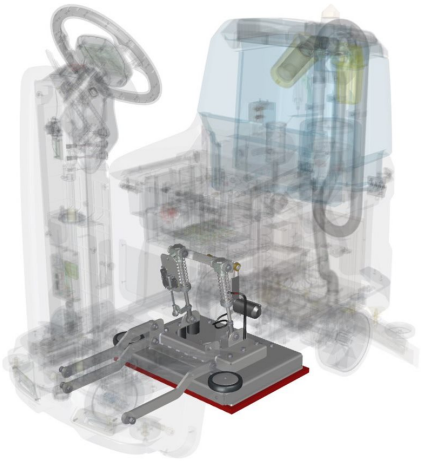
5.8.3 Brush Deck Actuator

(see section 4.8.3 at page 63)

Chapter 6

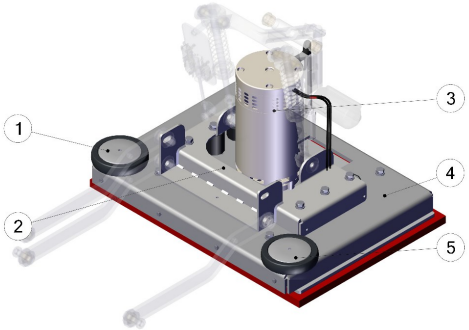
50 BTO Washing Unit

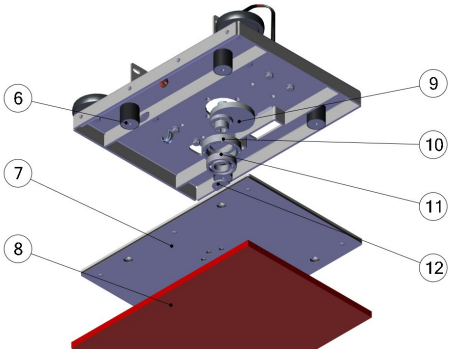
6.1 Location on machine



The orbital unit is located under the machine body in a central position.
The orbital unit control is assembled above it

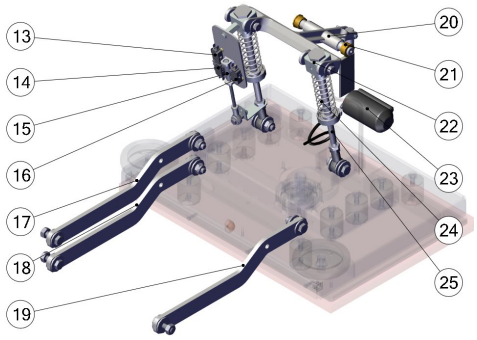
6.2 Main Components





1 Right Bumping wheel
2 Brush deck upper Body
3 Brush Motor
4 Brush deck lower Body
5 Left Bumping wheel
6 Antivibration
7 Orbital Brush deck Plate
8 Brush deck Pad
9 Eccentric Flange
10 Bearing housing
11 Bearing
12 Holding washer

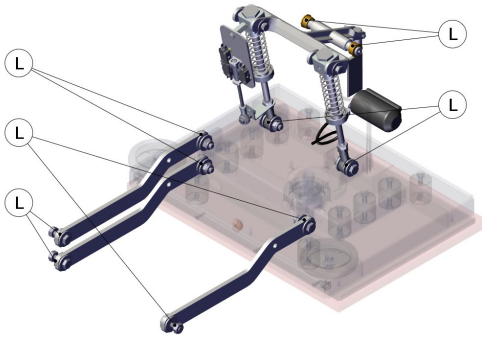
13 Pressure Microswitch 1
14 Max Pressure Microswitch 2
15 Microswitch activation Rod
16 Max Pressure Microswitch 3
17 Upper Lifting Arm
18 Lower Right Lifting Arm
19 Brush Deck Left Lifting Arm
20 Lifting Arm
21 Lifting Arm Bushings
22 Brush Deck lifting Pin Guide
23 Brushdeck Actuator
24 Brush Deck compensating Spring
25 Brush Deck lifting Pin



6.3 Lubrication Points

For lubrication use standard grease.

- Rotation Pin
- Actuator push Pin



6.4 Work requirements

The sweeping unit only works if the following conditions are met:

1. The batteries are not discharged.
2. The operator is seated on the machine so as to press the seat safety switch (1).
3. The machine is on (2).
4. The electrobrake is activated.
5. The functions setting on the display is Washing or Washing + Drying (3).
6. The accelerator pedal is pressed(4).

