

J2 - 9 way ribbon connector

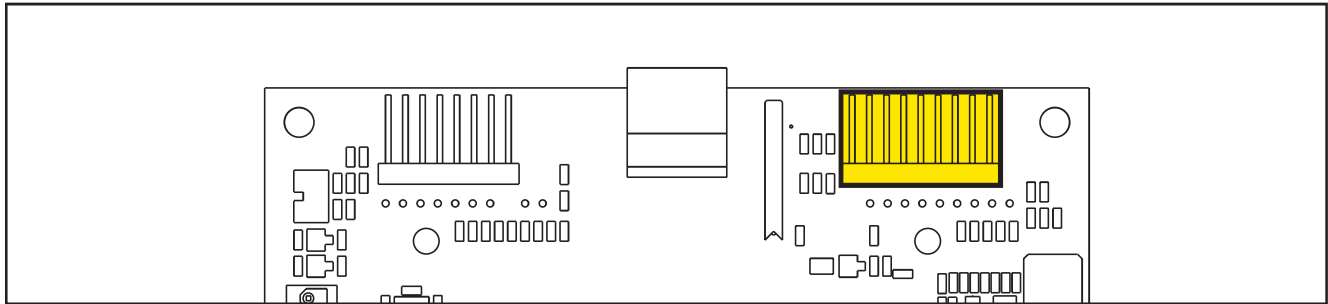


Figure 48:

PIN	Color	Circuit Description	Measured	Comments
1		Power supply - common	0.003v	
2		ON/OFF button (P0)	24.2v	Key off or key on
3		DETERGENT MIX button (P4)	3.14v Not pressed 0.02v pressed	
4		EDS button (P3) (Solution Button)	3.14v Not pressed 0.02v pressed	
5		VACUUM button (P2)	3.14v not pressed 0.05v pressed	
6		VACUUM function LED (LD2)	0.007v LED off	
7		SPOT function LED (LD1)	0.007v LED off	
8		SPOT button (P1) (EcoFlex – Burst of power)	3.14v Not pressed 0.02v pressed	
9		DS versions configurator	3.14v	

J3 - 8 way ribbon connector

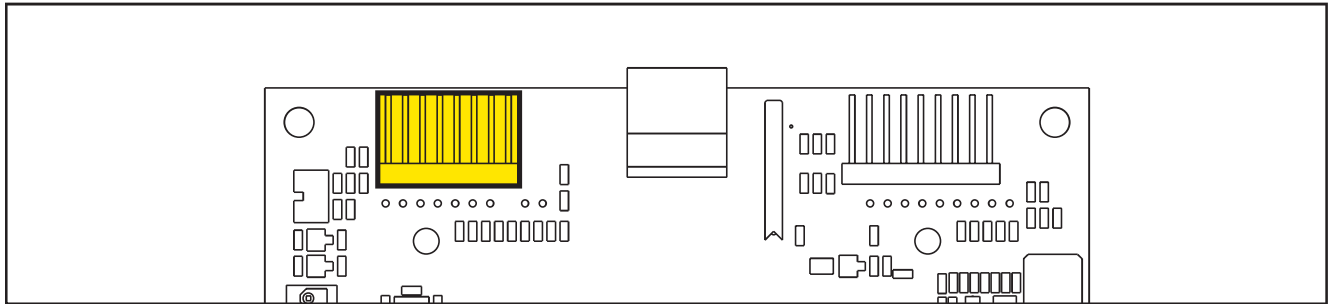


Figure 49:

PIN	Color	Circuit Description	Measured	Comments
1		Power supply - common	0.003v	
2		SP / EXTRAPR function LED (red)(LD3R)	1.78v Red LED on 0.032v Red LED off	
3		SP / EXTRAPR function LED (green) (LD3V)	1.95v Grn LED on 0.032v Grn LED off	
4		BRUSH RELEASE function LED (LD4)	0.07v LED off Pulsing when flashing	
5		BRUSH RELEASE switch (P6)	3.14v not pressed 0.03v pressed	
6		INCREASE SPEED button (P7)	3.14v not pressed 0.02v pressed	
7		DECREASE SPEED button (P8)	3.14v not pressed 0.02v pressed	
8		ONETOUCH / EXTRAPR. button (P5)	3.16v not pressed 0.04v pressed	

J4 - 3 Ways Potentiometer Connector

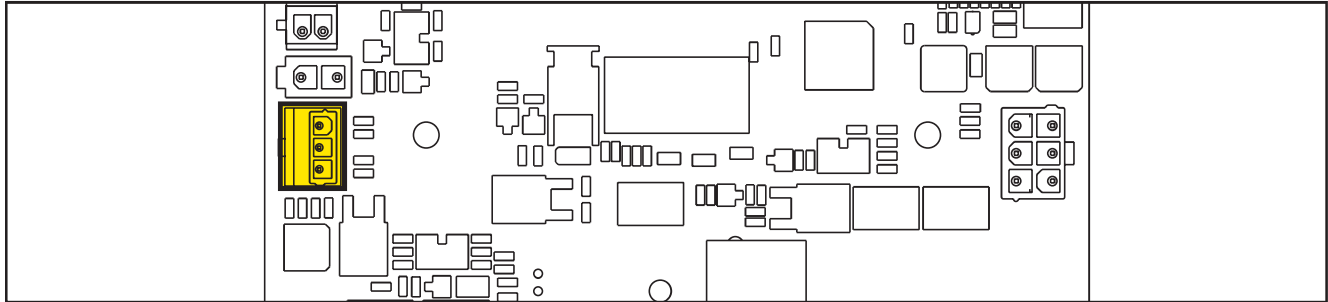


Figure 50:

PIN	Color	Circuit Description	Measured	Comments
1	Red	VR1 potentiometer power supply +	2.675	
2	White	VR1 potentiometer return	1.45 (Neutral)	2.48 (Full Fwd Pin 2), 0.44 (Full Rev Pin 2)
3	Black	VR1 potentiometer power supply -	0.41 (Ground)	

10 - Chassis System

Chassis (main parts)

The chassis function is primarily performed by the solution tank, the support housings for the wheels and working mechanisms are integrated in the gear motor unit and the rear frame.

Reference to Figure 1

Deck raising levers (see also Brush System, Disc and Brush System, REV)

Frame integrated in the drive motor (see also Wheels System, Drive)

Rear pivoting wheels support frame with squeegee raising/lowering system (see also Squeegee System)

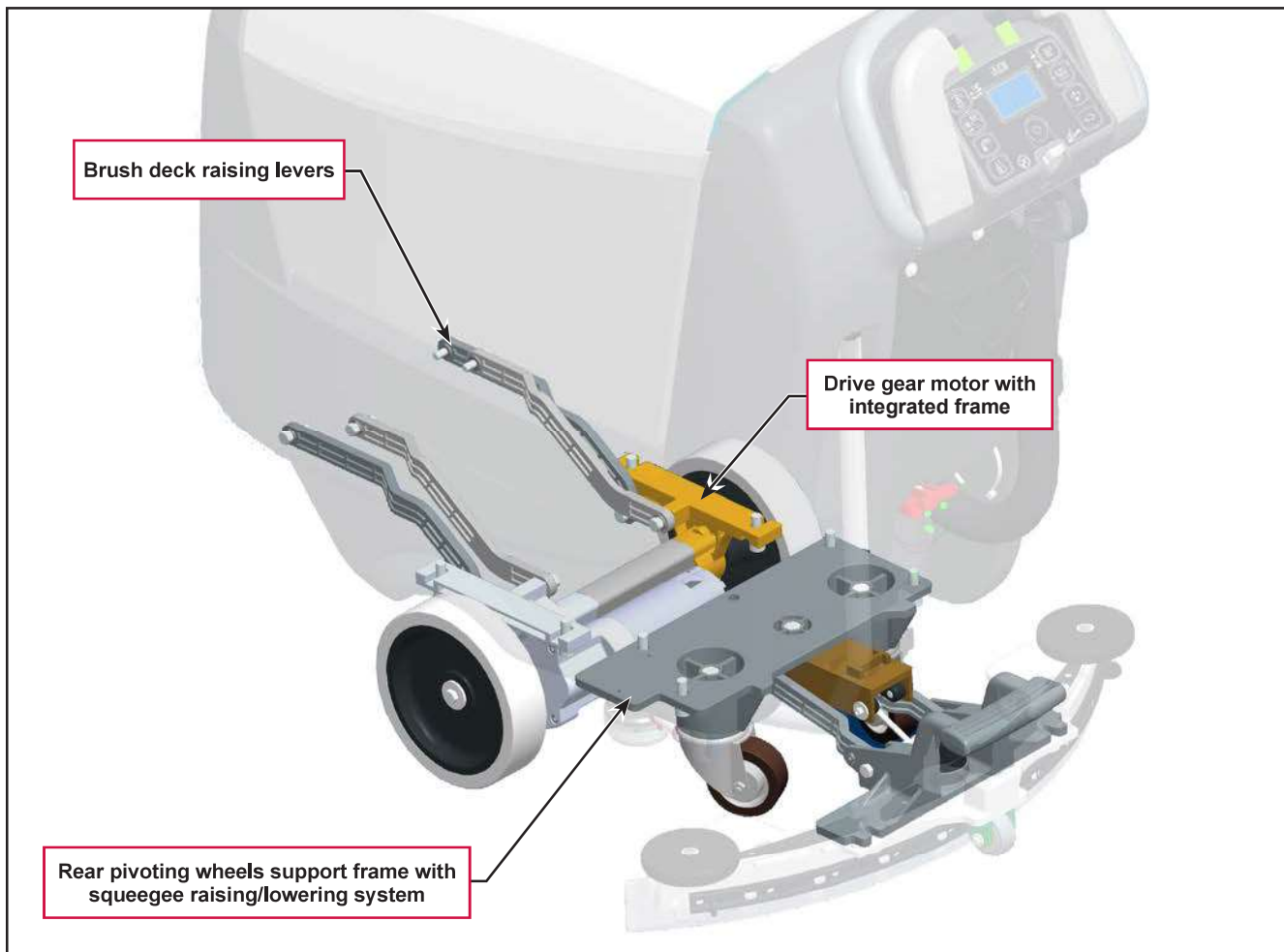


Figure 1:

20 - Wheel System, Traction

Functional Description

Machine movement is provided by the gear motor unit (M3).

The gear motor unit (M3) also functions as the main support of the machine, and is composed of an electric motor, the reduction unit with differential and the drive wheels.

The operator regulates the transfer speed, the working speed and reverse via the paddles, which are connected directly to the speed potentiometer (RV1). Reversing is performed by pressing the back paddle.

The Main machine controller (EB1) checks that the paddles are not pressed when the machine is started; if they are, an alarm is generated (see section “Main machine controller Alarm Codes” in the “Control System” chapter) and the drive system is inhibited.

Once the paddles are returned to the rest position, the alarm will stop automatically (without the need to turn the machine on and off).

When the paddles are pressed, the Main machine controller (EB1) supplies a voltage to the motor proportional to the position of the paddles themselves. The acceleration ramps and maximum speed can be set via the corresponding parameters (see section “Displaying and Modifying User Modifiable Parameters” in the “Control System” chapter).

Regulation of the maximum speed can be set with the buttons (hare / tortoise) on the User interface controller (EB3).

Wiring Diagram

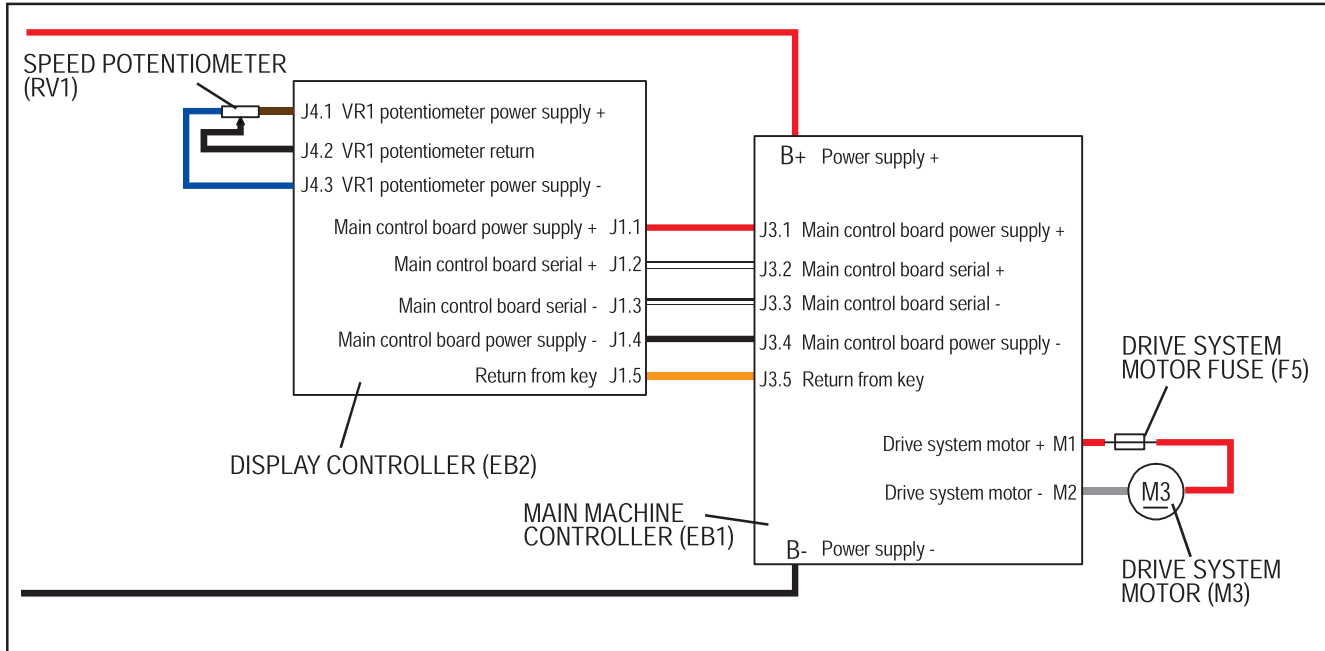


Figure 1:

Component Locations



Figure 2:



Figure 3:

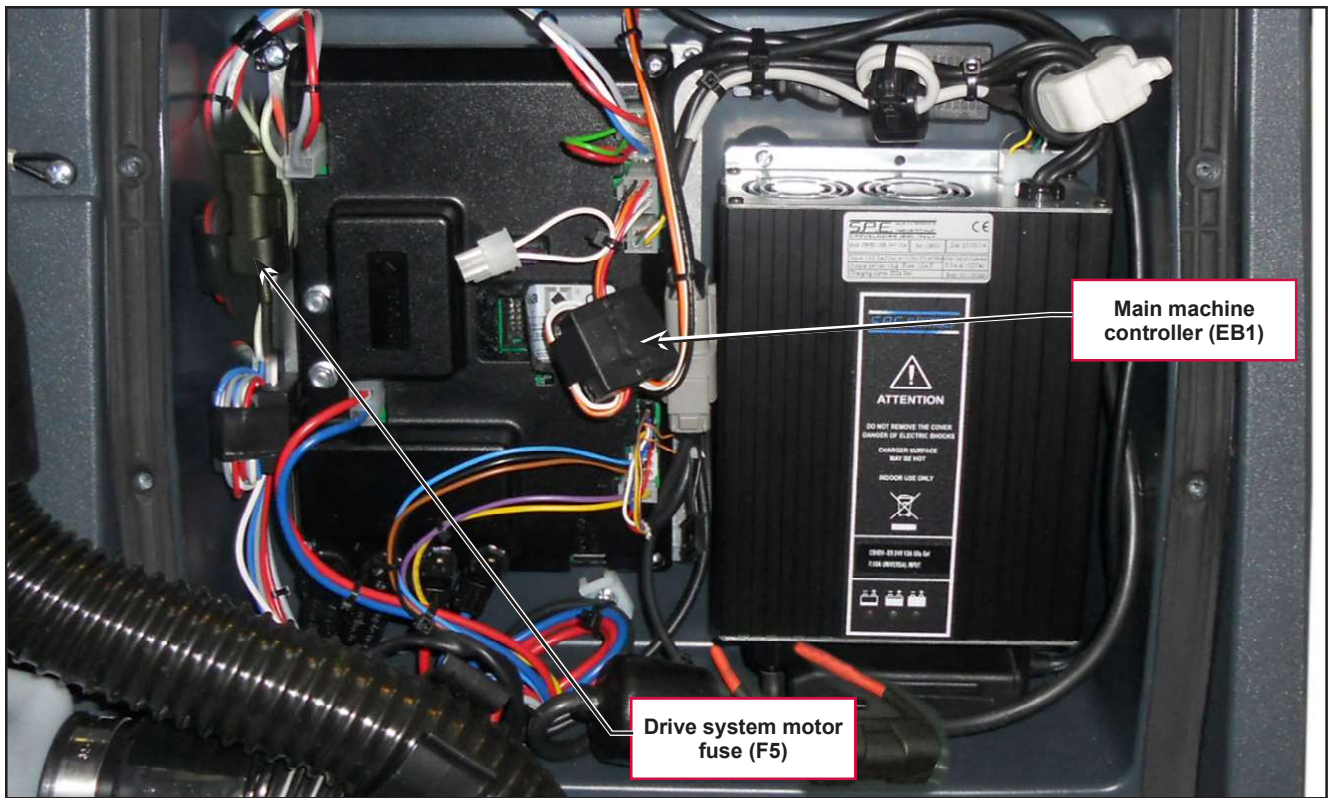


Figure 4:

Troubleshooting

Trouble	Possible Causes	Remedy
The machine does not move	Battery voltage too low	Charge the battery
	Drive system motor fuse (F5) broken	Replace
	Speed potentiometer (RV1) incorrectly regulated or broken	Replace
	Main machine controller (EB1) faulty	Replace
	Wiring damaged	Check all connections inside the electrical component compartment, included those of the Main machine controller (EB1)
	Drive system motor (M3) carbon brushes worn	Replace
	Drive system motor (M3) faulty	Replace

Drive System Gear Motor Current Draw Test



WARNING: This procedure must be performed by qualified personnel only and with the help of an assistant.

1. Drive the machine on a level floor.
2. Use a suitable chock to raise one side of the machine approximately 2cm from the floor and allow one drive wheel to turn freely.
3. Lift the recovery tank.



WARNING: Pay attention to the rotation of the driving wheel when performing the following steps.

4. Apply the amp clamp on the positive cable (red) of the battery wiring harness.
5. Turn on the machine and activate forward drive at maximum speed via the paddle, checking that the current draw falls within the following values:
 - Between 3 and 7A at 24V for AMER gear motor
 - Between 4 and 8A at 24V for TEKNO gear motor.
6. Release the paddle.
7. Switch off the machine and remove the amperometric clamp.
8. If the amperage is higher, perform the following procedures to detect and correct the abnormal amperage:
 - Check if there is dust or debris preventing the wheel rotation.
 - If necessary, check the motor carbon brushes.
 - If necessary, disassembly the Drive motor, and check the condition of all its components.
9. If the above-mentioned procedures do not lead to a correct amperage, the gearmotor must be replaced.

Removal and Installation

Speed Potentiometer

1. Drive the machine on a level floor, remove the key, and disconnect the red battery connector.
2. Unscrew the 2 screws (A) (Figure 4).
3. Release the retaining tab (B), then lift up and remove the User interface controller cover (C).
4. Disconnect the following connections:
 - (D) Speed potentiometer connection (J4).
 - (E) Display controller power supply connection (J1).
5. Unscrew the two hex screws (F), then remove the potentiometer (G).
6. Remove and retain the connecting rod (H).

