FIMAP®

SERVICE MANUAL

EMX

scrubber-dryer

doc_nr: 10129885 – ver: AB – data: 06/2024

EN *series* PERFORMANCE

INDEX

PREMISE

Purpose of the manual

Good customer service requires thorough training and well-structured training materials.

This service manual was created to assist certified service technicians with instructions and reference guide. It is recommended that you read this document completely before servicing the machine.

Update record

VERSION	MODIFICATION	REFERENCES
AB	Overdue maintenance notice	Sez. 3.3.9 Pag. 27

SECTION 1 - GENERAL INFORMATION

1.1 Configurations

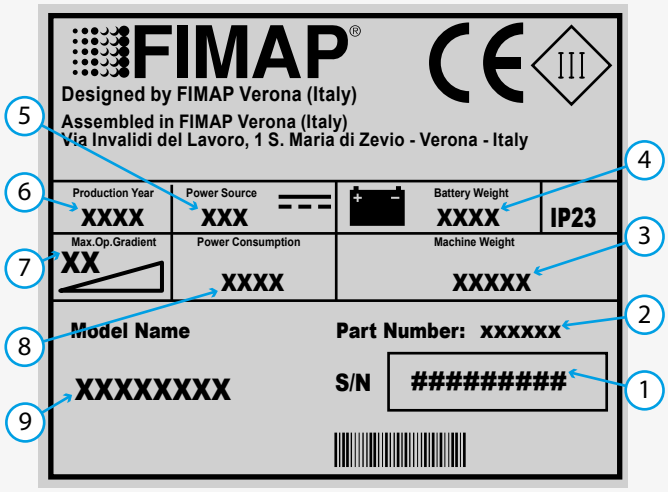
1.1.1 Types

VERSION	DESCRIPTION	
BASE ELETTRIC 50 E 230 V	COMFORT: hour meter, solution level indicator PRODUCTIVITY: aluminium squeegee attachment SAFETY Emergency Stop ENVIRONMENT FNC (Fimap Noise Canceling), FES (Fimap Emergency Saver), Start & Stop	
NO TRACTION BASE B 43 / 50 TRACTION BASE Bt 43 / 50	COMFORT: hour meter, solution level indicator PRODUCTIVITY: aluminium squeegee attachment SAFETY Emergency Stop ENVIRONMENT FNC (Fimap Noise Canceling), FES (Fimap Emergency Saver), Start & Stop	
PRO Bt 50	USER EXPERIENCE: Control panel with soft touch controls, Zone programmes, Speed control, Eco Mode, Power Mode, Maintenance warning. COMFORT Hour meter, Solution level indicator, Automatic brush attachment/release, Silent suction PRODUCTIVITY Detergent solution adjustment, Aluminium squeegee attachment SAFETY LED driving lights (front), Emergency Stop ENVIRONMENT FNC (Fimap Noise Canceling), FES (Fimap Emergency Saver), Start & Stop	

1.1.2 Bases

B / Bt	BtO	BtS
		
43B / 43Bt The disc washing base of the Ø 43cm version is equipped with a disc brush.	50 BtO The sweeping base of the "Orbital" 50cm working width version is equipped with a central rectangular oscillating pad	50 BtS The sweeping base of the "Cylindrical" version with a 50 cm working width is equipped with two counter-rotating cylindrical brushes with conveyor in the centre, and a drawer for collecting small debris
50Bt The disc washing base of the Ø 50cm version is equipped with a disc brush.		

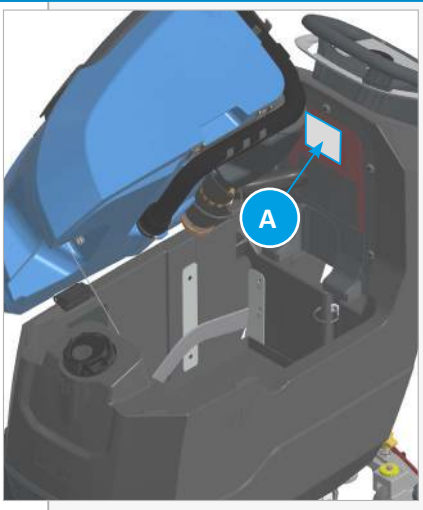
1.2 Serial number plate



The serial number plate of the machine is located in the steering column (A in side picture).

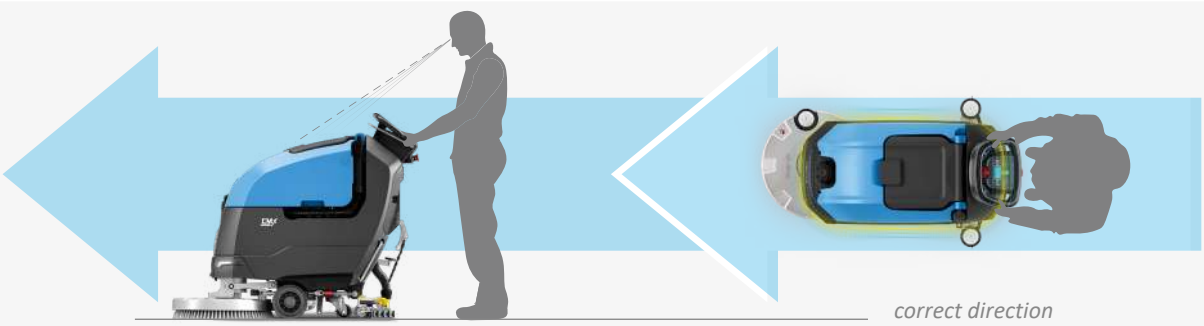
Index:

1. Serial number
2. Part number
3. Machine weight
4. Battery weight
5. Power supply
6. Production year
7. Maximum slope
8. Energy consumption
9. Machine name



1.3 Conventions

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



correct direction

1.4 General safety instructions

Always wear the appropriate personal protective equipment (PPE) whenever working.
When working near electrical components to avoid short circuits do not use:

- Non-insulated tools;
- Do not place or drop metal objects on electrically powered components;
- Remove rings, watches and clothing with metal parts that could come into contact with electrically powered components.
- Do not work under the raised machine without adequate fixed safety supports.
- Restore and recheck all electrical connections after any maintenance work.
- For any maintenance work, switch off the machine using the main switch (then remove the key from the lock) disconnect the battery connector from the electrical system connector.
- Avoid contact with moving parts. Do not wear loose clothing or jewellery and tie up long hair.
- Lock the wheels before lifting the machine.
- Lift the machine with equipment suitable for the weight to be lifted.
- Empty both tanks before transport.
- Bring both squeegees and brushes into working position before attaching the machine to the means of transport.
- The ramp for positioning the machine on top of the means of transport must be inclined so that the machine is not damaged.
- Check that the parking brake is properly applied after loading the machine onto the means of transport

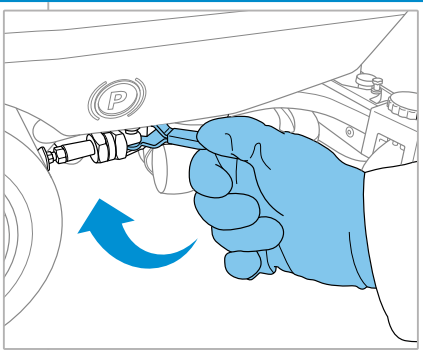
1.5 How to move the machine

To move the machine, release the parking brake located at the rear near the left wheel.

To release the parking brake where it is required, simply move the brake lever outwards.

When you have finished moving the vehicle, remember to re-engage the parking brake.

It is important to remember to disengage the brake when handling or working, as failure to disengage the parking brake would cause the left tyre to wear out prematurely due to friction.



1.6 Technical Data

EMX BASE ELETTRICA	I.S.U.	50 E
Nominal voltage *[IEC 60335-2-72; IEC 62885-9]*	V	230
Nominal frequency *[IEC 60335-2-72; IEC 62885-9]*	Hz	50
Nominal input power *[IEC 60335-2-72; IEC 62885-9]*	KW	0,82
Max surmountable slope at work with GVW weight *[IEC 60335-2-72; IEC 62885-9]*	%	2
Machine weight at work (Gross weight GVW) *[IEC 60335-2-72; IEC 62885-9]*	Kg lb	114,5 252.43
Transport weight *[IEC 60335-2-72; IEC 62885-9]*	Kg lb	80 176.37
Machine dimensions at work *(lunghezza; altezza; larghezza)*	mm in	1225x1030x597 48.23x40.55x23.50
Operator Sound Pressure Level (LpA) *[IEC 60335-2-72; IEC 62885-9; ISO 11201]*	dB (A)	<70
Sound power level (LwA) *[IEC 60335-2-72; IEC 62885-9; ISO 3744]*	dB (A)	<80
Uncertainty KpA	dB (A)	±1,5
Hand-arm vibrations *[IEC 60335-2-72; IEC 62885-9; ISO 5349-1]*	m/s2	<2,5
Vibration measurement uncertainty		±4%

EMX BASE	I.S.U.	43 B	50 B	43 Bt	50 Bt
Nominal voltage *[IEC 60335-2-72; IEC 62885-9]*	V	24	24	24	24
Nominal input power *[IEC 60335-2-72; IEC 62885-9]*	KW	0,92	0,92	1,07	1,07
Max surmountable slope at work with GVW weight *[IEC 60335-2-72; IEC 62885-9]*	%	2	2	2	2
Machine weight at work (Gross weight GVW) *[IEC 60335-2-72; IEC 62885-9]*	Kg lb	180 396.83	184 405.65	180 396.83	184 405.65
Transport weight *[IEC 60335-2-72; IEC 62885-9]*	Kg lb	140 308.65	144 317.47	140 308.65	144 317.47
Machine dimensions at work *(lunghezza; altezza; larghezza)*	mm in	1155x1030x591 45.47x40.55x23.27	1225x1030x597 48.23x40.55x23.5	1155x1030x591 45.47x40.55x23.27	1225x1030x597 48.23x40.55x23.5
Operator Sound Pressure Level (LpA) *[IEC 60335-2-72; IEC 62885-9; ISO 11201]*	dB (A)	66,2	66,2	66,2	66,2
Sound power level (LwA) *[IEC 60335-2-72; IEC 62885-9; ISO 3744]*	dB (A)	78,8	78,8	78,8	78,8
Uncertainty KpA	dB (A)	±1.5	±1.5	±1.5	±1.5
Hand-arm vibrations *[IEC 60335-2-72; IEC 62885-9; ISO 5349-1]*	m/s2	0,56	0,56	0,56	0,56
Vibration measurement uncertainty		±4%	±4%	±4%	±4%

EMX PRO	I.S.U.	43 BT	50 Bt	BTO	BTS
Nominal voltage *[IEC 60335-2-72; IEC 62885-9]*	V	24	24	24	24
Nominal input power *[IEC 60335-2-72; IEC 62885-9]*	KW	0,92	0,92	1,25	1,27
Max surmountable slope at work with GVW weight *[IEC 60335-2-72; IEC 62885-9]*	%	2	2	2	2
Machine weight at work (Gross weight GVW) *[IEC 60335-2-72; IEC 62885-9]*	Kg lb	180 396,83	184 405,65	178 392,42	150 330,69
Transport weight *[IEC 60335-2-72; IEC 62885-9]*	Kg lb	140 308.65	144 317.47	213 469.58	185 407.85
Machine dimensions at work *(lunghezza; altezza; larghezza)*	mm in	1155x1030x591 45.47x40.55x23.27	1225x1030x597 48.23x40.55x23.50	1163x1030x509 45.79x40.55x20.04	1107x1030x565 43.58x40.55x22.24
Operator Sound Pressure Level (LpA) *[IEC 60335-2-72; IEC 62885-9; ISO 11201]*	dB (A)	66,2	66,2	<70	<70
Sound power level (LwA) *[IEC 60335-2-72; IEC 62885-9; ISO 3744]*	dB (A)	78,8	78,8	<80	<80
Uncertainty KpA	dB (A)	±1.5	±1.5	±1.5	±1.5
Hand-arm vibrations *[IEC 60335-2-72; IEC 62885-9; ISO 5349-1]*	m/s2	0,56	0,56	<2,5	<2,5
Vibration measurement uncertainty		±4%	±4%	±4%	±4%

I.S.U. (International System of Units)

1.7 Necessary tools and diagnostics

In addition to a complete set of metric spanners, the following items are required for correct and quick troubleshooting and repair.

- Digital multimeter
- DC Current Clamp with 40-200A Backscale
- Densimeter
- Hydraulic lift
- Serial data cable Battery charger, part number **435226**

1.8 Clamping specifications

	STANDARD SCREWS			INOx SCREWS		
Ø Nominal	Nm	lb/In	lb/ft	Nm	lb/In	lb/ft
M4	3,1	27.4	2.3	2,1	18.6	1.5
M5	6,0	53.1	4.4	4,0	35.4	3.0
M6	10,4	92.0	7.7	7,0	62.0	5.2
M8	24,6	217.7	18.1	16,5	146.0	12.2
M10	50,1	443.4	37.0	33,5	296.5	24.7
M12	84,8	750.5	62.5	56,8	502.7	41.9

1.9 Scheduled maintenance

MAINTENANCE	DAILY	WEEKLY	MONTHLY	YEARLY
Check and charge battery if necessary	✓			
Tank and pipe cleaning check	✓			
Brush and pad cleaning	✓			
Squeegee cleaning	✓			
Clean Float	✓			
Empty/Clean Debris Collection Cage	✓			
Checking/Cleaning Suction Filter	✓			
Check Liquid Level of EACH Battery Cell		✓		
Check/Clean All Splash Guards		✓		
Check/Clean Filter Solution		✓		
Device lubrication			✓	
*) Checking/Replacing Carbon Brushes				✓
**) Control/tightening Electrical contacts				✓

*) *The brush motor and drive motor carbon brushes should be checked every 500 hours or once a year (to be assessed according to the working environment of the machine).*

**) *Carry out the operation after 100 operating hours, every replacement of an electrical component or once a year*

1.9.1 Before handing over the machine, carry out all the following operations (POI)

- Install the batteries and perform a complete recharge cycle (check the machine and charger settings);
- Install the clean water filter;
- Fill the solution tank completely with water; check for leaks and correct supply to the brushes
- Fill the Detergent Tank (if present) completely with water; check for leaks and correct dispensing
- Check the Washing function (base movement, water delivery and brush rotation)
- Check the Drying function (movement of the squeegee, operation of the suction motor and the tightness of the recovery tank)
- Check the Traction (forward, reverse and braking gear)
- Carry out on-site adjustments (base and squeegee adjustment)
- Check the function of the optional extras if present:
  - *Anti-collision sensors*
  - *Headlights*
  - *Service lights*
  - *Lance Kit*
  - *Gun Kit*
- When the demonstration is over, carry out daily maintenance immediately (see Operation and Maintenance Manual).

1.9.2 Demo tips

Squeegee
Have available a complete squeegee of a different length from the original (wider or narrower) if available.
Have available alternative squeegee kits in PARA and Polyurethane with different hardness.

Brushes
Have available PPL brushes in different thicknesses.
Have available a drive disc and various PADs of different hardness.

Detergent
Always have detergent available.
Have anti-foaming liquid available (in case the customer uses his own chemical).

1.10 Main components

1. Tank Recovery
2. Solution Tank
3. Suction Unit
4. Electrical System
5. Washing Unit
6. Chassis and Traction Group
7. Handlebar Group
8. Squeegee Control
9. Squeegee
10. Water Group
11. Battery Charger
12. FFM System (optional)

PART 2 - TROUBLESHOOTING GUIDE

2.1 Electrical system

MACHINE DOES NOT SWITCH ON	
The key is in position "0"	→ Turn the key to position "I"
The emergency button is pressed	→ Disarm the emergency button
The key microswitch is not correctly connected	→ Restore correct connections
Batteries are charged	→ Check for correct voltage
The key microswitch does not work	→ Replace the key microswitch
Batteries do not work correctly	→ See relevant section
The machine is correctly powered	→ Check the charge level of the batteries and if necessary run a re-charge cycle or replace them

THE CHARGER DOES NOT WORK	
The charger is not connected to the mains	→ Connect the charger to a powered socket
The charger is not connected to the batteries	→ Connect the charger to the batteries
The charger has one or more lights flashing continuously	→ The charger is at fault, check the alarm table and solve the problem by following the instructions
Correctly connected charger does not switch on	→ Replace charger

BATTERIES DO NOT WORK CORRECTLY	
Batteries are not connected correctly	→ Connect the bridge cable and output cables correctly
Batteries are discharged	→ Carry out a complete battery charging cycle
Battery poles are oxidised	→ Disconnect batteries, clean battery poles and reconnect batteries
Connector contacts are worn from operation (blackened)	→ Replace connector
With the machine in working condition one battery has less voltage (difference greater than 2V) than the others	→ Replace all batteries
Fuse on jumper cable is defective	→ Check for short circuits and replace jumper cable if not present
Connection cables are damaged	→ Replace damaged cables
The charger is not adjusted correctly	→ Adjust the charger correctly
The charger does not work	→ See the relevant section

AN ALARM MESSAGE APPEARS ON THE DISPLAY	
There is an alarm message on the display	→ Check which alarm it is and proceed to remedy the problem by following the instructions

THE MACHINE HAS A VERY LOW WORKING AUTONOMY	
The battery connections are oxidised	→ Disconnect the battery connection cables, clean the connectors and reconnect them to the batteries, protecting the connections with grease
Check all electrical contact connections for tightness	
Check the input and output voltage of the key block	
The batteries have already undergone many discharge and re-charge cycles	→ Disconnect the battery connection cables, clean the connectors and reconnect them to the batteries, protecting the connections with grease; Check the type of battery used and adjust the charger as indicated; Check the type of battery used and adjust the battery charge control; Replace batteries

2.2 Mechanical rubbing system

MACHINE DOES NOT WASH WELL	
(BASE) The machine is not in working order	→ Switch the machine on; Lower the base and squeegee to the ground; Press the handlebar lever
(PRO) The machine is not in working condition	→ Switch on the machine; Press the handlebar lever
The solution delivered is inadequate or insufficient	→ See the appropriate section
The bedplate is not adjusted correctly	→ Check and adjust the bedplate correctly following the instructions
An alarm message appears on the display	→ Check which alarm it is and proceed to remedy the problem following the instructions
(PRO) The "ECO" button is activated	→ Deactivate "ECO" mode
The microswitch on the man presence lever does not work	→ Replace the microswitch
The bedplate motor is not powered	→ Check the motor connections; Check the brush plate microswitch
Engine carbon brushes are worn out	→ Replace motor brushes
The base plate is raised off the ground	→ Lower the base plate to the ground

THE BRUSH MOTOR IS NOT WORKING PROPERLY	
The brush motor is not powered	→ Check the brush motor power connections
An alarm message appears on the display	→ Check which alarm it is and solve the problem by following the instructions
The microswitch on the base movement lever does not work	→ Replace microswitch
The brush motor is not powered if the control microswitches are working correctly	→ Check the electrical wiring and the correct functioning of the Function Board and replace it if necessary
Brush motor is not running although powered	→ Replace motor

BRUSH DECK DOES NOT MOVE	
The brush deck lever does not move	→ Check that there are no mechanical impediments to the movement of the lever
The brush deck lowers but does not touch the ground	→ Check for mechanical obstructions
The brush deck does not rise correctly	→ Check for mechanical obstructions
The base does not move	→ Check the motor connections to the function board and the maximum pressure microswitch

2.3 Drying system

MACHINE DOES NOT DRY PROPERLY	
The machine is not in working order	→ Switch the machine on; Lower the squeegee to the ground; Press the handlebar lever
The recovery tank is full	→ Empty the recovery tank in the correct way
The suction motor does not switch on	→ See the relevant section
(PRO) The machine is in "ECO" mode	→ Set the maximum suction power from the dashboard
The squeegee blades are worn or broken	→ Rotate or replace the squeegee blades
The squeegee is not adjusted correctly	→ Adjust the squeegee correctly following the instructions
The squeegee chamber or nozzle is dirty or clogged	→ Clean the squeegee
The suction system is dirty or clogged	→ Clean the suction system
Chamber and squeegee nozzle is dirty or clogged	→ Clean the suction system
The suction hose is dirty or clogged	→ Clean the suction system
Filter and bowl are dirty or clogged	→ Clean vacuum system
Suction cover not present or not correctly positioned	→ Position suction cover correctly
Suction cover gasket does not fit correctly	→ Replace gasket

SUCTION MOTOR DOES NOT RUN CORRECTLY	
The suction motor is switched off	→ Activate the suction motor by lowering the lever
The microswitch on the squeegee movement lever does not work	→ Replace the microswitch
The suction motor is not powered	→ Check the power connections of the suction motor
An alarm message appears on the display	→ Check which alarm it is and proceed to remedy the problem following the instructions
The motor brushes are worn	→ Replace the suction motor brushes
The suction motor does not turn even though it is powered	→ Replace the motor
(PRO) The suction motor button does not work	→ Replace the dashboard board

THE SQUEEGEE DOES NOT MOVE	
The squeegee lever does not move	→ Check that there are no mechanical impediments to the movement of the lever
The lever moves but the squeegee does not move	→ Check that there are no mechanical impediments to the movement of the squeegee

2.4 Chassis and traction system

THE TRACTION MOTOR IS NOT WORKING PROPERLY	
An alarm message appears on the display	→ Check which alarm it is and remedy the problem by following the instructions
Man presence lever is not pressed	→ Press man presence lever
Man presence microswitch is not connected correctly	→ Restore correct connections to the microswitch
Man presence microswitch does not function	→ Replace microswitch
The speed adjustment potentiometer does not work	→ Replace the speed adjustment potentiometer
The motor is not powered	→ Check the motor connections
The motor carbon brushes are worn out	→ Replace the motor carbon brushes
The traction motor does not move although powered	→ Replace the motor
The machine does not move	→ Release the manual buffer brake

2.5 Detergent solution delivery system

SOLUTION DISPENSED IS INADEQUATE OR INSUFFICIENT		
Solution tank is empty		→ Fill solution tank
(FSS) Detergent tank is empty		→ Fill detergent tank
(FSS) Water pump or detergent pump does not work		→ Check pump connections and replace if necessary
Flow regulation tap is completely closed		→ Open tap to desired position
Water flow regulation is set to minimum		→ Increase water flow
The water pump is not working		→ Check the water pump connections and replace if necessary
Solenoid valve does not work		→ Check the solenoid valve connections and replace if necessary
- The water circuit - Pipe from the tank to the filter - Filter - Hose from filter to distributor - Solution distributor	→ is clogged	→ Clean the water circuit
The cleaning agent used is not suitable		→ Replace the cleaning agent with the correct type
(FLR) Pump does not work		→ Check pump connections and replace if necessary
(FLR) Solenoid valve not working		→ Check solenoid valve connections and replace if necessary
(FLR) Recycle filter is clogged		→ Clean recycle filter

SECTION 3 - FUNCTIONAL GROUPS

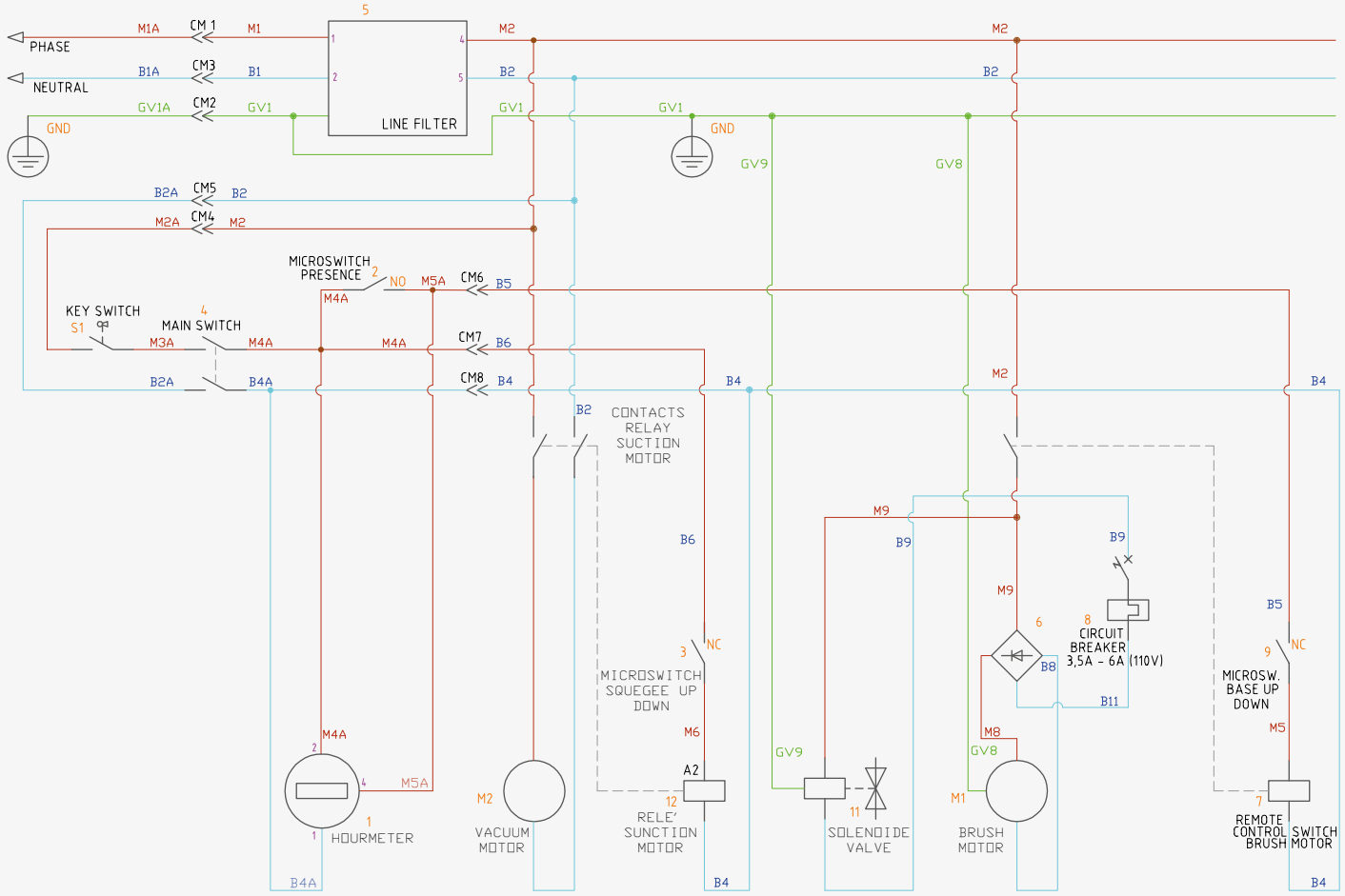
3.1 EMX E Electrical Plant

Washing and drying are controlled by microswitches.