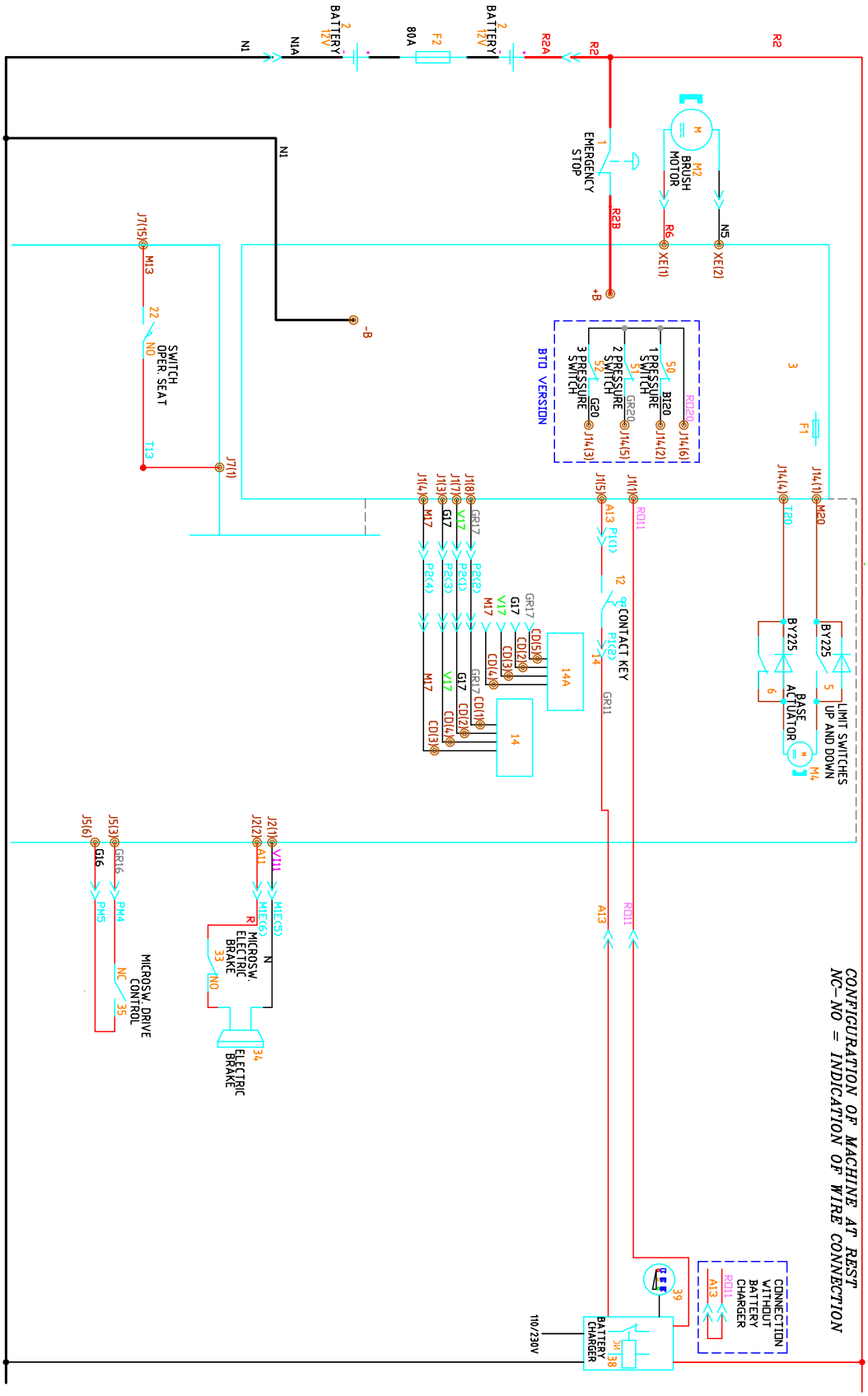
6.5 Operating mode

WASHING

<table>
<tr><th>Operator</th><th>Seat Microsw.</th><th>Action</th><th>Result</th></tr>
<tr><td>Sitting</td><td>Closed</td><td>Washing Enabled
Forward pedal pressed</td><td>Brushdeck Actuator goes down (+24V to M4)
<table>
<tr><th>Pressure Lev.</th><th>J12(2)</th><th>J12(3)</th><th>J12(5)</th></tr>
<tr><td>1</td><td>OFF</td><td>ON</td><td>ON</td></tr>
<tr><td>2*</td><td>OFF</td><td>OFF</td><td>ON</td></tr>
<tr><td>3</td><td>OFF</td><td>OFF</td><td>OFF</td></tr>
</table>
* = Not available on BMG PRO
Brush Motors ON after 1,5 seconds (+24V to M2)
Solution Pump ON if water level is different than 0 (+24V to Pa)
Solenoid Valve ON if water level is different than 0 (+24V to J11-13 to J11-5)</td></tr>
<tr><td>Sitting</td><td>Closed</td><td>Dosing system enabled
during work</td><td>Chemical Pump ON if water level is different than 0 (+24V to Pd)</td></tr>
<tr><td>Sitting</td><td>Closed</td><td>Backward function enabled
during work</td><td>Brushdeck Actuator goes down (+24V to M4)
Brush Motors ON (+24V to M2)
Solution Pump OFF
Solenoid Valve OFF
Chemical Pump OFF (if available)</td></tr>
<tr><td>Sitting</td><td>Closed</td><td>Traction Pedal not pressed
during work</td><td>Brushdeck Actuator rises after 10 seconds (-24V to M4)
Brush Motors OFF
Solution Pump OFF
Solenoid Valve OFF
Chemical Pump OFF (if available)</td></tr>
<tr><td>Sitting</td><td>Closed</td><td>Washing disabled
during work</td><td>Brushdeck Actuator rises (-24V to M4)
Brush Motors OFF
Solution Pump OFF
Solenoid Valve OFF
Chemical Pump OFF (if available)</td></tr>
</table>

6.6 Related electrical circuit

6.6.1 BMG 50 BTO



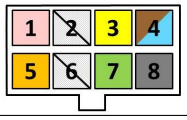
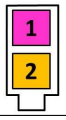
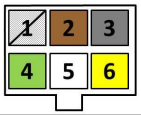
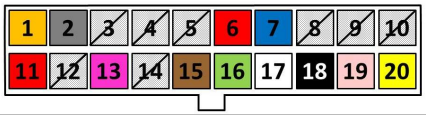
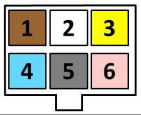
Functionality Check - 50 BTO Brush Deck

Conventions:

- $+V_b$: Positive voltage of the battery.
- $-V_b$: Negative voltage of the battery.
- The emergency button is not pressed, the key contact is closed and the charger is not connected to the mains.
- **The Brush Deck is in working condition**.

Input/output:

Satisfied condition	Pin	V at work	V at rest
Brush Motor Activated	XE(1) ref to XE(2)	$+V_b$	$-V_b$
Display Negative	J1(4) ref to B-	$-V_b$	$-V_b$
Display Transmission	J1(7) ref to B-	$+V_b$	$-V_b$
Display Receiving	J1(3) ref to B-	$+V_b$	$-V_b$
Display Positive	J1(8) ref to B-	$+V_b$	$+V_b$
Electrobrake Activated	J2(1) ref to J2(2)	$+V_b$	$-V_b$
Traction pedal pressed	J5(3) ref to J5(6)	$+V_b$	$-V_b$
Operator Seated	J7(15) ref to J7(1)	$+V_b$	$-V_b$
Brushes Actuator in motion	J14(1) ref to J14(4)	$+V_b$	$-V_b$
Brushes Actuator ALL OUT	J14(2) ref to J14(6)	$-V_b$	$+V_b$
Brushes Actuator ALL IN	J14(5) ref to J14(6)	$-V_b$	$+V_b$
Maximum pressure limit switch pressed	J14(3) ref to J14(6)	$-V_b$	$+V_b$

J1		J2	
J5		J7	
J14			

6.6.2 Relative electrical Components

Orbital Brush Motor

The motor is a DC type with permanent magnets, connected directly to the function board via a connector. With a constant 24 V DC supply (full battery) the single brush motor (M2) draws 1.7 Amps ± 0.1. With a constant 21 V DC supply (low battery) the absorption is 1.6 Amps ± 0.1.

Actuator

The actuator, by means of the lever and the tie rod, lowers the brush deck, moves it sideways and pushes to the ground.

Pressure Control Microswitch

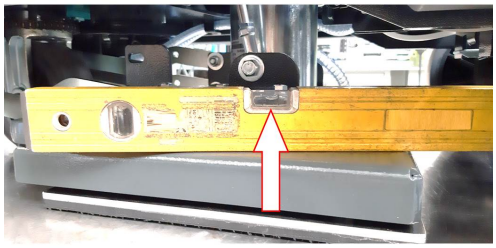
The pressure control microswitch is mounted on a bracket. It intervenes if the motors have a too low absorption to prevent the scrubdeck actuator from continuing to push. If the pin falls below its limit, the micro opens and stops the actuator.

6.7 Adjustments

6.7.1 50 BTO Brush Deck

The scrub deck is tilted in the transverse direction and should be adjusted longitudinally inclined to the machine so that the pad evenly lean to the ground and perform its function properly.

Procedure:



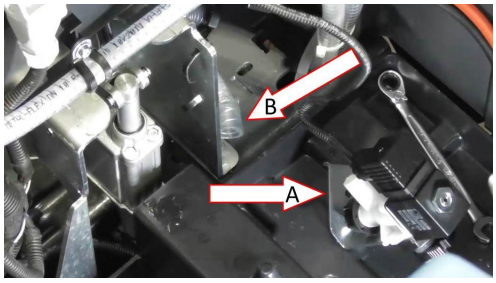
- Remove the Pad from the deck.
- Lower the deck so that the pad rests evenly and parallel to the ground.
- Check the flatness of the support surface with a bubble on both sides of the base.
- Use the fixing screw of the upper right arm and fix the adjustment by tightening the fixing nut.

6.7.2 Orbital Brush Deck Actuator

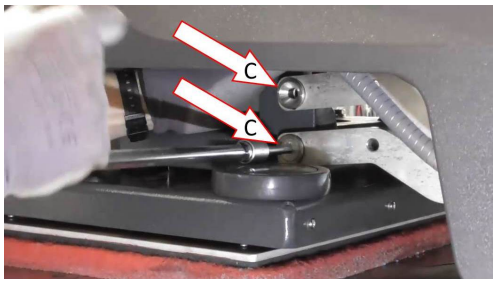
(see section 4.7.2 at page 62)

6.8 Disassembly

6.8.1 50 BTO Brush Deck



Close the water, lower the brush deck and switch off the machine. Remove the batteries, and disconnect the motor power connector. Remove the solenoid valve support screw (A) and disconnect the water hose (B).



Unscrew the right and left screws (C).

Lift the front of the machine with a suitable lifting system.
At this point remove the deck from the left side (D).