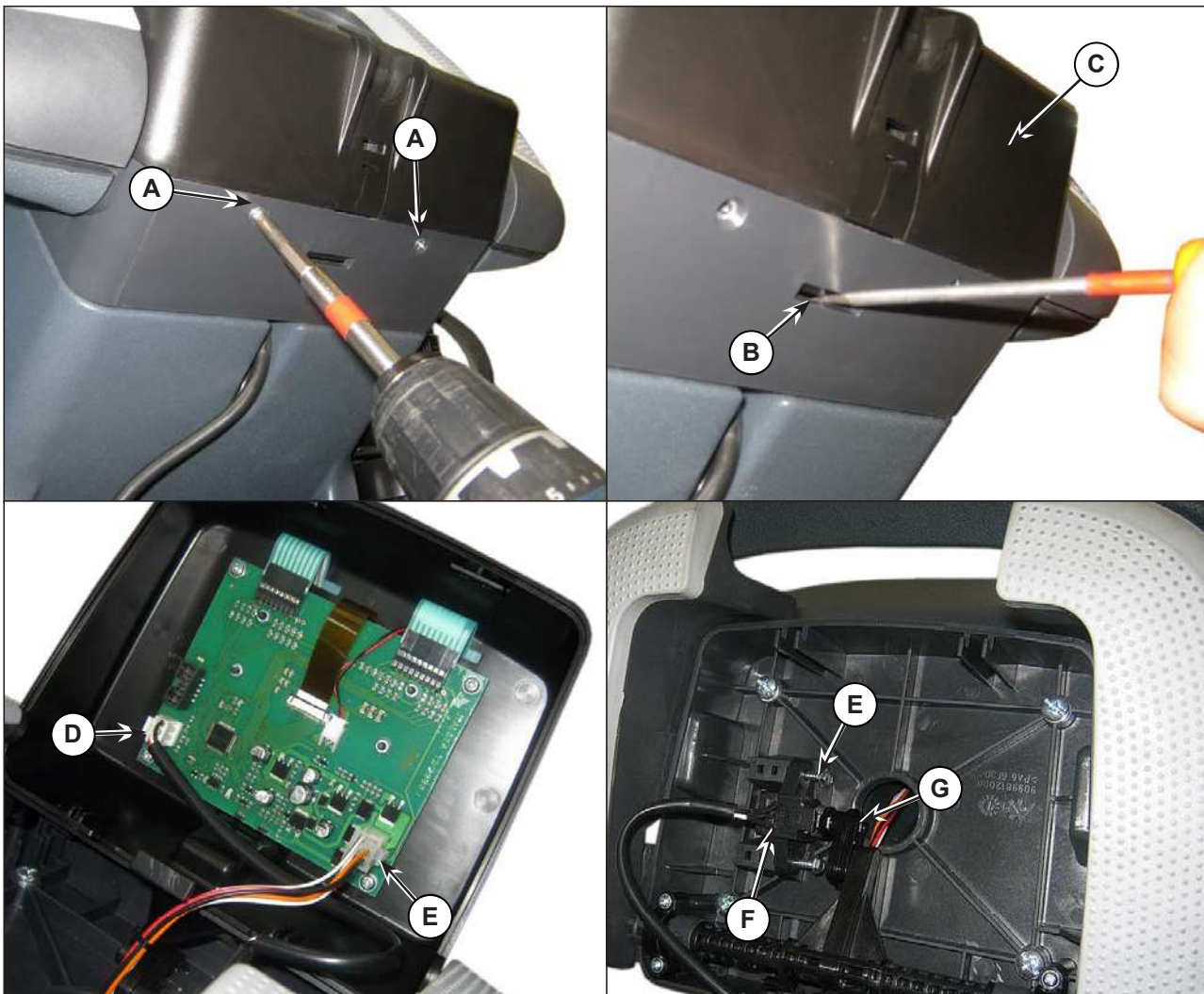


Figure 5:

Specifications

Description / Model	SC500		
	DISC	REV	
Driving wheel diameter	7.8 in (200 mm)		
Driving wheel specific pressure on the floor (*)	101 psi (0.7 N/mm ²)		
Rear wheel diameter	3.1 in (80 mm)		
Rear wheel specific pressure on the floor (*)	304 psi (2.1 N/mm ²)		
AMER electric wheel drive unit technical data	Power	0.27 hp (200 W)	
	Voltage	24V	-
	Transmission ratio	13:1	-
	Protection class	IP44	-
	Insulation class	F	-
TEKNO electric wheel drive unit technical data	Power	-	0.27 hp (200 W)
	Voltage	-	24V
	Transmission ratio	-	11:4
	Protection class	-	IP44
	Insulation class	-	F
Drive speed (variable)	0 - 3.1 mi/h (0 - 5 km/h)		
Maximum gradient when working	2% (1.14°)		

(*) Machines have been tested under the following conditions:

- Battery maximum size
- Maximum brush and squeegee size
- Full detergent tank
- Optional equipment installed
- Wheel weight checked
- Print on the floor checked on cement for each single wheel
- Result expressed as maximum value for both front and rear wheels

24 - Electrical System

Functional Description

With Conventional Lead/Acid Batteries

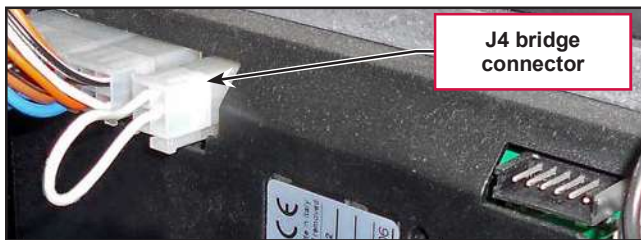
The batteries (2 x 12V) are connected together in series by the cables.

The battery charger (CH) is connected to the machine by two connectors (C) (power connection to the batteries) and C3 (4-way signal connection).

The grey and white cables (1 and 2 of connector C3) are short circuited inside the battery charger CH when this is not connected to the mains. If this connection is not made, all machine functions are disabled.

If the optional battery charger has not been installed, the relevant bridge must be used on connector C3.

The “bridge” is installed at the Main machine controller J4 location as shown in a photo below.



The green cable (terminal 4 of connector C3) is the data cable between the Main machine controller (EB1) and battery charger (CH).

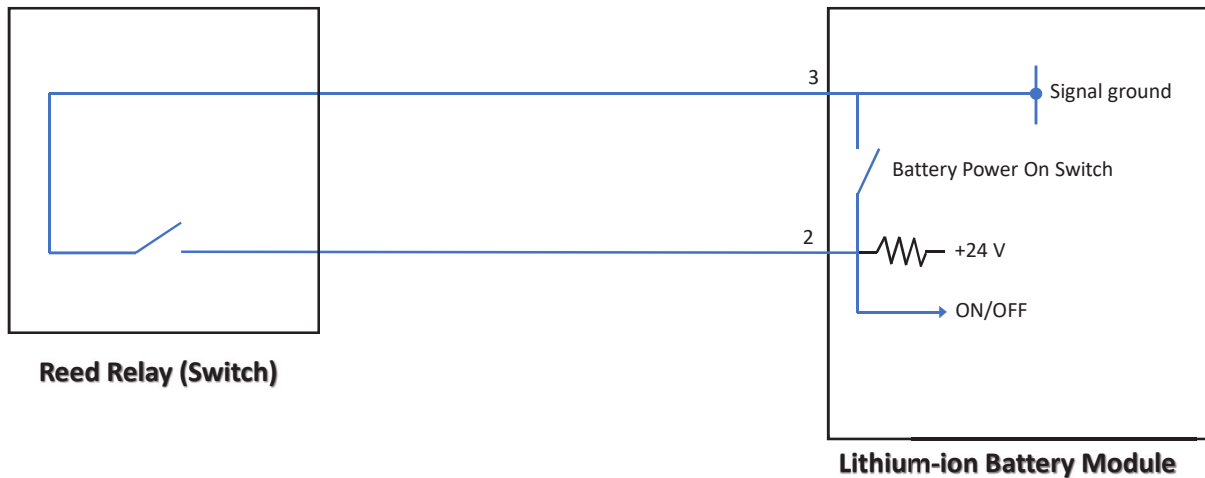
This connection allows the battery charger charging curve to be set directly from the User interface controller and to view the operational state of the battery charger during charging directly on the Display controller.

With Lithium-Ion Batteries

One to three, 24 volt Nilfisk Lithium-Ion battery modules may be installed in the machine to replace the conventional lead/acid batteries. These Lithium-ion battery modules can only be installed as part of an authorized Nilfisk kit or by the Nilfisk factory as changes are extensive and go beyond simply replacing the batteries. The modules themselves are more than just a chemical energy storage cell. They also contain a Battery Management System (BMS) that is responsible for connecting the internal battery source to the external power terminals when it is safe to do so. See the Nilfisk Lithium-Ion Battery Module service manual 56043180 for more information on the battery modules.

Powering on the machine

The battery modules must power on before the machine can be powered on. To power on the battery modules the on/off circuit of one of the modules must be connected to ground. The battery module sends 24V through a pull up resistor, out of pin 3 of the M12 round connector, to a reed switch located behind the magnetic key reader. When the key is inserted in the reader, the reed switch closes to connect the 24V on the line to ground, which causes the voltage to drop to 0 V. This is the signal for the battery module(s) to turn on. Once the battery module(s) are active, power is supplied to the EB1 Main Control Board.



Battery Charger

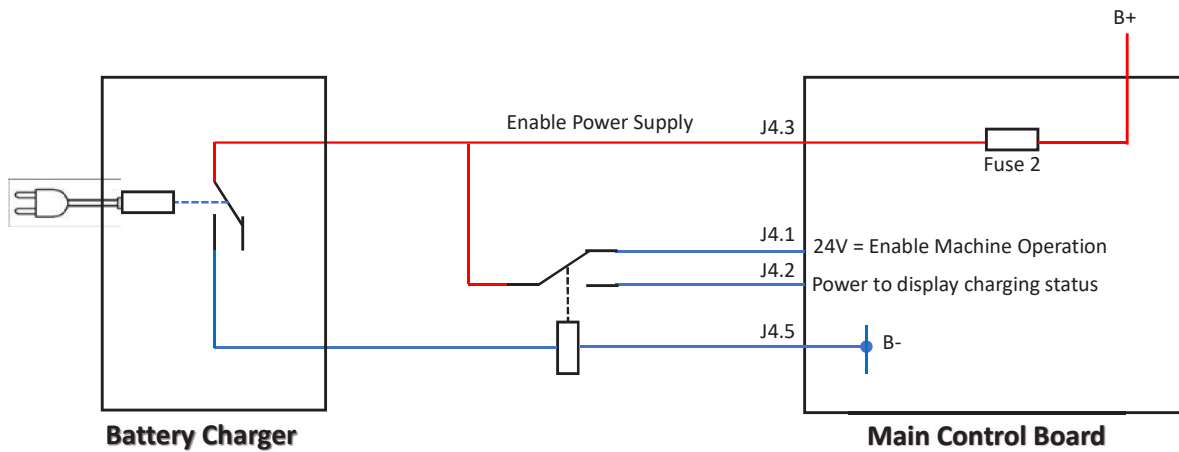
With Conventional Lead/Acid Batteries

When the battery charger (CH) is connected to the power supply, it removes power from J4.1 and provides a + 24V on J4.2: in this condition the Main machine controller (EB1) disables all the control and functions except the battery status indicator on the Display controller (EB3).

With Lithium-Ion Batteries

When Lithium-ion battery modules are installed, they are installed with the properly matched on-board battery charger. No other battery charger may be used.

The battery charger has an internal interlock circuit which is used to control an external relay which is added to the machine as part of the Lithium-Ion Battery kit. The additional external relay carries the current rather than the relay contacts inside the charger. A simplified schematic is shown below. When the external relay is not energized, positive battery power flows out J4.3 to the relay common terminal. It then flows out the relay's normally closed contact to J4.1. This "enables" normal machine operation. When the battery charger is plugged in, the battery positive "enable power supply" is used to energize the external relay. When this happens battery positive power is removed from J4.1 and transferred to J4.2 which will disable the machine operation so that it cannot propel itself when the battery charger is plugged in. The power in J4.2 allows the control panel display to be on to communicate charging status information.



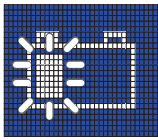
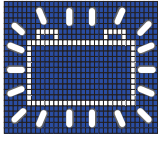
Low voltage cut out

With Conventional Lead/Acid Batteries

The Main machine controller (EB1) shuts off electrical loads to protect the batteries from damage caused by over discharging.

The voltage threshold where loads are turned off depends on the battery type. See table below.

Significant levels for machine operation

	INDICATION	TRANSITION THRESHOLD (VOLT)		CONSEQUENCE
		WET	GEL	
1		22V	22.2V	Little remaining run time, no block.
2		20.4V	21.6V	Brush OFF
3		19.4V	20.6V	Vacuum system OFF
4		18.4V	19.6V	Drive system OFF

With Lithium-Ion Batteries

The Battery Management System, which is an internal part of the Lithium-ion battery module, monitors the battery state of charge and will disconnect the internal battery cell block from the external power terminals to prevent damage from over discharging. If all battery modules shut down due to low voltage, the machine will be powered off and there will be no indication on the control panel.

Wiring Diagram

Battery charger circuits with conventional Lead/Acid Batteries

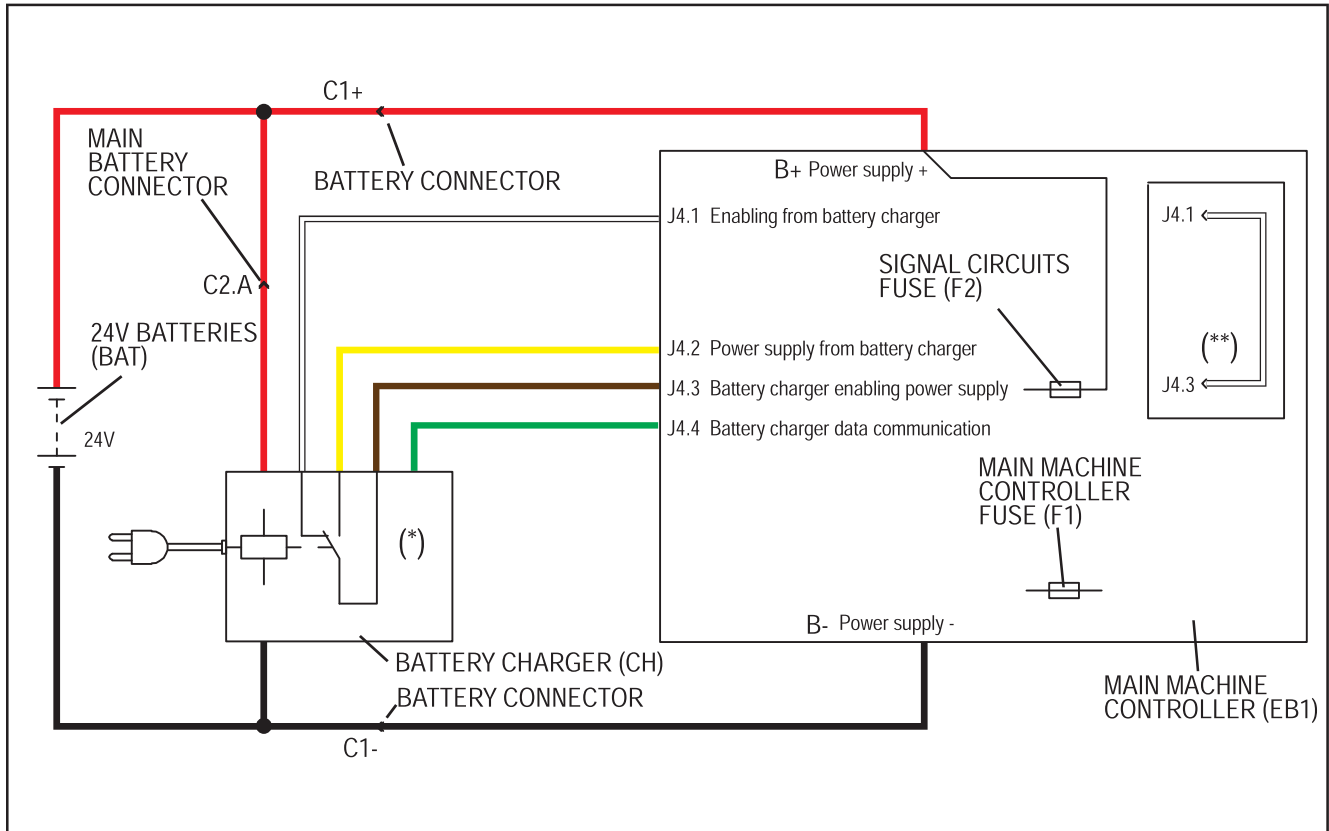


Figure 1:

(*) Optional for BASIC version

(**) Version without on-board battery charger

Battery charger circuits with Lithium-Ion batteries

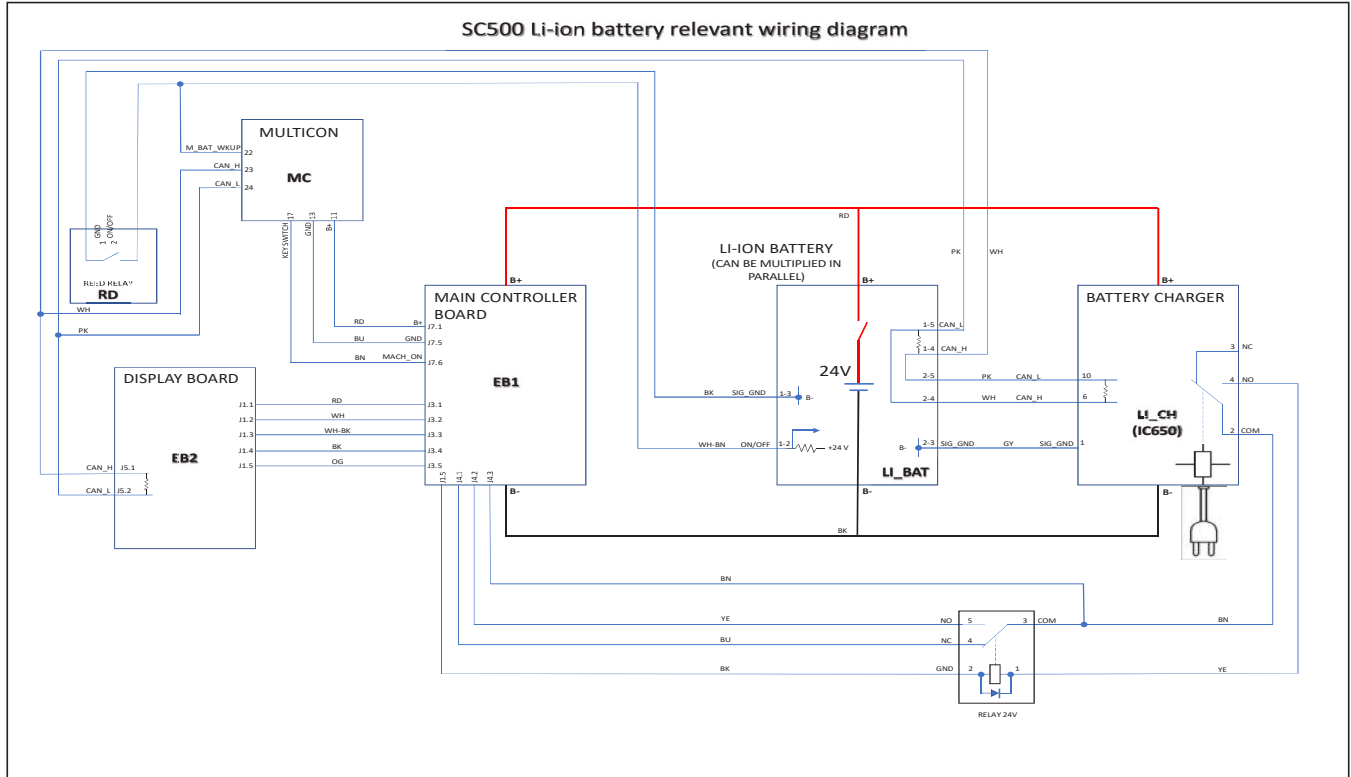


Figure 2:

Component Locations

With Conventional Lead/Acid Batteries

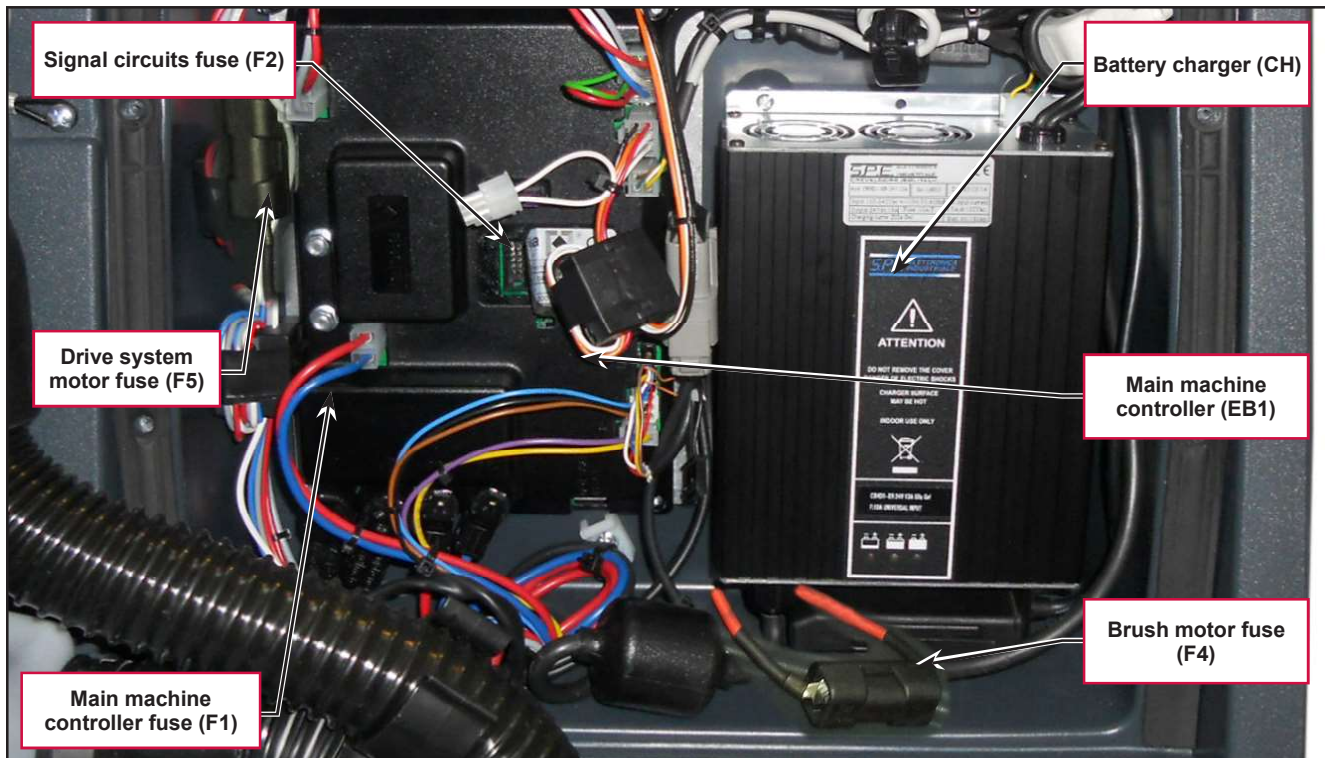


Figure 3:

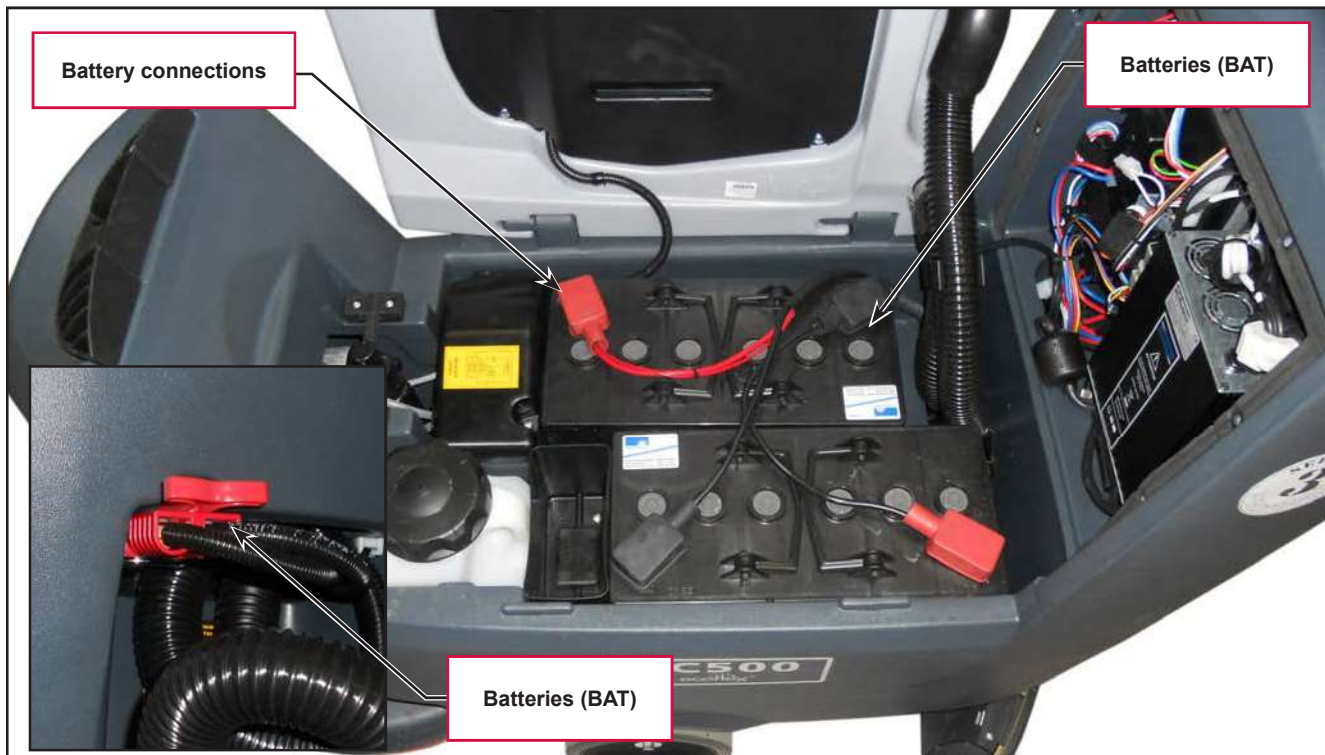


Figure 4:

With Lithium-ion Batteries

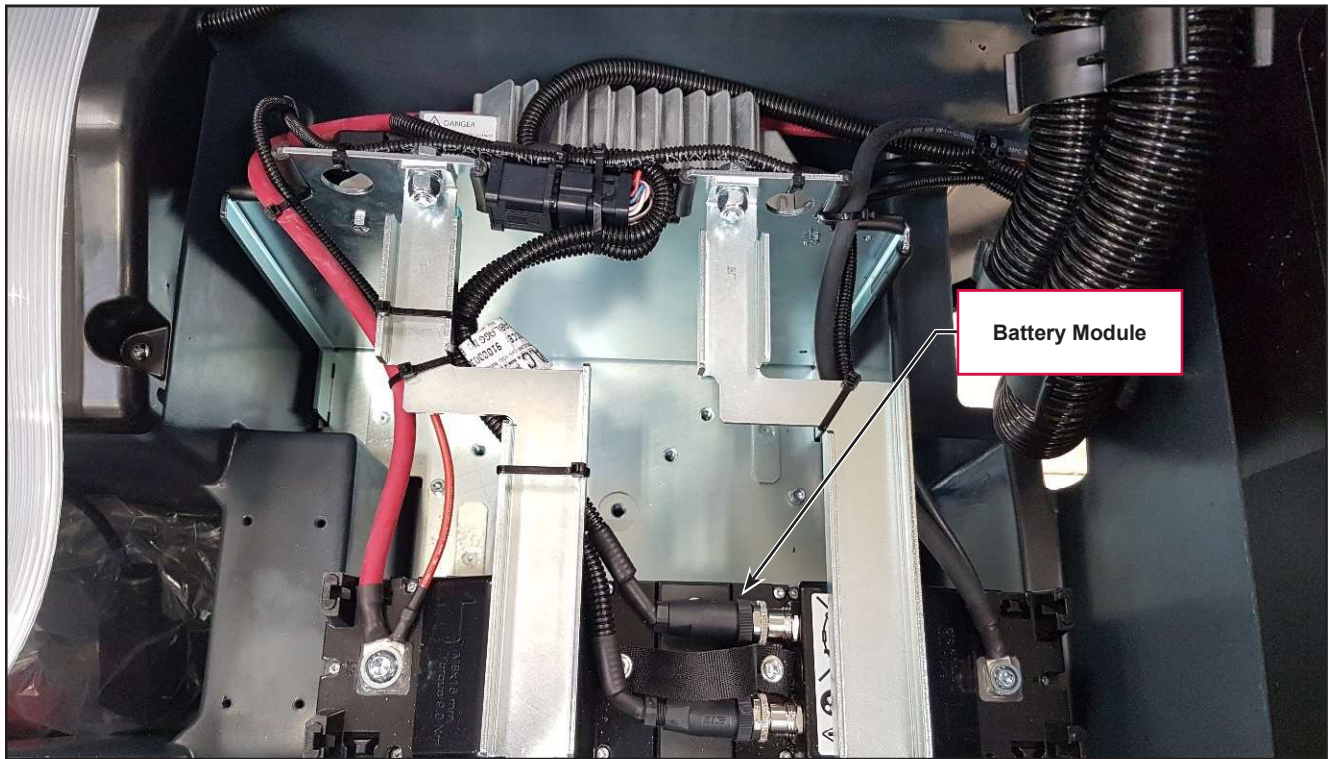


Figure 5:

Maintenance and Adjustments

Setting the Installed Battery Type

Set the machine and the on-board battery charger (where fitted) on the basis of the type of battery to be installed by modifying the BAT parameter as indicated.

1. Insert the “Supervisor” key (grey) in place of the “User” key (blue) to access the main screen (Figure 4) of the display.

2. Press the One-Touch button  to continue to the machine settings screen (Figure 5).





Figure 6:




Figure 7:

3. Press the One-Touch button  until you reach the BAT parameter.

MODIFIABLE PARAMETERS				
Code	Description	Min. Value	Factory Setting	Max. Value
BAT	Installed battery type	0	1	6

4. Press the “hare”  or “tortoise”  button to modify the value of the BAT parameter as per the following table:

Code BAT			
Value	Installed battery type		Note
0	WET	Wet cell batteries	
1	GEL / AGM	Generic GEL or AGM batteries	
2	GEL DISCOVER	DISCOVER® brand GEL batteries	
3	GEL OPTIMA	OPTIMA brand GEL batteries	
4	GEL EXIDE	EXIDE®/SONNENSHINE brand GEL batteries	
5	GEL FULLRIVER	FULLRIVER® brand GEL batteries	
6	NEXSYS	NEXSYS® type batteries ENERSYS® brand	Starting from S/N XXXXXXXXXXXX
7	Lilon	Nilfisk Lithium-ion battery module(s)	

5. Press the brush release button  to confirm the chosen parameter and return to the main screen.

Disconnect/Connect Lithium-Ion Batteries



CAUTION: Connections to lithium-ion batteries are not the same as a lead-acid batteries partly due to the CAN communication connections. Disconnect and reconnect lithium-ion battery cabling in the order given below to prevent damage to the batteries.

Disconnection

1. Power off the machine
2. Turn off battery modules
3. Separate the machine power connector
4. Disconnect the Battery Positive Cable
5. Disconnect the M12 round communication connection
6. Disconnect the Battery Negative Cable
7. Remove the termination resistor connector if present.

Connection

1. Connect the Battery Negative cable
2. Connect the M12 round communication connection
3. Connect the Battery Positive cable
4. Install the termination resistor connector if required
5. Connect the machine power connector
6. Power on the battery modules
7. Power on the machine

Battery Charging - Conventional Lead/Acid Batteries



Note: Charge the batteries when there is only one flashing segment displayed in the battery symbol, or at the end of each shift. Keeping the batteries charged make their life last longer.



CAUTION: When the batteries are discharged, charge them as soon as possible, as that condition makes their life shorter. Check for battery charge at least once a week.



CAUTION: If the machine is not equipped with on-board battery charger, choose an external battery charger suitable for the type of batteries installed.



WARNING: When using lead (WET) batteries, battery charging produces highly explosive hydrogen gas. Charge the batteries in well-ventilated areas and away from naked flames. Do not smoke while charging the batteries. Keep the recovery tank raised until the battery charging cycle is over.



WARNING: Pay close attention when charging WET CELL batteries, as there may be battery fluid leakages. The battery fluid is corrosive. If it comes in contact with skin or eyes, rinse thoroughly with water and consult a physician.

1. (For WET CELL batteries only) Check the level of electrolyte inside the batteries. If necessary, unscrew the caps and top up.
2. When the correct level is restored, close the caps and clean the tops of the batteries.

Charging Conventional Lead/Acid Batteries with an External Battery Charger

3. Check that the external battery charger is suitable by referring to the relevant Manual. The battery charger voltage rating must be 24V.
4. Disconnect the red battery connector with handle and connect it to the external battery charger.
5. Connect the battery charger to the electrical mains.
6. After charging, disconnect the battery charger from the electrical mains and from the battery red connector.
7. Connect the battery connector to the machine.
8. Carefully lower the recovery tank.



CAUTION: Never connect the battery charger to the opposing part of the red connector fixed to the machine. The electronic system could be irreparably damaged.

Charging Conventional Lead/Acid Batteries with an On-board Battery Charger

9. Plug the battery charger into the mains electricity supply (the mains voltage and frequency must be compatible with the battery charger values shown on the machine serial number plate).



Note: When the battery charger is connected to the electrical mains, all machine functions are automatically cut off.

10. When the first or second segment from the left in the battery symbol is flashing, this means that the battery charger is charging the batteries.
11. When the third segment from the left in the battery symbol is flashing, this means that the battery charger is finishing the battery charging cycle.
12. When all segments of the battery symbol are steadily lit, the battery charging cycle is complete.
13. Disconnect the battery charger plug from the mains and place it in its holder.
14. Carefully lower the recovery tank.



Note: For further information about the operation of the battery charger, see the relevant Manual.

Removal and Installation

Conventional Lead/Acid Batteries

1. Remove the ignition key, and disconnect the red battery connector.
2. Lift the recovery tank cover and check that it is empty; if not, empty it using the drain hose.
3. Grasp the handle and carefully lift the recovery tank.
4. The machine is supplied with cables suitable to install 2 12V batteries.
5. Carefully lift the batteries until the relevant compartment, then place them properly.
6. Route and install the battery cable as shown in the diagram (Figure 6), then carefully tighten the nut on each battery terminal.
7. Place the protection cap on each terminal, then connect the red battery connector.
8. Perform a complete battery charging cycle.

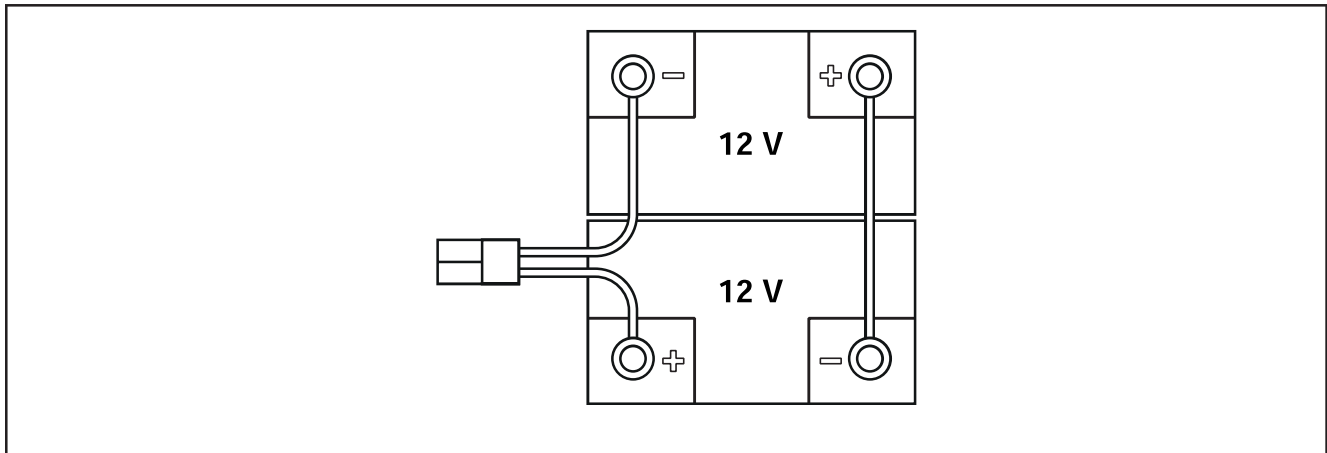


Figure 8:

Lithium-ion Batteries

Removal of a Lithium-ion Battery Module

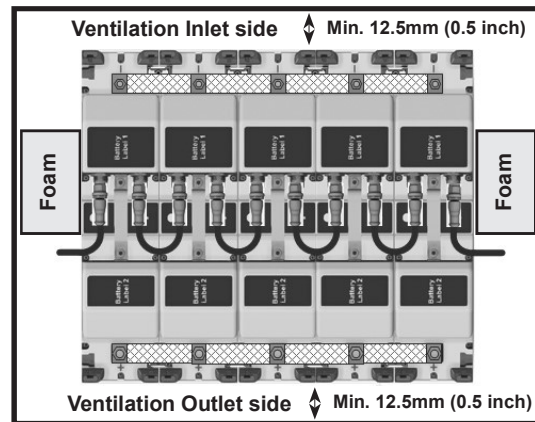
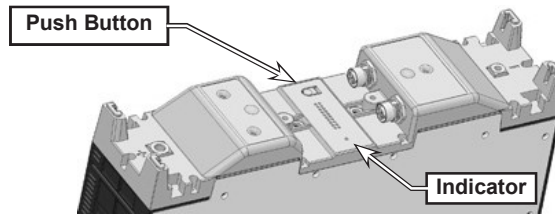


CAUTION: Review the information in the Lithium-Ion Battery Safety section in the General Information chapter before installation of battery modules, blocks, or system packs to avoid potential minor to moderate injury or equipment damage.

1. Identify and mark the battery module to be removed.



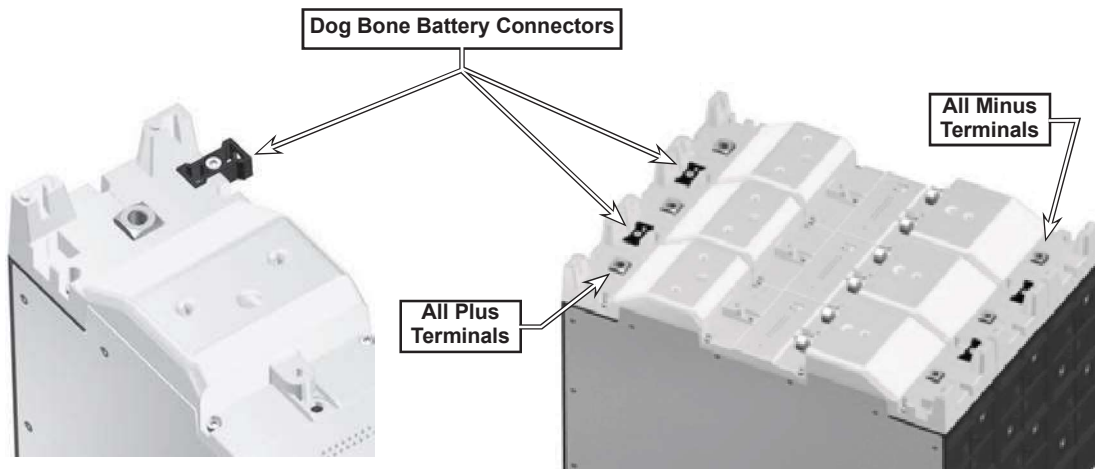
2. Shutdown the machine and verify that all the module indicator lights are extinguished. The extinguished indicators mean that there is no voltage at the terminals and the modules are safe to handle.
3. Before disconnection, become familiar with the cabling arrangement of the module, block, or system pack, as well as the ventilation spacing and any securing foam holding the batteries in place (see example at right). Make a sketch or take a photo for reference if a diagram does not already exist.



4. Separate the machine power connector
5. Disconnect the Battery Positive Cable
6. Disconnect the M12 round communication connection
7. Disconnect the Battery Negative Cable
8. Remove the termination resistor connector if present. .

CAUTION: Disconnect the battery cabling in the order given to prevent damage to the lithium-ion batteries. Connections to lithium-ion batteries are not the same as a lead-acid batteries.

9. Remove the dog bone mechanical connectors between the modules in the block with the marked modules.



10. Remove the faulty module(s). The remaining modules in the block can be pushed together and mechanically re-fastened with the dog bone connectors. The specific order of modules in a block does not matter.
11. If the removed module(s) will be replaced with an equal number of modules (in the same places), continue with Installation of a Replacement Battery Module.
12. If new, additional modules will be added to the pack:
 - See the Battery Block/Pack Guidelines section for guidelines about how to safely add new battery modules to an existing system pack.
 - Follow the general procedure in Installation of a Replacement Battery Module to install the new module(s).