The microswitches enable or disable the mechanical scrubbing function and the suction motor.

These signals are always combined by the electromechanical logic together with the man presence lever; they are suitably managed so as to make the scrubber dryer operate correctly and guarantee the operator's safety conditions.

3.1.1 EMX E Electronical Diagram



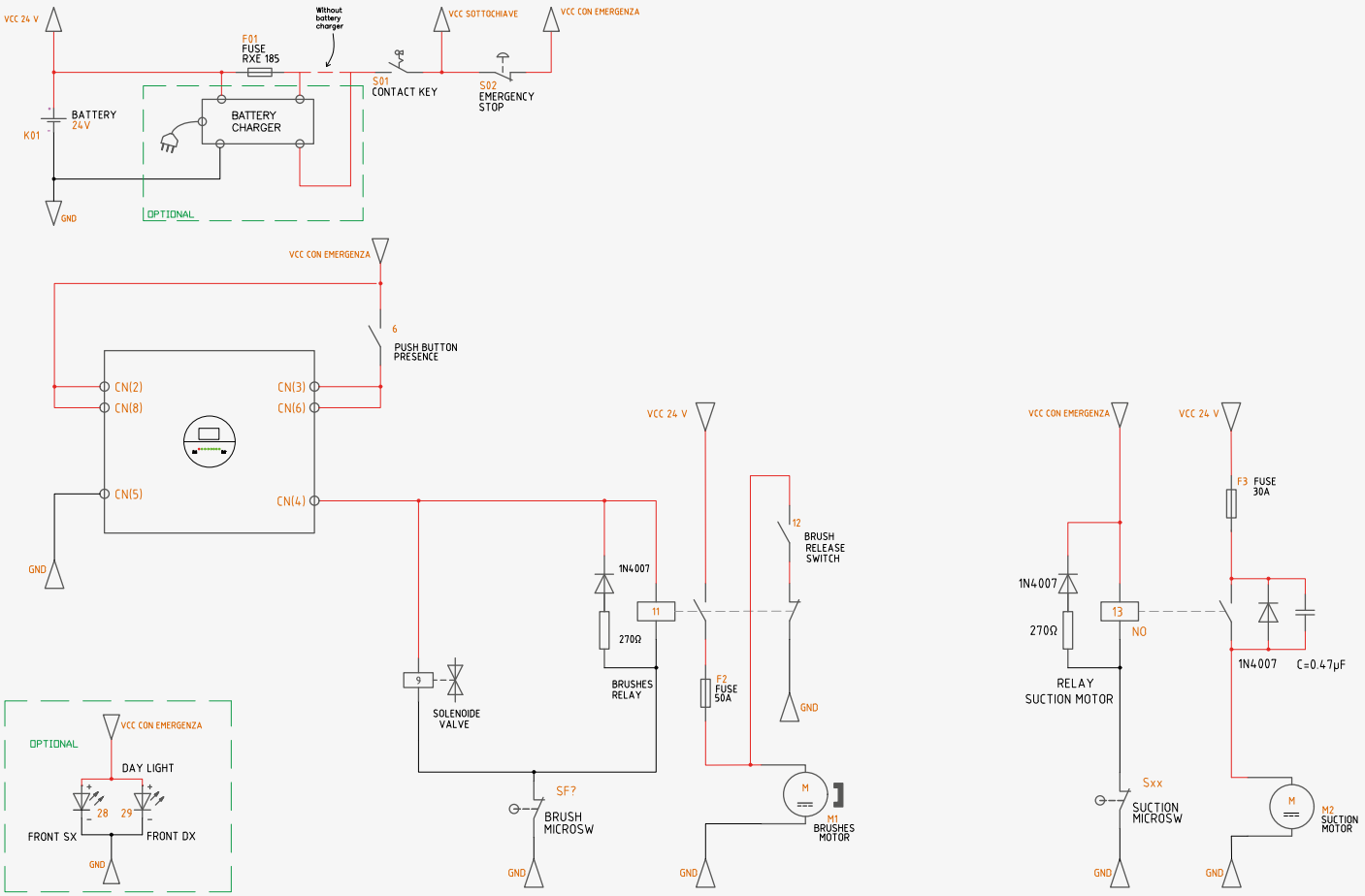
3.2 EMX BASE Electrical Plant

Traction and braking functions are managed by a traction control board.

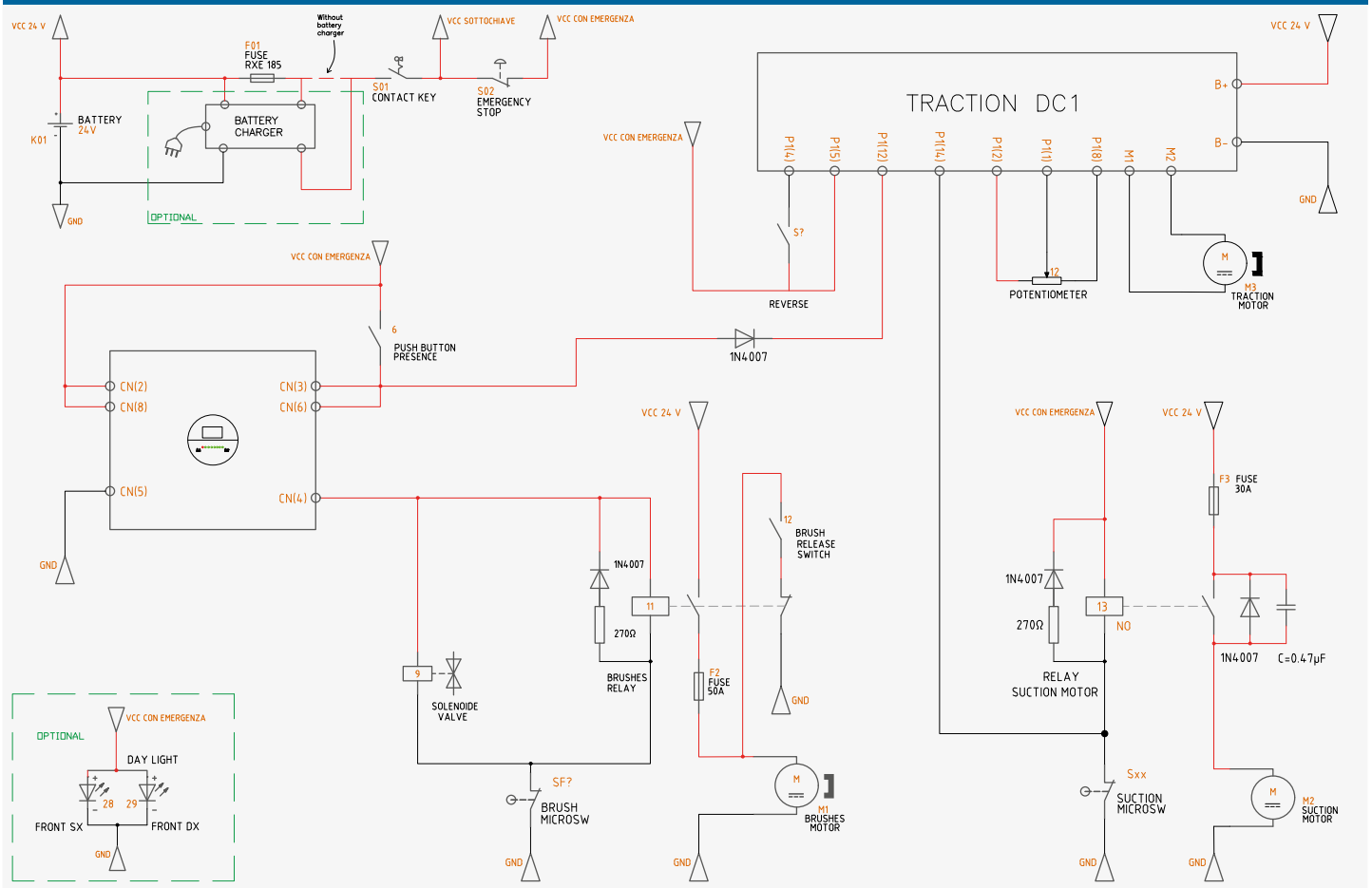
The board receives input signals from the electronic devices in the machine.

Switches enable or disable the brush motor function, the solenoid valve and the suction motor

3.2.1 EMX BASE No Traction Electrical Diagram

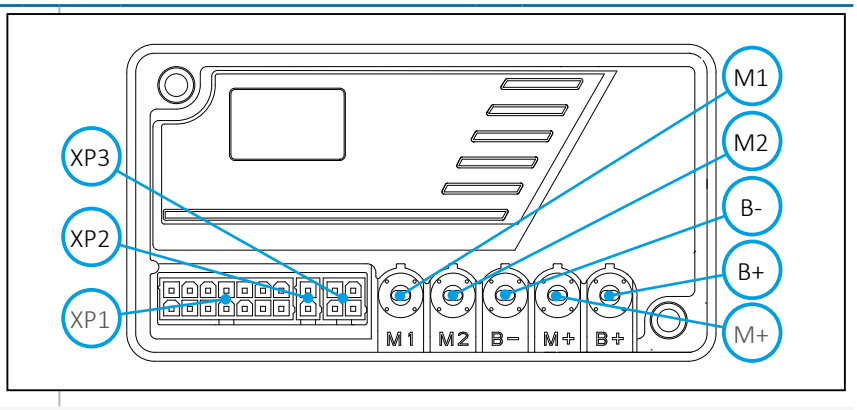


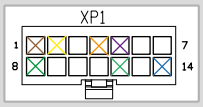
3.2.2 EMX BASE With Traction Electrical Diagram



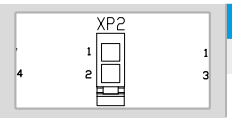
BASE Bt Traction board

The traction board handles all signals from the microswitches and the potentiometer in order to supply current to the traction motor.

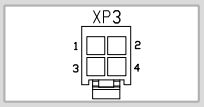




1	POT IN	THROTTLE INPUT	BROWN
2	POT HIGH+	THROTTLE (+)	YELLOW
3	HORN OUTPUT	HORN OUTPUT	
4	DIGITAL INPUT (IN1)	FORWARD/BACKWARD SW	ORANGE
5	DIGITAL INPUT	KEY IN	PURPLE
6	DIGITAL INPUT	SPEED LEVEL SW	
7	DIGITAL OUTPUT	KEY OUT	
8	POT LOW-	THROTTLE (-)	GREEN
9	SPEED LIMIT INPUT	THROTTLE (SPEED LIMIT SIGNAL)	
10	STATUS LED OUTPUT	STATUS LED OUTPUT	
11	BDI (0-5V)	BDI SIGNAL OUTPUT	
12	DIGITAL INPUT	OPERATOR PRESENCE SW	LIGHT BLUE
13	GND		
14	DIGITAL INPUT	TRACTION INHIBIT SW	BLUE



1	VCC	PARKING BRAKE +	
2	DIGITAL OUTPUT	PARKING BRAKE -	



1	RX (USART)		
2	GND		
3	CHARGE INHIBIT / TX (USART)	RESERVED FOR PC DEBUG	
4	VCC (+24VDC)		

●	B+	POWER INPUT	POWER SUPPLY (+)	RED
	M+	POWER OUTPUT	+24V DC (RESERVED)	- -
●	B-	POWER INPUT	POWER SUPPLY (-)	BLACK
○	M2	POWER OUTPUT	TRACTION MOTOR 1	WHITE
●	M1	POWER OUTPUT	TRACTION MOTOR 2	YELLOW

3.2.3 Alarm tables

Lithium Alarms (special hour meter for Lithium batteries)

ID ALL	MEANING	SOLUTION
ALL 01	Comunication	No communication between battery and hour meter: Check RS232 connection.
ALL 02	Display	Internal fault. Replace hour meter.
ALL 05	Comunication KO	Communication error: Replace hour meter

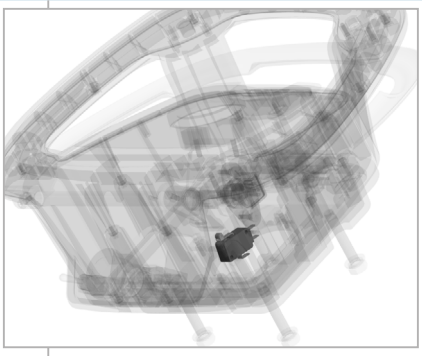
Allarmi di sovracorrente e temperatura

ALARM ID	POSSIBLE CAUSE
PNPPreChargeErr	EM break+ is short to B- Internal failure of controller
PVDD_VHighErr	PVDD voltage is higher than 34V (*PVDD is the motor and EM break power*)
PVDD_VLowErr	PVDD voltage is lower than 12V (*PVDD is the motor and EM break power*)
KeyIn_VHighErr	key in voltage is higher than 34V
KeyIn_VLowErr	key in voltage is lower than 12V
BatteryVoltageLowErr	Bat voltage is lower than 12V
BatteryVoltageHighErr	Bat voltage is higher than 34V
BatteryVoltageLimitLowErr	Bat voltage is lower than 10V
BatteryVoltageLimitHighErr	Bat voltage is higher than 36V
RelayConnect_Err	other failure cause the controller shut down the realy (*voltage abnormal, motor short*) Internal failure of controller
TractionM_TempNtcA_Err	Internal failure of controller, the traction motor ctrl mos ntc sensor abnormal
TractionM_TempNtcB_Err	Internal failure of controller, the traction motor ctrl mos ntc sensor abnormal
TractionM_TempHigh_Err	traction ctrl mos temprature is high, the controller will slow down traction current
TractionM_TempLimitHigh_Err	traction ctrl mos temprature is high, the controller will shut down traction motor ctrl
TractionMA_Mos_VHigh_Err	Internal failure of controller, the traction motor mos voltage is too high
TractionMA_Mos_VLow_Err	Internal failure of controller, the traction motor mos voltage is too low
TractionMB_Mos_VHigh_Err	Internal failure of controller, the traction motor mos voltage is too high
TractionMB_Mos_VLow_Err	Internal failure of controller, the traction motor mos voltage is too low
TractionM_Open_Err	traciton motor is not connected normally
TractionM_Short_Err	traciton motor is short
TractionM_OverLoad_Err	RESERVED
Output1_Open_Err	output1 config is ON,and output1 is not connected to controller
Output1_Short_Err	output1 config is ON,and output1 is short
Output2_Open_Err	output2 config is ON,and output1 is not connected to controller
Output2_Short_Err	output2 config is ON,and output1 is short
Output3_Open_Err	output3 config is ON,and output1 is not connected to controller
Output3_Short_Err	output3 config is ON,and output1 is short

Output4_Open_Err	output4 config is ON,and output1 is not connected to controller
Output4_Short_Err	output4 config is ON,and output1 is short
CAN_DisConnect_Err	RESERVED
UART_DisConnect_Err	if the controller is configed to be controled from usart, and the usart communication is not connect normally
PedalConnect_Err	throttle params ard inappropriate throttle is connected abnormally
PedalLimitConnect_Err	speed limit params are inappropriate speed limit is connected abnormally
PedalHPD_Err	when power on, the throttle and dirction are all in valid state (*the direction is not in P level, and the throttle is valid*)
eepromSysTime_Err	RESERVED
eepromParamList_Err	RESERVED
eepromSysInfo_Err	RESERVED
eepromPFC_Err	RESERVED
ProgramFile_Err	RESERVED
EmergencyStop Err	the bat is disconnected
ReverseLock Err	RESERVED
HPDLock Err	controller is locked beacuse of the HPD fault, and need restart the controller

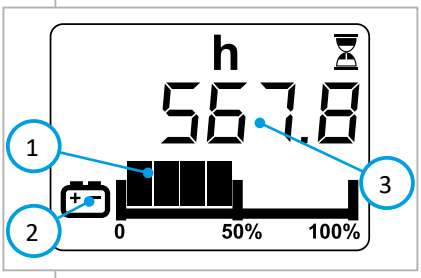
3.2.4 Man Presence Microswitch

All versions of the EMX are equipped with a man-presence microswitch, positioned in the machine handlebar and operated by the metal lever directly connected to the handlebar itself. This micro-switch regulates the consent to the mechanical cleaning system and the machine drive, if Bt version.



3.2.5 Hour Meter

The machine is equipped with an electronic hour meter installed on the control panel that allows the total working hours of the machine to be displayed, and the battery charge level to be shown in real time via a display. The device interrupts the machine's working cycle when the battery is low.



Index
1. battery charge level
2. battery charge level
3. hour meter

3.2.6 Regulations

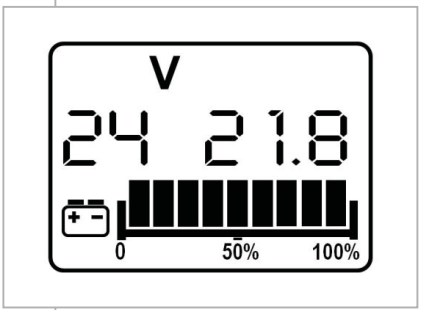
Battery control board (hour meter)

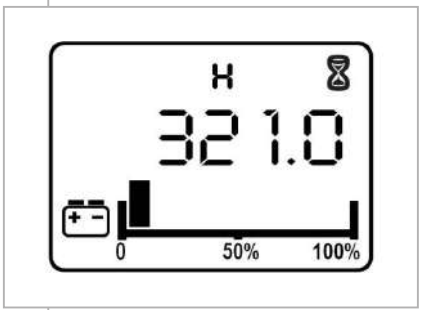
When switched on, the hour meter displays information about itself for the first 2sec:

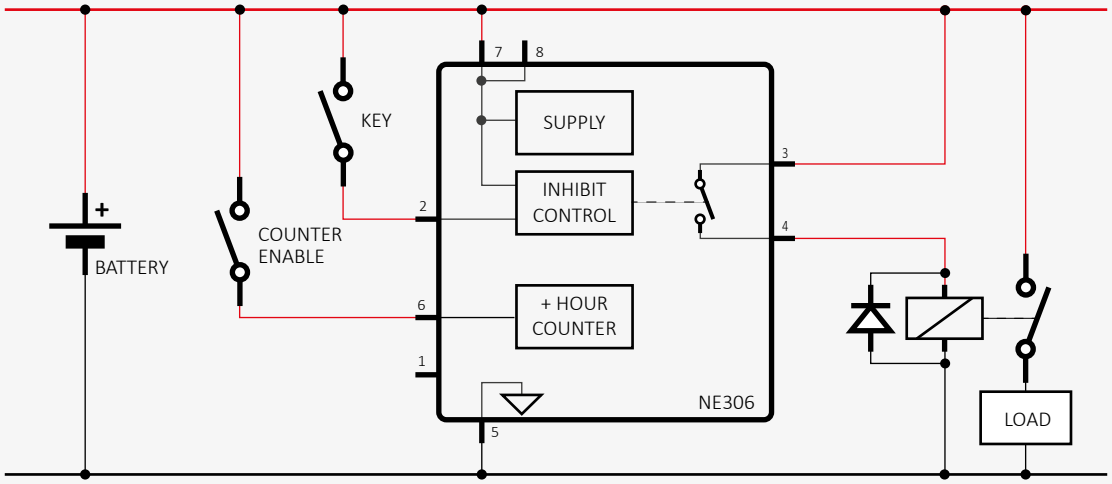
- First the software version, then the value on the left, which indicates the nominal voltage set for the battery (24V), while the value on the right indicates the maximum discharge threshold (e.g. 21.8.1V).

When the machine is in working condition, the hourglass symbol flashes.

When the discharge threshold is reached, the first segment flashes for 20 seconds, then it goes out and the battery symbol starts flashing.





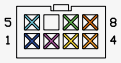


Check the correct setting of the hour meter in relation to the installed batteries.

To set the battery check card correctly, proceed as follows:

- Secure the machine.
- Remove the electrical system handle.
- On the back of the hour meter, set the dipswitches, following the instructions below (for dipswitch setting and consequent discharge threshold, see the battery manufacturer's instructions):

Battery setting



DP1	DP2	NOMINAL VOLTAGE
☐	☐	12 V
☐	☑	24 V
☑	☐	36 V
☑	☑	48 V

DP3	DP4	DP5	DP6	INHIBITION THRESHOLD
☐	☐	☐	☐	1,683 V/cell
☐	☐	☐	☑	1,700 V/cell
☐	☐	☑	☐	1,717 V/cell
☐	☐	☑	☑	1,733 V/cell
☐	☑	☐	☐	1,750 V/cell
☐	☑	☐	☑	1,767 V/cell
☐	☑	☑	☐	1,783 V/cell
☐	☑	☑	☑	1,800 V/cell
☑	☐	☐	☐	1,817 V/cell
☑	☐	☐	☑	1,833 V/cell
☑	☐	☑	☐	1,850 V/cell
☑	☐	☑	☑	1,867 V/cell
☑	☑	☐	☐	1,883 V/cell
☑	☑	☐	☑	1,900 V/cell
☑	☑	☑	☐	1,917 V/cell
☑	☑	☑	☑	1,933 V/cell

PIN	FUNCTION
1	NOT CONNECTED
2	Key positive command
3	Common relay
4	NO Relay contact
5	Battery negative
6	Positive hou meter command
7	Battery positive
8	Battery positive

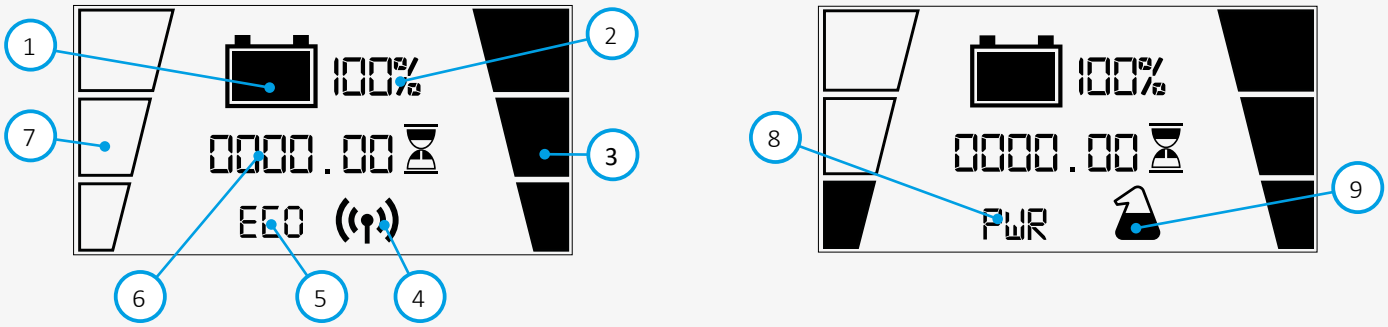
Index
☑ ON ☐ OFF

- Refit the electrical system cover.