6.8.2 Brush Deck Actuator

(see section 4.8.3 at page 63)

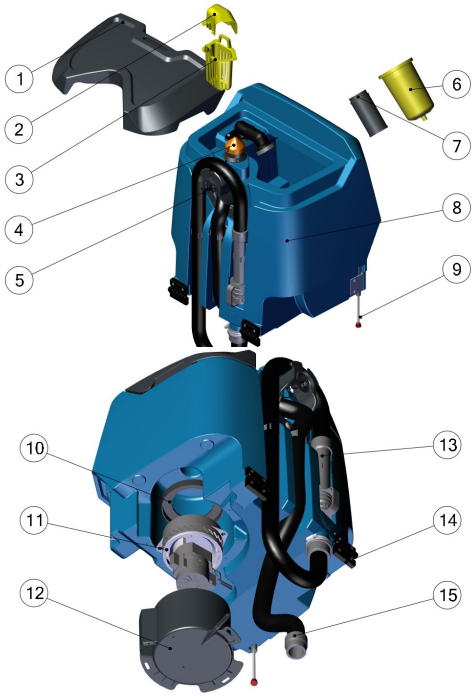
Chapter 7

Vacuum Unit

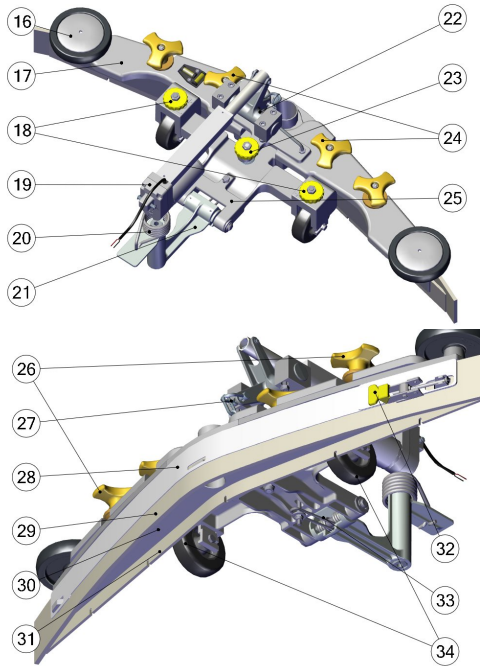
7.1 Location on machine

The vacuum unit is located in central rear position.

7.2 Main Components



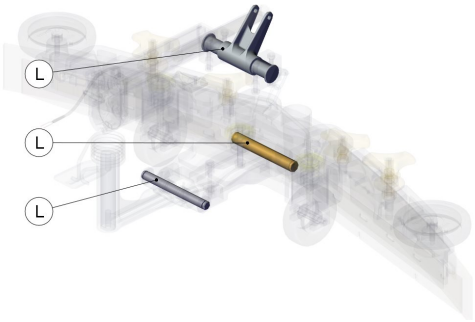
1 Vacuum Cover
2 Suction tray conveyor
3 Suction tray
4 Blinking Light
5 Rear view camera (PLUS)
6 Floater Protection
7 Floater
8 Recovery tank
9 Recovery tank support Rod
10 Vacuum motor hood
11 Vacuum motor
12 Vacuum motor Carter
13 Drain Hose
14 Tank Hinges
15 Squeegee Vacuum Hose



16 Bumping wheel
17 Squeegee rear coupling
18 Wheel height adjustment knobs
19 Actuator
20 retaining Spring
21 Squeegee front coupling
22 Squeegee lifting Lever
23 Tilt adjustment knob
24 Squeegee rubbers fixing knobs
25 Squeegee central coupling
26 Squeegee coupling Knobs
27 Squeegee lifting Chain
28 Squeegee Rear Rubber holder
29 Squeegee Rear Rubber
30 Squeegee lower body
31 Squeegee Front Rubber
32 Rear Rubber fixing Lever
33 Squeegee pushing spring
34 Squeegee Support Wheel

7.3 Lubrication Points

For lubrication use standard grease.



- Lifting Lever
- Bushings and Pins

7.4 Work requirements

The Vacuum unit only works if the following conditions are met:

1. The batteries are not discharged.
2. The operator is seated on the machine so as to press the seat safety switch (1).
3. The machine is on (2).
4. The electrobrake is activated.
5. The functions setting on the display is Drying or Washing + Drying (3).
6. The accelerator pedal is pressed(4).

7.5 Operating mode

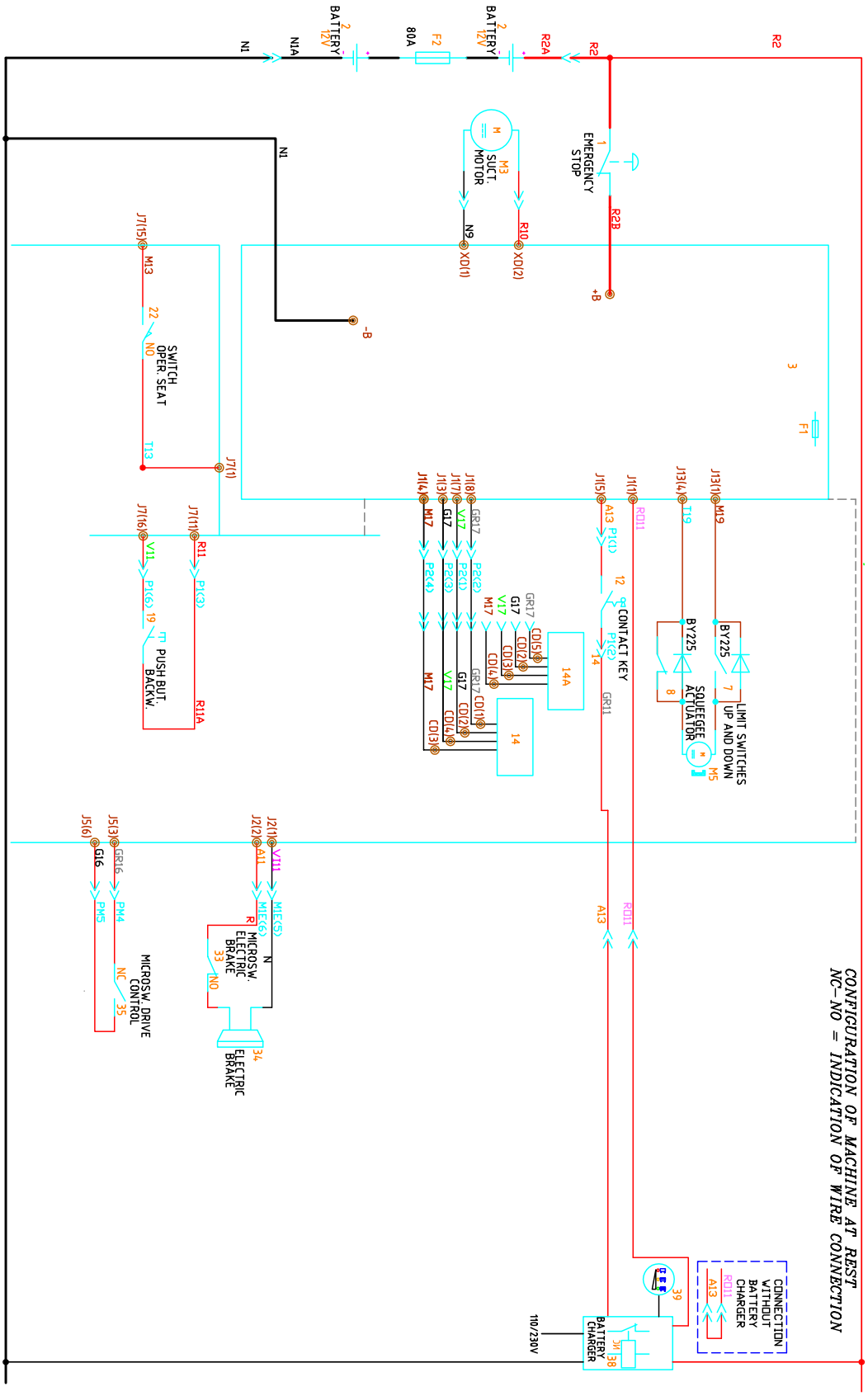
VACUUM

Operator	Seat Microsw.	Action	Result
Sitting	Closed	Vacuum Enabled Forward pedal pressed	Squeegee Actuator goes down (+24V to M5) Vacuum motor ON (+24V to M3)
Sitting	Closed	Backward function enabled during work	Squeegee Actuator rises (-24V to M5).
Sitting	Closed	Traction Pedal not pressed during work	Vacuum motor OFF after 10 seconds at maximum level.
Sitting	Closed	Vacuum Disabled during work	Squeegee Actuator rises (-24V to M5) Vacuum Motor OFF after 10 seconds at maximum level.

VACUUM WAND

Operator	Seat Microsw.	Action	Result
Standing	Open	Wand button enabled	Vacuum motor ON (+34V to M3) Squeegee Actuator goes down (+24V to M5)
Standing	Open	Wand button disabled	Vacuum motor OFF (+0V to M4) after 10 seconds at maximum level. Squeegee Actuator rises (-24V to M5) after the next traction consent.