Installation of a Replacement Lithium-ion Battery Module



CAUTION: Review the information in the *Lithium-Ion Battery Safety* section in the *General Information* chapter before installation of battery modules, blocks, or system packs to avoid potential minor to moderate injury or equipment damage.

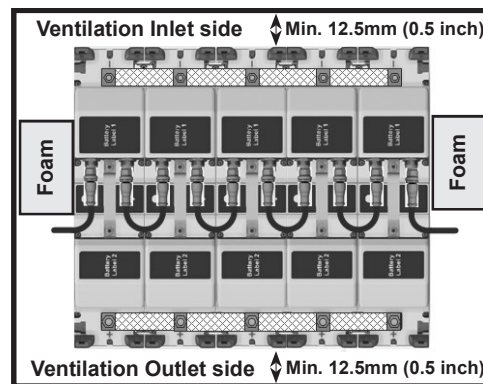


CAUTION: Electrically connect only same-voltage modules and only in parallel. Never connect them in series.

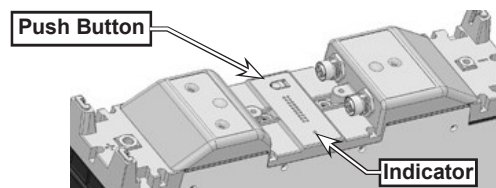


Note: When installing the battery, do not mount the Lithium-Ion Battery upside down or on the sides for air-flow. Do not cover or block the fan or air outlet to ensure the battery does not overheat.

1. Before the install of a new battery module, verify that the module does not have any conditions that may prevent normal operation. Press the push button on the stand-alone module. After startup, the indicator should display steady green. If the indicator displays blinking red, the module has an irreversible condition and cannot be used.
2. Verify that the new module's communication baud rate is compatible with the machine. Follow the Adjust Battery Baud Rate procedure in the Functional Description chapter to determine and adjust the new module's baud rate. (New battery modules a shipped with the Baud rate set to 250 kbps and Nilfisk machines usually use a 250 kbps baud rate except the SC50, which uses a 500 kbps rate.) If desired, check the baud rate of an existing module to verify the correct rate.
3. Before battery disconnection, become familiar with the cabling arrangement of the module, block, or system pack, as well as the ventilation spacing and any securing foam holding the batteries in place (see example below). Make a sketch or take a photo for reference if one does not already exist, including termination resistors.

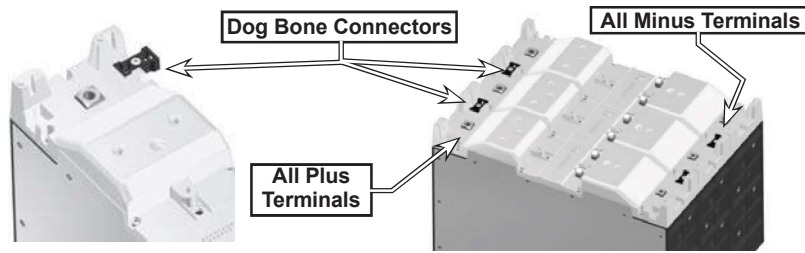


4. Verify that the machine, all the already-installed battery modules, and the new modules are powered down. When the modules are powered down the indicator light in the top, center of them are extinguished. This means there isn't any voltage at the terminals and the modules are safe to handle.



CAUTION: Connect the battery cabling in the order given in to prevent damage to the lithium-ion batteries. Connections to lithium-ion batteries are not the same as a lead-acid batteries.

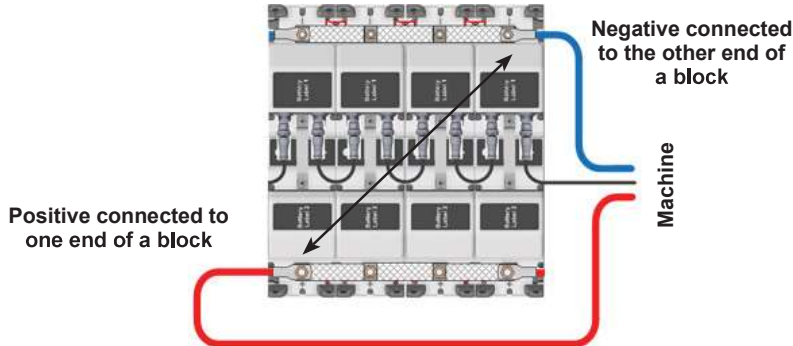
5. Place the replacement module alongside the block that had an old module removed and use the dog bone mechanical connectors that came with the module to fasten it to the block. The specific order of modules in a block does not matter.



6. Connect the cabling in the following order:
 - a. Connect the Battery Negative cable. Use a torque wrench to tighten the negative terminal M6 bolts to 2.9 lbf-ft (3.9 Nm).
 - b. Connect the M12 round communication connection
 - c. Connect the Battery Positive cable. Use a torque wrench to tighten the positive (+) terminal M8 bolts supplied with the module to 6.6 lbf-ft
 - d. Install the termination resistor connector if required
 - e. Connect the machine power connector
 - f. Power on the battery modules
7. Power on the machine



Note: The power cabling must be connected diagonally across the blocks as shown below.



8. Start up the machine.
9. Verify that the battery pack is in node ID configuration mode. All the module indicators will display as shown below.

Indicator: Displays as shown

Led										...
Sec.	0.3	0.3								0.6

10. When the node ID configuration process is complete, verify that the module’s indicators all display in steady green (active mode) and are ready for use.

Checking/Replacing Fuses

1. Drive the machine on a level floor.
2. Remove the ignition key and disconnect the red battery connector.
3. Lift the recovery tank.
4. Remove the 7 screws and remove the electronic component compartment cover.
5. Check/replace the following fuses (Figure 7):
 - (F1) 100A midi fuse - Main machine controller (A).
 - (F2) 3A blade fuse - Signal circuits (B).
6. Place the Main machine controller assembly in its housing, tighten the mounting screws and install the electronic component compartment cover.

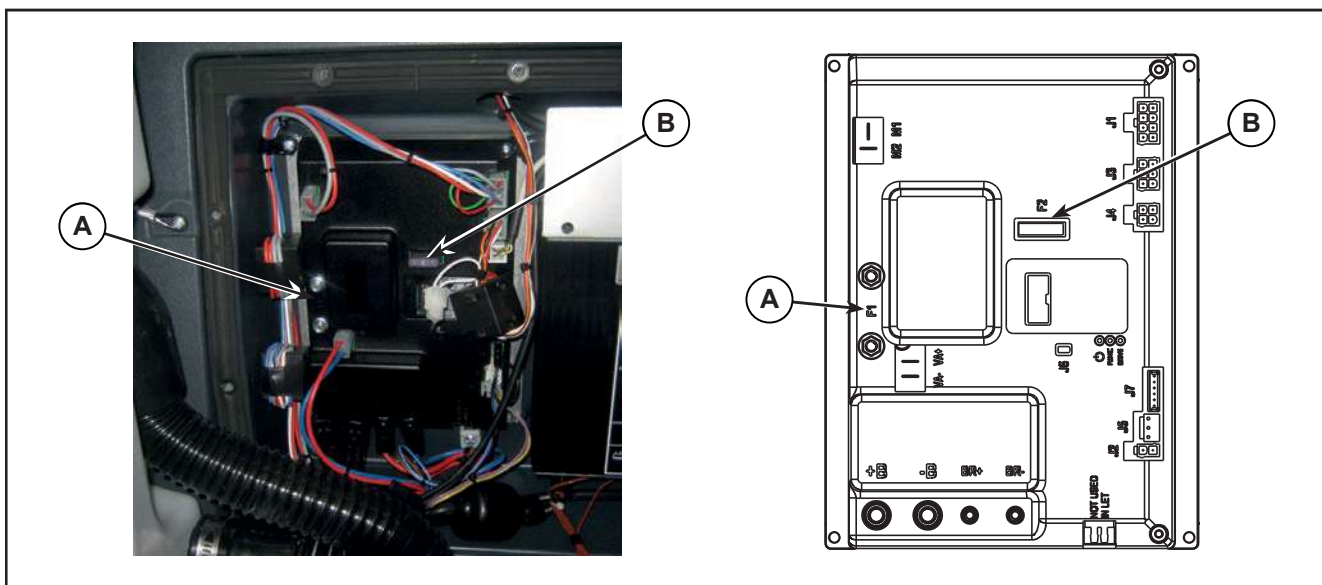


Figure 9:

7. Remove the protection cover of its fuseholder, then check/replace the following fuses (Figure 8):
 - (F4) 50A midi fuse - brush motor (C).
 - (F5) 30A midi fuse - Drive system motor (D).
8. Place the Main machine controller assembly in its housing, tighten the mounting screws and install the electronic component compartment cover.



Figure 10:

Troubleshooting

With Conventional Lead/Acid Batteries

See the other chapters for previously provided instructions for other electrical system components.

Trouble	Possible Causes	Remedy
The machine does not power on	Batteries (BAT) flat or connections faulty	Charge the batteries or clean the connections
	The batteries (BAT) are broken	Check the battery no-load voltage
	The battery charger (CH) is broken	Replace
	The wiring harness is cut or pressed or short circuited	Repair



Note: A damage to the battery charger or its connections can prevent the machine from operating properly.

With Lithium-ion Batteries

See the other chapters for previously provided instructions for other electrical system components.

Trouble	Possible Causes	Remedy
The machine does not power on	Li-ion battery modules not powering on	Use the power switch on a battery module to attempt to power on the modules.
	Reed Switch behind key reader is not closing when magnetic key is inserted	Use the power switch on a battery module to attempt to power on the modules. If they power on using a battery module switch, check the reed relay switch and its related wiring.
	The battery charger (CH) normally closed interlock relay contact is open.	Replace the charger
	The wiring harness has an open circuit	Repair

General Wiring Diagram - With key slot (Model No.: 9087352020, 9087354020, 9087350020, 9087351020, 9087353020, 9087355020)

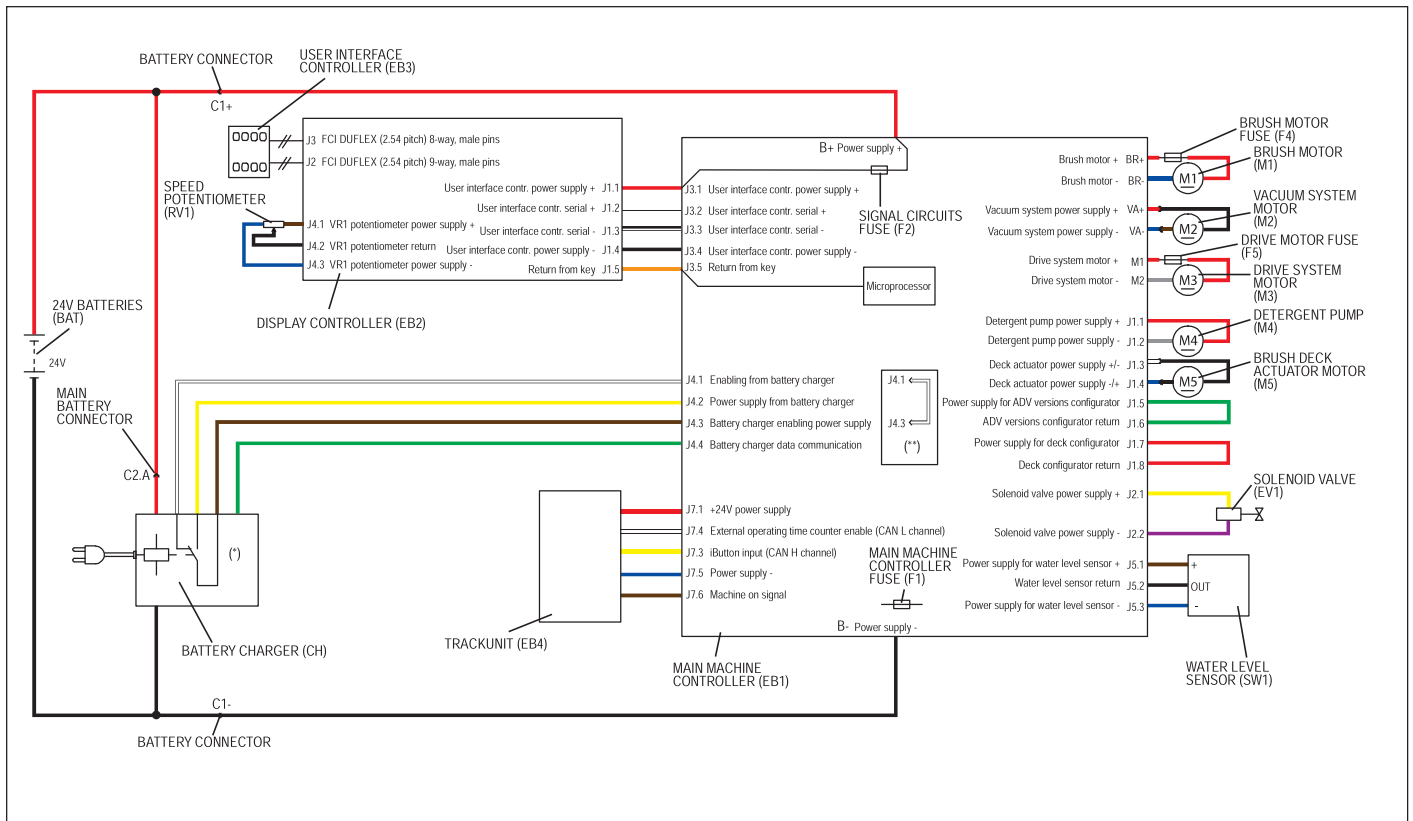


Figure 11:

(*) Optional for BASIC version

(**) Version without on-board battery charger

General Wiring Diagram - with magnetic smart key and conventional batteries

(Model No.: 9087403020, 9087404020, 9087400020, 9087401020, 9087405020, 9087402020)

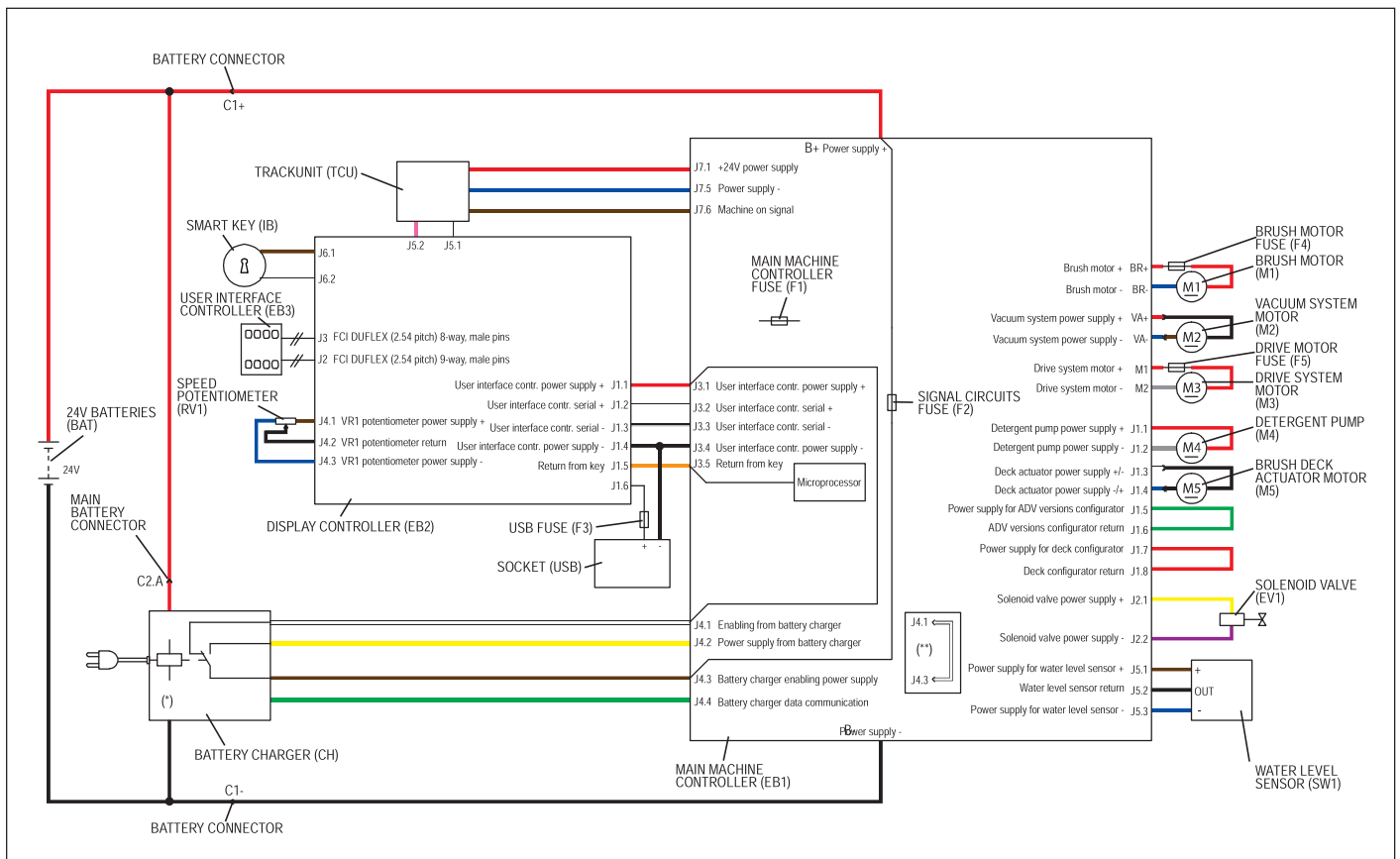


Figure 12:

(*) Optional for BASIC version

(**) Version without on-board battery charger

General Wiring Diagram - with magnetic smart key and Lithium-Ion batteries

(Model No.: 9087403020, 9087404020, 9087400020, 9087401020, 9087405020, 9087402020)

Currently, there is not an updated complete machine wiring diagram integrated with the lithium ion battery kit. Use the General Wiring Diagram for conventional batteries along with this diagram showing the circuits relevant to the Lithium-Ion battery.

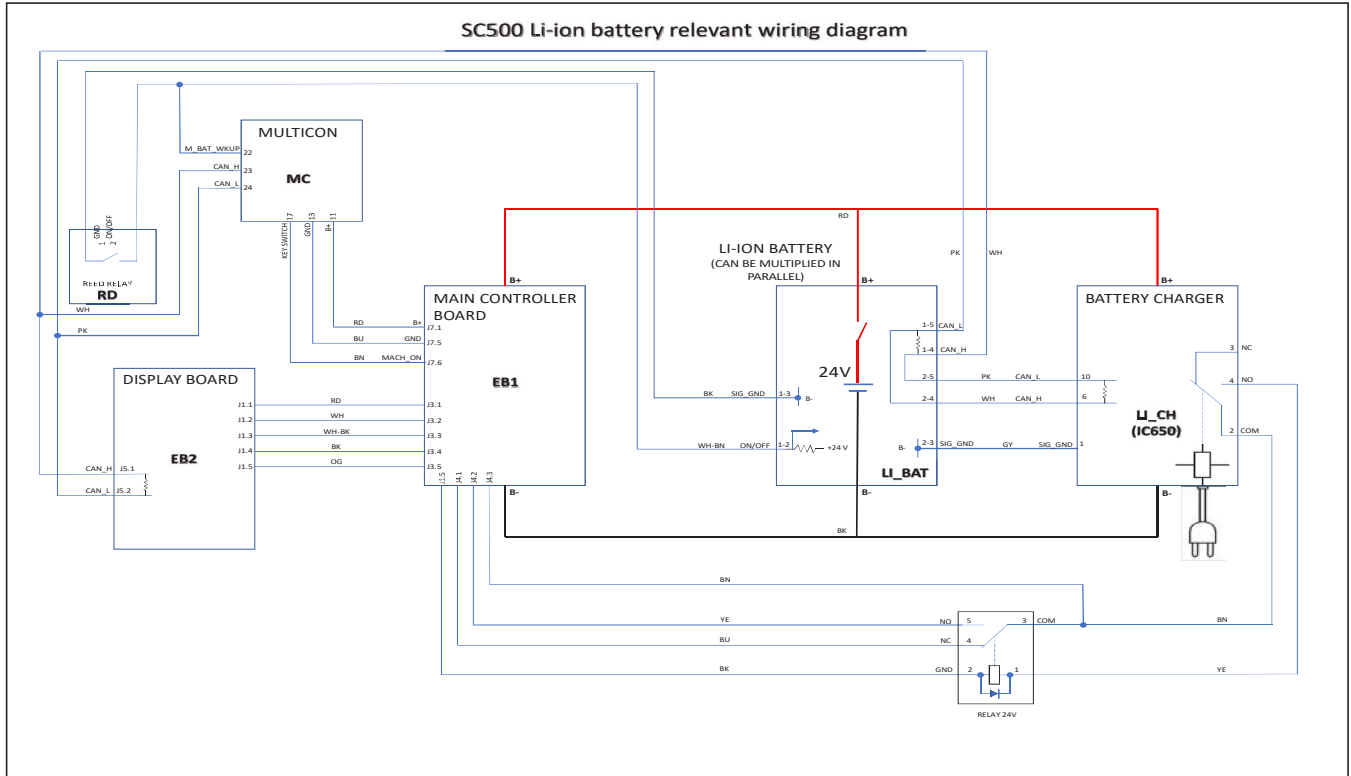


Figure 13:

Specifications

Description / Model		SC500	
		DISC	REV
Battery compartment size (length x width x height)		13.7x13.7x10.2 in (350x350x260 mm)	
Standard batteries (2)		12V 105 AhC5	
Standard battery run time (capacity)		3.5 h	
Battery charger	Model	24V 13A	
	Input voltage	85Vac÷264Vac, 50Hz÷60Hz	
	Charging procedure	by microprocessor	
	Efficiency	> 85%	
	Environmental protection class	IP30	

30 - Solution System

Functional Description

The solution system supplies water and detergent to the brush when cleaning the floor. The solution tank is also the main machine body. There is a manual valve on the left side of the tank to close the water supply whenever maintenance must be performed on the machine. The solution flows from the tank to the tap, through the filter and solenoid valve (EV1) and then to the brush deck.