3.3 EMX PRO Electrical Plant

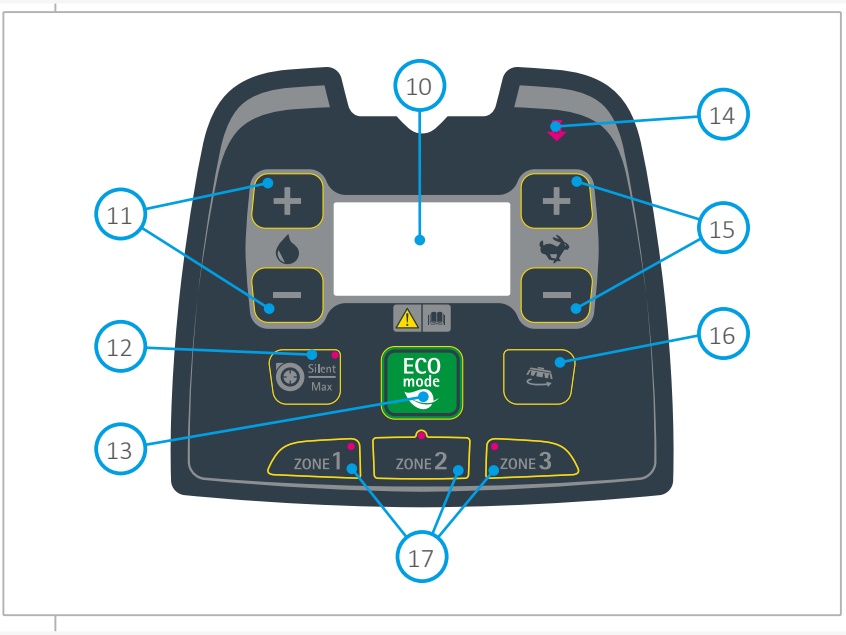
Traction and braking functions are managed by a function board.
The board receives input signals from the electronic devices in the machine

3.3.1 Display PRO Version



Index

1. Remaining battery charge.
2. Percentage of remaining battery charge.
3. Forward speed performance level.
4. Automatic fleet management system (if fitted).
5. ECO" work programme is active.
6. Machine hour meter.
7. Detergent solution delivery level.
8. POWER MODE" work programme.
9. Automatic detergent dosing system.
10. Control display.
11. Detergent solution adjustment buttons .
12. Vacuum "silent/MAX" squeegee function control.
13. ECO-MODE work programme control button.
14. Reverse gear activation.
15. Feed speed adjustment buttons .
16. Brush release button.
17. Work zone selection/setting buttons.



Functions and Controls

In normal working condition, the display shows the hour meter and the percentage remaining battery charge status. In residual charge conditions the battery control board is programmed to disable successively:

1. the brush motor (suction and drive motor still working) when the remaining battery charge is 20%.
2. the vacuum motor when the remaining charge is 10%.

Machine Control Panel Functions

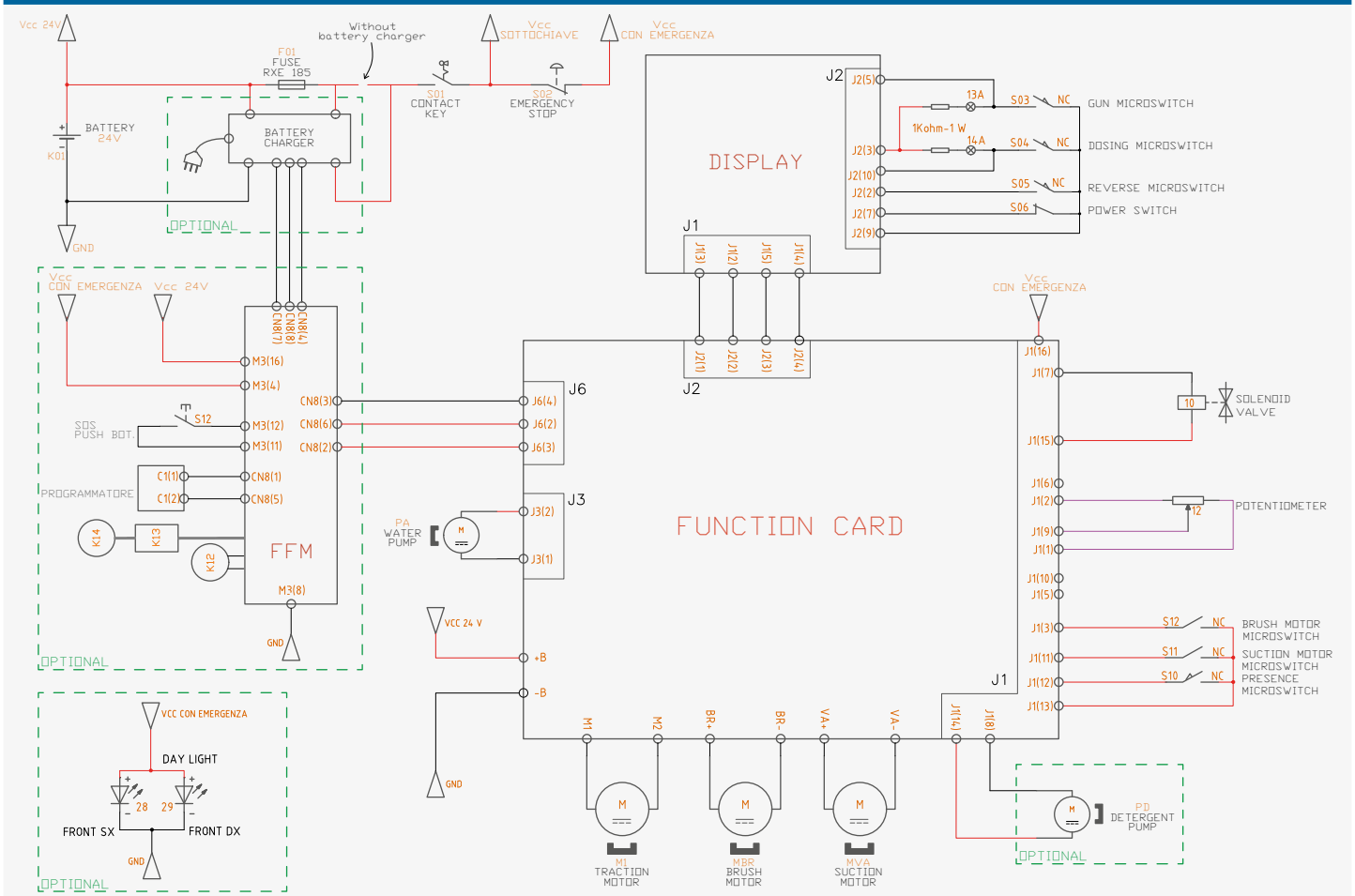
- Manage and set the main functions and controls of the machine during the work cycle;
- Display alarm signals for correct and easy detection of any anomaly.
- Differentiated access to three menus:

Work Menu
shows the battery level and the hours worked by the machine (according to the Operator Menu setting).
In the event of a fault, the Work Menu also shows any alarm message.

Operator Menu
contains the basic settings that can be used by the machine operator

Advanced Menu
in which it is possible to change advanced settings and, thanks to the Monitor Mode function, to check motor absorption.

3.3.2 EMX PRO Electrical Diagram

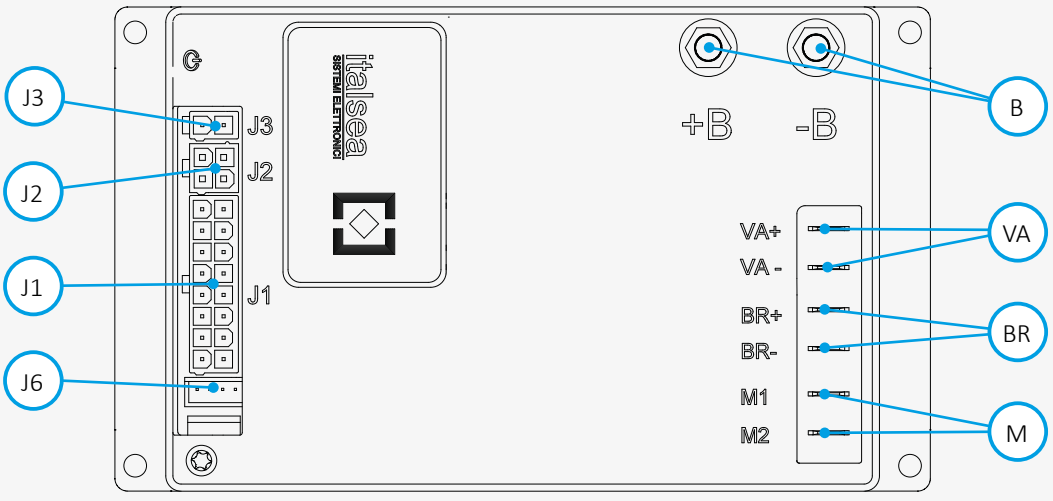


CAUTION

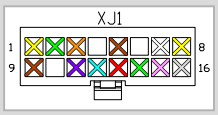
THE OPERATOR MENU IS FREELY ACCESSIBLE
WHILE THE ADVANCED MENU IS PASSWORD PROTECTED

3.3.3 Function control board PRO

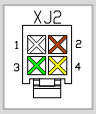
The function control board is the heart of the machine and based on the information received from the operator it regulates the behaviour of the machine under working conditions. The tables show the cable legend for each individual connector and the contact legend.



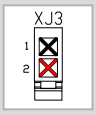
Index
Power outputs
M Traction motor
BR Brush motor
VA Suction motor
B Board power supply



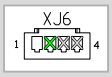
iD	SIGNAL	PRO Bt	PRO BtS	PRO BtO	COLOUR
1		POT SPEED(Vcc)			YELLOW
2		POT SPEED (gnd)			GREEN
3		BRUSH DECK MICROSWITCH			ORANGE
4			EN SWEEP		PURPLE
5	POSITIVE	3 / 10			GREY
6					BLACK
7		SOLENOID VALVE			WHITE
8		DETERGENT PUMP (*100Hz)			PINK
9		POT SPEED (SIGNAL)			BROWN
10		RESERVE SOLUTION FLOAT			GREY
11		SQUEEGEE MICROSWITCH			PURPLE
12		MAN PRESENCE MICROSWITCH			LUGHT BLUE
13	POSITIVE	11 / 12			RED
14	POSITIVE	8			BROWN
15	POSITIVE	6 / 7			PINK
16		KEY (IN)			RED



iD	SIGNAL	PRO Bt	PRO BtS	PRO BtO	COLOUR
1	POSITIVE	RECEPTION HOUR METER			BLUE
2	HANDLEBAR SWITCHO	BRUSH DETACH COMMAND			BROWN
3		RESISTENCE (SWEEP)			GREEN
4	NEGATIVE	GND			ORANGE



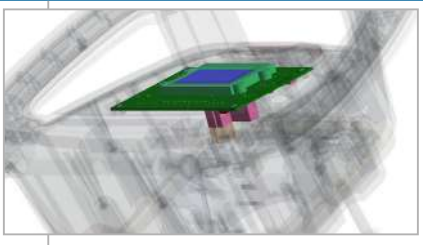
iD	SIGNAL	PRO Bt	PRO BtS	PRO BtO	COLOUR
1	NEGATIVE	WATER PUMP			BLACK
2	POSITIVE	WATER PUMP			RED



iD	SIGNAL	PRO Bt	PRO BtS	PRO BtO	COLOUR
1		--			
2	RECEPTION	FFM COMMUNICATION			GREEN
3	TRASMISSION	FFM COMMUNICATION			GREY
4	NEGATIVE	FFM COMMUNICATION			GREY

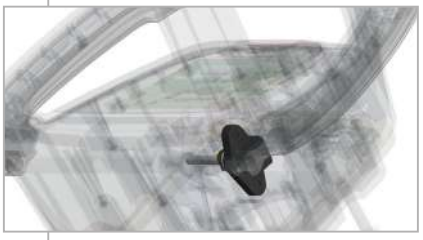
3.3.4 Control Board

The control board is located inside the control panel and transfers all information and settings set by means of the control buttons to the function control board. The command board communicates with the function control board via a connection cable.



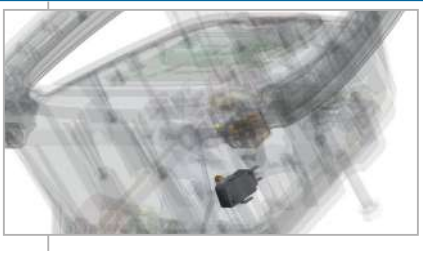
3.3.5 Man Presence Microswitch

All versions of the EMX are equipped with a man-presence microswitch, operated by the man-presence lever. This micro switch regulates the consent to the mechanical rubbing system and the machine's traction, where present.



3.3.6 Potentiometer

The potentiometer is used to adjust the machine's feed speed, and to send the appropriate control signals to the function control board.



3.3.7 Alarms

AL_iD	MEANING	SOLUTION
AL_1	Brush current protection	Check brush function mode. High brush motor operating current detected.
AL_2	Suction motor current protection	Check suction motor absorption. High suction motor current detected.
AL_3	Power stage damaged	Brush/suction power stage damaged: replace circuit board. Alarm may also appear with machine on during drive.
AL_4	Overcurrent on brush or suction motor output	Short-circuit detected on brush or suction motor output: check connections and state of motors.
AL_5	Thermal protection on brush/suction stage	Overheating on brush and suction power stage: check motor absorption.
AL_6	Fault on brush actuator limit switch reading	When the machine is switched on, 1 microswitch is open: check the microswitches on the base frame and their cables and the position of the base frame.
AL_7	Fault on wiper actuator limit switch reading	When switching on the machine, 1 microswitch is open: check the microswitches of the crankcase and the relevant cables and position of the crankcase
AL_8	Brush actuator	End position not reached
AL_9	Squeegee actuator	End position not reached
AL_12	Traction alarm	Check traction motor cables, if the problem persists, replace the motor
AL_13	Potentiometer pull	Check the potentiometer cables, if the problem persists, replace the potentiometer.
AL_14	Lever pressed	Run consent micro closed on ignition detected: release lever.
AL_15	Thermal protection on traction power stage	Overheating traction power stage: check motor absorption
AL_16	Traction power stage damaged	The alarm can also appear when the machine is switched on during traction. Replace the board.
AL_17	Overcurrent on traction output	Short circuit detected on traction motor output: check connections and motor status.
AL_18	Traction current protection	Check traction function mode. High working current detected by the traction motor
AL_19	Traction fuse power stage damaged	Traction power stage read as damaged. If it persists replace card.
AL_20	Traction fuse power stage damaged	Replace circuit board Control Functions/Power
AL_21	Wrong key sequence	Bounce detected on key signal. Switch off the machine, wait at least 2sec and switch on again. If the problem persists, replace the key block.
AL_22	General relay damaged	Check the connection of the motors. If the connection is correct, replace the board. The alarm is also generated if the power fuse is damaged.
AL_23	Overvoltage	Detected on function/power control board. Check battery connections.
AL_24	**Battery not connected to function board**	**Check power connections and battery voltage**
AL_25	No communication between control board and function/power board	Check the connections between the control board and the function/power board.
AL_26	RX-TX function-traction	Check the connections between the function control board and the traction motor
AL_24	If parameter P.03 Battery Selection is at 5 (Lithium), and the board does not receive the battery % value message on the ID600, the alarm is displayed for 10sec: • In case of broken communication while the machine is switched on. • In case of communication failure at power-up.	

Overcurrent and temperature alarms

The cylindrical brush motor control board is responsible for the electronic management of the relevant motor.
In the event of a fault, it interrupts power to the motor for protection and produces a series of flashes.

BLINKS	MEANING	SOLUTION
1	UNDERVOLTAGE	Check output voltage from function card, if it is equal to Vb, replace the motor control card.
2	OVERCURRENT	Check motor absorption, if it is too high the motor is mechanically impeded or defective, replace the motor. If the problem persists, replace the motor control board
3	BLOCKED MOTOR	Motor appears to have a mechanical blockage or is defective, replace the motor.
4	BOARD ERROR	Internal electronic error, replace the motor control board.
5	HALL ERROR	Check wiring (white connector with thin wires between the brushless board and the motor). If wiring OK, Hall Sensor is damaged, replace motor.
6	MISSING PHASE	One or more signals lose power. It could be low input voltage or a problem on the brushless board in one of the power outputs. If wiring OK, replace motor control board.

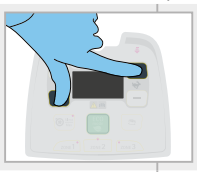
3.3.8 Programming

The Dashboard allows access to basic settings with free access and to the password-protected parameter list (the password is 60).

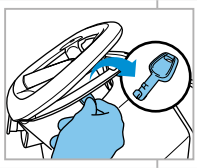
Index
1. SCROLL UP (Scroll up the parameter list)
2. SCROLL DOWN (Scroll down the parameter list)
3. SCROLL UP (Increase Value)
4. SCROLL DOWN (Decrease value)
5. ENTER (Confirm)

Overcurrent and temperature alarms

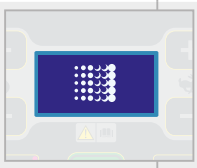
To access the operator menu, proceed as follows:



With the machine switched off, press the (2) and (3) keys simultaneously.



With both keys pressed, turn the ignition key to the ON position.



Wait for the Operator Menu text interface to load

Release the keys (2) and (3).

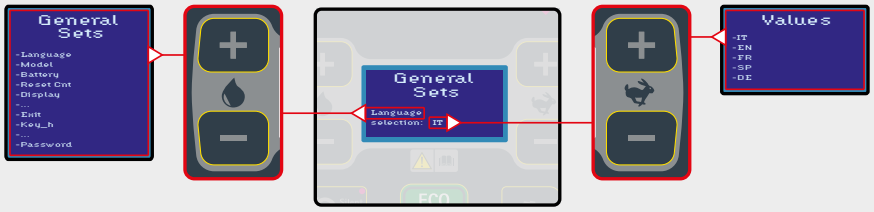
To navigate within the Menu sections use the (1) and (2) keys.

To change a setting use the (3) and (4) buttons.

The changed setting remains automatically confirmed, both when leaving the menu (exit) and when switching off the machine.

Navigating and Changing General Sets

To scroll through the 'General Sets' menu use the + and- keys on the left (① and ②), changing values (Values) is done with the + and- keys on the right (③ and ④).



To exit the "General Sets" menu, select the "EXIT" item and press the "ECO mode" button.

Parameter Menu Access and Menu Tree

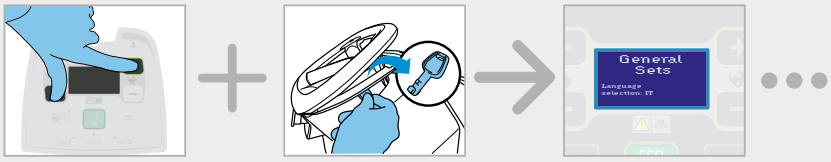
The menu structure can be schematically summarised in the following image.
Switch on the machine and access the menus by following the icons in the diagram

Menù operatore

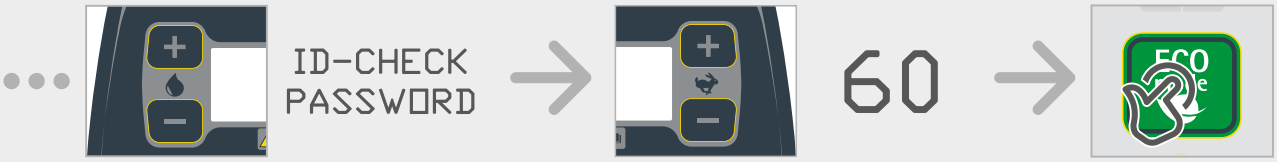
ID	DESCRIPTION	RANGE	DEFAULT
1	Language setup	0=IT; 1=EN; 2=FR; 3=SP; 4=DE	**1**
2	Machine model setup	0=Bt; 1=BtS; 2=BtO; 3=NoLogo Bt; 4=NoLogo BtS; 5=NoLogo BtO;	**0**
3	Battery type setup	0=Pb60; 1=Gel60; 2=PPb; 3=Pb80; 4=Gel80; 5=Litio	**1**
4	Partial hour meter reset	0 ÷ 1	**0**
5	Display Contrast	0=Key; 1=Traction	**1**
6	Display Contrast	5 ÷ 50	**15**
7	Display brightness	0 ÷ 10	**0**
8	Optional accessories activation	0=None; 1=FSS	**0**
9	Optional accessories activation	0=None; 1=Wand; 2=Spray	**2**
10	Exiting the operator menu	Y= Yes N= No	
11	Total machine start-up hours meter		
12	Total traction motor usage hours meter		
13	Total brush motor usage hours meter		
14	Total suction motor usage hours meter		
15	Hour meter type selection *(Key connected to the turn on key / Traction connected to the traction motor)*	0= Key; 1= Traction	**0**
16	Advanced menu password *(Only for expert technicians)*		**(60)**

Advanced service menu (16)

To access the advanced service menu, you must go to the General Sets menu (as seen above).



Once in the menu, use buttons 1 and 2 on the left of the control panel to go to the ID CHECK- Password menu, use button 3 (+) on the right to press until you reach the password for access (60) and press the "ECO mode" button.



Once in the service menu, we have the possibility to act in the following sub-menus:

SUB-MENU	DESCRIPTION
General Sets	Access to general parameters
Brushes set	Access to brush base parameters
Water Pump sets.	Access to parameters related to the water pump function
Chemical sets	Access to parameters related to the detergent pump function
Service	
Vacuum sets	Access to parameters relating to the suction function
Traction sets	Access to parameters relating to the traction function
Monitor Mode	Access to display of working parameters
Engineer pars	DO NOT USE
...Exit...	Return to the main screen

To select the desired sub-menu, press the ECO mode key .

Once the parameter item to be changed has been selected with the left buttons 1 and 2, to change the parameter value press the right buttons 3 and 4; the value is saved automatically.

To exit the sub-menu, press the ECO Mode button and then select the Exit item

MENÙ “General Sets”

DESCRIPTION	RANGE	DEFAULT
Language Selection	0=IT; 1=EN; 2=FR; 3=SP; 4=DE	1
Model Selection	0=BT; 1=BTS; 2=BTO; 3=NoLogo BT; 4=NoLogo BTS; 5=NoLogo BTO;	0
Battery Selection	0=Pb60; 1=Gel60; 2=PPb; 3=Pb80; 4=Gel80; 5=Litio	1
Reset count-meter	0 ÷ 1	0
Reset Main count-meter	0 ÷1	0
Display count-meter	0 ÷1	
Display Tune	5 ÷ 50	15
Display Brightness	0 ÷ 10	0
Solution Management	0=None; 1=FLR; 1=FSS	0
Wand/Spray	0=None; 1=Wand; 2=Spray	2

MENÙ “Brushes Sets”

DESCRIPTION	RANGE	DEFAULT
Imax	20 ÷ 50	40
Inom	10 ÷ 40	25
Tnom	1 ÷ 60	30
Toff	0.0 ÷ 1.0	0.0
Treset	0 ÷ 100	30
Ton	0.0 ÷ 0.5	0.0
Speed Reduction	15 ÷ 24	24
Pressure level 1	0 ÷ 40	10
Pressure level 2	0 ÷ 40	20
Range	0 ÷ 10	2

MENÙ “Water Pump Sets”

DESCRIPTION	RANGE	DEFAULT
Flow Lvl 1	0 ÷ 100	25
Flow Lvl 2	0 ÷ 100	50
Flow Lvl 3	0 ÷ 100	90

MENÙ “Chemical Sets”

DESCRIPTION	RANGE	DEFAULT
Pulse Duration	1 ÷ 100	75
Percent. Chemical	0.0 ÷ 3.0	2.0

MENÙ “Service”

DESCRIPTION	RANGE	DEFAULT
Service Start	0 ÷ 1000	100
Service Time	5 ÷ 60	10
Service Reset	0 ÷ 1	0

MENÙ “Vacuum Sets”

DESCRIPTION	RANGE	DEFAULT
Imax	10 ÷ 40	30
Inom	5 ÷ 40	23
Tnom	1 ÷ 30	10
Toff	0 ÷ 30	5
Toff Stop	0 ÷ 100	15
Eco Speed	15 ÷ 20	17

MENÙ “Traction Sets”

DESCRIPTION	RANGE	DEFAULT
acc	0.5 ÷ 5.0	2.5
dec	0.5 ÷ 5.0	1.0
rev	0.5 ÷ 5.0	1.0
FW speed	0 ÷ 100	100
BW speed	0 ÷ 100	60
Min speed	0 ÷ 20	0
ref_0	0.0 ÷ 5.0	2.6
ref_FW	0.5 ÷ 13.0	4.8
ref_BW	0.5 ÷ 13.0	4.8
ref_DB	0 ÷ 50	20
Brake delay	0 ÷ 100	0.0
Multimode V (work speed)	10 ÷ 100	100
Multimode I (not used)	5 ÷ 45	35
Runaway	0 ÷ 20	20
Speed lvl1	10 ÷ 100	50
Speed lvl2	10 ÷ 100	75
Imax	10 ÷ 45	45
Imon	5 ÷ 15	10
Tnom	1 ÷ 30	20

Monitor Mode

The Monitor Mode function allows the following values to be checked on the display during operation:

Menù "Monitor Mode"

VALUES THAT CAN BE DISPLAYED (individually, one at a time)
No Monitor
Battery
Traction Voltage
Traction Current
Traction Ammeter
Brushes Current
Vacuum Current
Traction Temp
Function temp

To display the values, follow the procedure outlined here:

Enter the "Monitor Mode" menu, and confirm by pressing button 5 (ECO Mode).