7.6 Related electrical circuit



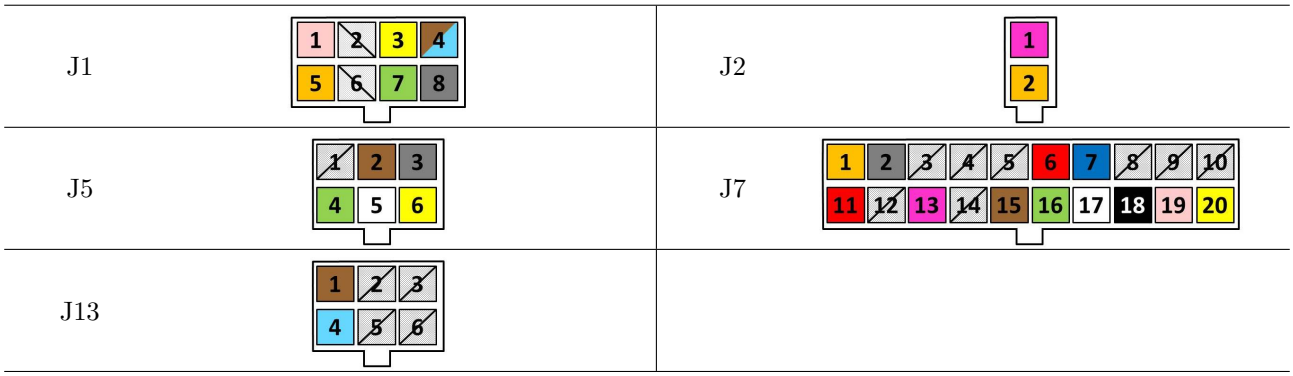
Functionality Check - Vacuum Unit

Conventions:

- $+V_b$: Positive voltage of the battery.
- $-V_b$: Negative voltage of the battery.
- The emergency button is not pressed, the key contact is closed and the charger is not connected to the mains.
- **The Vacuum system is in working condition**.

Input/output:

Satisfied condition	Pin	V at work	V at rest
Vacuum Motor Activated	XD(1) ref to XD(2)	$+V_b$	$-V_b$
Vacuum Wand Activated	J1(8) ref to J7(18)	$+V_b$	$-V_b$
Display Transmitting	J1(7) ref to B-	$+V_b$	$-V_b$
Display Negative	J1(4) ref to B-	$-V_b$	$-V_b$
Display Receiving	J1(7) ref to B-	$+V_b$	$-V_b$
Display Positive	J1(8) ref to B-	$+V_b$	$+V_b$
Electrobrake Activated	J2(1) ref to J2(2)	$+V_b$	$-V_b$
Traction pedal pressed	J5(3) ref to J5(6)	$+V_b$	$-V_b$
Backward Activated	J7(11) ref to J7(16)	$+V_b$	$-V_b$
Seated Operator	J7(15) ref to J7(1)	$+V_b$	$-V_b$
Squeegee Actuator in motion	J13(1) ref to J13(4)	$+V_b$	$-V_b$



7.6.1 Relative electrical Components

Vacuum Motor

The vacuum motor produces a vacuum in the system upstream of it which causes a flow of air that runs through the entire drying system and allows the water to be sucked together with the air.

2 Stages Motor
With a constant 24 V DC supply (full battery) the single motor without load (M3) draws 17,6 Amps ± 0,1. With a constant 21 V DC supply (low battery) the absorption is 15,9 Amps ± 0,1.
3 Stages Motor
With a constant 24 V DC supply (full battery) the single motor without load (M3) draws 24,0 Amps ± 0,1. With a constant 21 V DC supply (low battery) the absorption is 22,0 Amps ± 0,1.

Actuator

The squeegee lifting actuator, by means of the lever and the tie rod, lowers the squeegee and pushes it to the ground.

Floater microswitch (FLR)

The Floater microswitch by means of the lever, indicates when the water level is at critical level of overflow or empty in the case of recycling system (optional).

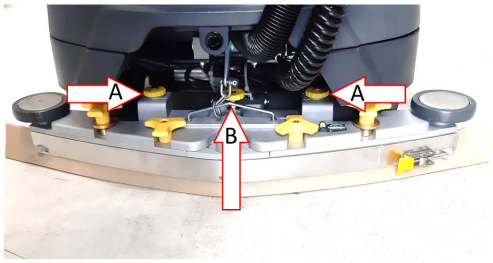
Flashing light

The flashing light always active when the machine is on, has the function of facilitating its visibility.

7.7 Adjustments

7.7.1 Squeegee

The Squeegee Support has to be adjusted with the Squeegee fitted on, lowered on the floor and vacuum system on. The goal of the adjustment is to let the squeegee blade be angled **45 degrees** to the floor for its whole length.
To obtain the correct adjustment act on the squeegee wheels adjusting knobs (A) to adjust the distance from the floor, and on the central adjusting knob (B) to adjust the inclination of the squeegee.



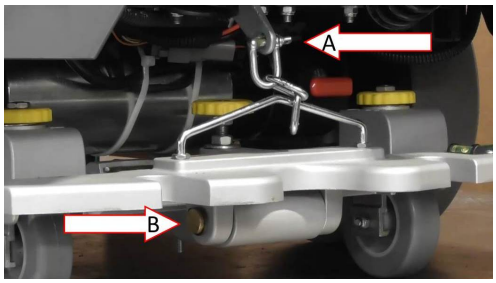
Procedure:

Switch the machine ON and lower the squeegee to the floor.
Slowly advance by pressing the traction pedal.
During the advancement, adjust the squeegee via the knobs so as to obtain an inclination of the squeegee rubbers of 45 degrees (A) on the floor throughout their length.

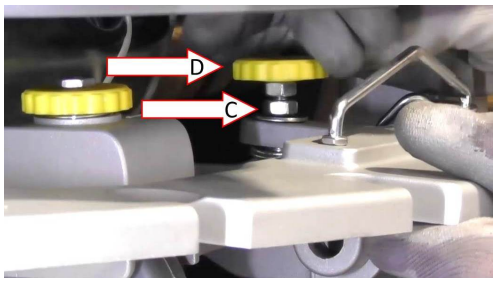
7.8 Disassembly

7.8.1 Squeegee Support

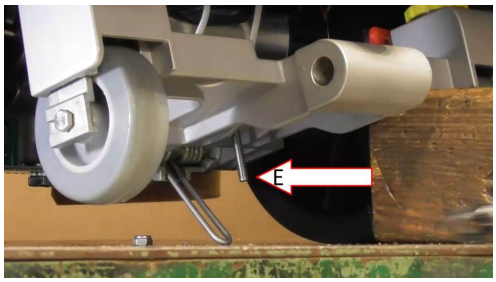
Lower the squeegee and turn the machine Off.
Remove the squeegee from its support.
Remove the shackle of the chain (A) and the snap ring to remove the pin (B).



Loosen the locknut (C) and unscrew the knob completely (D).
Remove the rear support.

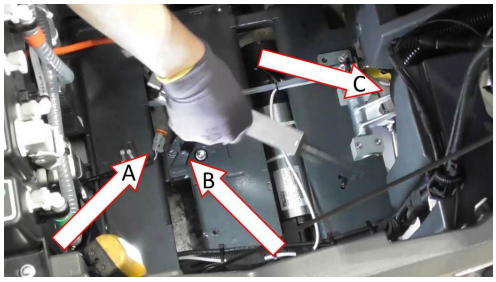


Unscrew the nut and release the pressure spring (E).
Remove the seeger to remove the pin and remove the front support.



7.8.2 Squeegee Actuator

Lower the squeegee and turn off the machine.
Remove the batteries and the battery tray.
Disconnect the connector (A).
Remove the seegers to remove the pins (B, C) and remove the actuator.



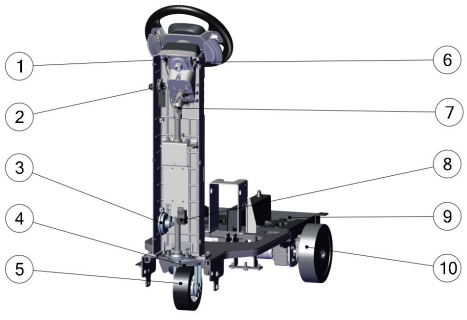
Chapter 8

Frame and Traction Unit

8.1 Location on machine

The frame and traction unit is located under the machine body.