The detergent pump (M4), present only on EcoFlex systems, controls the flow of detergent from the EcoFlex tank which is then transported to the flow in the main tube just before the solution enters the brush deck.

The EcoFlex system can be selected with the specific button on the User interface controller (EB3).

The quantity of detergent is defined by the operator via the buttons on the User interface controller (EB3).

Solution flow levels 1, 2 and 3 regulate the flow of detergent solution on the basis of the machine speed so as to keep the quantity of solution dispensed per square metre of floor treated constant (for further details and modifications, see the corresponding section in the chapter Control System).

Located centrally, below the tank, there is also a hole for draining any liquid in the battery compartment.

The solution flow is regulated by various timed ON / OFF cycles, according to:

- Water flow rate regulation (0 - 4)
- Solution tank level

Both the solenoid valve and detergent pump (when the EcoFlex system is enabled) follow the same timings.

The solenoid valve and detergent pump operate only with the following inputs/conditions:

- Brush function on
- Forward paddle pressed
- Battery level not in condition with flashing segments.

Water Level Sensor Operation

The water level sensor (SW1) is positioned about half the height of the solution tank so as to provide the information to the electronic system on the level of water present in the tank (more than half, less than half).

Through this information the times of opening of the solenoid valve (EV1) and the detergent pump (M4) are adjusted to maintain this flow more constant (Figure 1).

The water level sensor is capacitive with NPN output (output 0 Volt with water, floating without water).

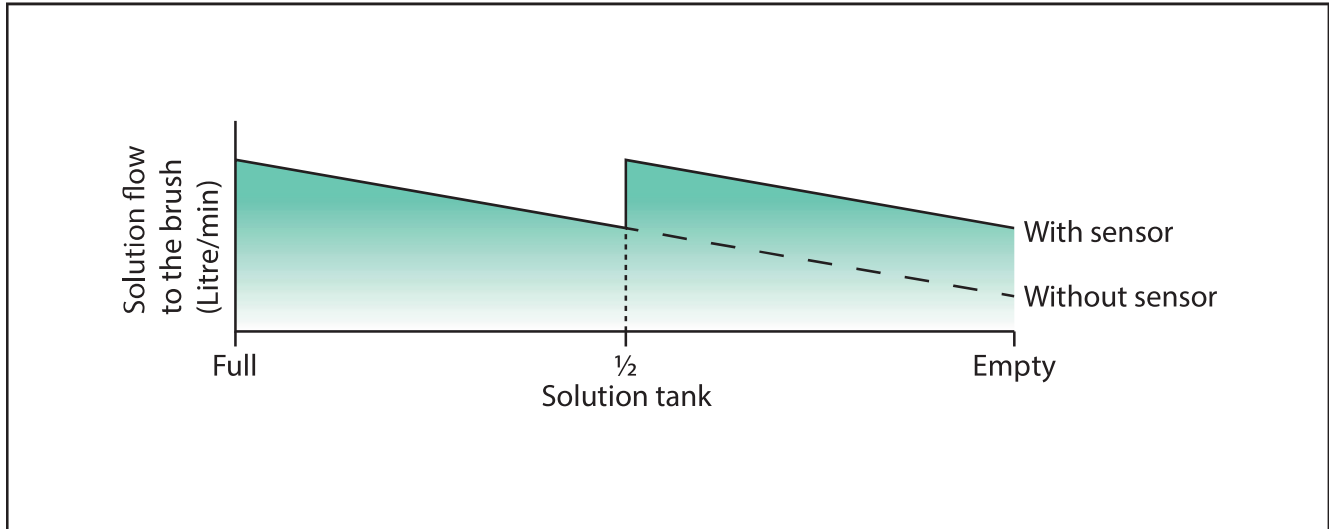


Figure 1:

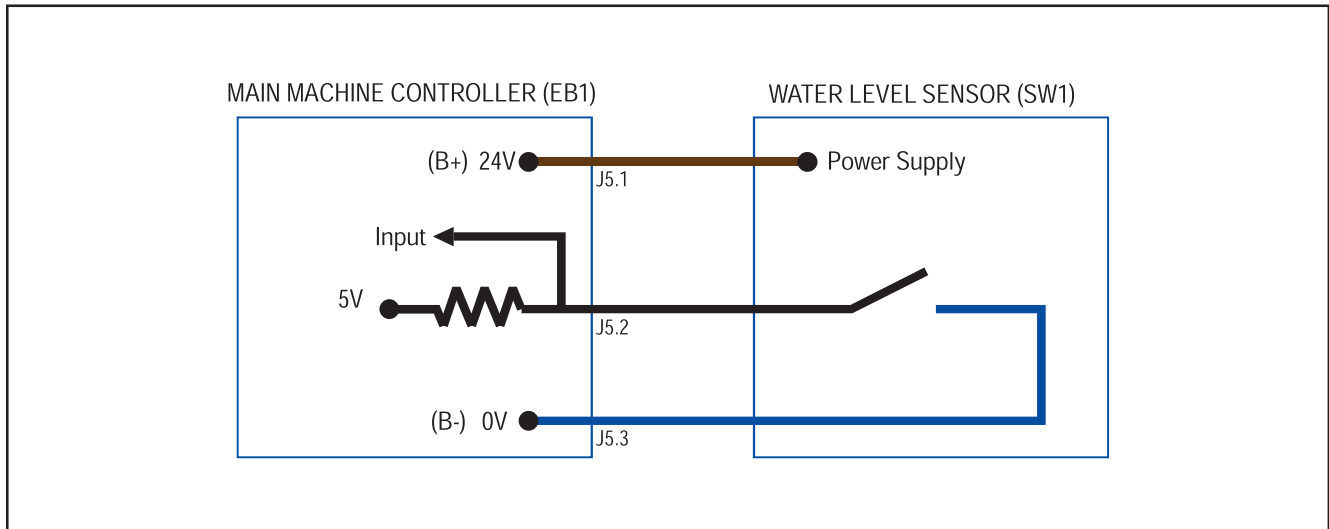


Figure 2:

Wiring Diagram

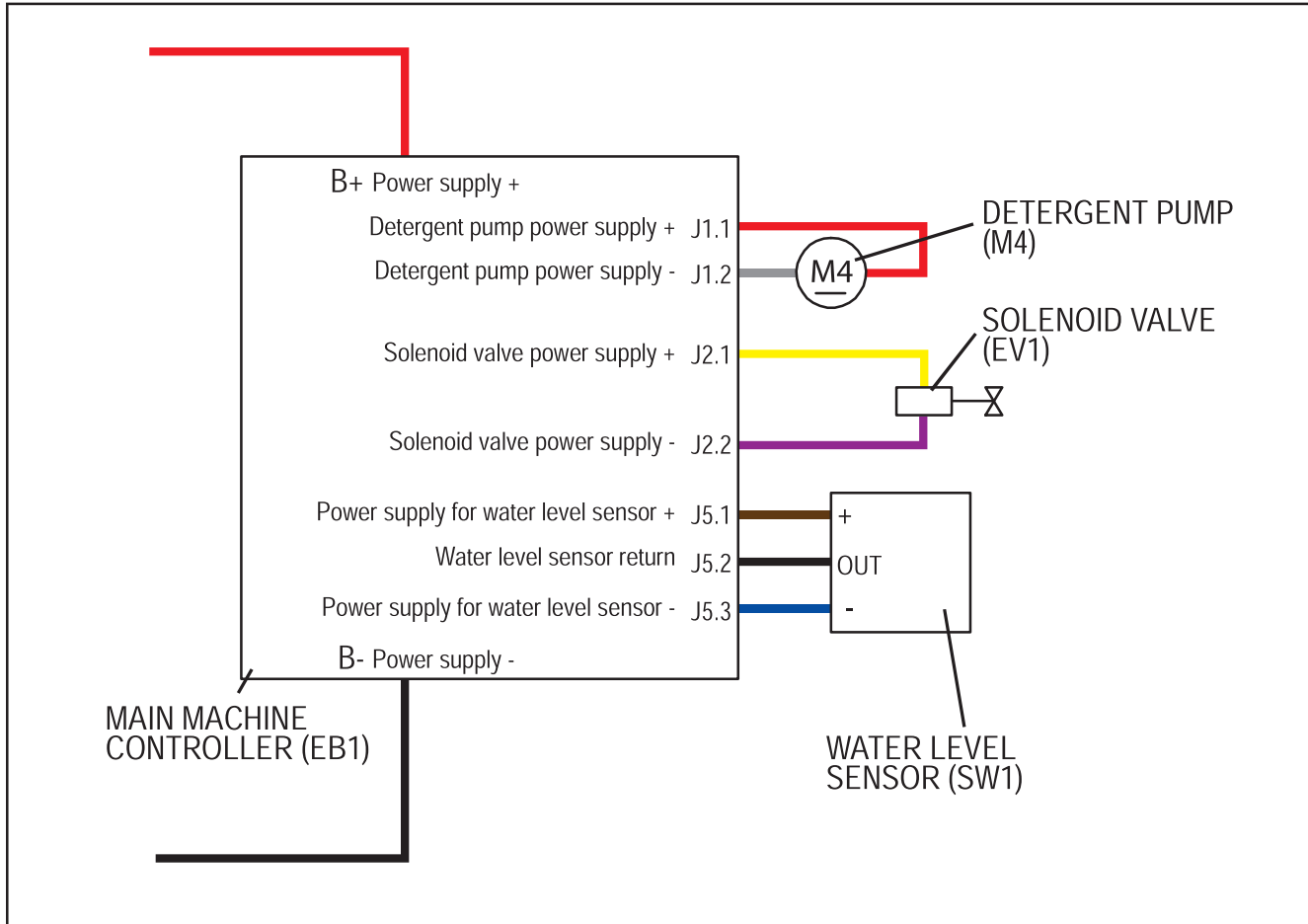


Figure 3:

Component Locations



Figure 4:



Figure 5:

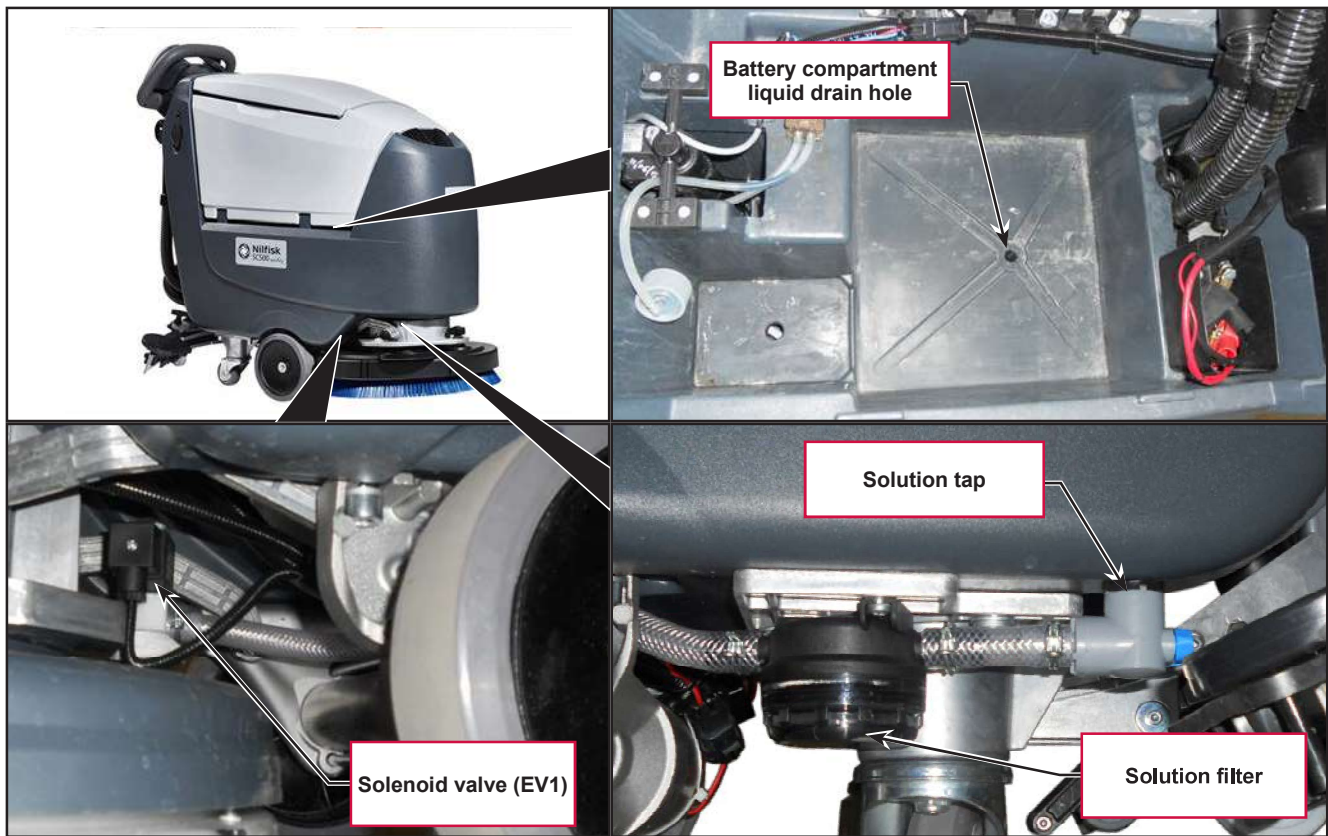


Figure 6:

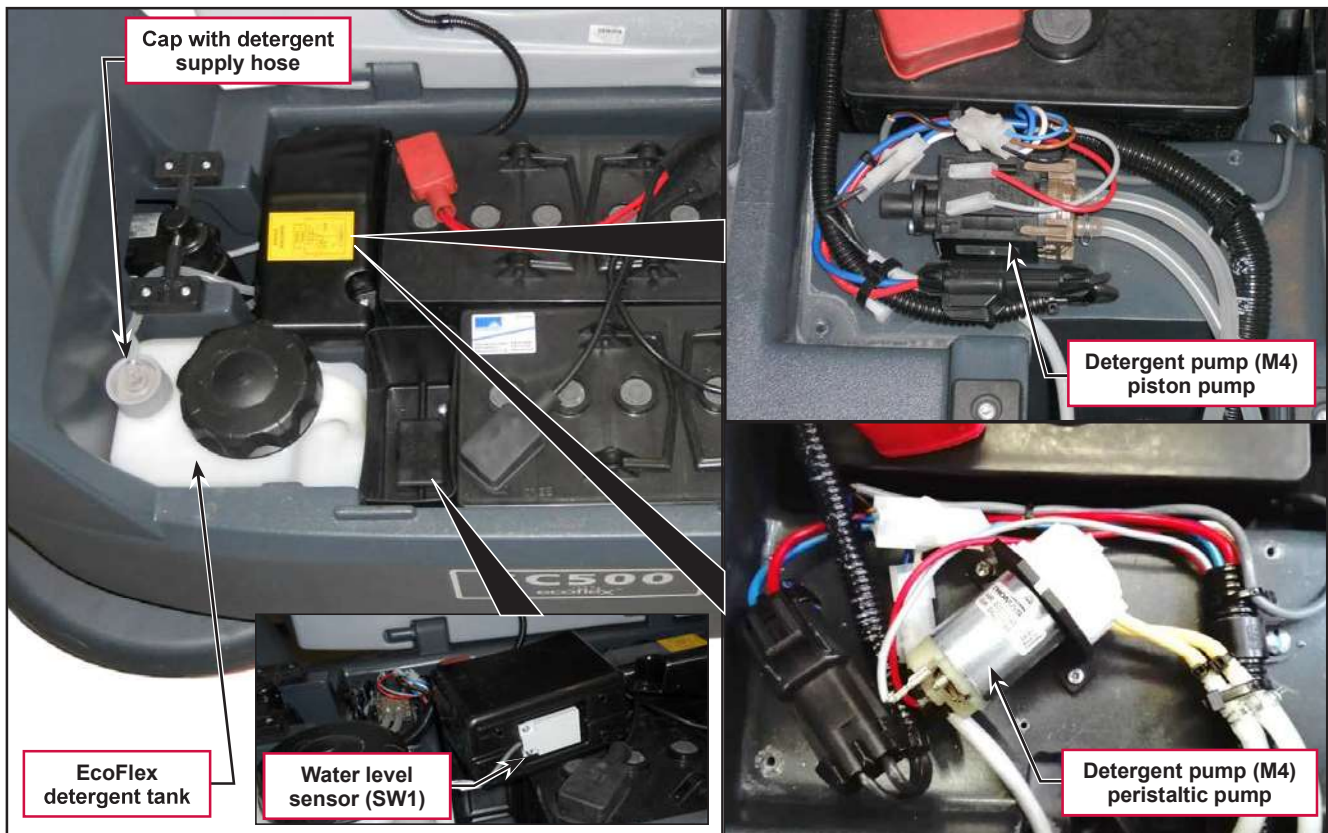


Figure 7:

Maintenance and Adjustments

Cleaning the Detergent Solution Tank and Filter

1. Drive the machine on a level floor.
2. Ensure that the machine is off and the ignition key has been removed.
3. Drain the detergent solution tank with the level hose. Then, rinse the tank with clean water.
4. Close the detergent solution valve (A) (Figure 8). The valve (A) is closed when it is in position (B) and it is open when it is in position (C).
5. Remove the transparent cover (D) and the gasket (E), then remove the filter strainer (F). Wash and rinse them, then refit them carefully onto the filter support (G).
6. Open the valve (A).