Use buttons 1 and 2 until you locate the parameter you wish to examine in working mode, and confirm by pressing button 5.

Once confirmed, scroll through the parameters with buttons 1 and 2 until you locate exit, and confirm with button 5.

The display will immediately return to working mode, but the relative measurement will be shown at the top.

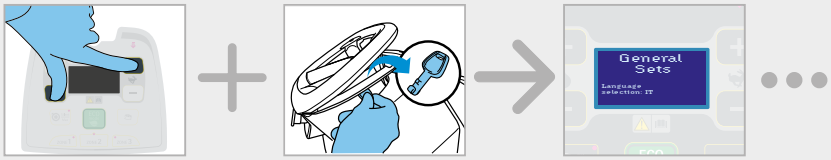
To exit the Monitor Sets function switch the machine off and on again.

3.3.9 Overdue maintenance notice

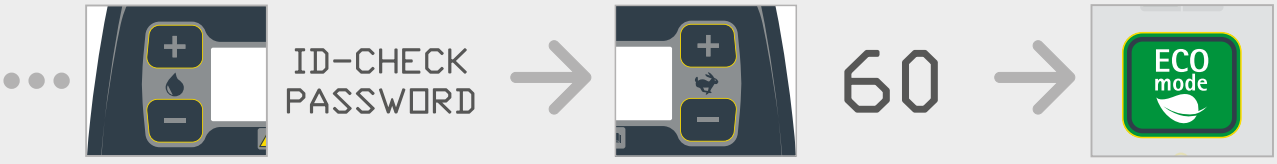
Hour counters have been included in PRO models to remind you of machine maintenance.

The display will show the following symbol:

To access the advanced service menu, you must go to the General Sets menu (as seen above).



Once in the menu, use buttons 1 and 2 on the left of the control panel to go to the ID CHECK- Password menu, use button 3 (+) on the right to press until you reach the password for access (60) and press the "ECO mode" button.



Once in the menu with the + and- keys on the right navigate through the menu until you get to the SERVICE item.

Within the service menu we find 3 editable parameters:

- SERVICE START: every how many hours the “maintenance expired” warning (service start) is proposed;
- SERVICE TIME: how many seconds the display of the “maintenance due” warning lasts (maintenance time).

The warning appears each time the machine is turned on for the set seconds;

- SERVICE RESET: if set to 1, it reloads the “SERVICE START” value at the next restart and then returns to 0.

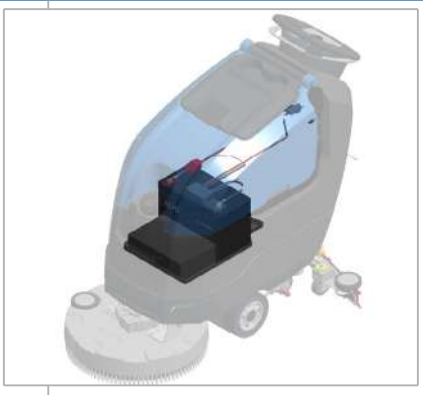
WARNING

If the SERVICE START= 0 parameter, the service is inactive.

3.4 BATTERIES AND CHARGERS

3.4.1 Location on the machine

The machine is available with the battery charger option. The battery charger is located on the rear side of the machine, with operator access for easy charging.



3.4.2 Batteries

The 24V power supply with one 24V battery in series or two 24V batteries in parallel. The function card converts the voltage value of the batteries into a percentage value. This value is then used for operation as a percentage of charge compared to the maximum capacity. The conversion depends on the battery type (settable by parameter). The following table shows the percentage values as a function of battery voltage value where Vb is the voltage read on the battery.

DISPLAY	Vb	Pb60	Gel60	Pure Lead	Pb80	Gel80	LITHIUM (*)
100 %	≥	24.3	24.3	24.5	24.3	24.3	25.3
90 %	≤	24.3	24.3	24.5	24.3	24.3	25.3
80 %	≤	24.1	24.0	24.3	24.0	24.0	25.2
70 %	≤	23.5	23.7	24.2	23.5	23.6	25.1
60 %	≤	23.0	23.4	24.1	22.9	23.2	25.0
50 %	≤	22.5	23.1	23.9	22.3	22.8	24.9
40 %	≤	22.1	22.8	23.8	21.7	22.4	24.7
30 %	≤	21.7	22.5	23.6	21.1	22.0	24.5
20 %	≤	21.2	22.2	23.4	20.5	21.6	21.5
10 %	≤	20.8	21.9	23.2	20.1	21.2	21.0
0 %	≤	20.4	21.6	23.0	19.8	20.9	20.6

Alert threshold 1: when the 20% battery level is reached, the brush function is disabled.

Alert threshold 2: when the 10% battery level is reached, the machine switches to transfer mode, regardless of the selected operating mode.

*) If Lithium is selected, the remaining battery charge is determined directly by the SHUNT; if there is a lack of communication between the SHUNT and the Function Card, alarm 24 appears for 10 seconds, then the battery charge calculation is determined with the voltages in the table, it is advisable to check and if necessary reprogram the SHUNT.

3.4.3 Battery charger

The battery charger is located on the rear side of the machine and is easily accessible to the operator. When the charging cycle starts, the red LED flashes once, the yellow LED flashes once and then the green LED flashes to indicate which charging algorithm has been selected. A correct recharge cycle consists of the following series of phases.

Charging cycle

PHASE	LED		DESCRIPTION
A			Depending on the charging curve setting *(*)*
B		RED	First charging phase
C		YALLOW	Second charging phase
D		GREEN	Battery charged

Check that the charger set-up corresponds to the type of battery actually installed on the machine.

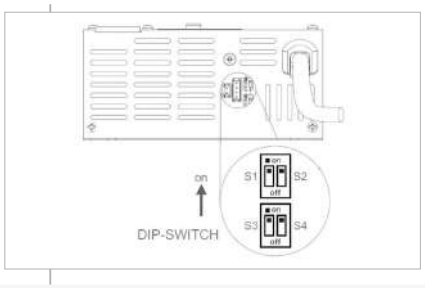
(*) See table of Dip Switch settings.

Battery charger adjustment

Proceed as follows to adjust the battery charger:

- Remove the battery charger from the machine.
- Set the dip switches inside according to the table below.

The dip switches are divided into pairs.
The top pair refers to DP1 and DP2.
The bottom pair consists of DP3 and DP4.
The table illustrates the setting of the dip switches.



Dip Switch Setting

DP1	DP2	DP3	DP4	SETUP	STANDARD	LED RED	LED YELLOW	LED GREEN
☐	☐	☐	☐	IUI0-Wet Generic		●	●	☼
☑	☑	☐	☐	IUI0-Wet TJ		●	●	☼ ☼
☐	☑	☐	☐	IUoU-Gel TJ		●	●	☼ ☼ ☼
☑	☐	☐	☐	IuIa-Gel ES	*	●	●	☼ ☼ ☼ ☼
☐	☐	☐	☑	IUI0-Gel SO		●	●	☼
☑	☑	☐	☑	IUI0-Gel Generic		●	●	☼ ☼
☐	☑	☐	☑	IUI0-AGM DI		●	●	☼ ☼ ☼
☑	☐	☐	☑	IUIa-AGM ES		●	●	☼ ☼ ☼ ☼
☐	☐	☐	☑	IUoU-AGM Generic		●	●	☼
☑	☑	☑	☐	IUa-Litio DI		●	●	☼ ☼
☐	☑	☑	☐	IUa-Litio ZH		●	●	☼ ☼ ☼
☑	☐	☑	☐	IUa-Litio Generic		●	●	☼ ☼ ☼ ☼
☐	☐	☑	☑	IUIa-Wet Generic		●	●	☼
☑	☑	☑	☑	IUIa-Gel Generic		●	●	☼ ☼
☐	☑	☑	☑	IUa-AGM Generic		●	●	☼ ☼ ☼
☑	☐	☑	☑	REMOTE		- -	- -	- -

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● OFF ●/● ON ☼ BLINKING ☑ ON ☐ OFF

Charger Error Codes

The battery charger is equipped with an alarm signalling system by means of successive flashes of the Yellow LED.

LED FLASHES	DESCRIPTION	SOLUTION
☼	Battery disconnected o Reverse polarity o Short circuit in output	Check connection to battery.
☼ ☼	Time-out alarm: defective battery or battery capacity too high	The alarm resets by disconnecting the power supply. If it occurs again, consult service
☼ ☼ ☼	Defective battery alarm	The alarm is reset by disconnecting the power supply. If it occurs again, consult service.
☼ ☼ ☼ ☼	Over-temperature alarm	The alarm resets itself when the charger cools down. Check ventilation.

Charger Connectors

Battery (-)
Battery (+)

Realy COM contact
Realy NC contact

3.4.4 Maintenance and checks

Electrical system

Check (to be carried out after 10h of operation from initial start-up and every 150h thereafter)

Check the function and correct connection of switches, microswitches, motors, solenoid valves, contactors, relays, power fuses, thermal circuit breakers and battery bridge cables.
Periodically check the condition of electrical connections. To access the electrical system, remove the control panel and the rear protection cover.

Batteries

Check (to be carried out every 150h)

Check the correct connection of the bridge cable and that the contacts of the battery connection cables are not oxidised.

Acid battery check

Electrolyte density test

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

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

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

If the measured density is still lower, try an equalisation cycle (if the charger permits). If in any case the measured density of all or some of the cells is less than 1.227, this means that:

1. The battery is probably at the end of its service life
2. The battery has been left uncharged for too long
3. Part of the electrolyte has been lost during topping up
4. A cell is defective or leaking
5. The addition of water was excessive shortly before the test

	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 voltage test, batteries must be left unused (i.e. neither charged nor used) for at least 6 hours, preferably 24 hours.

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

If the battery has values lower than those in the table there is a possibility that:

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

Checking the electrolyte level

It is very important to check that the electrodes are always immersed in the electrolyte because their exposure to air leads to their rapid and progressive degeneration through corrosion.
A drop in the electrolyte level is physiological in acid batteries, so it is very important to check the electrolyte level periodically and add water if necessary.
When adding water, it is very important to use distilled water and to take great care not to cause the liquid to leak due to excessive addition.
Simply add water so that the electrolyte level is sufficient to completely cover the plates.
To add water act as follow:

1. Check the electrolyte level in the various cells
2. If necessary, add water until the plates are covered
3. Charge the battery completely
4. At the end of charging, check the level again
5. Add water (if necessary) so that the liquid level is 3-4 mm below the cell cap.

CAUTION

THE ELECTROLYTE IS A SULPHURIC ACID SOLUTION AND THEREFORE CORROSIVE AND EXTREMELY DANGEROUS TO HEALTH, TAKE GREAT CARE IN ALL THE STEPS DESCRIBED AND USE THE PRECAUTIONS INDICATED IN THE BATTERY MANUAL

3.5 Scrubbing Group

3.5.1 Location on the machine

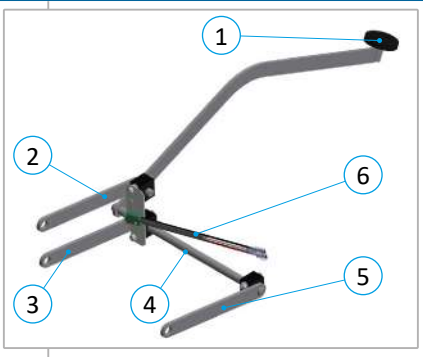
The scrubbing unit is located under the machine body in a frontal position.

The scrubbing unit is controlled by a foot pedal lever that can be activated by the operator.

3.5.2 Main Components

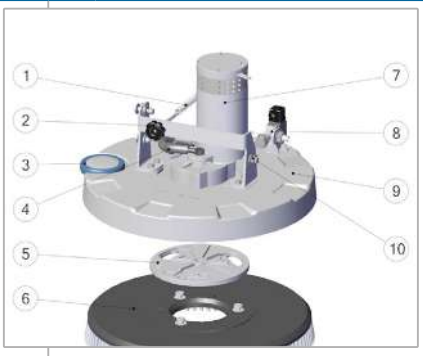
Brush deck control

1. Brush deck control pedal
2. Upper tribrach arm
3. Lower right brush deck arm
4. Pivot lever
5. Lower left brush deck arm
6. Brush deck consensus microswitch



Brush deck

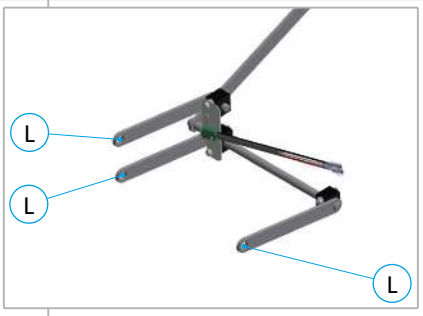
1. Tilt adjustment spring
2. Lateral adjustment adjuster
3. Bumper wheel
4. Water hose
5. Brush coupling flange
6. Brush
7. Brush gear motor
8. Solenoid valve
9. Base frame
10. Crankcase coupling bushing



Lubrication points Brush deck control

Use standard-use grease for lubrication.

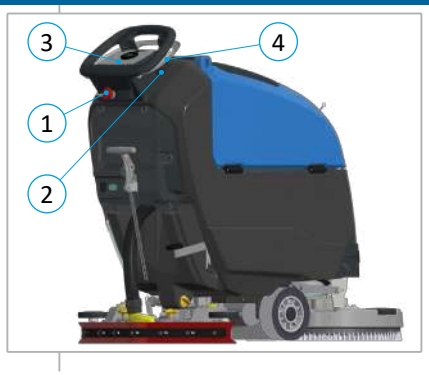
- Lifting arms
- Bushings
- Seat Sliding Pedal Crankcase Control

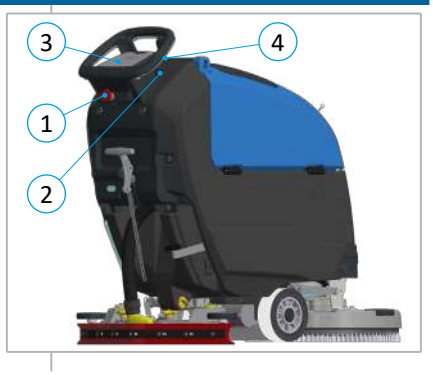


3.5.3 Working Requirements

The disc scrubbing unit only works if the following conditions are met:

1. The batteries are not discharged ( ).
2. The machine is switched on (2).
3. The emergency button is not pressed (1).
4. The foot pedal lever is released to release the micro (3).
5. The handlebar lever is activated (4).





3.5.4 Working modes

"BASE" Washing version

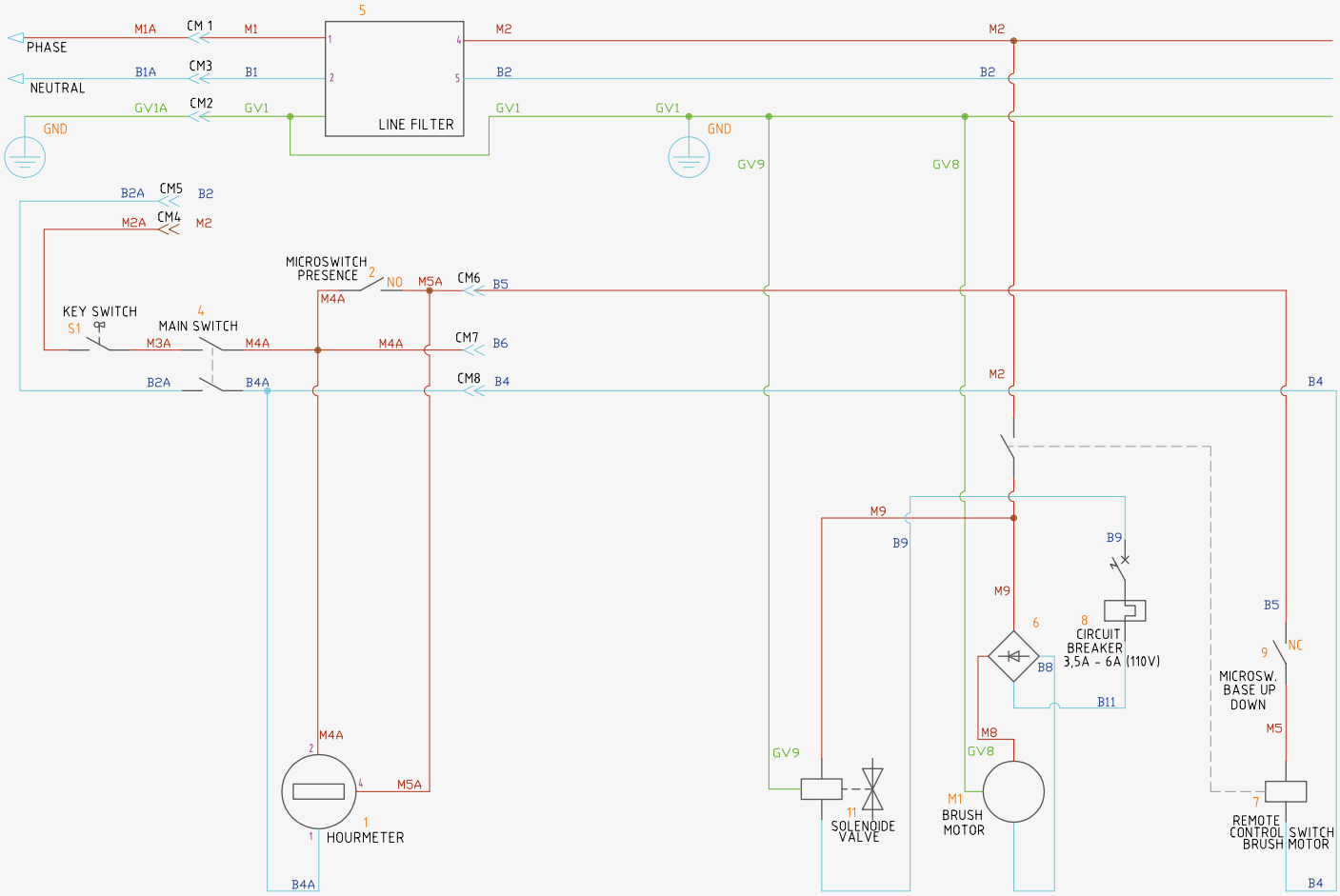
PREMISE	ACTION	RESULT
MACHINE ON	Pedal lever down Handlebar lever pressed	Brush motor ON (+24V to M2-M2A) Solenoid valve ON
MACHINE ON	Reverse gear engaged	Brush motor ON (+24V to M2-M2A) Solenoid valve ON
MACHINE ON	Handlebar lever not pressed in work	Brush motor OFF (0V to M2-M2A); Solenoid valve OFF
MACHINE ON	Washing OFF during work Foot pedal lever up	Brush motor OFF (0V to M2-M2A); Solenoid valve OFF

"PRO" washing version

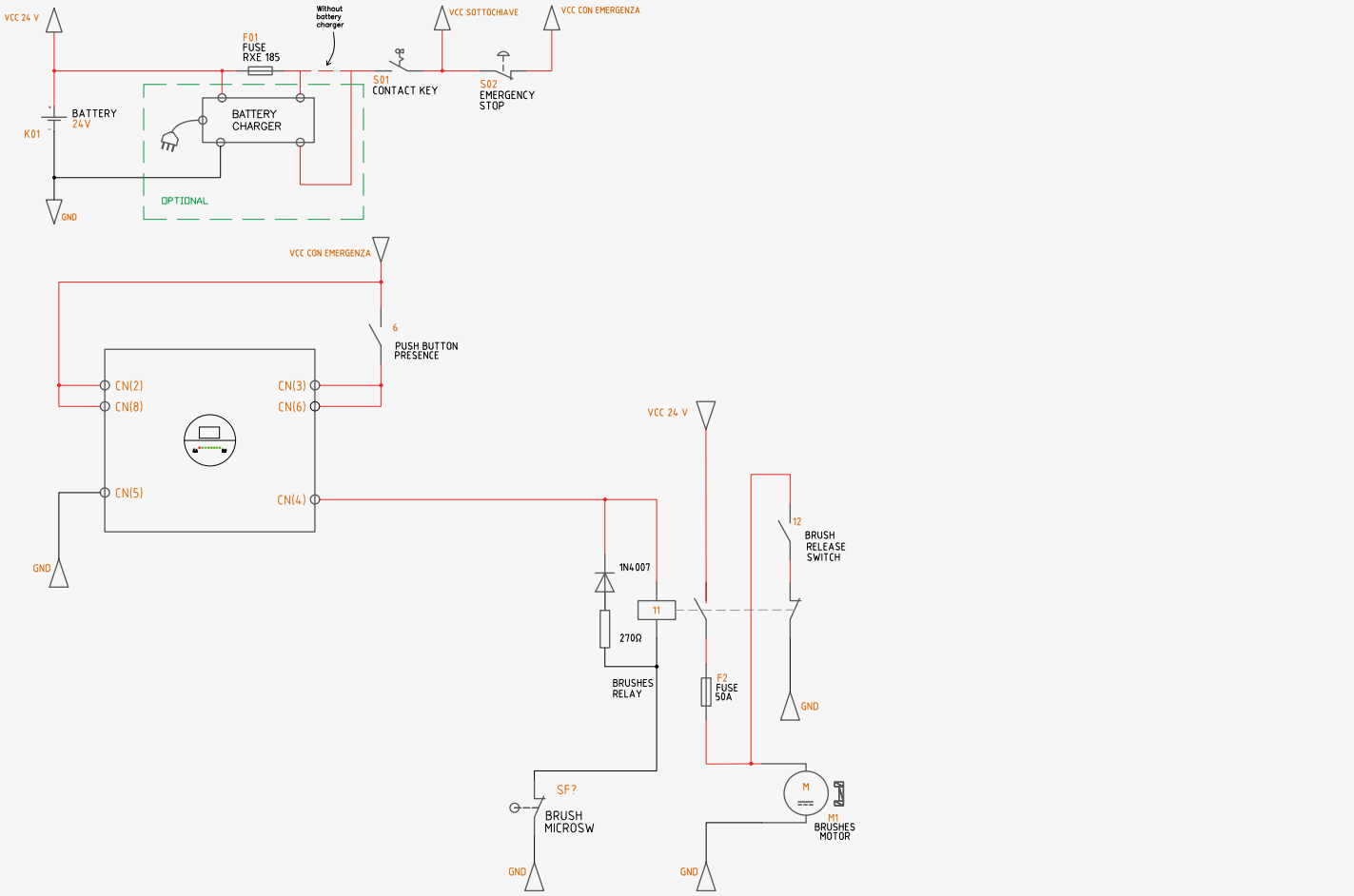
PREMISE	ACTION	RESULT
MACHINE ON	Pedal lever down Handlebar lever pressed	Brush motor ON (+24V to M2-M2A) Solenoid valve ON if water level is at 0 (+24V To J6-13 To J6-5)
MACHINE ON	Reverse gear engaged	Brush motor ON (+24V to M2-M2A); Solenoid valve OFF
MACHINE ON	Handlebar lever not pressed at work	Brush motor OFF (0V to M2-M2A); Solenoid valve OFF
MACHINE ON	Washing OFF in work Foot pedal lever up	Brush motor OFF (0V to M2-M2A); Solenoid valve OFF