8.2 Main Components



1 Backward switch
2 Key Switch
3 Horn
4 Steering Chain
5 Front Wheel
6 Max Pressure Switch
7 Handle Joint
8 Horn Relay
9 Battery Tray
10 Rear Wheel
11 Horn Button
12 Wand activation switch (optional)
13 Spray Gun activation switch (optional)
14 Traction Gearmotor
15 Dashboard / touchscreen Display
16 Key
17 Electrobrake

8.3 Work requirements

The traction unit only works if the following conditions are met:

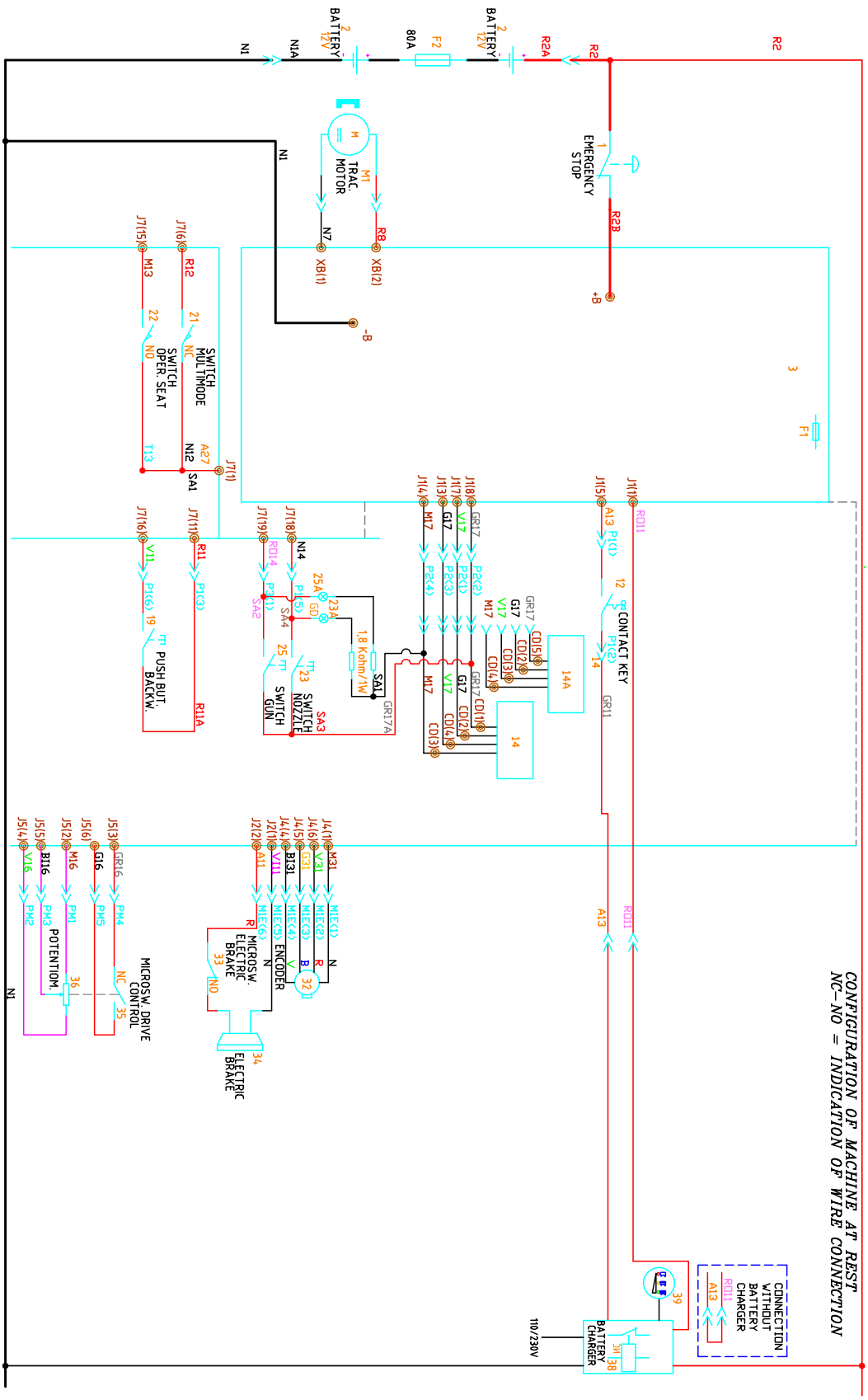
1. The batteries are not discharged.
2. The operator is seated on the machine so as to press the seat safety switch (1).
3. The machine is on (2).
4. The electrobrake is activated.
5. The accelerator pedal is pressed(4).

8.4 Operating mode

TRACTION

Operator	Seat Microsw.	Action	Result
Sitting	Closed	Forward pedal pressed	Traction motor ON +24V to M1).
Sitting	Closed	Backward function enabled	Traction motor ON (-24V to M1).

8.5 Related electrical circuit



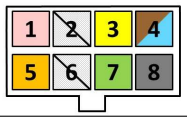
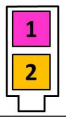
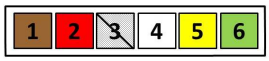
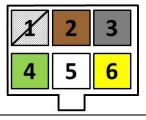
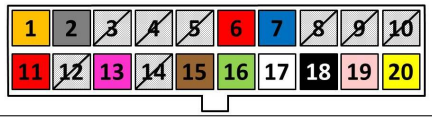
Functionality Check - Traction Unit

Conventions:

- $+V_b$: Positive voltage of the battery.
- $-V_b$: Negative voltage of the battery.
- The emergency button is not pressed, the key contact is closed and the charger is not connected to the mains.
- **The Traction is in working condition**.

Input/output:

Satisfied condition	Pin	V at work	V at rest
Display Negative	J1(4) ref to B-	$-V_b$	$-V_b$
Display Transmitting	J1(7) ref to B-	$+V_b$	$-V_b$
Display Receiving	J1(3) ref to B-	$+V_b$	$-V_b$
Display Positive	J1(8) ref to B-	$+V_b$	$+V_b$
Electrobrake Activated	J2(1) ref to J2(2)	$+V_b$	$-V_b$
Encoder activated	J4(1) ref to B-	$+V_b$	$-V_b$
Encoder activated	J4(4) ref to B-	$+V_b$	$-V_b$
Encoder activated	J4(5) ref to B-	$+V_b$	$-V_b$
Encoder activated	J4(6) ref to B-	$+V_b$	$-V_b$
Brake pedal pressed	J5(3) ref to J5(6)	$+V_b$	$-V_b$
Potentiometer Activated	J5(2) ref to J5(4)	$+V_b$	$-V_b$
Potentiometer Signal Activated	J5(5) ref to J5(4)	$+V_b$	$-V_b$
Curve Speed red. Microswitch	J7(6) ref to J7(1)	$+V_b$	$-V_b$
Seated Operator	J7(15) ref to J7(1)	$+V_b$	$-V_b$
Backward activated	J7(11) ref to J7(16)	$+V_b$	$-V_b$
Spray Gun activated	J7(18) ref to J1(8)	$-V_b$	$+V_b$
Wand activated	J7(19) ref to J1(4)	$-V_b$	$+V_b$
Gearmotor activated	XB(1) ref to XB(2)	$+V_b$	$-V_b$

J1		J2	
J4		J5	
J7			

8.5.1 Relative electrical Components

Traction Gearmotor

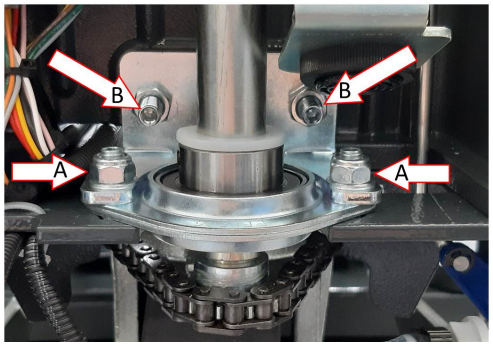
The traction of the machine is guaranteed by an electric motor installed in combination with a gear reducer, which acts directly on the rear wheels of the machine, ensuring traction. With constant 36 V DC power supply (battery charged) the traction gearmotor with no load (M1) absorbs 2.1 Amps ± 0.1. With constant 31 V DC power supply (low battery) the absorption is 2.0 Amps ± 0.1.