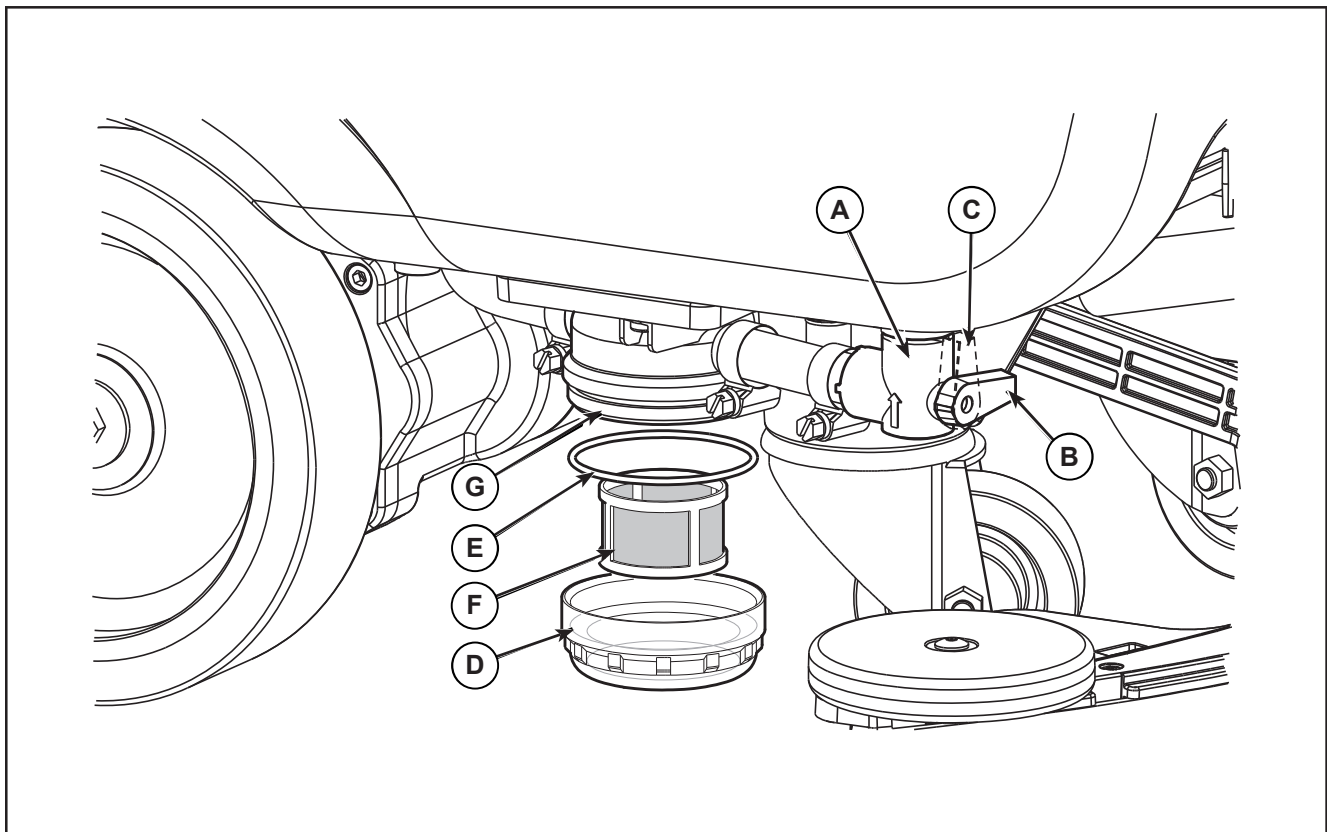


Figure 8:

Cleaning the EcoFlex Detergent Tank

Clean the detergent tank as follows.

1. Drive the machine to the appointed disposal area.
2. Ensure that the machine is off and the ignition key has been removed.
3. Lift the recovery tank cover by opening it with the handle and check that the tank is empty; if not, empty it using the drain hose.
4. Close the recovery tank cover until the handle clicks.
5. Grasp the handle and carefully lift the recovery tank.
6. Unscrew the cap (A) (Figure 9) from the detergent tank (B).
7. Remove the tank.
8. Rinse and wash out the tank in the appointed disposal area.
9. Replace the detergent tank (B) as shown in the figure, then refit the cap (A).
10. When the detergent tank has been drained, it may be necessary to drain the EcoFlex system too (see procedure in the section Draining the EcoFlex System).

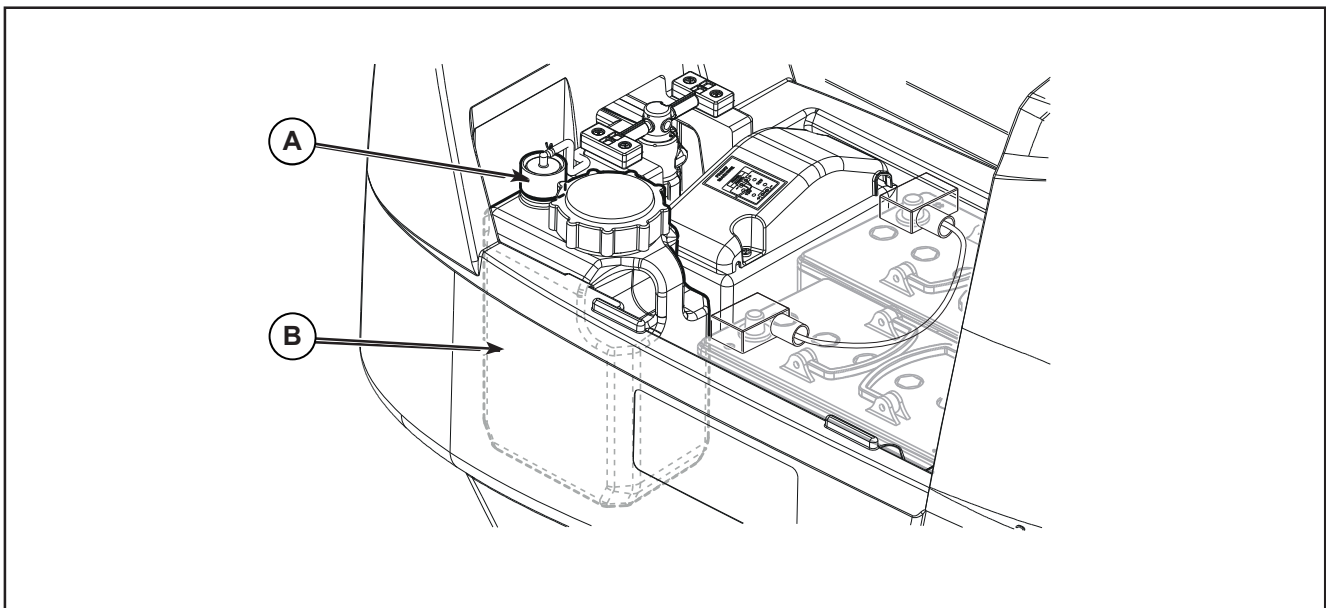










Figure 9:

Draining the EcoFlex System

Clean the detergent tank following the procedure in the previous section.


To remove residual detergent from the detergent hoses and pump, proceed as follows.



11. Turn on the machine by the key and the button .
12. Press the One-Touch button . Check that the detergent quantity indicator  on the display has at least one segment lit.
13. Press the detergent flow rate adjustment button  and the detergent percentage adjustment button  together, until the EcoFlex system drain activation screen appears on the display (after approximately 5 seconds).

14. Release the buttons  and  and wait for the countdown timer on the display to finish and the vacuum to be activated.
15. Collect the detergent remained on the floor.
16. Remove the ignition key.
17. Lift the recovery tank, then check that the detergent tank hose is empty, otherwise perform steps 3 to 7 again.



Note: The draining cycle lasts about 30 seconds, then the vacuum function automatically turns on, which allows to remove the detergent remained. The draining cycle can also be performed with the detergent tank full of water, thus cleaning the system thoroughly. It is advisable to perform this type of draining to clean the EcoFlex system from dirt and deposits if the machine has not been used/cleaned for a long time. The draining cycle can also be performed to quickly fill the detergent supply hose when the tank is full but the system is still empty. If necessary, the draining cycle can be performed several times in succession.

Troubleshooting

Trouble	Possible Causes	Remedy
Small amount of solution or no solution reaches the brush	The solution filter is clogged/dirty	Clean the filter
	Solution supply valve locked in (semi) closed position	Replace the valve
	Solenoid valve (EV1) broken or electrical connection interrupted	Replace the solenoid valve/repair the electrical connection
	Presence of debris in detergent solution tank blocking the outlet hole	Clean the tank
	Presence of debris in the detergent solution hose, blocking the passage of the liquid	Clean the hoses
	Main machine controller (EB1) faulty	Replace
	Display controller (EB2) faulty	Replace
	User interface controller (EB3) faulty	Replace
The solution reaches the brush also when the machine is off	Presence of dirt or scale in solenoid valve (EV1)	Clean the solenoid valve
	Solenoid valve (EV1) broken	Replace the solenoid valve
The EcoFlex system detergent is not reaching the brush, or is not arriving in sufficient quantity On the brush comes only water	The detergent flow percentage is too low	Check/change the percentage
	The hydraulic circuit upstream of the detergent pump is not triggered	Check if the hose is filled and, if necessary, perform one or more draining cycles
	The detergent pump (M4) is broken or there is an open in the electrical connection	Replace the pump/repair the electrical connection
	The detergent pump (M4, piston pump) is broken	Replace the detergent pump
	The head of the detergent pump (M4, peristaltic pump) is exhausted	Replace the head of the detergent pump
	The motor of the detergent pump (M4, peristaltic pump) is broken	Replace the detergent pump
	There is foreign material/debris in the detergent tank clogging the output hole	Clean the tank
	There is debris in the detergent hoses clogging the detergent flow	Clean the hoses
	The detergent flow regulation button  is not working correctly	Replace the User interface controller (EB3)
	Main machine controller (EB1) faulty	Replace
	Display controller (EB2) faulty	Replace
	User interface controller (EB3) faulty	Replace

Trouble	Possible Causes	Remedy
The EcoFlex system will not activate and the LED does not come on	User interface controller (EB3) faulty	Replace
	The Main machine controller (EB1) has not been set for operation with the EcoFlex system	If present, remove the jumper (J6) (Figure 10) on the rear of the Main machine controller (EB1)
The symbol  is displayed when the solution tank is empty	Humid fouling inside the solution tank	Washing the solution tank with clean water
	Presence of water between the water level sensor and the outer wall of the solution tank	Dry the area
	Water level sensor broken	Replace the sensor
The symbol  is displayed when the solution tank is full	Excessive distance between the water level sensor and the wall of the solution tank	Check the proper installation of the sensor
	Discontinued wiring harness	Check the wiring harness between the sensor and the Main machine controller (EB1)
	Water level sensor broken	Replace the sensor

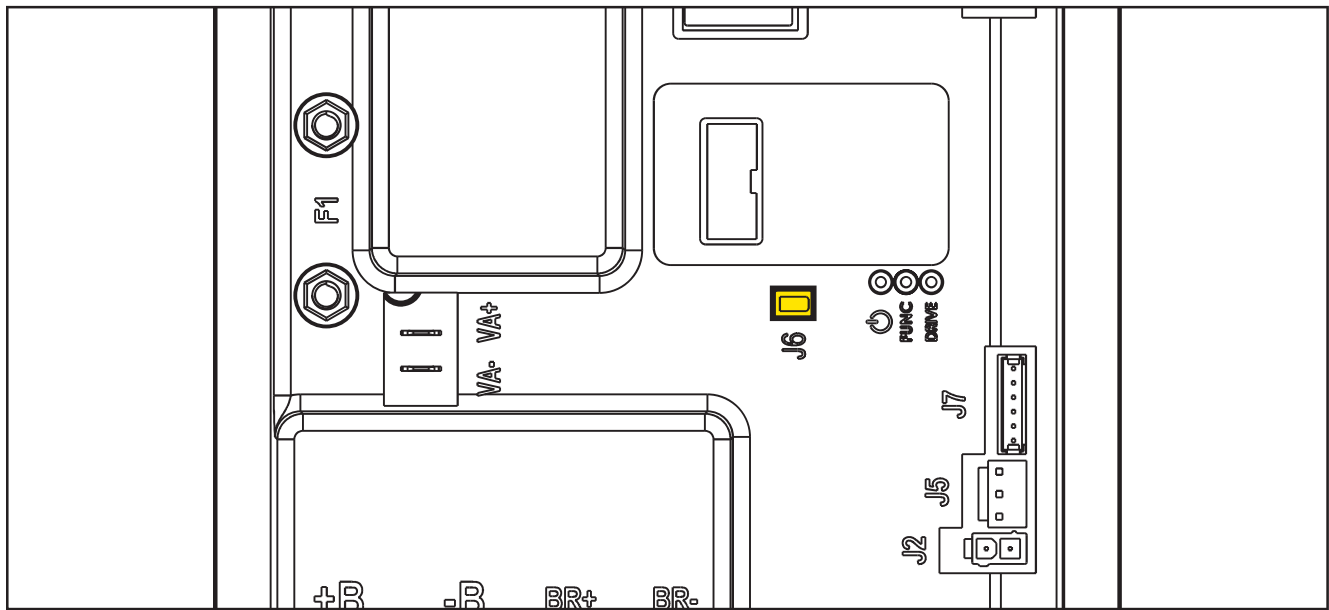




Figure 10:

Removal and Installation

Solenoid Valve

Remove

1. Drive the machine on a level floor or on a hoisting system to facilitate the disassembly procedures.
2. Turn on the machine by the key and the button .
3. Lower the brush deck by pressing the One-Touch button .
4. Switch off the machine and disconnect the battery connector.
5. Unscrew and disconnect the connection (A) (Figure 11) on the solenoid valve (B).
6. Disconnect the detergent supply hose (C) from the solenoid valve.
7. Unscrew the two screws (D), disconnect the hose (E), then remove the solenoid valve (B).

Installation

8. Assemble the components in the reverse order of disassembly.

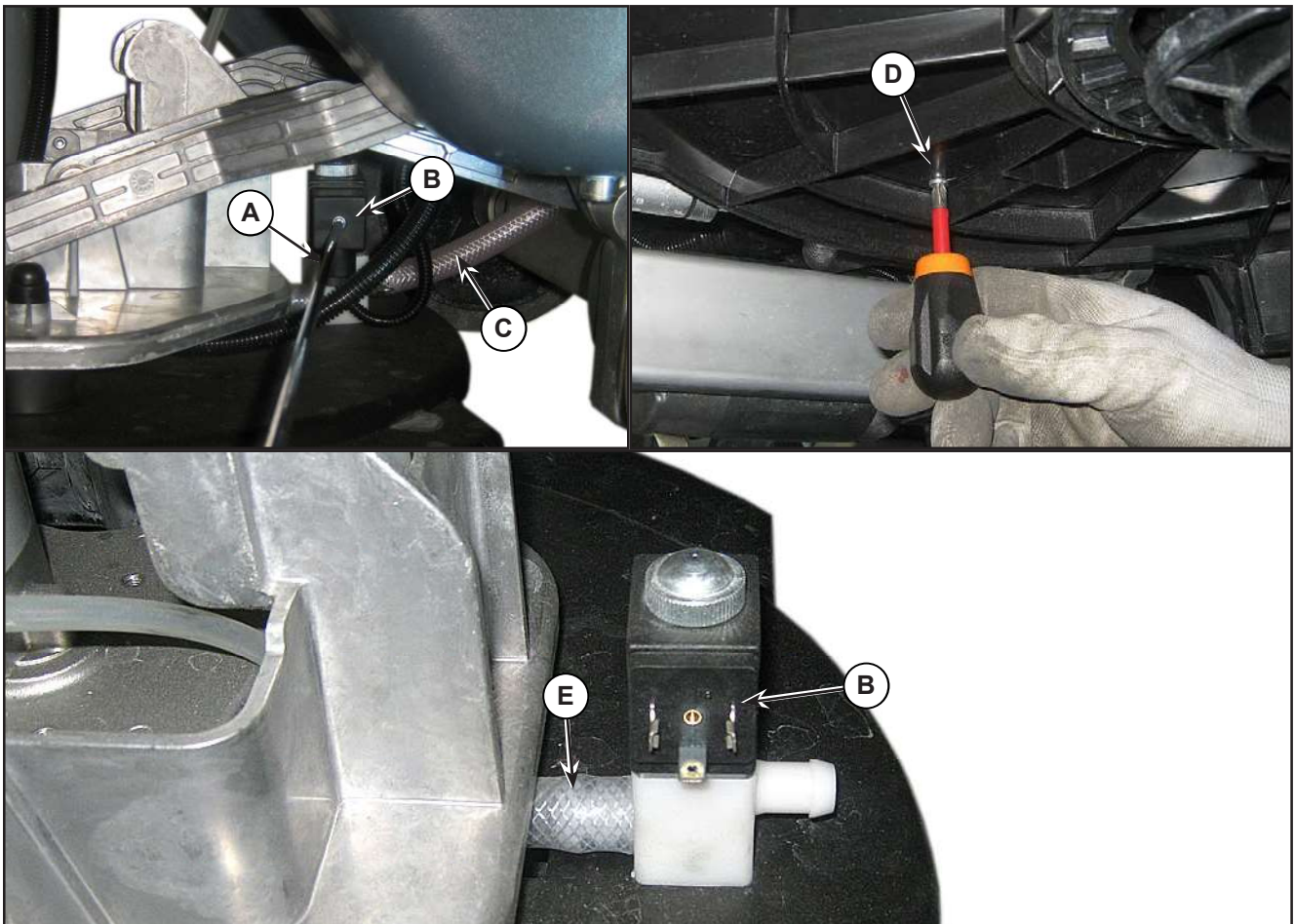


Figure 11:

Detergent Pump (Piston Pump)

(Model No.: 9087352020, 9087354020, 9087350020, 9087351020, 9087353020, 9087355020)

Remove

1. Drive the machine on a level floor.
2. Switch off the machine and disconnect the battery connector.
3. Lift the recovery tank.
4. Unscrew the two screws (A) (Figure 12) and remove the cover (B).
5. Disconnect the connectors (C) and the tank hose (D) and brush hose (E).
6. Unscrew the two screws (F) and remove the detergent pump (G).

Installation

7. Assemble the components in the opposite order to that they were removed in, ensuring the supply hoses (D) and (E) are correctly fitted on the detergent pump.

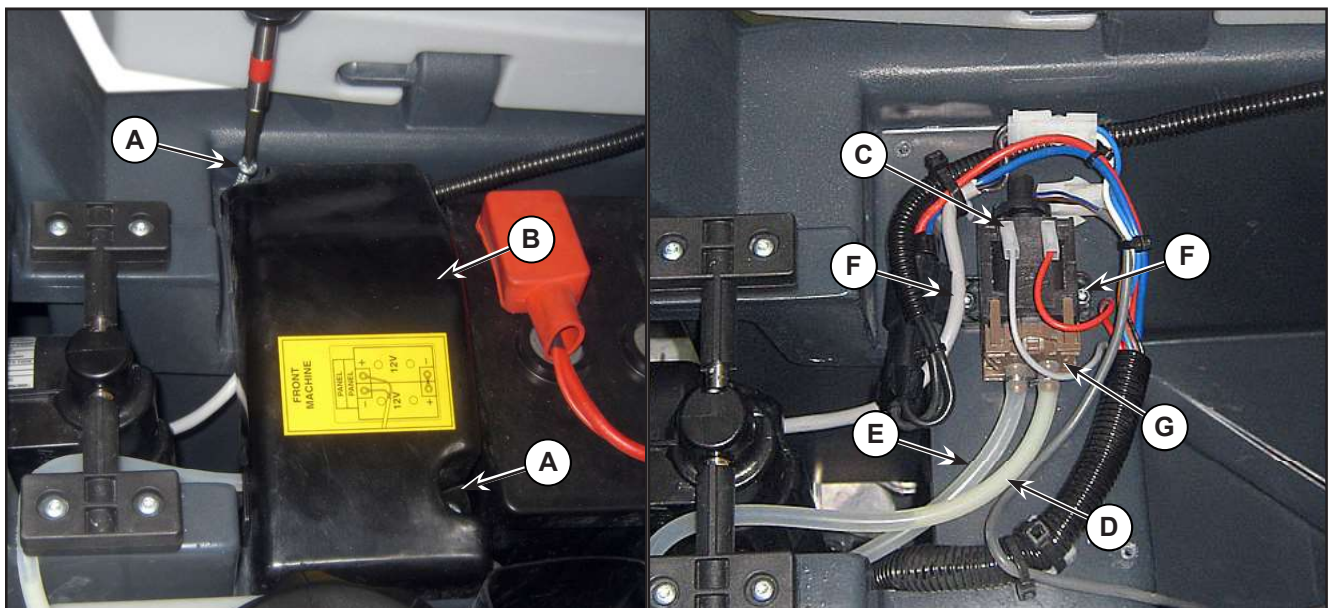


Figure 12:

Detergent Pump (Peristaltic Pump)

(Model No.: 9087403020, 9087404020, 9087400020, 9087401020, 9087405020, 9087402020)

Remove

1. Drive the machine on a level floor.
2. Switch off the machine and disconnect the battery connector.
3. Lift the recovery tank.
4. Unscrew the two screws (A) (Figure 13) and remove the cover (B).
5. For remove only the head of the detergent pump:
 - a. Disconnect the tank hose (C) and brush hose (D).
 - b. Remove the head of the detergent pump (E) to the detergent pump motor .
6. For remove the detergent pump:
 - a. Disconnect the connectors (F) and the tank hose (C) and brush hose (D).
 - b. Unscrew the two screws (G) and remove the detergent pump (H).

Installation

Assemble the components in the opposite order to that they were removed in, ensuring the supply hoses (C) and (D) are correctly fitted on the detergent pump.