3.5.5 Related electric circuit

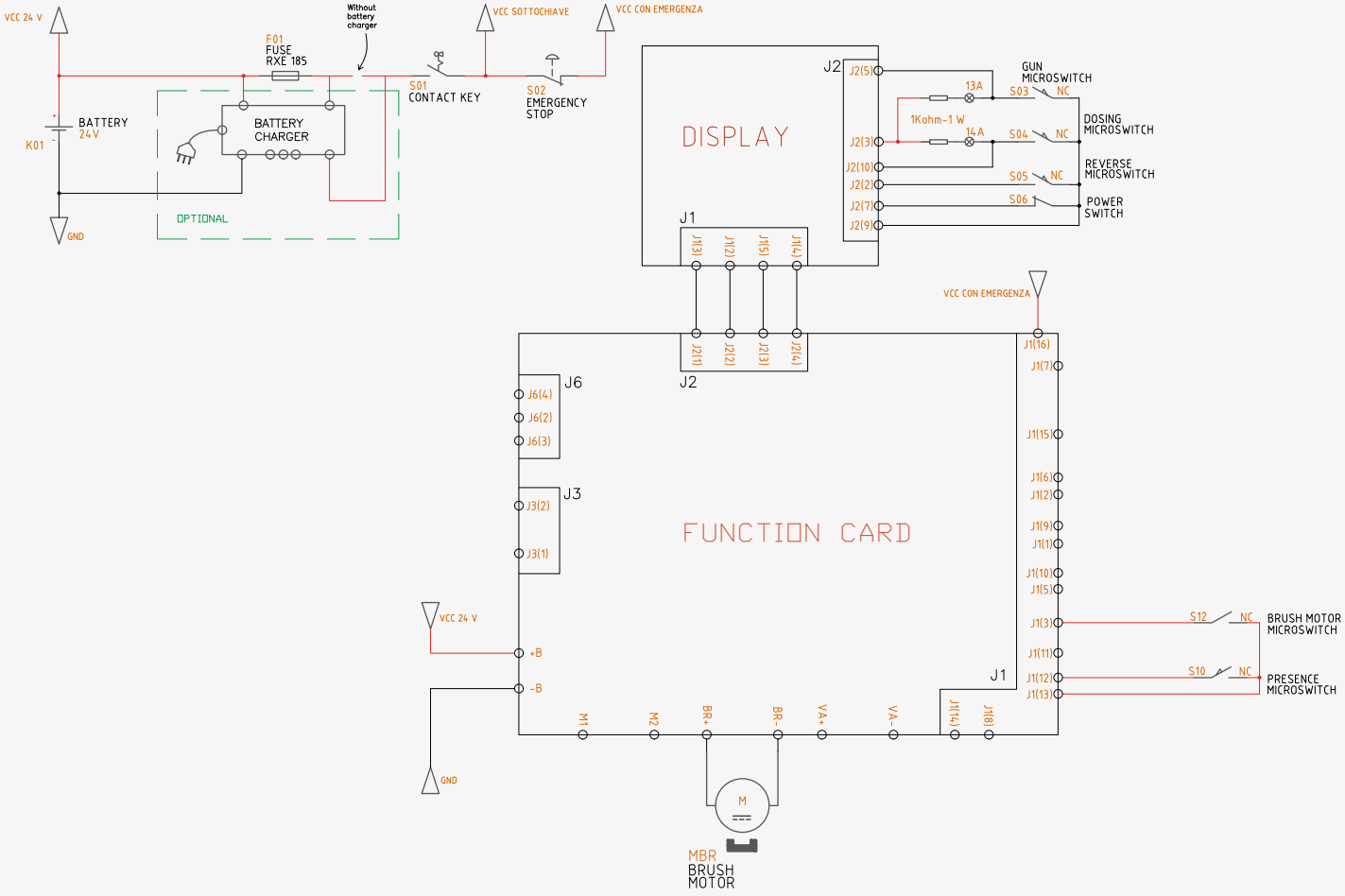
FUNCTIONAL DIAGRAM ELECTRIC VERSION



FUNCTIONAL DIAGRAM BASE VERSION Bt



FUNCTIONAL DIAGRAM PRO VERSION



Brush motor

The brush motor is a DC type with permanent magnets, connected directly to the function board via a connector.
With power supply of constant 24 V DC (charged battery) the brush motor at no load (M2) absorbs 2.6 Amps 0.1. With constant 21 V DC power supply (discharged battery) the absorption is 2.4 A

Brush deck Activation Microswitch

The brush deck activation microswitch is mounted on a bracket. When the brush deck is lowered, the lift arm activates the microswitch, enabling power to the motor.

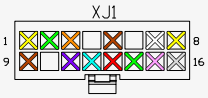
Control Working Brush deck Washing Disk

Conventions:

- +Vb: Positive battery voltage.
- 0b: Negative battery voltage.
- The Emergency Button is not pressed, the Key Contact is closed and the Battery Charger is not connected to the mains.
- The brush deck is in working condition

INPUT /OUTPUT

CONDITION FULFILLED	**P** (in)	**V** (at work)	**V** (at rest)	**V** (in reverse)
BRUSH MOTOR ACTIVATED	BR+ ref to BR-	+Vb	0	+Vb
MAN PRESENCE HANDLEBAR PRESSED	J1(12) ref to J1(13)	0	-Vb	0
POSITIVE DISPLAY	J2(3) ref to B-	+Vb	0	+Vb
NEGATIVE DISPLAY	J2(4) ref to B+	-Vb	-Vb	-Vb
BRUSH DECK LEVER DOWN	J1(12) ref to B-	+Vb	0	+Vb



3.5.6 Adjustments

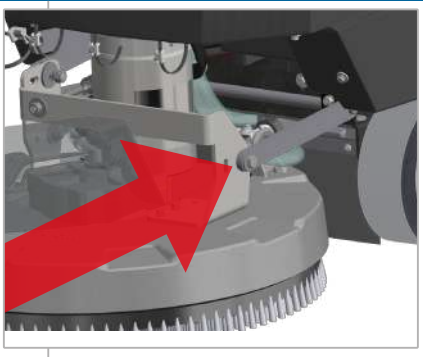
Brush deck

The brush deck is tilted longitudinally to the machine so that the brushes have a distance of approx. 3-5 mm from the floor, which is greater at the front than at the rear. This is to ensure that during work, the brushes rest evenly on the floor and perform their function correctly.

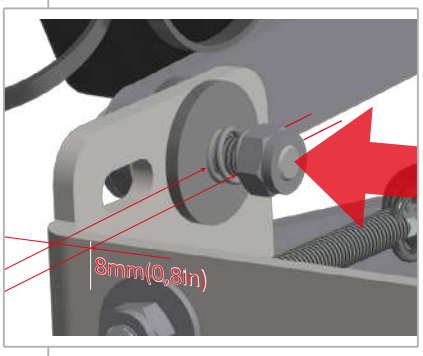
Prerequisites: brushes removed, machine switched off.

Procedure:

1. Switch on the machine and lower the brush deck.
2. Loosen the screw securing the brush deck to the left arm.
3. Lower the brush deck to the ground and tighten the fixing screw of the left support arm.



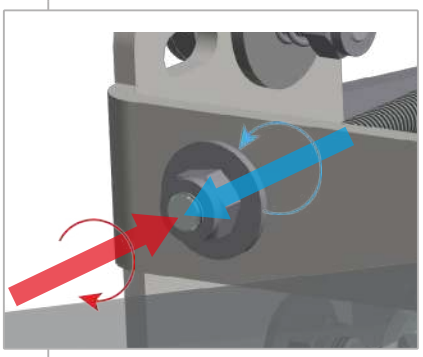
Tighten the fixing screw of the right upper arm until the spring is compressed to 8mm (0.3in).



Turn on the machine and lower the brush deck.

Loosen the screw securing the brush deck to the left arm.

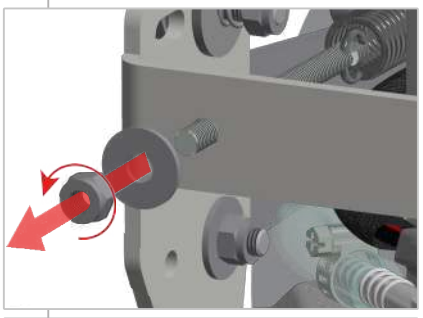
Lower the brush deck to the ground, and tighten the fixing screw of the left support arm.



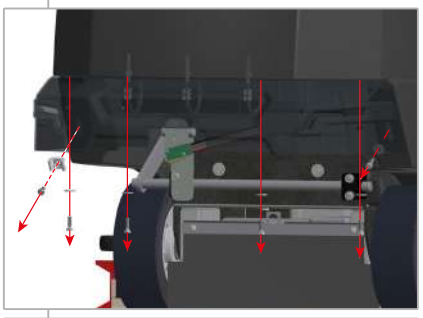
3.5.7 Disassembly

Brush deck

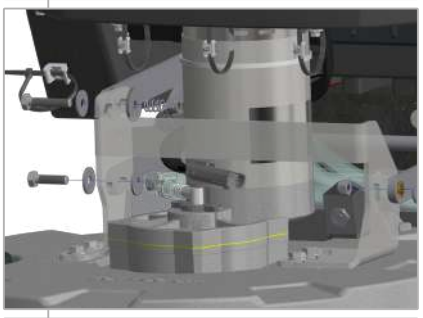
Unhook the brush, lower the brush deck to the ground and switch off the machine.
Remove the Machine Directionality Adjustment knob, together with the rod and spring



Remove the front mask by unscrewing the fixing screws.

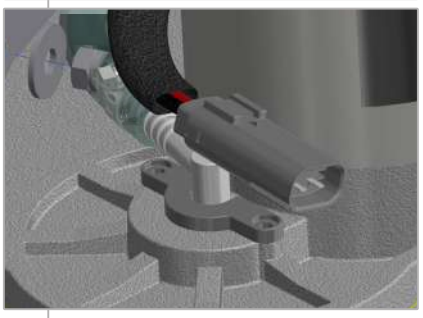


Remove the screws securing the brush deck to the support arms.



Disconnect the motor electrical connector and the solenoid valve electrical connector.

Disconnect the solenoid valve discharge pipe.



Brush flange

Remove the Complete Rubbing Assembly from the machine.

Place the brush deck so that the motor cover rests on the ground.

Unscrew the flange by turning it in the same direction as the working brush and remove the spacer.

Note:
Before refitting the flange, lubricate the thread with grease to prevent blockage by oxide or dirt.

3.6 Sweeping Group

3.6.1 Location on the machine

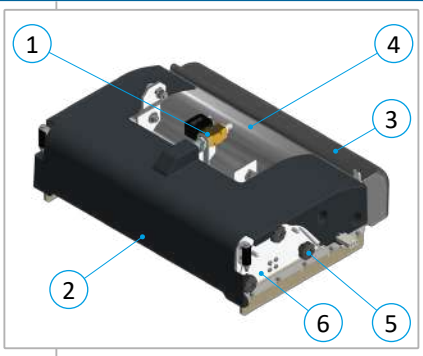
The sweeping unit is located under the machine body in a frontal position.

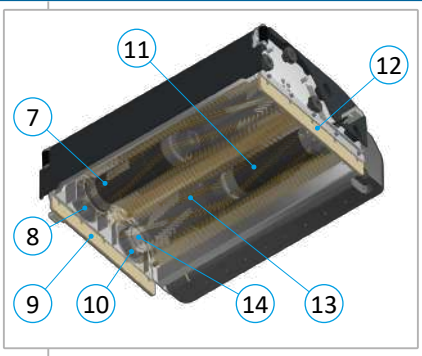
The sweeping unit is controlled by a foot pedal lever that can be activated by the operator.

3.6.2 Main Components

Brush deck

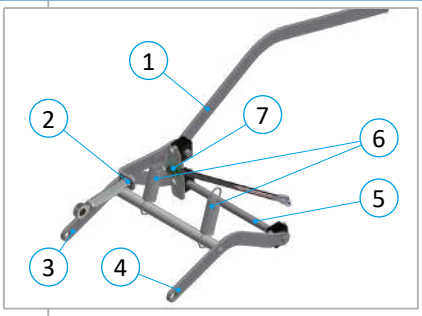
1. Solenoid valve
2. Brush deck casing
3. Waste drawer
4. Brush deck body
5. Brush closing knob
6. Brush cover
7. Front brush motor
8. Bearing bracket
9. Left splash guard
10. Brush bearing bracket
11. Rear brush motor
12. Right splash guard rubber
13. Brush deck tunnel interior
14. Brush bearing





Brush deck control

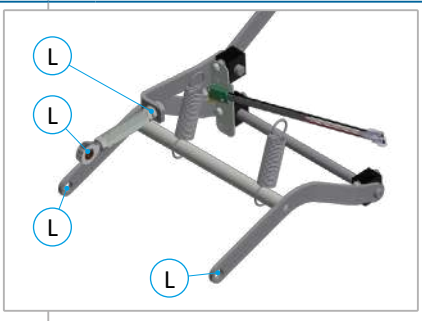
1. Brush deck control pedal
2. Upper support arm
3. Lower left basement arm
4. Right lower arm, brush deck
5. Brush deck pivot pin
6. Extra pressure spring
7. Microswitch



Lubrication points

Use grease with the following or similar characteristics for lubrication:

PROPERTY			VALUE (1)	METHOD	VALUE (2)	METHOD
Type of lubricant			Minerale		PAO	
Additive component			PTFE	ASTM D-217		ASTM D-217
Consistency	NLGI	25°C	2	ISO 2137	2	ISO 2137
Density	g/cm³		0,899 (25°C)	IPPM-CS/03	0,98 (20°C)	IPPM-CS/03
Kinematic viscosity	cSt.	100°C 40°C	12,1 154,3		73 610	ISO 12058

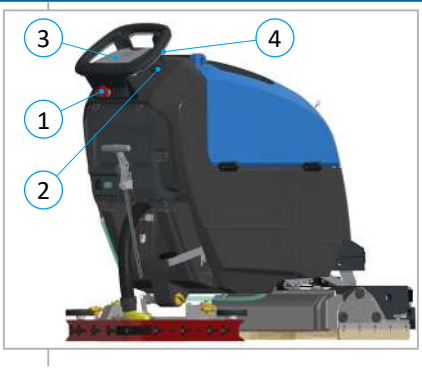


- Lifting arms, bushings, brush deck control pedal sliding seat (L).

3.6.3 Working requirements

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

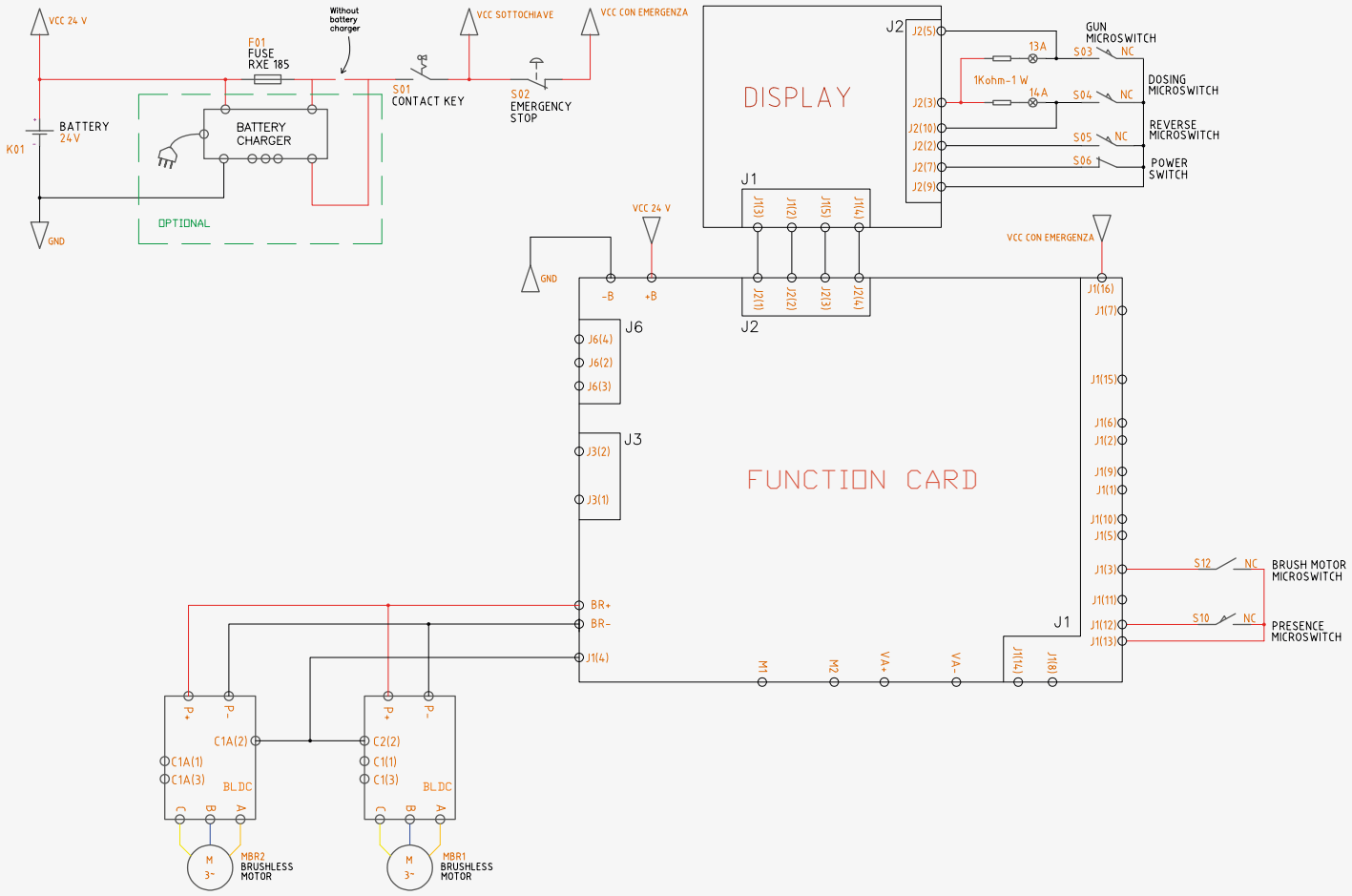
1. The batteries are not discharged ( ).
2. The machine is switched on (2).
3. The emergency button is not pressed (1).
4. The brush deck is in contact with the floor.
5. The function setting on the display is Wash or Wash + Dry (3).
6. The handlebar lever is pressed (4).



3.6.4 Modes of operation

PREMISE	ACTION	RESULT
MACHINE ON	Pedal lever down Handlebar lever pressed	Brush motor ON (+24V to M2-M2A) Solenoid valve ON if water level is at 0 (+24V To J6-13 To J6-5)
MACHINE ON	Reverse gear engaged	Brush motor ON (+24V to M2-M2A); Solenoid valve OFF
MACHINE ON	Handlebar lever not pressed at worK	Brush motor OFF (0V to M2-M2A); Solenoid valve OFF
MACHINE ON	Washing machine OFF	Brush motor OFF (0V to M2-M2A); Solenoid valve OFF

3.6.5 Related Electrical Circuit



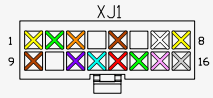
Brush deck work control

Conventions:

- +Vb: Positive battery voltage.
- 0b: Negative battery voltage.
- The Emergency Button is not pressed, the Key Contact is closed and the Battery Charger is not connected to the mains.
- Brush deck is in working condition.

INPUT / OUTPUT

CONDITION FULFILLED	**P** (in)	**V** (at work)	**V** (at rest)	**V** (in reverse)
BRUSH MOTOR ACTIVATED	BR+ ref to BR-	+Vb	0	+Vb
BRUSH MOTOR ACTIVATED	J1(4) ref to B-	+Vb	0	+Vb
HANDLEBAR PRESSED	J1(12) ref to J1(13)	0	-Vb	0
POSITIVE DISPLAY	J2(3) ref to J1(5)	+Vb	+Vb	+Vb
NEGATIVE DISPLAY	J2(4) ref to J1(4)	-Vb	-Vb	-Vb
SWEEPING VERSION	J2(3) ref to J1(14)	+Vb	+Vb	+Vb



Related electrical components

Brush motor

Brush motors are brushless type, connected to their control board via a connector accessible from the electrical system. With a power supply of constant 24 V DC (charged battery) the single brush motor (M2 and M2A) absorbs 3.6 Amps 0.1. With a power supply of 21 V DC constant (discharged battery) the absorption is 3.4 Amps 0.1.

3.6.6 Adjustments

Brush deck

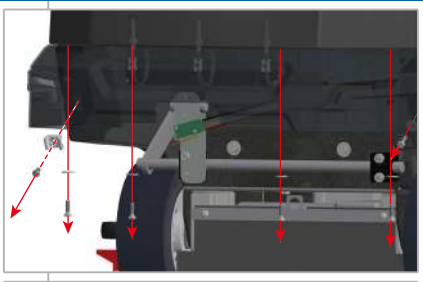
The brush deck is attached to the support arms, which must be adjusted so that the brush motors have a maximum absorption of 1 A. This ensures that during the work phase, the brushes rest evenly on the ground and perform their function correctly.
Prerequisites: Brushes fitted, machine switched on and current clamp on the motor cables.
Procedure:

- Fit the brushes to the brush deck.
- Adjust the left and right hexagonal arms while the brush deck is running and measure the absorption.
- Once the adjustment has been made, tighten the lock nuts.

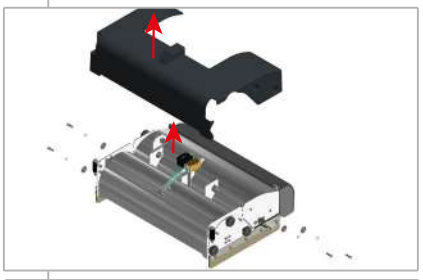
3.6.7 Disassembly

Brush deck

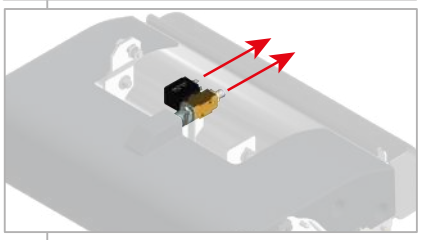
Lower the brush deck to the ground and switch off the machine.
Remove the upper casing by unscrewing the fixing screws.



Remove the brush deck cover by unscrewing the fixing screws.
Remove the screws securing the brush deck to the support arms.

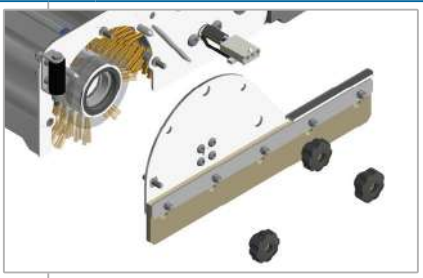


Disconnect the electrical connector of the motor and the electrical connector of the solenoid valve.
Disconnect the solenoid valve's discharge pipe.



Brush motor and pentagon

Remove the Complete Rubbing Assembly from the machine.
Remove the tunnel covers, remove the brushes and remove the brush tray.



Remove the screws securing the brush motor to the brush deck.

Remove the connector from the contacts
Unscrew the 4 fixing screws and remove the bearing cover and bearing support.
At the other end, unscrew the screw and remove the brush pentagon and spacer.

3.7 Orbital Scrubbing Unit

3.7.1 Location on the machine

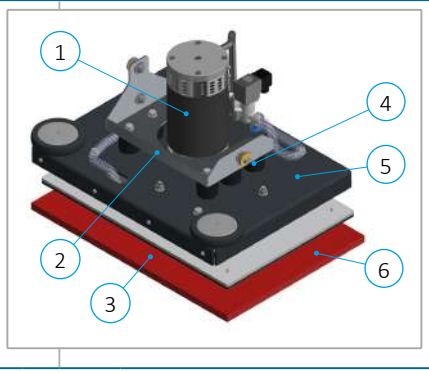
The orbital scrubbing unit is located under the machine body in a frontal position.

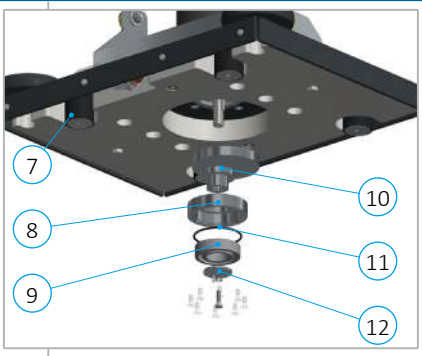
The scrubbing unit is controlled by a foot pedal that can be activated by the operator.