Batteries

The batteries must have a voltage of 24V. Two 12V monoblock elements can be installed (see section 3.3.19 at page 33).

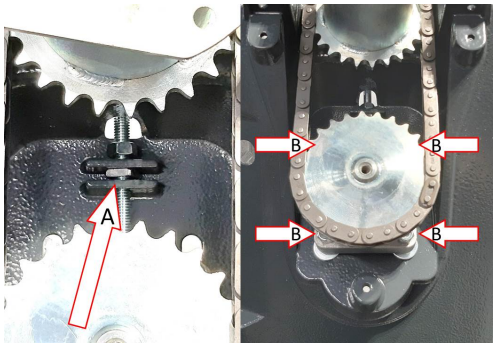
8.6 Adjustments

8.6.1 Steering Chain



Remove the front carter.
Loosen the 2 lower screws (A).
Loosen the lock nuts of the upper headless screws (B) and adjust the distance from the steering column until a medium tension of the chain is obtained, which must not have any slack. Tighten the locknuts and the lower screws.

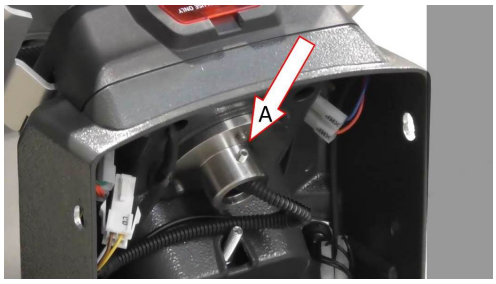
8.6.2 Steering Column Chain



Remove the front carter.
Remove the display and the steering wheel.
Loosen the four screws of the lower crown. (B).
Block the square nut (A) with a wrench and tighten the threaded bar until the chain is in a medium tension.
Tighten the lower crown screws.

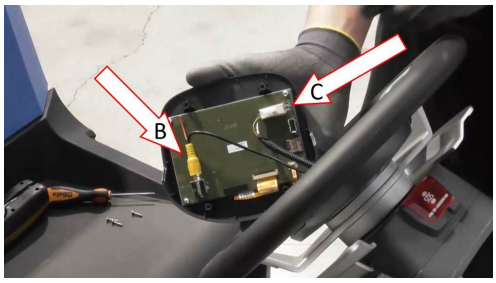
8.7 Disassembly

8.7.1 Touchscreen Display



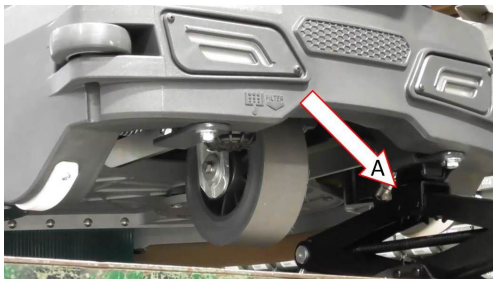
Unscrew the 6 screws of the nose and remove it.
Unscrew the headless screw (A).

Slide out the display and remove the 4 screws on the back.
Open the display and remove connectors (B,C).

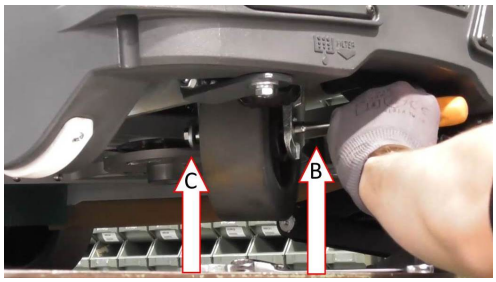


8.7.2 Front Wheel

Raise the machine with a hydraulic actuator (A). Unscrew the screws also on the other side.

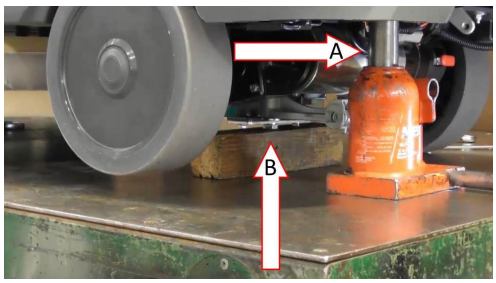


If necessary, use an instrument (B) to push the pin (C) out of the seat.

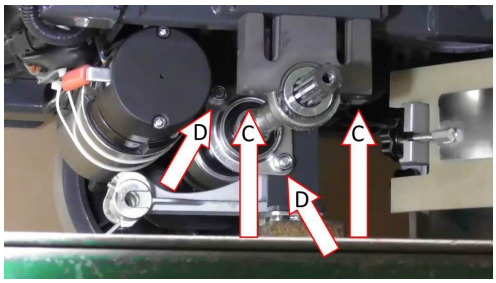


8.7.3 Traction Gearmotor

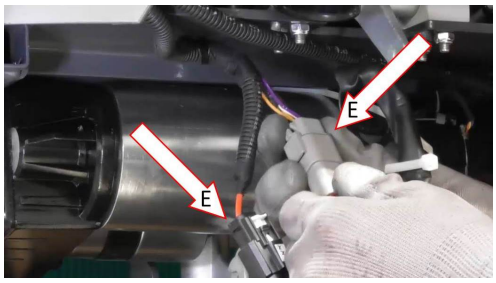
Remove the Complete Squeegee Holder (see section 7.8.1 at page 86).
Place a wedge at the front of the front wheel.
Lift the rear part of the machine with a suitable lifting system (A) and insert a shim (B) under the central screw of the squeegee support hook.
Insert two wedges at the front of the machine, under the two anti-tipping points.



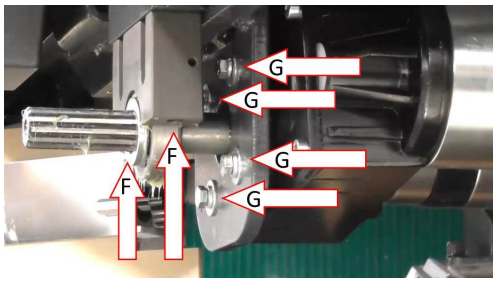
Remove the right wheel and the lower part of the relative bearing support (C). Remove the central bearing fixing nuts (D), and extract the axle shaft from the gear.



Release the gearmotor wiring and disconnect the two connectors (E).



Remove the left wheel and the lower part of the relative bearing support (F).
Unscrew the four screws (G) that fix the gearmotor to the machine frame, extract the left axle shaft and remove the gearmotor.

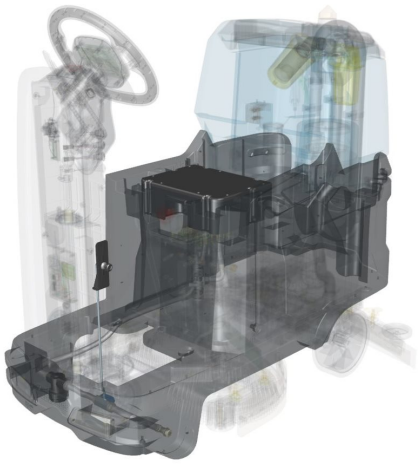


Chapter 9

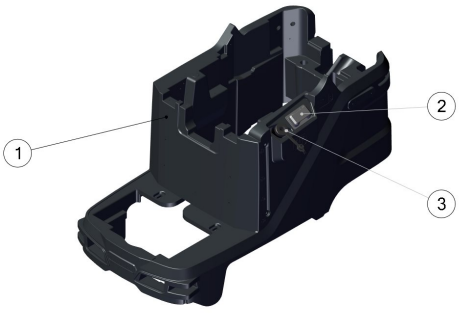
Water Unit

9.1 Location on machine

The Water unit is located under the machine body in central position.



9.2 Main Components



1 Solution Tank
2 Chemical dosing Cap
3 Water fill Cap
4 Water Pump
5 Water Valve Knob
6 Water Filter
7 Pump group Connector
8 Solenoid
9 Water Valve

9.3 Work requirements

The Water unit only works if the following conditions are met:

1. The batteries are not discharged.
2. The operator is seated on the machine so as to press the seat safety switch (1).
3. The machine is on (2).
4. The electrobrake is activated.
5. The functions setting on the display is Washing or Washing + Drying (3).
6. The water valve is open, and on the display the water level is more than zero.
7. The accelerator pedal is pressed(4).