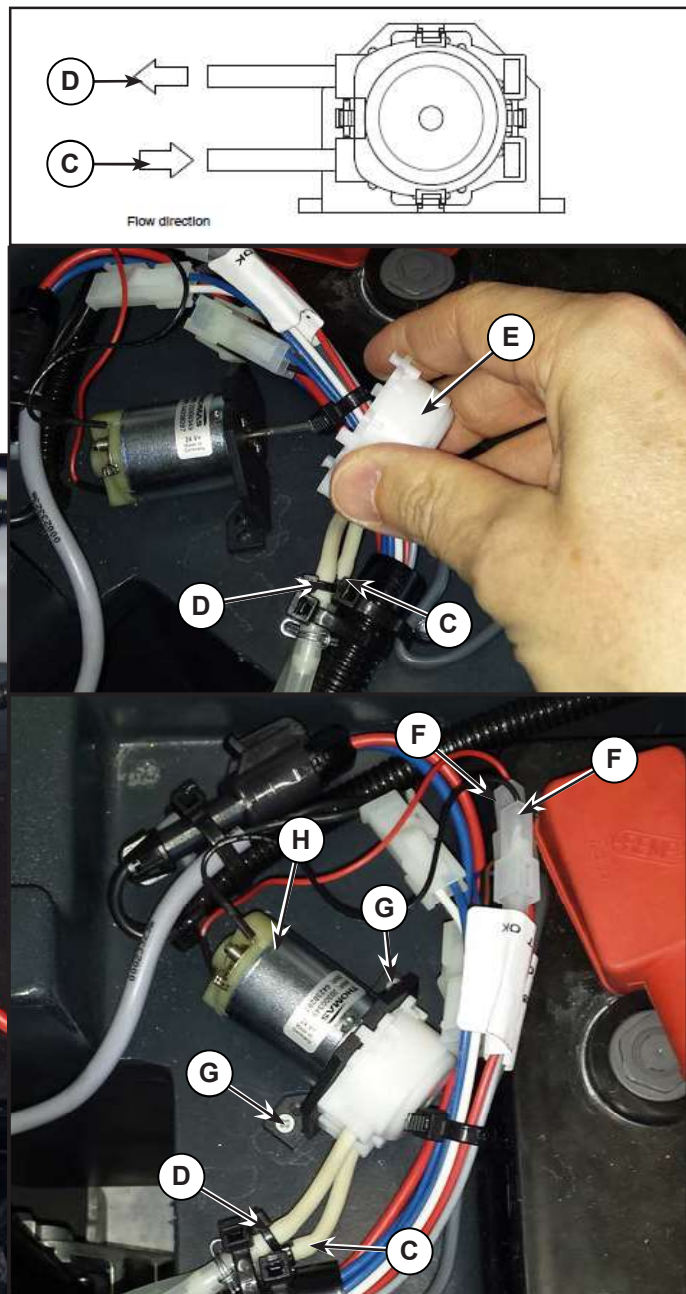


Figure 13:

Checking the Water Level Sensor Operation

1. Insert the Supervisor key (yellow) in place of the User key (grey or blue) to access the main screen (Figure 14) of the multifunction display.
2. With the solution tank more than half full, the symbol displayed is (A).
3. With the solution tank less than half full, the symbol displayed is (B).

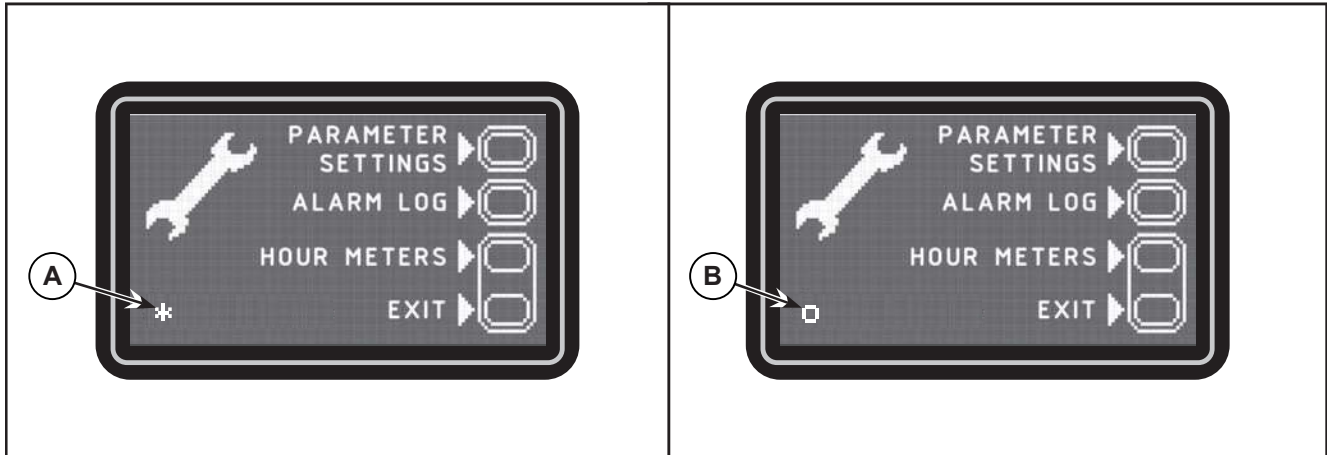


Figure 14:

Water Level Sensor

Remove

1. Drive the machine on a level floor.
2. Switch off the machine and disconnect the battery connector.
3. Lift the recovery tank.
4. Unscrew the two screws (A) (Figure 15) and remove the cover (B).
5. Unscrew the two screws (C) and lift the tank (D).
6. Disconnect the connector (E).
7. Disassemble and remove the water level sensor (F).

Assembly

8. Assemble the components in the reverse order of disassembly.

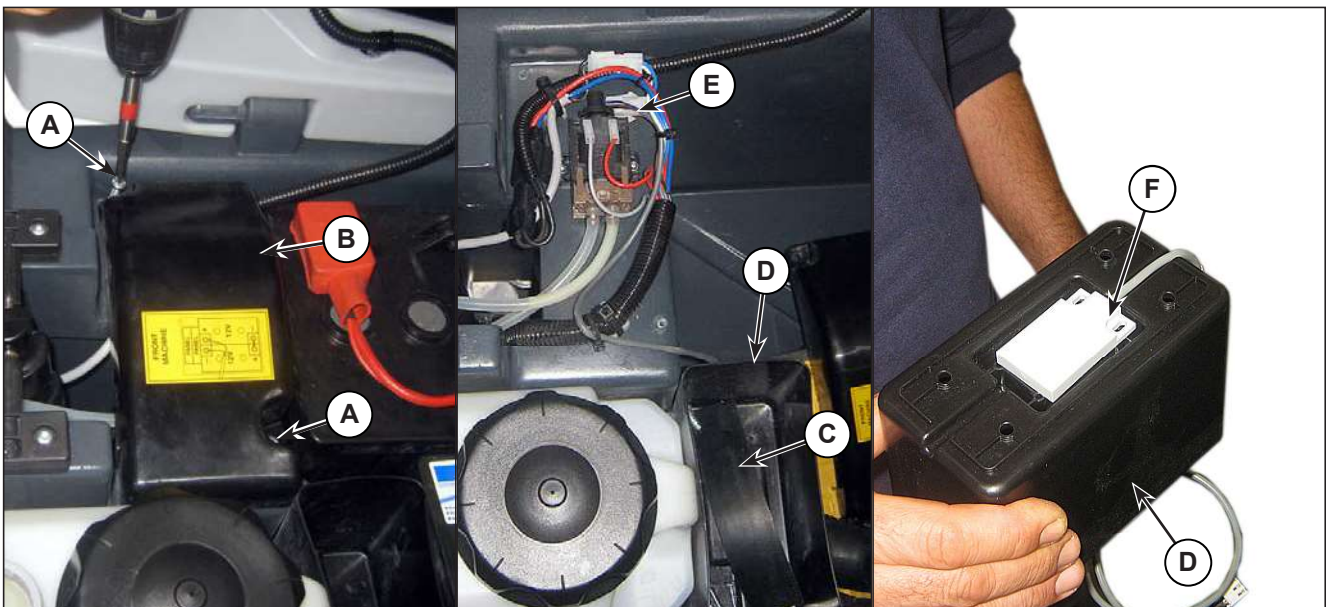


Figure 15:

Specifications

Description / Model	SC500	
	DISC	REV
Solution tank capacity	12 US gal (45 liters)	
Solution flow values	0.75 cl/m / 1.5 cl/m 3.0 cl/m / 2.8 l/min	0.38 cl/m / 0.75 cl/m 1.5 cl/m / 2.8 l/min
EcoFlex kit tank capacity	1.3 US gal (5 L)	
EcoFlex kit detergent percentage setting	Ratio 1:400 ÷ 1:33 (0.25% ÷ 3%)	

34 - Scrub System, Disc

Functional Description

The disc brush system can be started by the operator.

The disc brush turn counter-clockwise.

The rotating brush system cleans the surface of the floor. The main component of the brush system is the deck where the brush or the pad holder with pad suitable for the type of surface to be cleaned is installed.

The brush deck is installed on a frame to which the electrical actuator and the four levers for connection to the frame integrated with the brush motor is coupled.

The electrical actuator (M5) lifts and lowers the deck. The operating and washing pressure depends on the weight of the deck. The actuator also permits the extra pressure function. Extra pressure is selected via the button on the User interface controller.

Brush rotation occurs only when the brush motor (M1) is driven by the Main machine controller (EB1) following activation of the paddle.

The brush system uses the solution to wash the floor.

In case of brush motor overload, a safety system stops the brush to prevent continuous overload.

If the overload takes place when the extra pressure function is on, the system automatically turns the extra pressure function off. If the overload persists, the brush stops.

The overload is detected by monitoring the current flow on the brush motor. If the motor current reaches the value stored in the parameter “VS1” and the overload persists, the brush motor will stop following a delay which varies on the basis of the extent of the overload.

To start scrubbing again after a brush stop due to overload, turn the machine off. Then restart the machine.

To work properly, the brush motor (M1) needs the following:

- Brush function on
- Forward paddle pressed
- Battery level not in critical condition with flashing segments.

Brush Release System

In order to release the brush from its hub, the brush motor starts up and then stops rapidly. The brush's inertia thus causes it to disengage from the hub.

Wiring Diagram

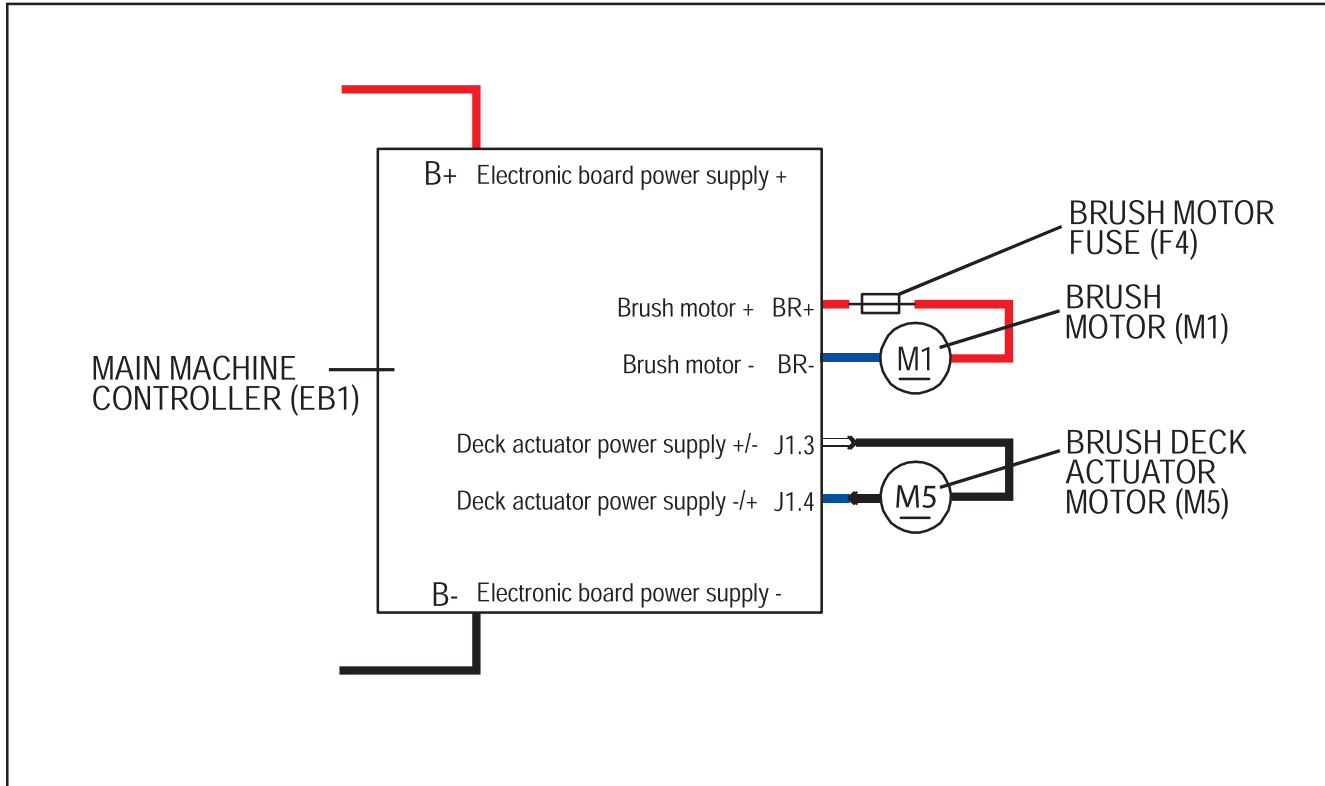


Figure 1:

Brush Deck Actuator System

The brush deck actuator of SC500 is a new generation actuator developed by SIR and ITALSEA and it is controlled directly by the Main machine controller (EB1) without electromechanical limit switches. ITALSEA patented the system to control the actuator. Basically the system uses deeply measurements of the current flow in the actuator to know its position in real time.

The actuator is mechanically proof of the end of stroke because of it reaches the end of stroke with limited voltage applied and so with a limited speed and force.

The actuator moves and stops in 3 defined positions:

1. RETRACTED: fully retracted end of stroke (deck lifted)
2. WORK: intermediate position (deck on the floor, normal work condition)
3. EXTRAPRESSURE: fully extended end of stroke (deck on the floor with extrapressure given pressing the actuator integrated spring)

The actuator is powered at 50% PWM (about 12Vdc) near the end of strokes or during the machine switch-on reset feature, otherwise at 100% PWM (24Vdc)

The machine switch-on reset feature moves the actuator from the position where it was the last time the machine was switched off to the RETRACTED position.

The quotes of the actuator strokes, with a tolerance of ± 2 mm are: stroke RETRACTED-WORK = 3.3 in (85 mm), stroke RETRACTED-EXTRAPRESSURE (end to end) = 4.7 in (120 mm).

There are time out limits and amperometric limits related to the different phases of the movement as follow:

Movement from:	To:	PWM	AMP limit	Alarm if AMP limit reached	Timeout
Extrapressure	Work	100% (=24Vdc)	4A per Time>1sec.	Yes	7.5 sec.
Work	Retracted – 0.4 in (10 mm)	100%(=24Vdc)	4A per Time>1sec.	Yes	15 sec.
Retracted – 0.4 in (10 mm)	Retracted	50%(=12Vdc)	2A per Time>1sec.	Not (Main machine controller assumes the actuator reaches the end of stroke)	
Reset (during machine switch on)		50%(=12Vdc)	2A per Time>1sec.	Not (Main machine controller assumes the actuator reaches the end of stroke)	25 sec.

Component Locations

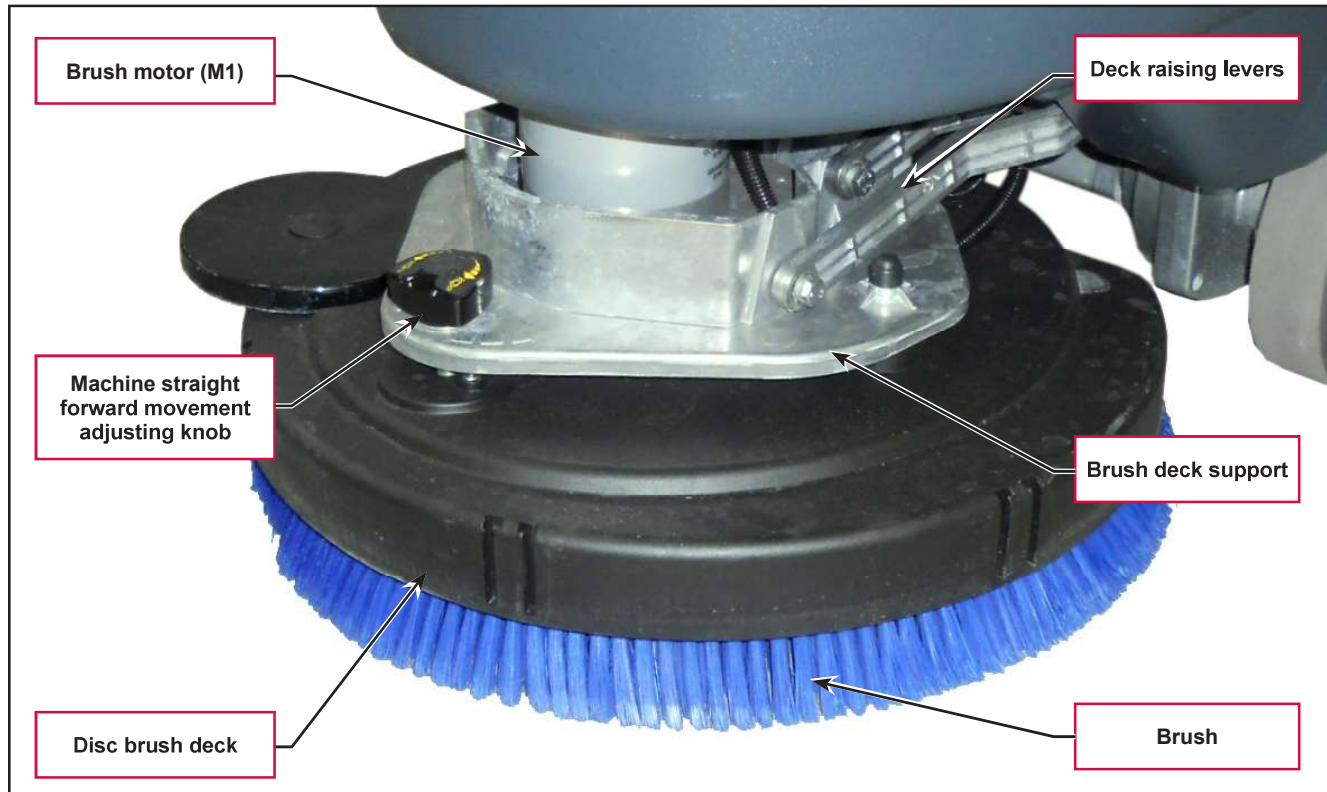


Figure 2:

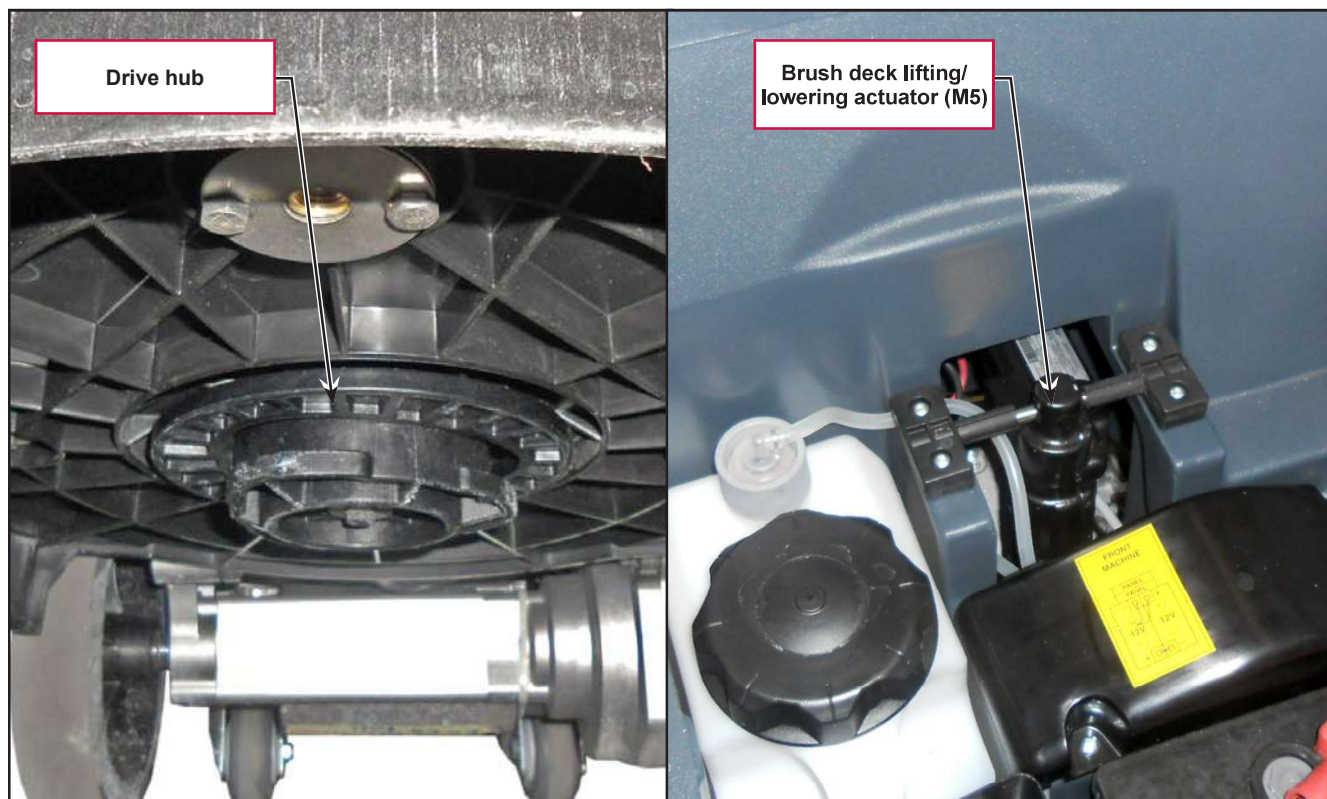





Figure 3:



Figure 4:




Maintenance and Adjustments

Brush Installation/Removal

1. According to the kind of cleaning to be performed, the machine can be equipped either with the brush (A) (Figure 5) or the pad-holder (B) with pad (C) together with the appropriate deck.
2. Turn on the machine by the key and the button .
3. Bring the machine speed to minimum by pressing the tortoise  machine speed adjustment button.
4. With the brush deck raised, position the brush (A) or pad-holder (B) under the deck.
5. Press the One-Touch button  to lower the deck onto the brush.
6. To engage the brush, press the paddle (2), then release it. If necessary, repeat the procedure until the brush is engaged.