3.7.2 Main Components

Brush deck

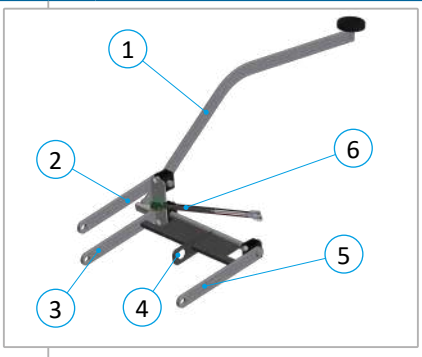
7. Brush deck motor
8. Brush deck upper body
9. Buffer
10. Upper vibration dampers
11. Lower brush deck body
12. Buffer plate
13. Lower vibration dampers
14. Bearing bracket
15. Bearing
16. Bearing bracket
17. Oring
18. Sealing washer





Brush deck control

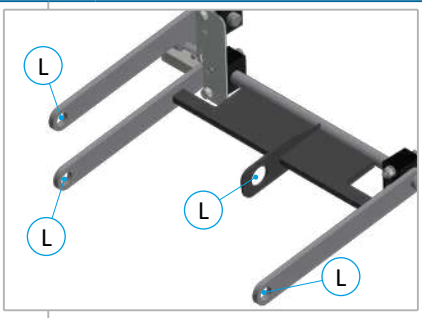
19. Crankcase control pedal
20. Upper brush deck arm
21. Lower right crankcase arm
22. Basement control arm
23. Lower left basement arm
24. Brush deck consent microswitch



Lubrication Points

Use standard-use grease for lubrication.

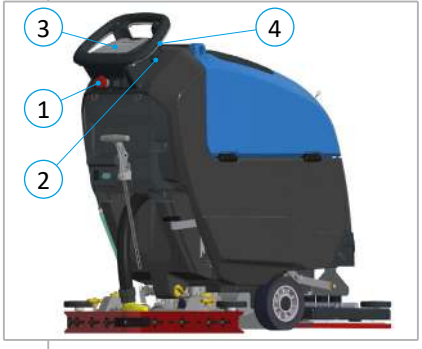
- Lifting arms
- Bushings
- Sliding seat Brush deck control pedal



3.7.3 Working Requirements

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

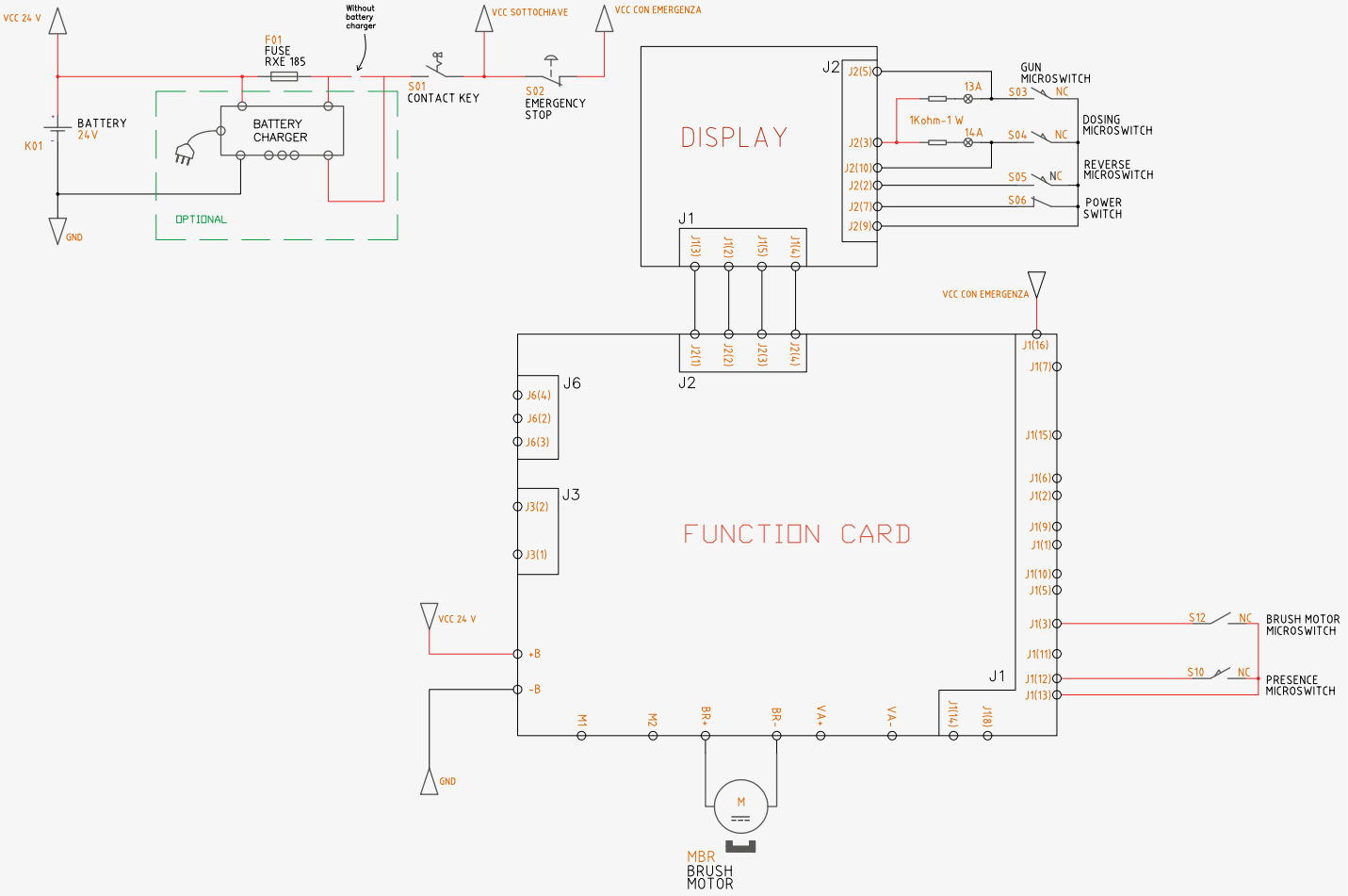
1. The batteries are not discharged ( ).
2. The machine is switched on (2).
3. The emergency button is not pressed (1).
4. The brush deck is on the floor.
5. The function setting on the display is Wash or Wash + Dry (3).
6. The handlebar lever is pressed (4).



3.7.4 Mode of Operation

PREMESE	ACTION	RESULT
MACHINE ON	Washing activated (ECO Mode) Handlebar lever pressed	Brush motor ON after 1.5 seconds (+24V to M2-M2A) Solution pump ON if water level 0 (+24V to Pa); Solenoid valve ON if water level 0 (+24V to J1-15 To J1-7)
MACHINE ON	Dosing unit activated in work	Dosing unit pump ON if water level not 0 (+24V to Pd)
MACHINE ON	Reverse gear activated in work	Brush motor ON (+24V to M2-M2A) Solution pump OFF Solenoid valve OFF Dosing pump OFF (if available)
MACHINE ON	Handlebar lever not pressed in work	
MACHINE ON	Washing machine OFF in work	

3.7.5 BtO Electric diagram



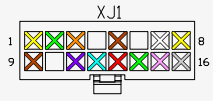
Orbital Brush Deck Work Control

Conventions:

- +Vb: Positive battery voltage.
- 0b: Negative battery voltage.
- The Emergency Mushroom is not pressed, the Key Contact is closed and the Battery Charger is not connected to the mains.
- Brush deck is in working condition.

INPUT / OUTPUT

CONDITION FULFILLED	P (in)	V (at work)	V (at rest)	V (in reverse)
BRUSH MOTOR ACTIVATED	BR+ ref to BR-	+Vb	0	+Vb
HANDLEBAR PRESSED	J1(12) ref to J1(13)	0	-Vb	0
POSITIVE DISPLAY	J2(3) ref to J1(5)	+Vb	+Vb	+Vb
NEGATIVE DISPLAY	J2(4) ref to J1(4)	-Vb	-Vb	-Vb



Related electrical components

Brush motor

The brush motor is a DC type with permanent magnets, connected directly to the function board via a connector.
With power supply of constant 24 V DC (charged battery) the brush motor at no load (M2) absorbs 1.7 Amps 0.1. With a power supply of 21 V DC constant (discharged battery) the no-load brush motor (M2) absorbs 1.6 Amps 0.1.

3.7.6 Adjustments

Brush deck

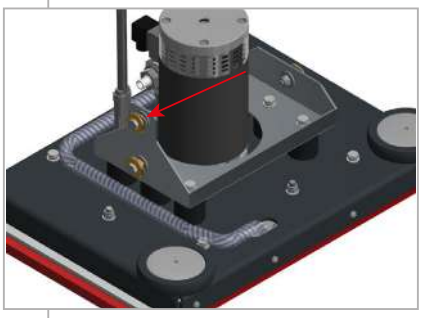
The brush deck is tilted in the transverse direction and must be adjusted tilted longitudinally to the machine so that the pad rests evenly on the ground and performs its function correctly.

Procedure:

Lower the brush deck so that the pad rests evenly and parallel to the ground.

Check the flatness of the supporting surface with a spirit level on both sides of the brush deck.

Turn the fixing screw on the upper right arm and secure the adjustment by tightening the fixing nut.



3.7.7 Disassembly

Brush deck assembly

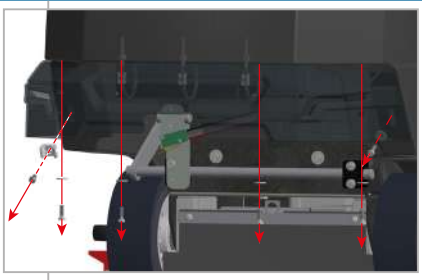
Lower the brush deck to the ground and switch off the machine.

Remove the upper casing by unscrewing the fixing screws.

Remove the screws securing the brush deck to the support arms.

Disconnect the motor's electrical connector.

Disconnect the solenoid valve solution delivery hose.

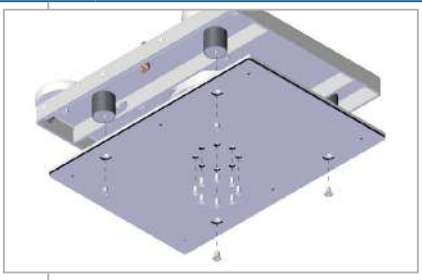


Motor Brush

Remove the complete brush deck.

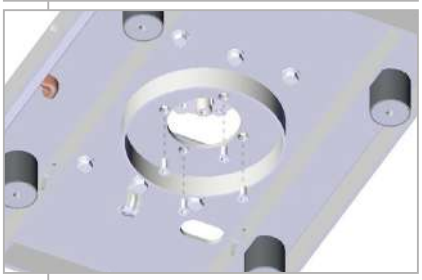
Remove the pad from the brush deck.

Remove the pad holder by unscrewing the fixing screws.



Unscrew the central screw from the motor shaft and remove the washer with pin, the bearing and its support, and the orbital flange.

Unscrew the fixing screws and remove the motor.



3.8 Suction Unit

3.8.1 Location on the machine

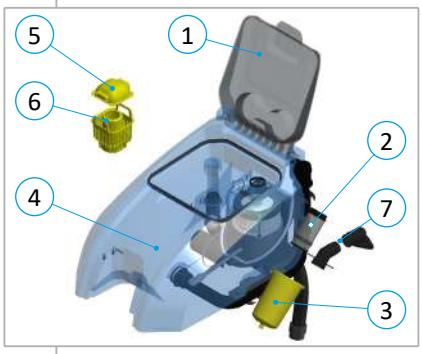
The suction unit is located under the machine body in the rear position.

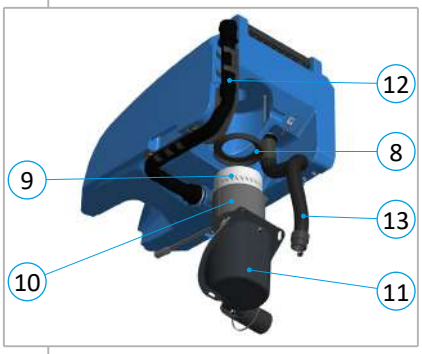
The suction unit is controlled by the squeegee movement lever that can be activated by the operator.

3.8.2 Main components

Motor

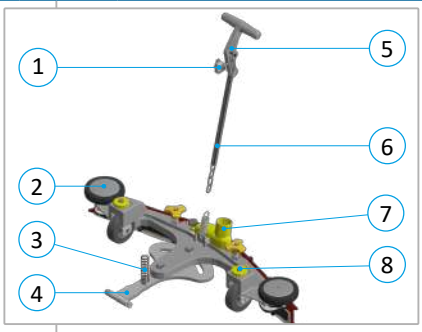
1. Suction cover
2. Pellet suction filter
3. Filter protection cup
4. Recovery tank
5. Tray lid
6. Filter tray
7. Intake manifold
8. Suction motor boot
9. Suction motor
10. Sound absorbing
11. Suction motor cover
12. Exhaust Hose
13. Squeegee suction hose

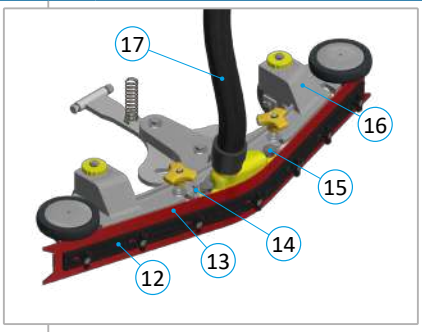


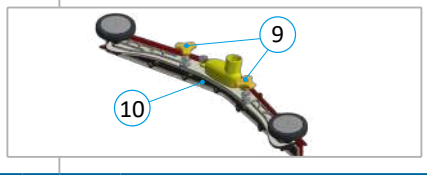


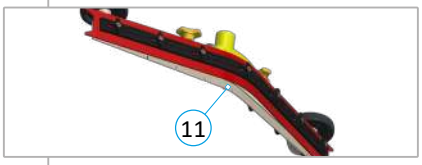
Aqueegee group

1. Suction activation microswitch
2. Bumper wheel
3. Squeegee pressure spring
4. Squeegee attachment front staff
5. Squeegee control lever
6. Squeegee lifting chain
7. Suction nozzle
8. Wheel height adjustment knobs
9. Squeegee attachment knobs
10. Front rubber-pressing staff
11. Front squeegee rubber
12. Back rubber-pressing staff
13. Back squeegee rubber
14. Tilt adjustment screw
15. Suction nozzle fixing screw
16. Rear staff squeegee attachment
17. Suction hose





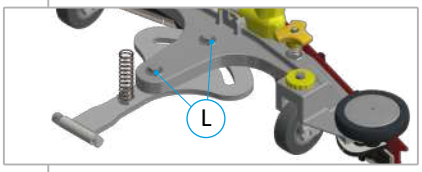




Lubrication Points

For lubrication, use standard use grease

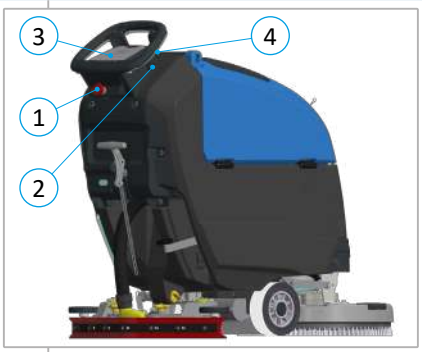
- Squeegee arm junction



3.8.3 Work requirements

The vacuum unit will only operate if the following conditions are met:

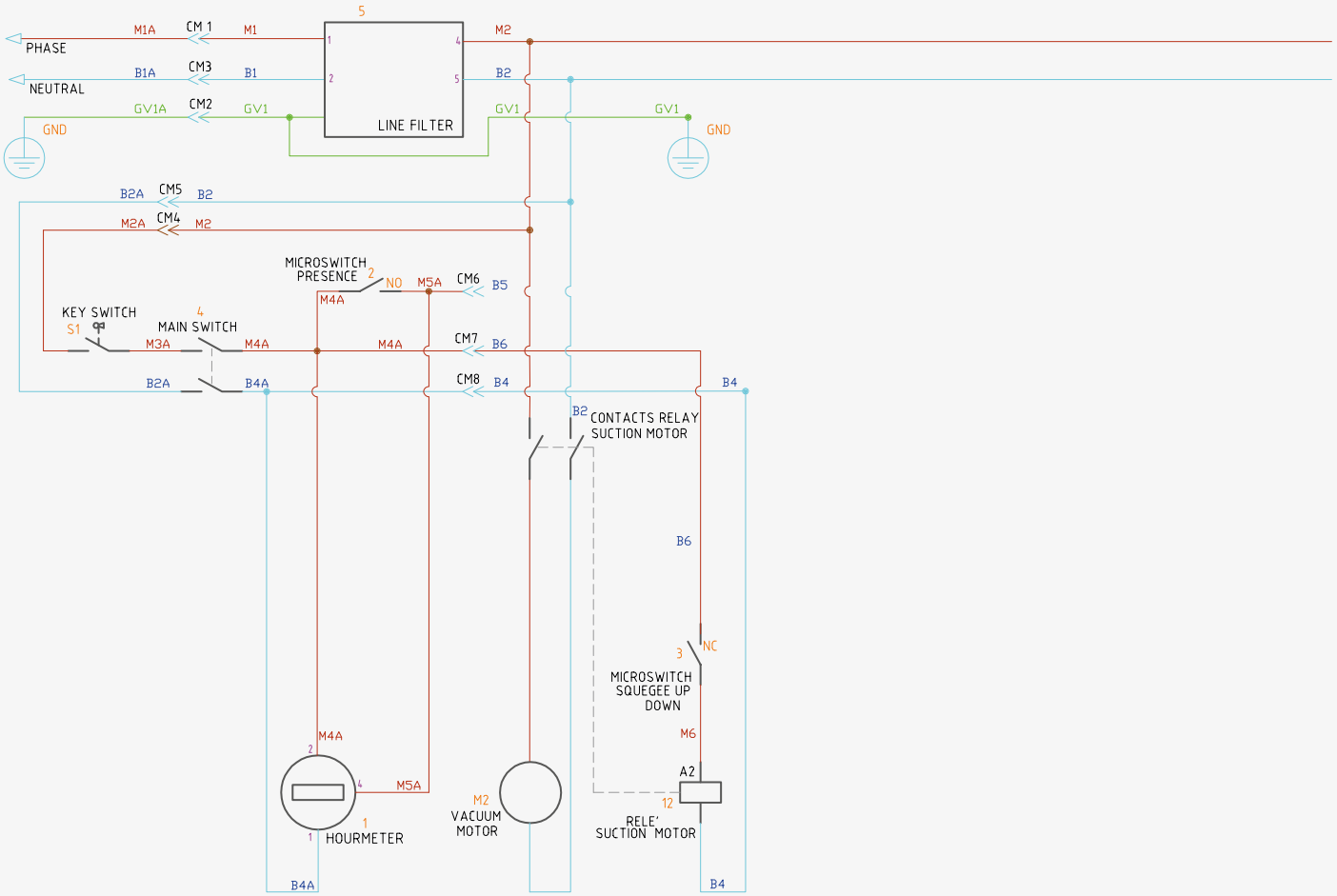
1. The batteries are not discharged ( ).
2. The machine is switched on (2).
3. The emergency button is not pressed (1).
4. The squeegee lever is unlocked to release the micro (3).
5. The Handlebar lever is pressed (4).



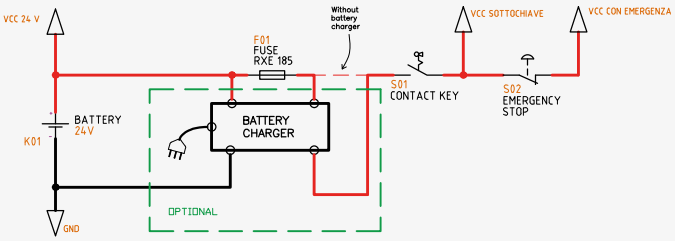
3.8.4 Modes of operation

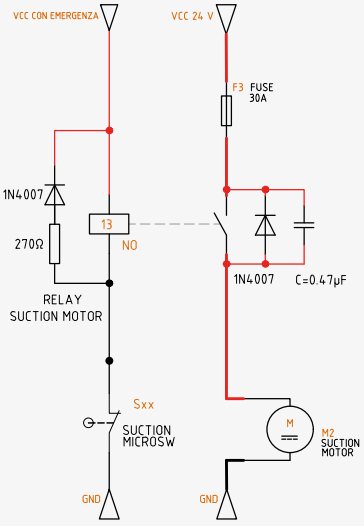
PREMESE	ACTION	RESULT
MACHINE ON	Squeegee lever down	Suction motor ON (+24V to M3)
MACHINE ON	Squeegee lever down Handlebar lever pressed Reverse gear activated at work	Suction motor ON (+24V to M3) Traction motor OFF
MACHINE ON	Handlebar lever not pressed while working	Suction motor ON
MACHINE ON	Squeegee lever raised at work	(BASE) Suction is switched off as soon as the lever is raised; (PRO) Suction motor OFF after 5 sec. at maximum level (0V to M3)

3.8.5 Wiring diagram E version



3.8.6 Wiring diagram Base version





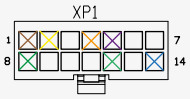
Sweeping Brush Deck Work Control

Conventions:

- +Vb: Positive battery voltage.
- 0b: Negative battery voltage.
- The Emergency Mushroom is not pressed, the Key Contact is closed and the Battery Charger is not connected to the mains.
- Brush deck is in working condition.

INPUT / OUTPUT

CONDITION FULFILLED	**P** (in)	**V** (at work)	**V** (at rest)	**V** (in reverse)
SUCTION MOTOR ACTIVATED	VAC(1) ref to VAC(2)	+Vb	0	0
SQUEEGEE LEVER DOW	XP1(13) ref to XP1(11)	+Vb	0	0

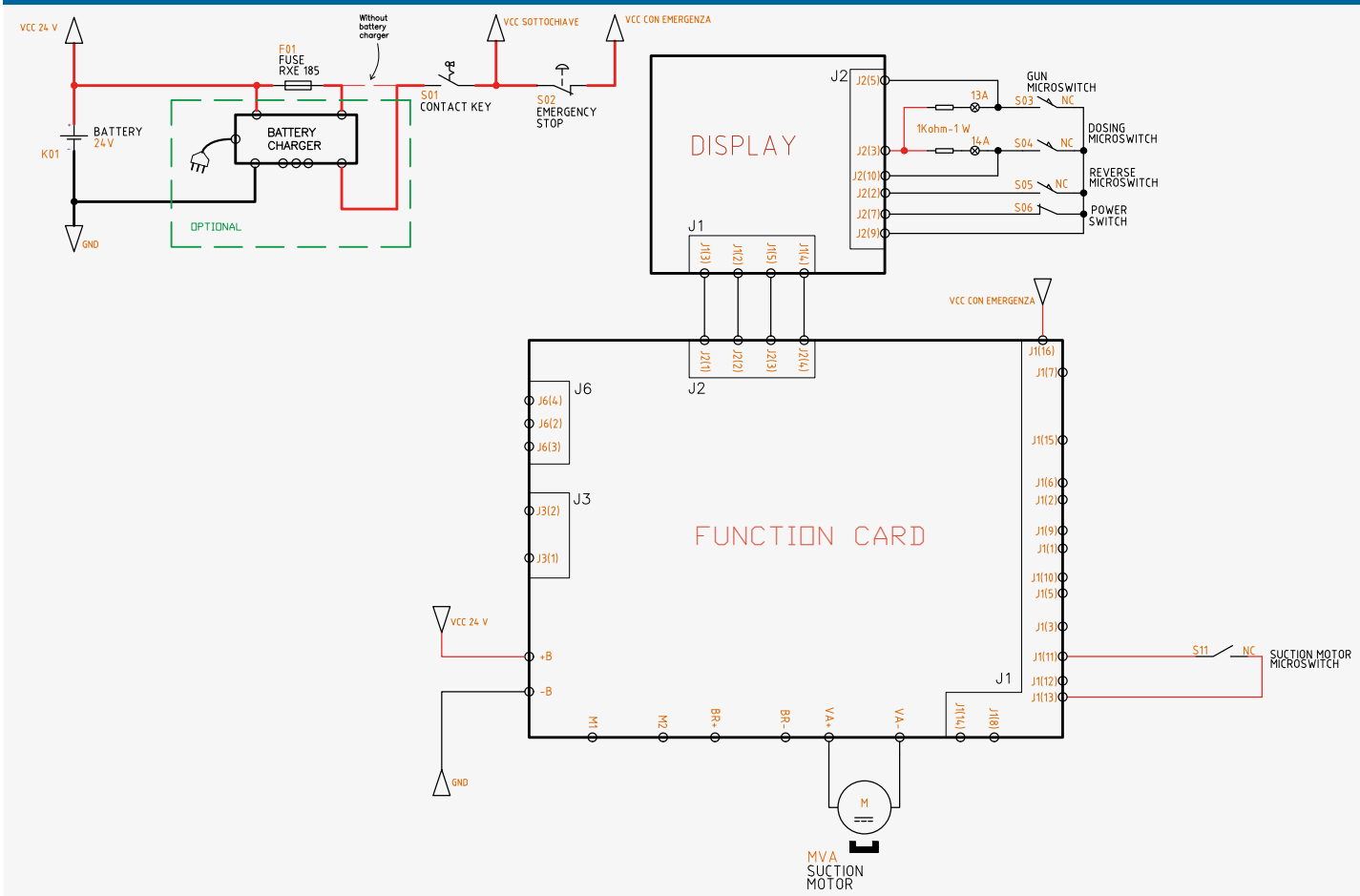


Related Electrical Components

Suction motor

The vacuum motor produces a vacuum in the system upstream of it, which causes a flow of air that travels through the entire drying system and allows the water to be sucked in with the air.
With a constant 24 V DC power supply (battery charged), the single vacuum brush motor (M4) draws 16.8 Amps 0.1. With a power supply of 21 V DC constant (discharged battery) the absorption is 15.2 Amps 0.1.