9.4 Operating mode

WASHING

Operator	Seat Microsw.	Action	Result
Sitting	Closed	Washing Enabled Forward pedal pressed	Solution Pump ON if water level is different than 0 (+24V to Pa) Solenoid Valve ON if water level is different than 0 (+24V to J6-13 to J6-5)
Sitting	Closed	Dosing system enabled during work	Chemical Pump ON if water level is different than 0 (+24V to Pd)
Sitting	Closed	Backward function enabled during work	Solution Pump OFF Solenoid Valve OFF Chemical Pump OFF (if available)
Sitting	Closed	Traction Pedal not pressed during work	Solution Pump OFF Solenoid Valve OFF Chemical Pump OFF (if available)
Sitting	Closed	Washing disabled during work	Solution Pump OFF Solenoid Valve OFF Chemical Pump OFF (if available)

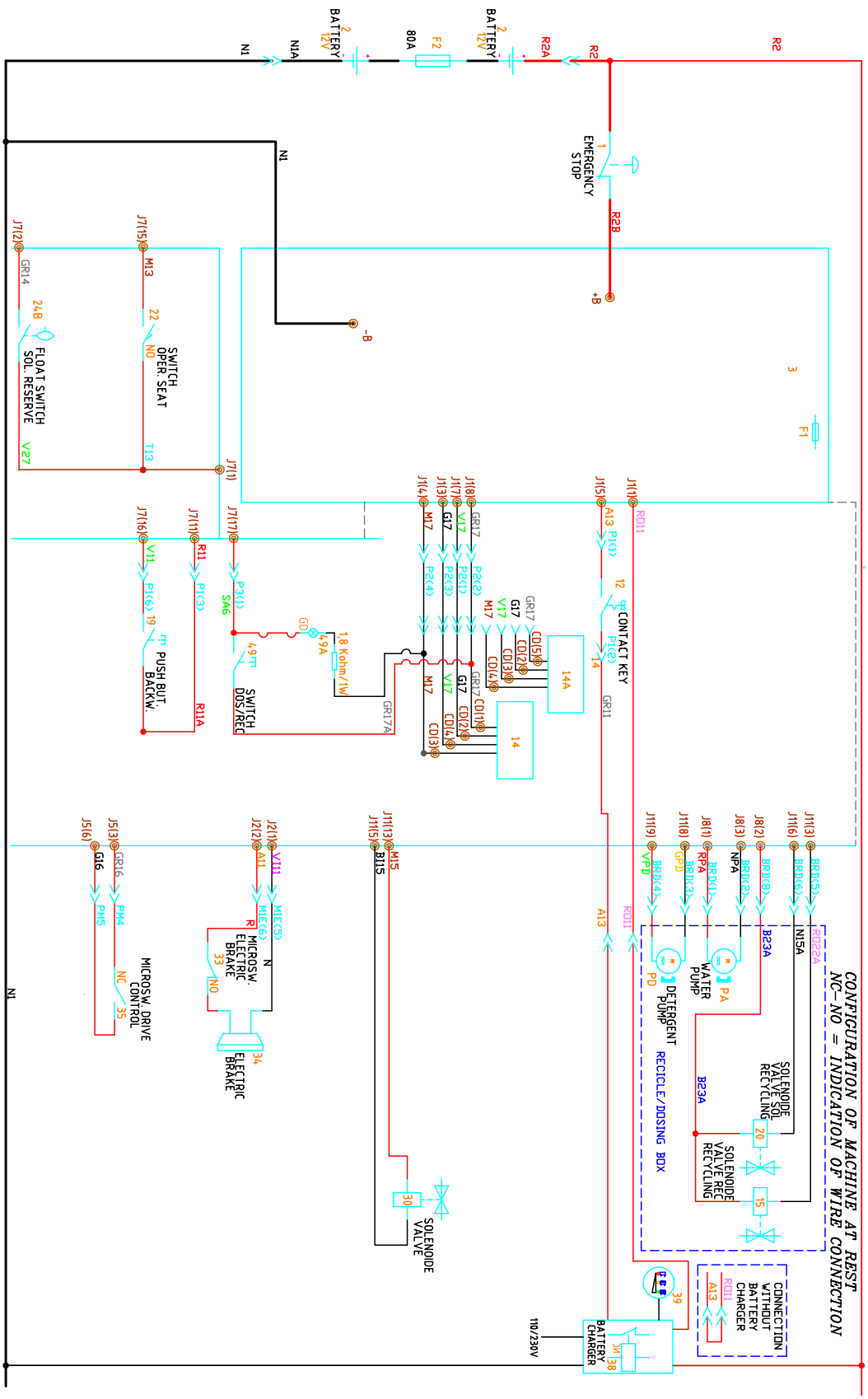
SPRAY GUN

Operator	Seat Microsw.	Action	Result
Standing	Open	Gun button enabled trigger pushed	Solution Pump ON (+24V ref to J7-1/J7-3).
Standing	Open	Gun button disabled	Solution Pump OFF (+0V ref to J7-1/J7-3).

RECYCLE SYSTEM

Operator	**Seat Microsw.**	**Action**	**Result**
Sitting	Closed	Recycled button enabled Solution tank reserve floater enabled Recovery tank reserve floater disabled Forward pedal pressed	Recycle Pump ON (+24v ref to j7-2/j7-4).
Sitting	Closed	Recovery tank reserve floater enabled	Recycle Pump OFF (+0V ref to J7-1/J7-3).
Sitting	Closed	Recycled button disabled	Recycle Pump OFF (+0V ref to J7-1/J7-3).

9.5 Related electrical circuit



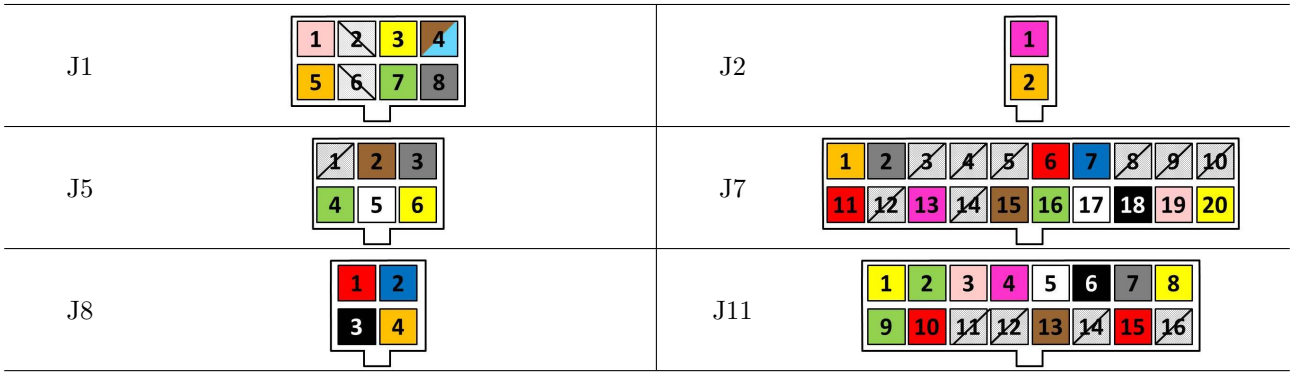
Functionality Check - Water Unit

Conventions:

- $+V_b$: Positive voltage of the battery.
- $-V_b$: Negative voltage of the battery.
- The emergency button is not pressed, the key contact is closed and the charger is not connected to the mains.
- **The Water system is in working condition**.