3.8.7 Wiring diagram PRO version



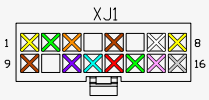
Sweeping Brush Deck Work Control

Conventions:

- +Vb: Positive battery voltage.
- 0b: Negative battery voltage.
- The Emergency Mushroom is not pressed, the Key Contact is closed and the Battery Charger is not connected to the mains.
- Brush deck is in working condition.

INPUT / OUTPUT

CONDITION FULFILLED	**P** (in)	**V** (at work)	**V** (at rest)	**V** (in reverse)
SUCTION MOTOR ACTIVATED	VAC(1) ref to VAC(2)	+Vb	0	0
SQUEEGEE LEVER DOWN	J1(13) ref to J1(11)	+Vb	0	0
POSITIVE DISPLAY	J2(3) ref to B-	+Vb	+Vb	+Vb
NEGATIVE DISPLAY	J2(4) ref to B+	-Vb	-Vb	-Vb



Related Electrical Components

Suction motor

The suction 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 in together with the air.

2-Stage motor

With a constant 24 V DC power supply (battery charged) the single brush motor (M4) draws 16.8 Amps 0.1. With a power supply of 21 V DC constant (discharged battery) the absorption is 15.2 Amps 0.1.

3.8.8 Adjustments

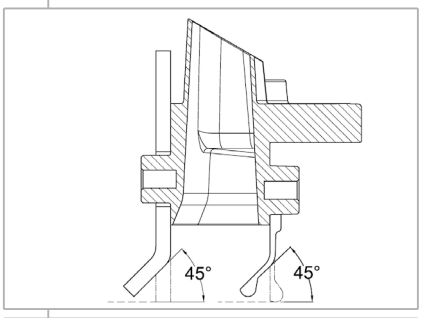
Squeegee

The squeegee support must be adjusted when lowered to the ground. The suction motor must be switched on. The purpose of the adjustment is to obtain an inclination of the squeegee wheels to the floor of 45 degrees along their entire length.
To obtain the correct adjustment you can use the squeegee wheel adjustment knob to adjust the squeegee height and the central adjustment knob to adjust the squeegee angle.

Switch on the machine and lower the squeegee to the ground.

Advance slowly by pressing the drive lever.

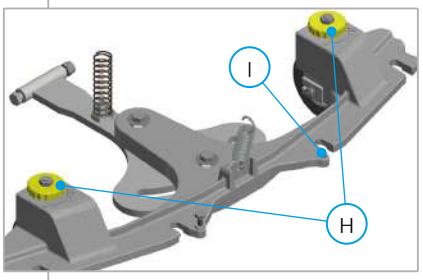
While advancing, adjust the squeegee by means of the knobs so that the squeegees are inclined at an angle of 45 degrees to the floor along their entire length.



Procedure:
Switch on the machine.

Lower the squeegee to the ground and advance slowly.

While moving forward, adjust the squeegee by means of the knobs (H) and (I) so that the squeegee blades are inclined at an angle of 45 degrees to the floor along their entire length.



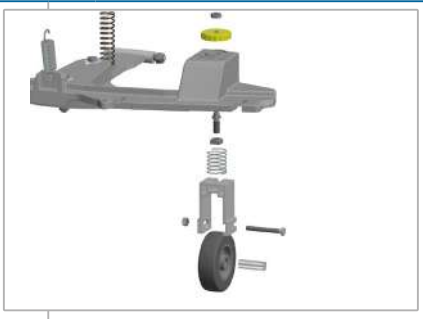
3.8.9 Disassembly

Squeegee support

- Remove the squeegee from the machine.
- Ensure that the Squeegee Lift Lever is lowered.
- Unscrew the screw that fixes the squeegee lifting chain to the Squeegee Lift Lever and place it at the rear of the Squeegee Support.
- Unscrew the nuts that secure the gas spring to the squeegee support and remove the gas spring.
- Unscrew the screws that secure the squeegee support to the squeegee arm.
- Rotating Squeegee Arm.
- Remove the squeegee support..

Squeegee adjustment wheels

- Remove the squeegee from the machine.
- Ensure that the Squeegee Lift Lever is lowered.
- Unscrew the screw that secures the squeegee lifting chain to the Squeegee Lift Lever and place it at the rear of the Squeegee Support.
- Unscrew the nuts that secure the gas spring to the squeegee support and remove the gas spring.
- Unscrew the screws that secure the squeegee support to the squeegee arm.
- Rotating Squeegee Arm.
- Remove the squeegee support.

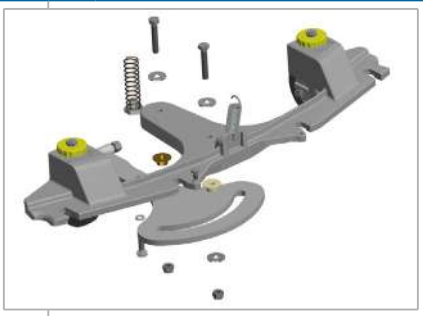


Squeegee Rotation Arm

Remove the squeegee support.

Loosen the screws that secure the squeegee swivel arm to the machine chassis.

Remove the squeegee rotation arm.

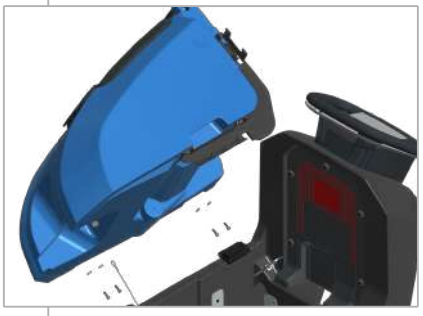


Recovery tank

Disconnect the Suction Hose and the Drain Hose from the Recovery Tank.

Disassemble the Suction Motor.

Unscrew the screws of the sealing cord and tank rotation hinges and remove it.



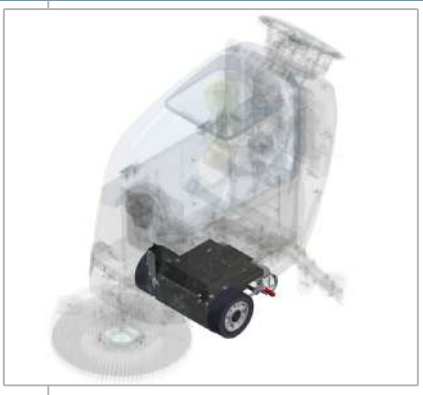
Suction Hood

Remove the screws on the sides of the recovery tank.
Unscrew and remove them from both sides.
Lift off the cover.

3.9 Traction and Chassis Group

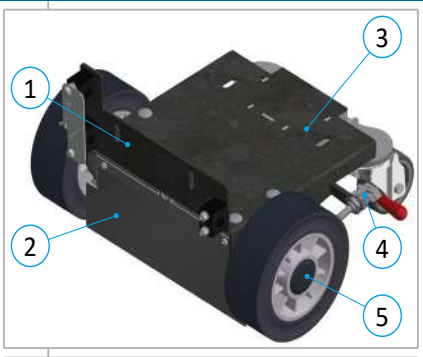
3.9.1 Location on the machine

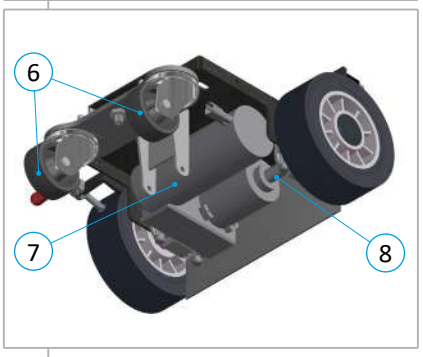
The chassis and traction unit is located under the machine body



3.9.2 Main Components

1. Chassis
2. Rubber splash guard
3. Chassis
4. Parking brake
5. Front Wheel
6. Rear Wheel
7. Traction Drive Motor
8. Semi-shafts

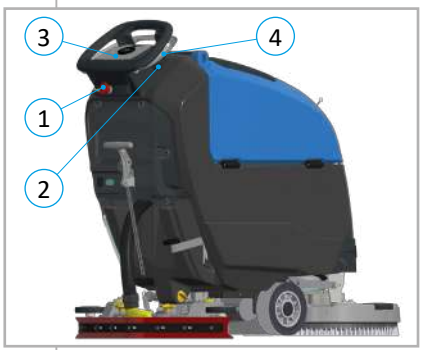


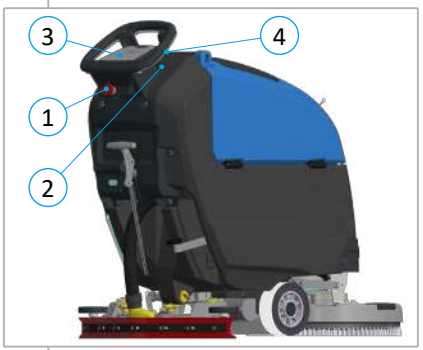


3.9.3 Working Requirements

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

1. The batteries are not discharged ( ).
2. The emergency button is not pressed (1).
3. The machine is switched on (2).
4. The handlebar lever is pressed (4).

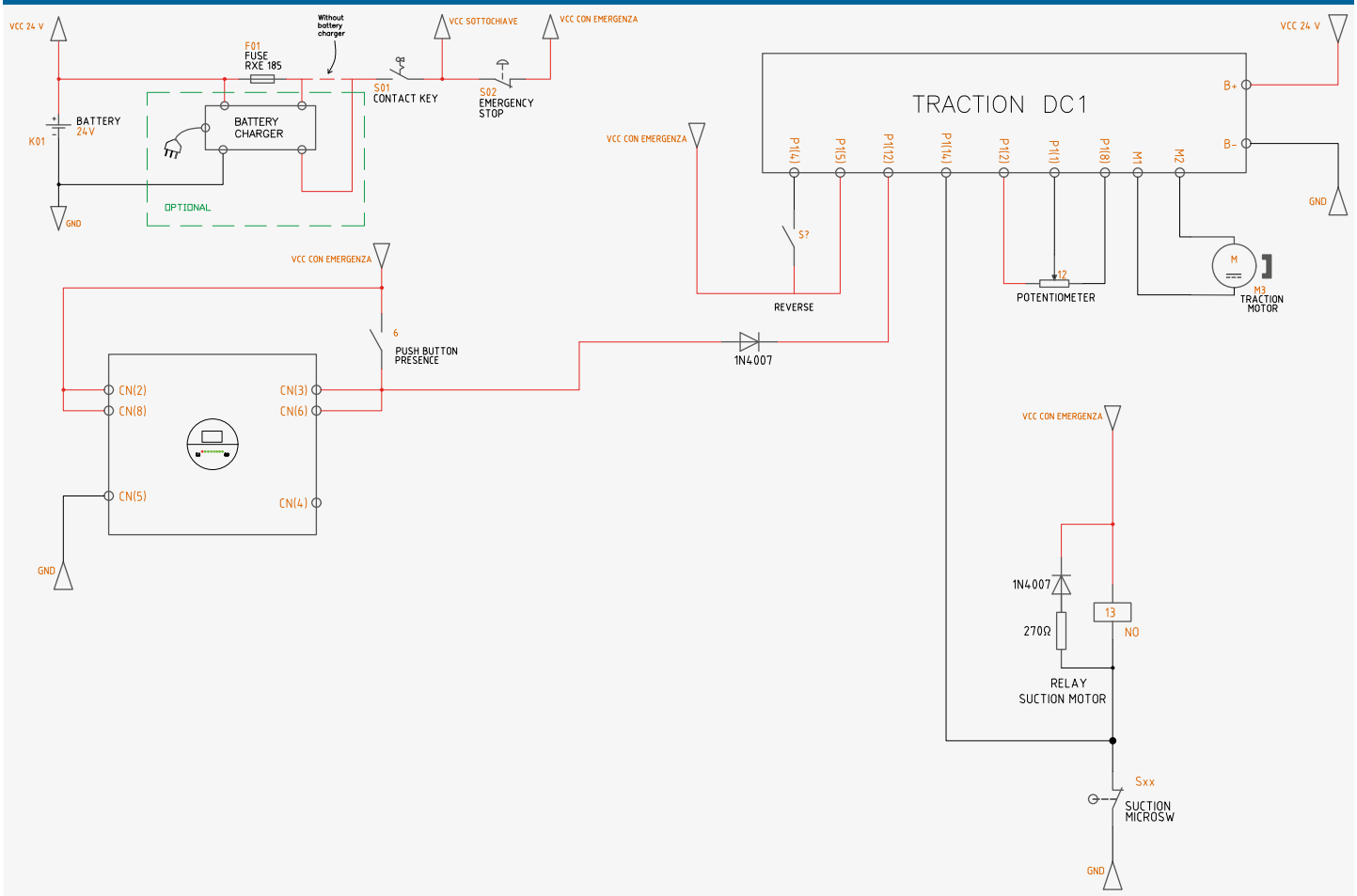




3.9.4 Operating Modes

PREMESE	ACTION	RESULT
MACHINE ON	HANDLEBAR LEVER PRESSED	TRACTION MOTOR ON (+24V to M1)
MACHINE ON	REVERSE GEAR ACTIVATED IN WORK	TRACTION MOTOR ON (-24V to M1)
MACHINE ON	HANDLEBAR LEVER NOT PRESSED IN WORK	TRACTION MOTOR OFF (0V to M1)

3.9.5 Wiring diagram BT Base version



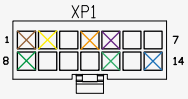
Labour Control

Conventions:

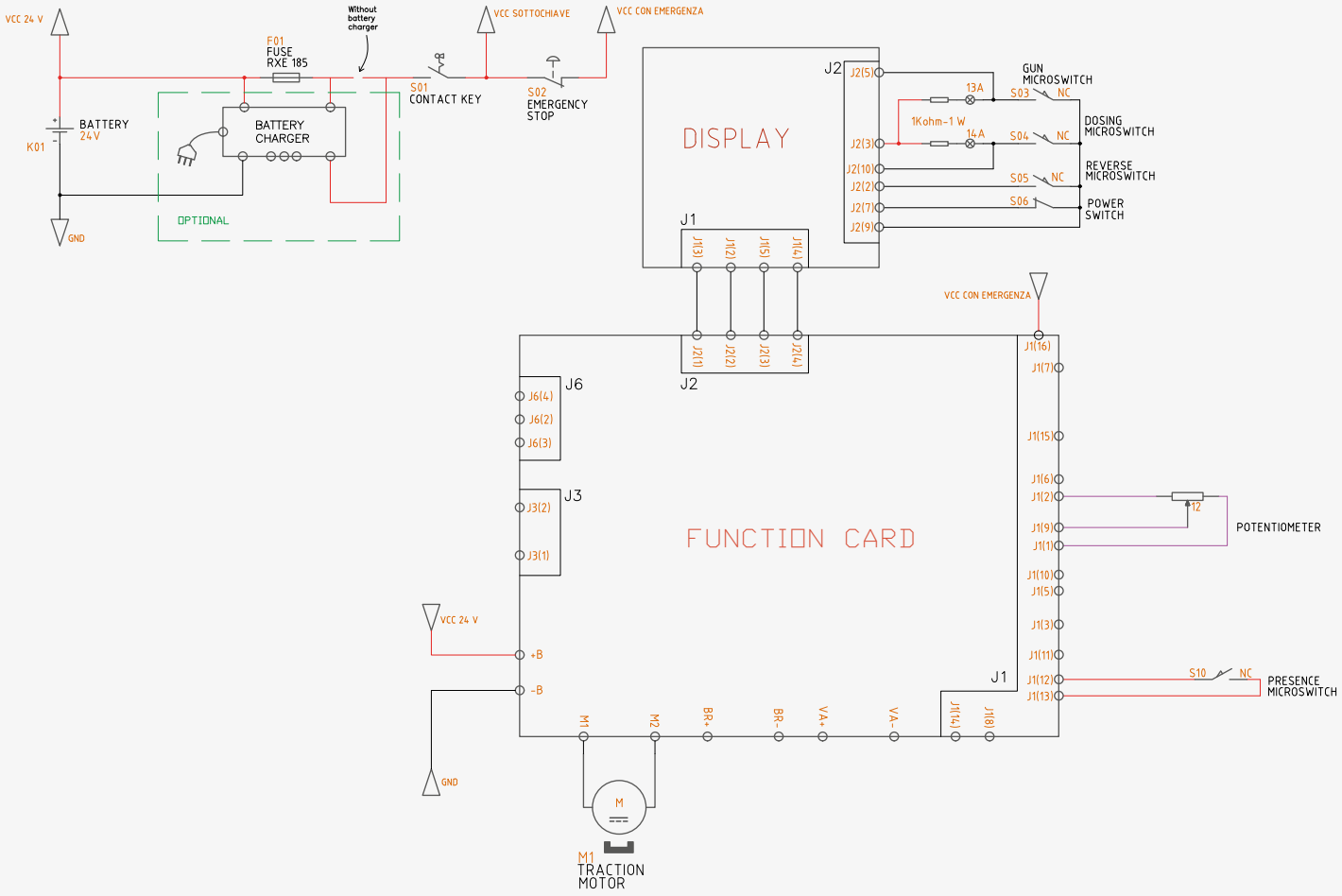
- +Vb: Positive battery voltage.
- 0b: Negative battery voltage.
- Emergency Button not pressed, Key Contact closed and Battery Charger not connected to the mains.
- Brush deck in working condition

INPUT / OUTPUT

CONDITION FULFILLED	P (in)	V (at work)	V (at rest)	V (in reverse)
TRACTION MOTOR ACTIVATED	M1 ref to M2	+Vb	0	-Vb
OPERATOR LEVER PRESSED	XP1(12) ref to XP1(13)	+Vb	0	+Vb
POTENTIOMETER ACTIVATED	XP1(1) ref to XP1(2)	+Vb	0	+Vb



3.9.6 Wiring diagram PRO version



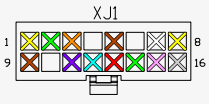
Labour Control

Conventions:

- +Vb: Positive battery voltage.
- 0b: Negative battery voltage.
- Emergency Button not pressed, Key Contact closed and Battery Charger not connected to the mains.
- Brush deck in working condition

INPUT / OUTPUT

CONDITION FULFILLED	P (in)	V (at work)	V (at rest)	V (in reverse)
TRACTION MOTOR ACTIVATED	M1 ref to M2	+Vb	0	-Vb
OPERATOR LEVER PRESSED	J1(12) ref to J1(13)	+Vb	0	+Vb
POTENTIOMETER ACTIVATED	J1(2) ref to J1(2)	+Vb	0	+Vb
POTENTIOMETER SIGNAL ACTIVATED	J1(9) ref to B-	+Vb	0	-Vb
POSITIVE DISPLAY	J2(3) ref to B-	+Vb	+Vb	+Vb
NEGATIVE DISPLAY	J2(4) ref to B+	-Vb	-Vb	-Vb



Related electrical components

Traction motor

The traction motor is a DC type with permanent magnets, connected directly to the function board via a connector. With a constant 24 V DC power supply (battery charged) the traction motor at no load (M1) absorbs 2.1 Amps. With a constant 21 V DC power supply (discharged battery) the absorption is 2.0 Amps 0.1.

3.9.7 Dismantling

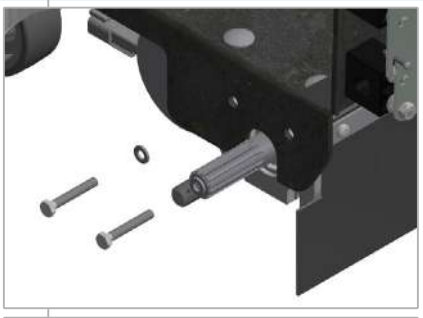
Wheels

Lift the wheel in question off the ground.
Remove the cap and unscrew the screw securing the wheel to the axle shaft.
Remove the wheel with the help of a wheel extractor, if necessary.
Remove the spacer

Traction Drive Moto

Remove the wheels.

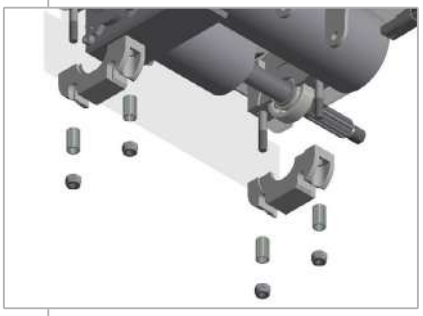
Remove the 4 screws fixing the gear motor to the chassis and bearing bracket.

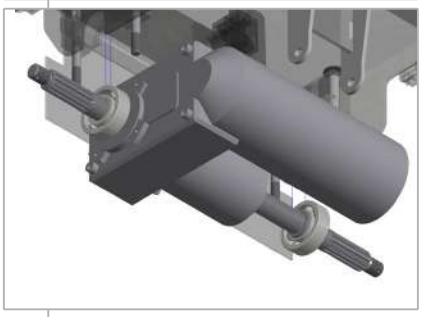


Disconnect the Traction Motor's electrical connector.

Remove the screws securing the bearing supports, paying attention to the gearmotor, which will be free to drop to the ground.

Remove the shafts and extract the bearings.

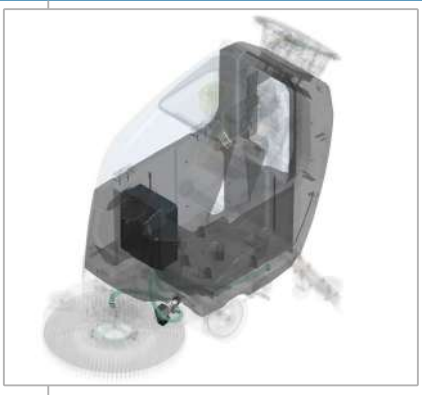




3.10 Pump Group

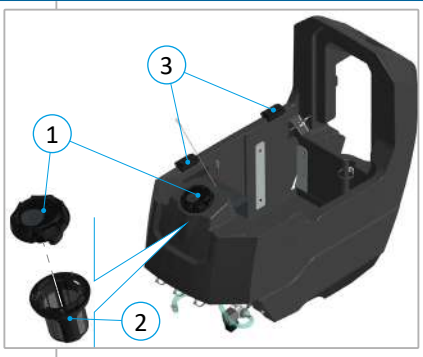
3.10.1 Location on the machine

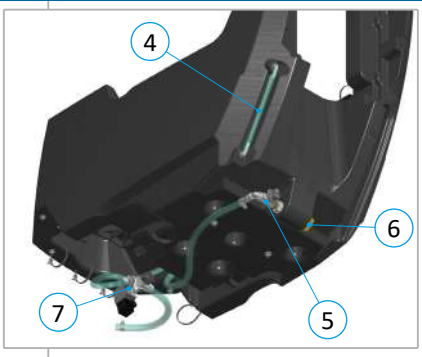
The pump unit is located inside the machine body



3.10.2 Main components

1. Solution tank filler cap
2. Filter
3. Hinges
4. Level indicator tube
5. Solution dispensing tap
6. Water filter/discharge tap
7. Solenoid valve





3.10.3 Working Requirements

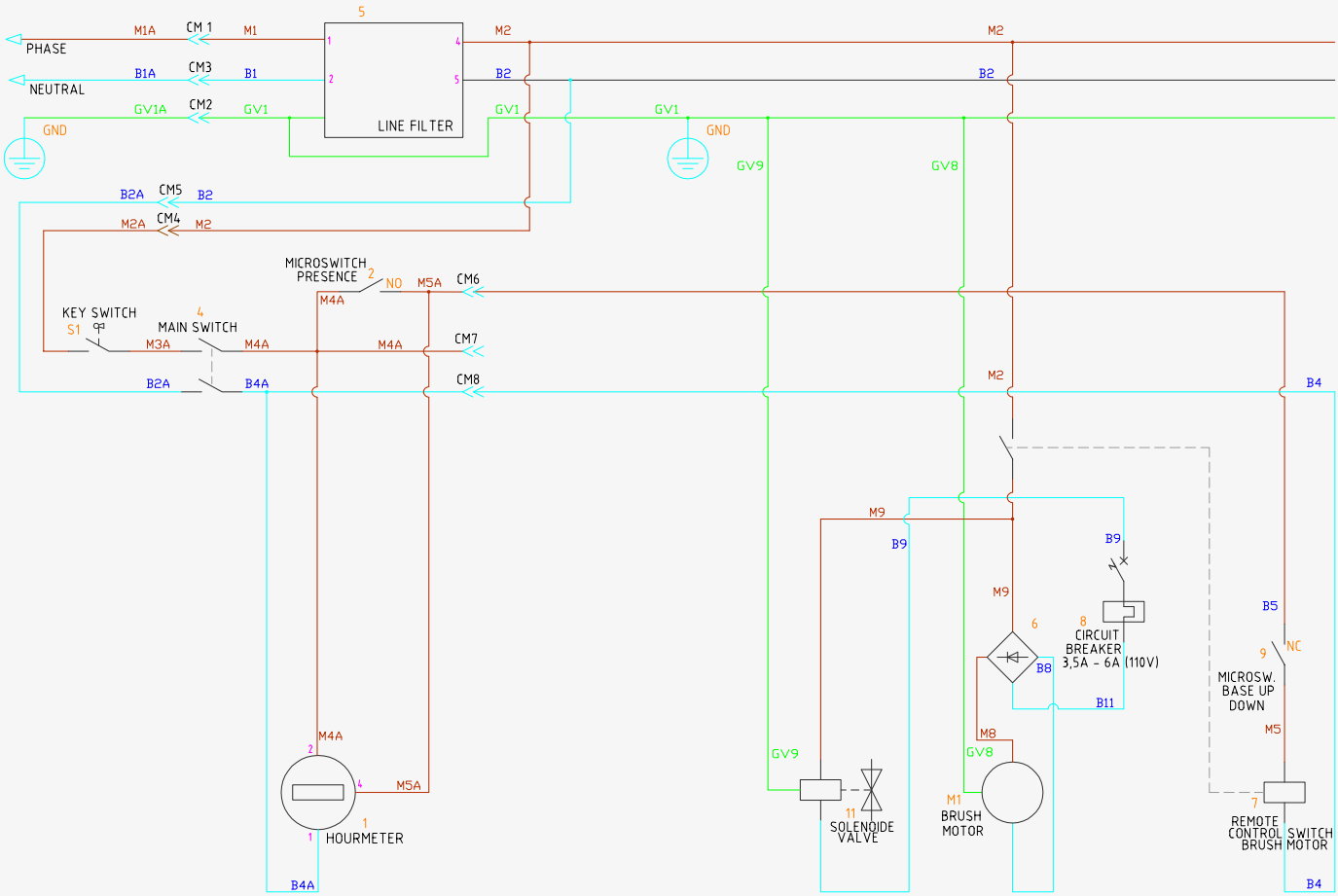
The solution unit only works if the following conditions are met:

1. The batteries are not discharged ( ).
2. The machine is switched on (2).
3. The emergency button is not pressed (1).
4. (BASE) The brush deck foot lever is unlocked to release the micro(3).
   (PRO) The function setting on the display is Wash or Wash + Dry (3).
5. The water valve is fully open (4).
6. The handlebar lever is pressed (5).

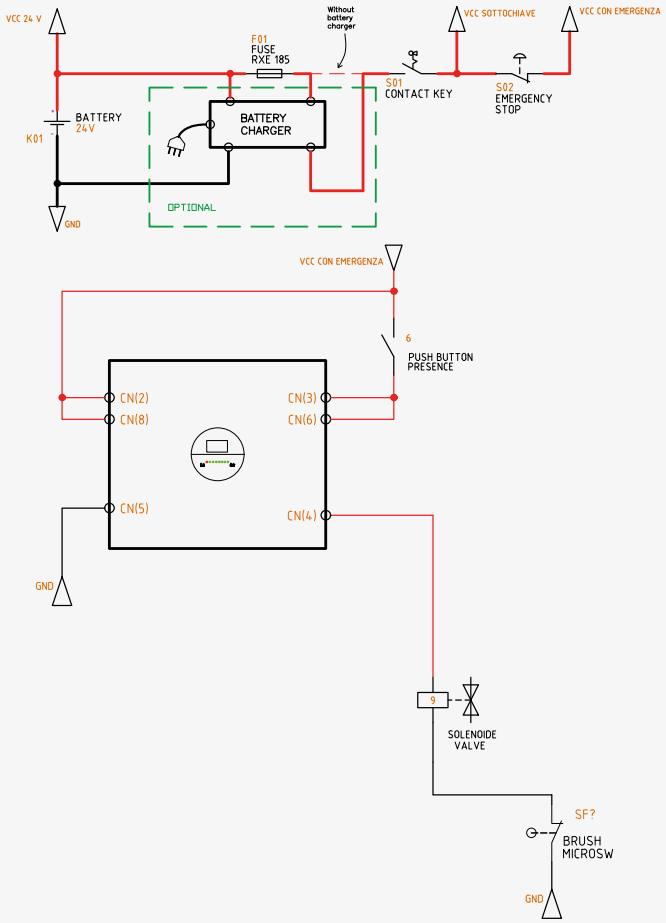
3.10.4 Operating Modes

PREMESE	ACTION	RESULT
MACHINE ON	Washing activated (ECO Mode) Handlebar lever pressed	Solution pump ON if water level not 0 (+24V to Pa); Solenoid valve ON if water level not 0 (+24V to J1-15 To J1-7)
MACHINE ON	Dosing unit activated in work	Dosing pump ON if water level not 0 (+24V to Pd)
MACHINE ON	Reverse gear activated in work	Solution pump OFF; Solenoid valve OFF; Dosing pump OFF (if available)
MACHINE ON	Handlebar lever not pressed while working	Solution pump OFF; Solenoid valve OFF; Dosing pump OFF (if available)
	Handle lever not pressed in work	Solution pump OFF; Solenoid valve OFF; Dosing pump OFF (if available)

3.10.5 Wiring diagram E version



3.10.6 Wiring diagram Base version



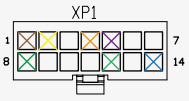
Labour Control

Conventions:

- +Vb: Positive battery voltage.
- 0b: Negative battery voltage.
- Emergency Button not pressed, Key Contact closed and Battery Charger not connected to the mains.
- Brush deck in working condition

INPUT / OUTPUT

CONDITION FULFILLED	**P** (in)	**V** (at work)	**V** (at rest)	**V** (in reverse)
SUCTION MOTOR ACTIVATED	VAC(1) ref to VAC(2)	+Vb	0	0
SQUEEGEE LEVER DOWN	J1(13) ref to J1(11)	+Vb	0	0

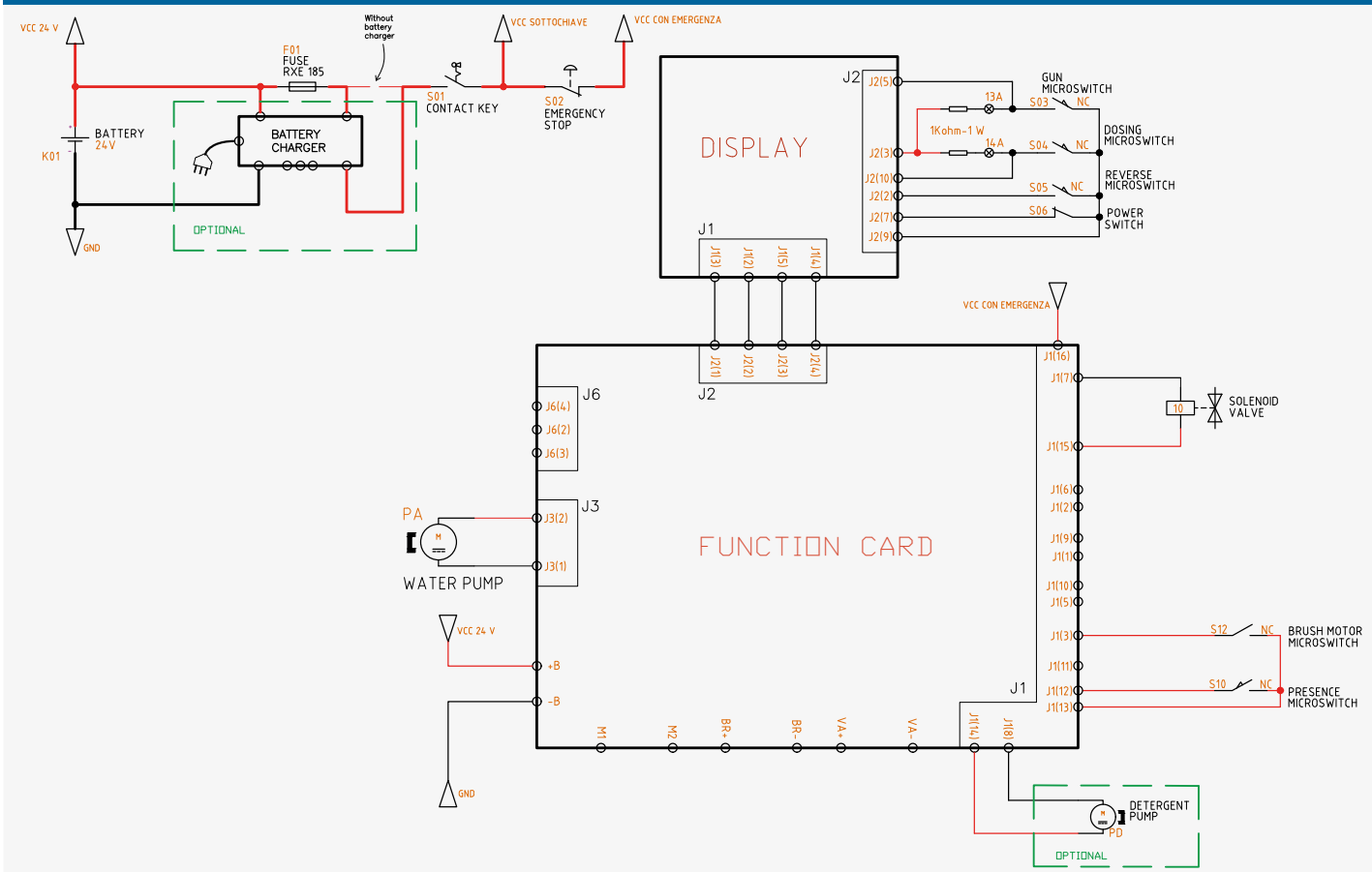


Related electrical components

Solenoid valve

The solenoid valve is located near the brush deck. When the brush motor consent microswitch is activated, the solenoid valve opens and supplies the solution to the washing system.

3.10.7 Electrical diagram PRO version



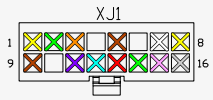
Labour Control

Conventions:

- +Vb: Positive battery voltage.
- 0b: Negative battery voltage.
- Emergency Button not pressed, Key Contact closed and Battery Charger not connected to the mains.
- Brush deck in working condition

INPUT / OUTPUT

CONDITION FULFILLED	P (in)	V (at work)	V (at rest)	V (in reverse)
OPERATOR LEVER PRESSED	J1(15) ref to J1(6)	+Vb	0	+Vb
SOLENOID VALVE ACTIVATED	J1(15) ref to J1(7)	+Vb	0	0
POSITIVE DISPLAY	J2(3) ref to B-	+Vb	+Vb	+Vb
NEGATIVE DISPLAY	J2(4) ref to B+	-Vb	-Vb	-Vb
WATER PUMP	J3(2) ref to J3(1)	+Vb	0	0



Related electrical components

Motor Suction Solenoid Valve

The solenoid valve is located near the brush deck; when the brush motor consent microswitch is activated, the solenoid valve opens and supplies the solution to the washing system.

Water pump

On activation of the man on wash lever, the pump starts to supply the solution to the washing system.

Detergent pump

Upon activation of the man presence lever in washing mode, if present, the pump starts to supply the chemical to the washing system, in the set dilution percentage.

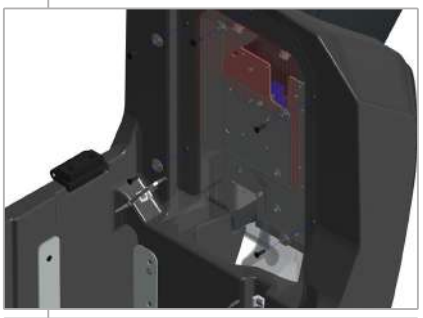
Recycle pump

When the empty solution tank microswitch is activated, the pump starts to draw water directly from the recovery tank and supply it to the washing system.

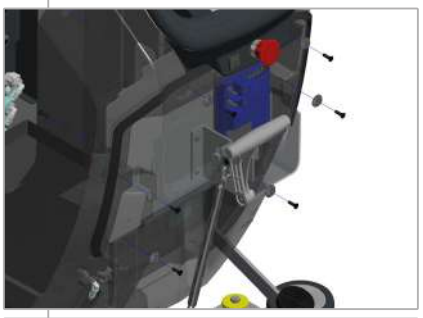
3.10.8 Dismantling

Tank Solution

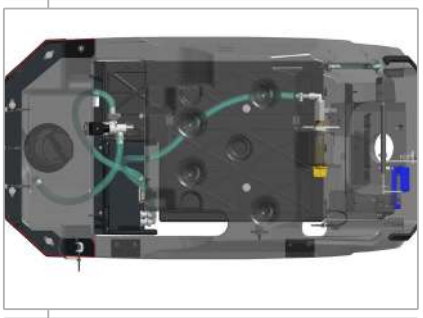
Remove the recovery tank and the electrical system cover.



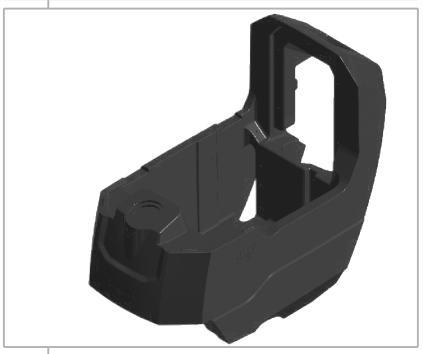
Remove handlebar and electrical system metal panel.
Remove the rear covers.



Remove the lower crankcases and the water assembly.



Remove the remaining parts



SECTION 4 - CONSUMPTION AND STOCK MATERIALS

4.1 Consumption Materials

CODE	Q.TY	DESCRIPTION	GROUP	43			50					
				B	Bt	Bt PRO	E	B	Bt	Bt PRO	BtS	BtO
404653	1	BRUSH 20 - Ds 508 Df495-PPL 0,9	BRUSH DECK				X	X	X	X		
404654	1	BRUSH 20 - Ds 508 Df495-PPL 0,3	BRUSH DECK				X	X	X	X		
405631	1	BRUSH 20 - Ds 508 Df495-PPL 0,6	BRUSH DECK				X	X	X	X		
405632	1	BRUSH 20 - Ds 508 Df495-TYNEX 1	BRUSH DECK				X	X	X	X		
449908	1	BRUSH 20 - Ds 508 Df495-TAMPICO	BRUSH DECK				X	X	X	X		
452403	1	BRUSH 43cm De=430 Df=410 PPL 0,3 LIGHT BLUE	BRUSH DECK	X	X	X						
452404	1	BRUSH 43cm De=430 Df=410 PPL 0,6 WHITE	BRUSH DECK	X	X	X						
452405	1	BRUSH 43cm De=430 Df=410 PPL 0,9 BLACK	BRUSH DECK	X	X	X						
452406	1	BRUSH 43cm De=430 Df=410 PPL 0,9 TYNEX 1,0	BRUSH DECK	X	X	X						
452407	1	BRUSH 43cm De=430 Df=410 PPL 0,9 TAMPICO	BRUSH DECK	X	X	X						
459363	2	MOTOR CARBON BRUSH 452017 CARBON BRUSH	BRUSH DECK	X	X	X		X	X	X		
424210	2	SUCTION MOTOR CARBON BRUSH A471 EMB (11,2X71)	SUCTION MOTOR	X	X	X		X	X	X	X	X
409413	2	BRUSH 7X14 (PINK) (M.RID.407551)	CHASSIS AND STAFF		X	X			X	X	X	X
431024	1	REAR RUBBER 33 SHORE H=70 L=750 S=4	SQUEEGEE	X	X	X	X	X	X	X		
430968	1	REAR RUBBER POLIURETANO H=70 L=750 S=4	SQUEEGEE	X	X	X	X	X	X	X		
431026	1	REAR RUBBER LATEX H=70 L=750 S=4	SQUEEGEE	X	X	X	X	X	X	X		
219374	1	FRONT RUBBER POLIURETANO H=45 L=690 S=4	SQUEEGEE	X	X	X	X	X	X	X		
434542	1	REAR RUBBER 33 SHORE H=70 L=850 S=4	SQUEEGEE								X	X
219375	1	FRONT RUBBER POLIURETANO H=45 L=790 S=4	SQUEEGEE								X	X

4.1 Consumable Materials

The following table is intended as a suggestion on the minimum amount of spare parts to be purchased and kept in stock. It is to be considered as a guide only and does not take into account the type of job site where the machine usually works.

On the basis of the "Number of machines" followed, we will multiply the Index indicated by the Quantity in the "Spare Materials" table..

Machines number	Index In.
1	**1**
10	**2**
25	**3**
50	**4**

Example of the use of the table for the calculation of Stock Materials:
The number of machines maintained is 12, the Indicative Reference Index is 2:

Machines number	Index In.
1	1
10	**2**
25	3
50	4

how many '7CFCT020' cards should there be in the maintainer's warehouse?

CODE	Q.TY	DESCRIPTION	GROUP	43			50					
				B	Bt	Bt PRO	E	B	Bt	Bt PRO	BtS	BtO
457727	1	DISPLAY CARD 7T100014	MARCH COMMAND			X				X	X	X
446359	1	7CFCT020 CARD	MARCH COMMAND			X				X	X	X
440063	1	HOUR METER NE306	MARCH COMMAND	X	X			X	X			
409511	1	SAFETY CIRCUIT BREAKER 3,5A	ELECTRICAL SYSTEM				X					

Consulting the table 'Stock materials' the quantities are 2, so the 7CFCT020 cards we recommend to have in stock are **4**.

4.3 Stock Materials

CODE	Q.TY	DESCRIPTION	GROUP	43			50					
				B	Bt	Bt PRO	E	B	Bt	Bt PRO	BtS	BtO
452017	1	MOTOR. 24V 500W 140RPM M18-SX-NO PIPE	BRUSH DECK	X	X	X		X	X	X		
437859	1	BRUSH FLANGE	BRUSH DECK	X	X	X		X	X	X		
410575	1	GREEN CENTER LOCK H=20	BRUSH DECK	X	X	X	X	X	X	X		
447905	1	MOTOR 24V 680W 2000G ZYT-114J-14	BRUSH DECK									X
436434	1	BATTERY CHARGER NE284F 24V 15A WITH MOLEX	BATTERY CHARGER		X				X	X	X	X
435489	1	EMERGENCY BUTTON NP2-BS542	MARCH COMMAND	X	X	X		X	X	X	X	X
409491	3	MICROSWITCH.10A 3X22 C/ROTEL 4.8 V5C010FB3D	MARCH COMMAND	X	X	X	X	X	X	X	X	X
426993	1	INT. BASCULA VERDE 13(2)A 250VAC SR-20	MARCH COMMAND				X					
457536	1	DASHBOARD KEYBOARD	MARCH COMMAND			X				X	X	X
457727	1	DISPLAY CARD 7T100014	MARCH COMMAND			X				X	X	X
446359	1	7CFCT020 CARD	MARCH COMMAND			X				X	X	X
440063	1	HOUR METER NE306	MARCH COMMAND	X	X			X	X			
409511	1	SAFETY CIRCUIT BREAKER 3,5A	ELECTRICAL SYSTEM				X					
448111	1	NET FILTER 06S42E15547433248.21.7105C9Q	ELECTRICAL SYSTEM				X					
428642	1	CONTACTOR 220V 50/60Hz QUAD. BARRA DIN	ELECTRICAL SYSTEM				X					
416815	1	MOTOR DIODE BRIDGE 1500 UHS	ELECTRICAL SYSTEM				X					
448109	1	FINDER RELAY 628282300300	ELECTRICAL SYSTEM				X					
457726	1	7CFS1140 FUNCTIONS CARD	ELECTRICAL SYSTEM			X				X	X	X
427429	1	MICROSWITCH 10A FASTON 6.3	ELECTRICAL SYSTEM	X	X	X	X	X	X	X	X	X
457631	1	CARD LINQI DC1	ELECTRICAL SYSTEM		X				X			
409607	1	FUSE 30A	ELECTRICAL SYSTEM		X				X			
409612	1	FUSE 50A	ELECTRICAL SYSTEM		X				X			
409614	1	FUSE 60A	ELECTRICAL SYSTEM		X				X			
407578	1	DOUBLE CONTACTOR 24V 100A	ELECTRICAL SYSTEM		X				X			
407580	1	RELAY FINDER 65.31- 24V 30A 1 VIA FASTON	ELECTRICAL SYSTEM		X				X			
427429	1	MICROSWITCH 10A FASTON 6.3	ELECTRICAL SYSTEM		X				X			
407896	1	SOLENOID VALVE 1/2 230V 14W	WATER SYSTEM				X					
447762	1	SUCTION MOTOR 24V 422W H1216 BB30SC66.5TH39	SUCTION MOTOR	X	X	X		X	X	X	X	X
457315	1	AIR FILTER H14 72X130	SUCTION MOTOR	X	X	X	X	X	X	X	X	X
427083	1	SUCTION MOTOR 230V 50Hz 450W H1000 TANG 2S	SUCTION MOTOR				X					
232632	1	SUCTION COVER GASKET L=1200	RECOVERY TANK	X	X	X	X	X	X	X	X	X
446353	1	V-RING GASKET VA0040 H=9 NBR	RECOVERY TANK	X	X	X	X	X	X	X	X	X
405960	1	RUBBER GASKET FOR FITTING	RECOVERY TANK	X	X	X	X	X	X	X	X	X
446963	1	EXTENSIBLE HOSE 1:4 d=35 L=650	RECOVERY TANK	X	X	X	X	X	X	X	X	X
457553	1	HOSE D.38x900 SPIR. MAN. D.50 WITH CAP	RECOVERY TANK	X	X	X	X	X	X	X	X	X
216999	1	MICROSWITCH ABV1612613 + FASTON	CHASSIS	X	X	X	X	X	X	X	X	X
424462	2	WHEEL PIV. D=80 H=32 2 CUSCINETTI AISI	CHASSIS	X	X	X	X	X	X	X	X	X
407551	1	MOTOR 24V 150W 100RPM	CHASSIS		X	X			X	X	X	X
438487	2	WHEEL D=80 H=25 GOMMA GRIGIA	SQUEEGEE	X	X	X	X	X	X	X	X	X
436120	2	BRUSH DECK BUMPER WHEEL D=100 H=20	SQUEEGEE	X	X	X	X	X	X	X	X	X
407887	1	COMPLETE SOLENOID VALVE 24V 1/2" ACL 3	BRUSH DECK									X
441999	1	ORBITAL WATER DISTRIBUTION PIPE	BRUSH DECK									X
447874	1	SOLENOID VALVE 24V 3/8 0-5bar (E106CB40-201)	BRUSH DECK								X	
227916	1	HOSE D=14 L=50	BRUSH DECK								X	
459018	1	BRUSH MOTOR 24V 350W 600RPM+MOLEX	BRUSH DECK								X	
446388	1	PUMP 3210YB-24-100 8L-MIN 6 BAR	WATER SYSTEM								X	

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