Input/output:

Satisfied condition	Pin	V at work	V at rest
Display Negative	J1(4) ref to B-	$-V_b$	$-V_b$
Display Transmission	J1(7) ref to B-	$+V_b$	$-V_b$
Display Receiving	J1(3) ref to B-	$+V_b$	$-V_b$
Display Positive	J1(8) ref to B-	$+V_b$	$+V_b$
Electrobrake activated	J2(1) ref to J2(2)	$+V_b$	$-V_b$
Traction pedal pressed	J5(3) ref to J5(6)	$+V_b$	$-V_b$
Backward activated	J7(11) ref to J7(16)	$+V_b$	$-V_b$
Seated Operator	J7(15) ref to J7(1)	$+V_b$	$-V_b$
FSS/FLR activated	J7(17) ref to J1(8)	$-V_b$	$+V_b$
Solution Tank Floater	J7(2) ref to J7(1)	$+V_b$	$-V_b$
Water Pump Activated	J8(3) ref to J8(1)	$+V_b$	$-V_b$
Solenoid Valve activated	J11(13) ref to J11(5)	$+V_b$	$-V_b$
Solution tank recycle solen. Valve	J11(6) ref to J8(2)	$+V_b$	$-V_b$
Recovery tank recycle solen. Valve	J11(3) ref to J8(2)	$+V_b$	$-V_b$
Chemical Pump activated	J11(8) ref to J11(9)	$+V_b$	$-V_b$



9.5.1 Relative electrical Components

Water Pump

The water pump, connected to the solution tank and to the solenoid valve, allows a regular flow to the brushes.

Solenoid Valve

The solenoid valve is located on the back of the brush deck body, which can be easily accessed from the left side.

Chapter 10

Consumable and Recommended Spare Parts

10.1 Consumable

10.1.1 Washing Unit

BMG 56					
PN	**Description**	**Width ϕ**	**Bristle**	**ϕ Bristle**	**Color**
436232	BRUSH PPL 0,3	560 mm 22 in	PPL	0,3 mm 0,3 in	Light Blue
436233	**BRUSH PPL 0,6**	560 mm 22 in	PPL	0,6 mm 0,023 in	White
436234	BRUSH PPL 0,9	560 mm 22 in	PPL	0,9 mm 0,035 in	Black
436235	TYNEX BRUSH	560 mm 22 in	ABRASIVE	0,9 mm 0,035 in	Gray
436236	PAD HOLDER	535 mm 21 in	-	-	-
Carbon Brushes					
422462	BRUSH MOT. CARB. BR.	7 x 14 x 19 mm 0,27 x 0,55 x 0,75 in	-	-	-

BMG 65					
PN	**Description**	**Width ϕ**	**Bristle**	**ϕ Bristle**	**Color**
422189	BRUSH PPL 0,3	340 mm 13 in	PPL	0,3 mm 0,3 in	Light Blue
422971	**BRUSH PPL 0,6**	340 mm 13 in	PPL	0,6 mm 0,023 in	White
422972	BRUSH PPL 0,9	340 mm 13 in	PPL	0,9 mm 0,035 in	Black
422981	TYNEX BRUSH	340 mm 13 in	ABRASIVE	0,9 mm 0,035 in	Gray
422973	PAD HOLDER	330 mm 13 in	-	-	-
Carbon Brushes					
422462	BRUSH MOT. CARB. BR.	7 x 14 x 19 mm 0,27 x 0,55 x 0,75 in	-	-	-

Blue = Standard

BMG 50 BTO		
PN	**Description**	**Measures**
443711	WHITE PAD	508 x 355 mm 20 x 14 in
442661	GREEN PAD	508 x 355 mm 20 x 14 in
442005	RED PAD	508 x 355 mm 20 x 14 in
443712	BROWN PAD	508 x 355 mm 20 x 14 in
442662	BLACK PAD	508 x 355 mm 20 x 14 in
Carbon Brushes		
422462	ORBIT MOT. CARB. BR.	7 x 14 x 19 mm 0,27 x 0,55 x 0,75 in

10.1.2 Vacuum Unit

PN	Description	Measures	BMG		
			56	**65**	**50 BTO**
Squeegee					
228561	**RUBBER KIT PARA 40 SHORE**	890 x 65 x 6 mm 35 x 2.5 x 0.25 in	√	√	√
228562	RUBBER KIT POLYURETHANE	890 x 65 x 6 mm 35 x 2.5 x 0.25 in	√	√	√
438487	WHEEL	D=80 H=25 mm D=4 H=1 in	√	√	√
Splashguards					
228563	**SPLASHG. RUBBER R/L PARA 40SH**	475 x 100 x 6 mm 19 x 4 x 0.25 in		√	
228564	SPLASHG. RUBBER R/L POLY 40SH	475 x 100 x 6 mm 19 x 4 x 0.25 in		√	
Carbon Brushes					
424210	VAC. MOT. CARB. BR.	6 x 11 x 25 mm 0.25 x 0.43 x 1 in	√	√	√

10.1.3 Frame and Traction Unit

PN	Description	Measures	BMG		
			56	**65**	**50 BTO**
436222	FRONT WHEEL	175 x 60 mm 6.90 x 2.35 in	√	√	√
426460	REAR WHEEL	225 x 69 mm 8.85 x 2.70 in	√	√	√
Carbon Brushes					
422462	TRAC. MOT. CARB. BR.	7 x 14 x 19 mm 0.27 x 0.55 x 0.75 in	√	√	√

Blue = Standard

10.2 Recommended Spare Parts

The following table refers to the Recommended Spare Parts, and reports the amount suggested by the number of purchased machines.

Machines		**Parts**
1	⇒	1
10	⇒	2
25	⇒	3
50	⇒	4

10.2.1 Electrical System

		BMG	
PN	Description	PRO	Plus
436144	EMERGENCY BUTTON	√	√
449177	MAIN CARD 7CFX2010	√	√
228373	MEMBRANE DASHBOARD BMG PRO	√	
228368	TOUCH SCREEN DASHBOARD BMG PLUS		√
228372	JEY SWITCH ASSEMBLY	√	√
443042	BACKWARD/EXTRAPRESSURE SWITCH	√	√
409491	EXTRAPRESSURE MICROSWITCH	√	√
216691	CURVE SPEED RED. MICROSWITCH	√	√
443155	TRACTION PEDAL ASSEMBLY	√	√
226032	HORN SWITCH	√	√
443044	WAND SWITCH	√	√
443044	SPRAY GUN SWITCH	√	√
436434	BATTERY CHARGER (OPTIONAL)	√	√
449017	BLINKING LIGHT	√	√
226283	ANTICOLLISION SENSOR		√
443706	REAR VIEW CAMERA		√

10.2.2 Washing Unit

		BMG		
PN	Description	56	65	50 BTO
223301	RIGHTSIDE GEARMOTOR 24V 500W 140RPM	√	√	
441826	RIGHTSIDE BRUSH FLANGE	√	√	
223444	LEFTSIDE GEARMOTOR 24V 500W 140RPM		√	
448807	LEFTSIDE BRUSH FLANGE		√	
227828	MOTOR 24V 680W 2000RPM			√
441992	ANTIVIBRATING			√
436120	BRUSHDECK BUMPING WHEEL	√		√
430956	BRUSHDECK BUMPING WHEEL		√	
228340	BRUSHDECK ACTUATOR	√	√	√

10.2.3 Vacuum Unit

PN	Description
222453	VACUUM MOTOR 24V 450W 2ST
225686	VACUUM MOTOR 36V 650W 3ST (OPTIONAL)
446963	VACUUM HOSE D=35 L=650
449128	DRAIN HOSE D=38 L=1534 W/CAP
448860	INTAKE MANIFOLD
412363	VACUUM AIR FILTER
227204	RECYCLE FILTER (OPTIONAL)
228377	RECYCLE FLOATER SWITCH (OPTIONAL)

10.2.4 Cleaning Solution Supply Unit

PN	Description
212616	CLEAN WATER COMPLETE FILTER
407887	COMPLETE SOLENOID VALVE 24V 1/2” ACL 3
223537	WATER PUMP
227294	SPRAY GUN PUMP (OPTIONAL)
438680	CHEMICAL PUMP (OPTIONAL)
438680	RECYCLE PUMP (OPTIONAL)
447874	RECYCLE SOLENOID VALVE (OPTIONAL)

10.2.5 Frame and Traction Unit

PN	Description
449002	TRACTION GEARMOTOR 24V 300W

Fimap S.p.A.
Service Manual BMG

Fimap S.p.A. Via Invalidi del Lavoro, 1 - 37050 S.Maria di Zevio Verona - ITALY
Tel. +39 045 6060411 - Fax +39 045 6060417
Edizione: May 9, 2019