CAUTION: Turn the machine speed to idle and slightly press the paddle, otherwise the machine starts to move.

7. To remove the brush, the deck must be lifted by pressing the One-Touch button , then press the brush release button . When the display shows the  icon, wait until the brush is lowered onto the floor.

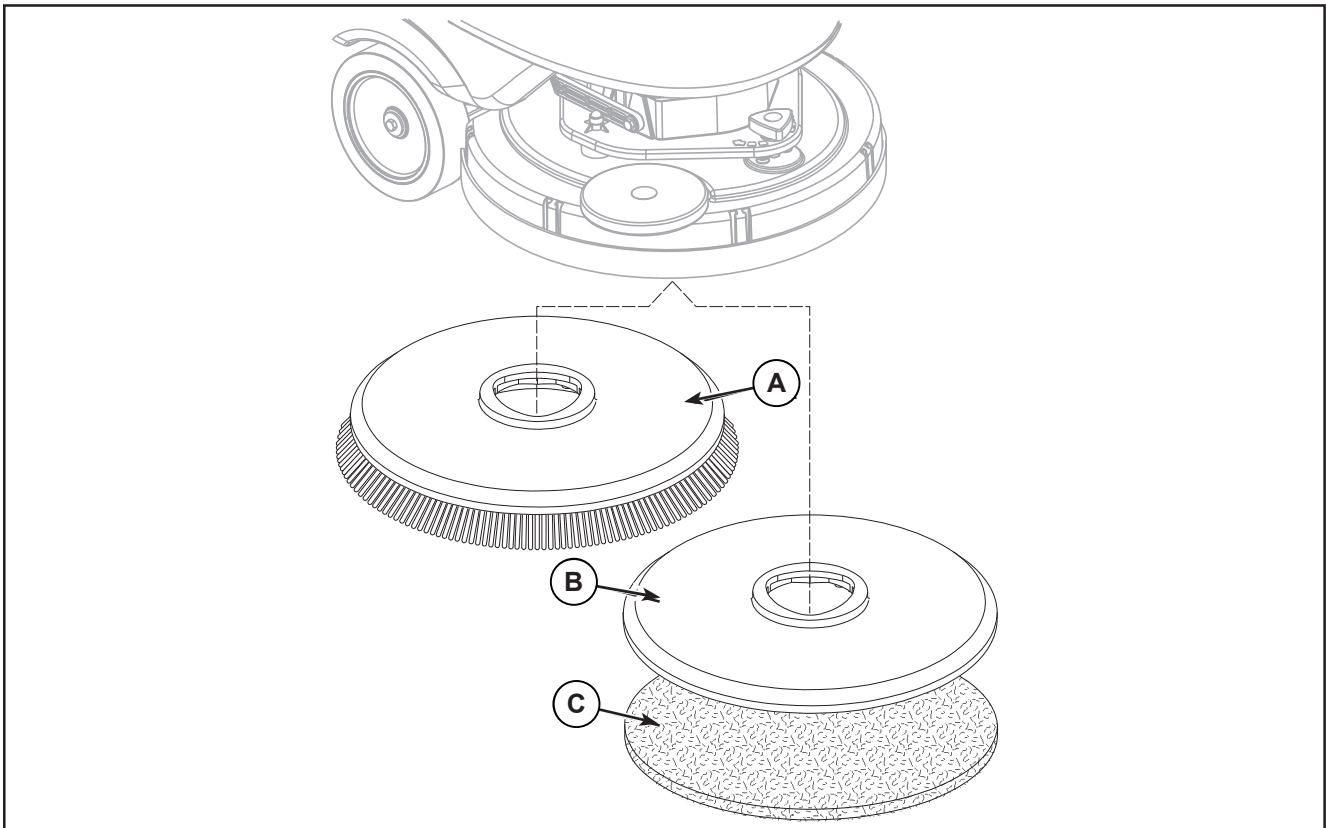


Figure 5:




Troubleshooting

Trouble	Possible Causes	Remedy
The brush does not clean properly	The brush is excessively worn	Replace
The brush does not turn		See the chapter Control System, Main machine controller (EB1) Error Codes
	Brush motor fuse (F4) broken	Replace
	Brush motor carbon brushes worn	Replace
	Presence of bulky debris or string around the brush or between the brush and attachment flange	Remove the brush and clean it
	Faulty brush motor	Repair or replace
	Wiring damaged	Repair
It is not possible to raise/lower the brush		See the chapter Control System, Main machine controller (EB1) Error Codes
	Deck raising/lowering actuator (M5) broken	Replace
	Break in actuator wiring	Check the connections according to the instructions in the Electrical System chapter, Troubleshooting paragraph
	Main machine controller (EB1) damaged	Replace
The brush disengagement system does not work	Main machine controller (EB1) faulty	Replace

Brush Motor Current Draw Test



WARNING: This procedure must be performed by qualified personnel only.

1. Drive the machine on a level floor.
2. Remove the brush.
3. Disconnect the drive system connector (A) (Figure 6) on the Main machine controller (B) to disable machine movement.
4. Turn on the machine by the key and the button .
5. Press the One-Touch button  to lower the brush deck.
6. Apply the amperometric clamp (C) to an electrical cable (D) of the brush motor.
7. Activate the brush by pressing the paddle, then check that the brush motor current draw is between 3 and 4A at 20V(*).
8. Deactivate the brush by releasing the paddle and raise the brush deck by pressing the One-Touch button .
9. Remove the Amp clamp (C).
10. If the amperage is higher, perform the following procedures to detect and correct the abnormal amperage:
 - Check the brush motor carbon brushes.
 - Remove the brush motor then check the condition of its components.
11. If the above-mentioned procedures do not lead to a correct amperage, it is necessary to replace the brush motor.

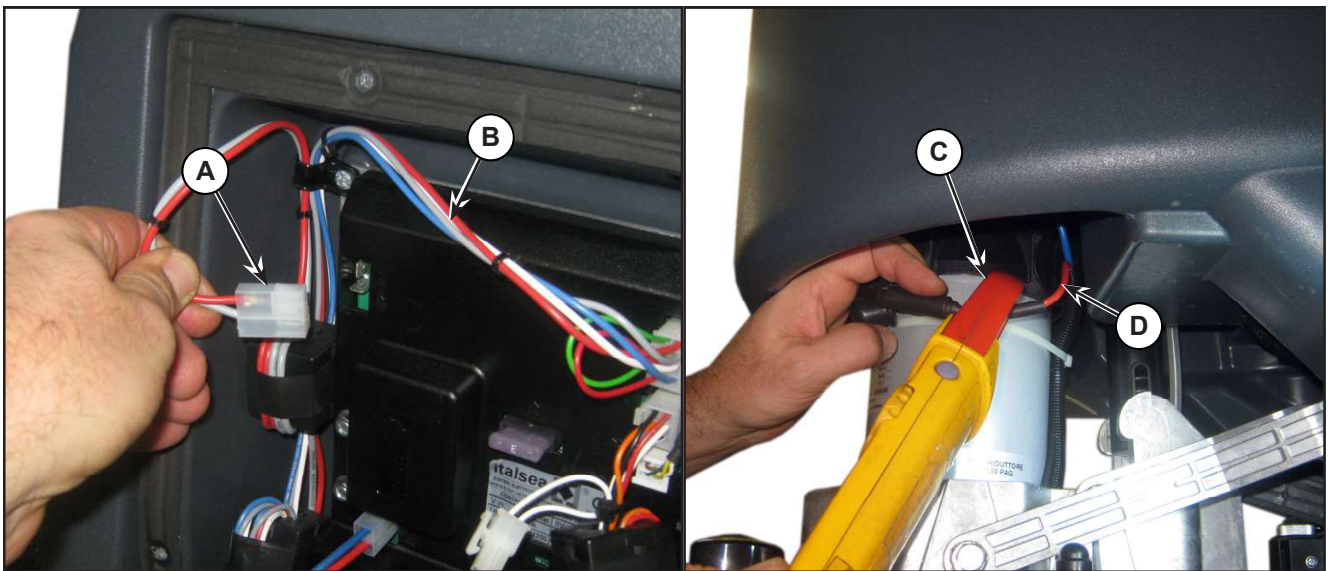




Figure 6:

(*) Voltage value supplied by the Main machine controller to the brush gear motor when the gear motor current draw is less than the value of the RPM parameter.

Removal and Installation

Brush Deck

Disassembly

1. Drive the machine on a level floor or on a hoisting system to facilitate the disassembly procedures.
2. Remove the brush.
3. Turn on the machine by the key and the button .
4. Lower the brush deck by pressing the One-Touch button .
5. Switch off the machine and disconnect the battery connector.
6. Undo the screw (A) (Figure 7) on the pin of the actuator (B); retain the bushing.
7. Unscrew and disconnect the connection (C) on the solenoid valve (D).
8. Disconnect the detergent supply hose (E) from the solenoid valve.
9. Remove the cover (F) (Figure 8), then disconnect the hose (G) from the detergent pump (H).

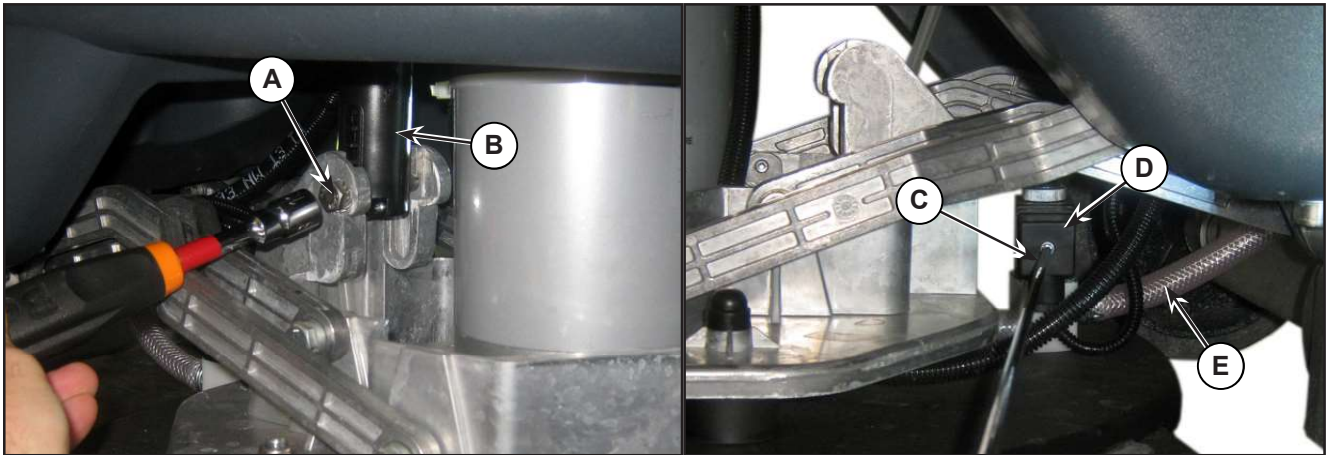


Figure 7:

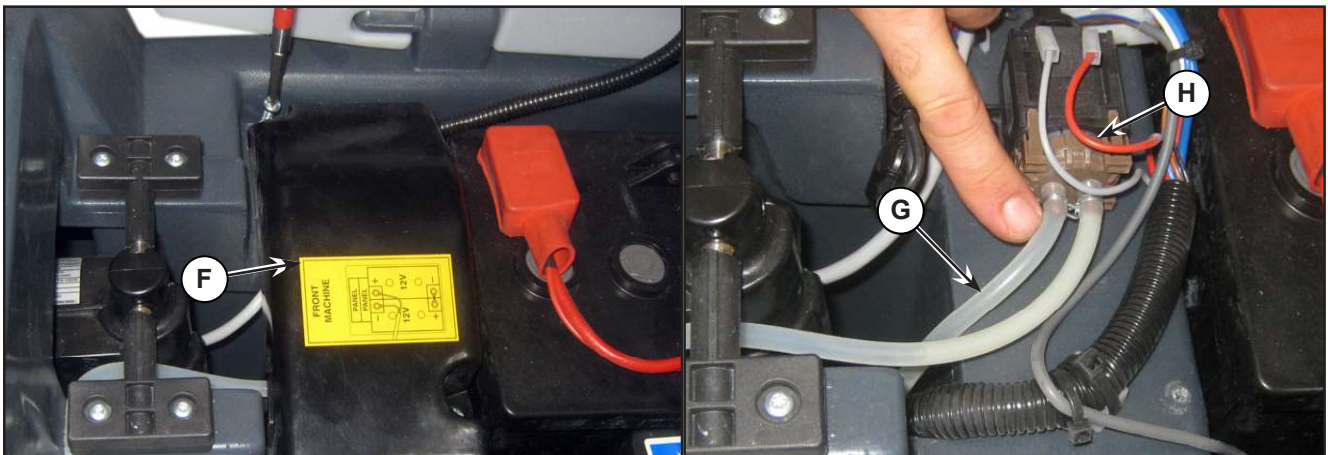


Figure 8:

10. Remove the 4 screws (I) (Figure 9) fastening the deck raising levers (J), retaining the bushings and washers.
11. Unscrew the 2 retaining nuts (K) and disconnect the brush motor power supply cables (L).

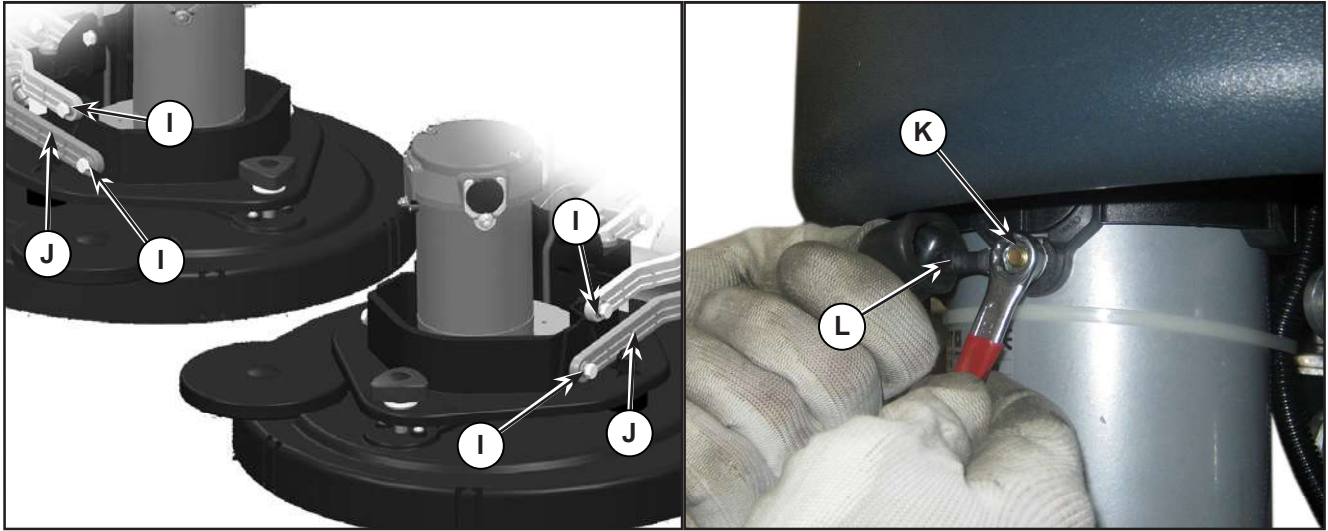


Figure 9:

12. Extract the brush deck (M) (Figure 10) from beneath the solution tank.

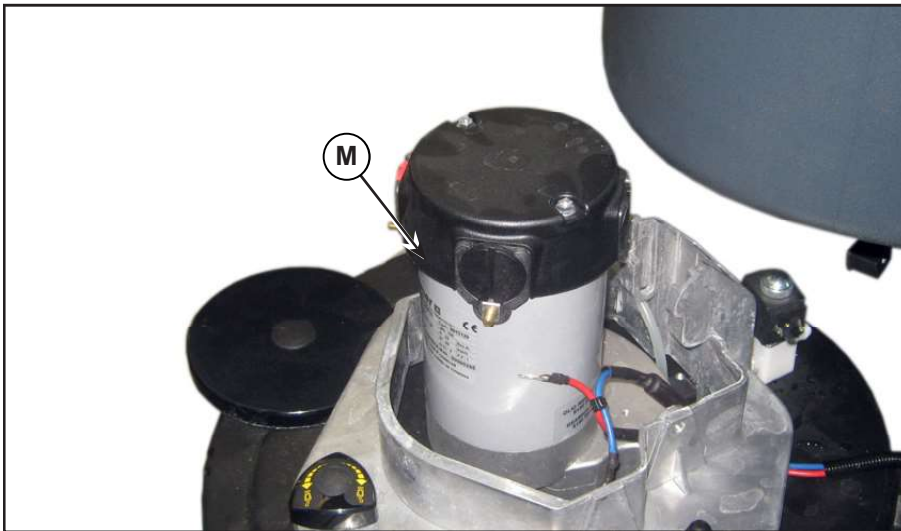


Figure 10:

Assembly

13. Assemble the components in the opposite order they were removed in, ensuring the brush motor power supply cable polarities are correct.

Checking/Replacing Brush Motor Carbon Brushes

Check

1. Remove the brush deck.
2. Remove any dust and dirt from around the brush motor carbon brushes.
3. Remove the four protective covers (A) (Figure 11) by disconnecting the clips.
4. Remove the carbon brush nuts (B) with the lead-in wires.
5. Disengage the tabs (C) and remove the carbon brushes (D).
6. Check the carbon brushes (D) for wear. The carbon brushes are worn out when:
 - They do not make sufficient contact with the armature of the brush motor due to their wear
 - When their contact surface is not intact
 - When the residual stroke is below 0.12 in (3 mm)
 - When the thrust spring etc. is broken
7. Replace the carbon brushes as an assembly.

Reassembly

8. Assemble the components in the reverse order of disassembly.

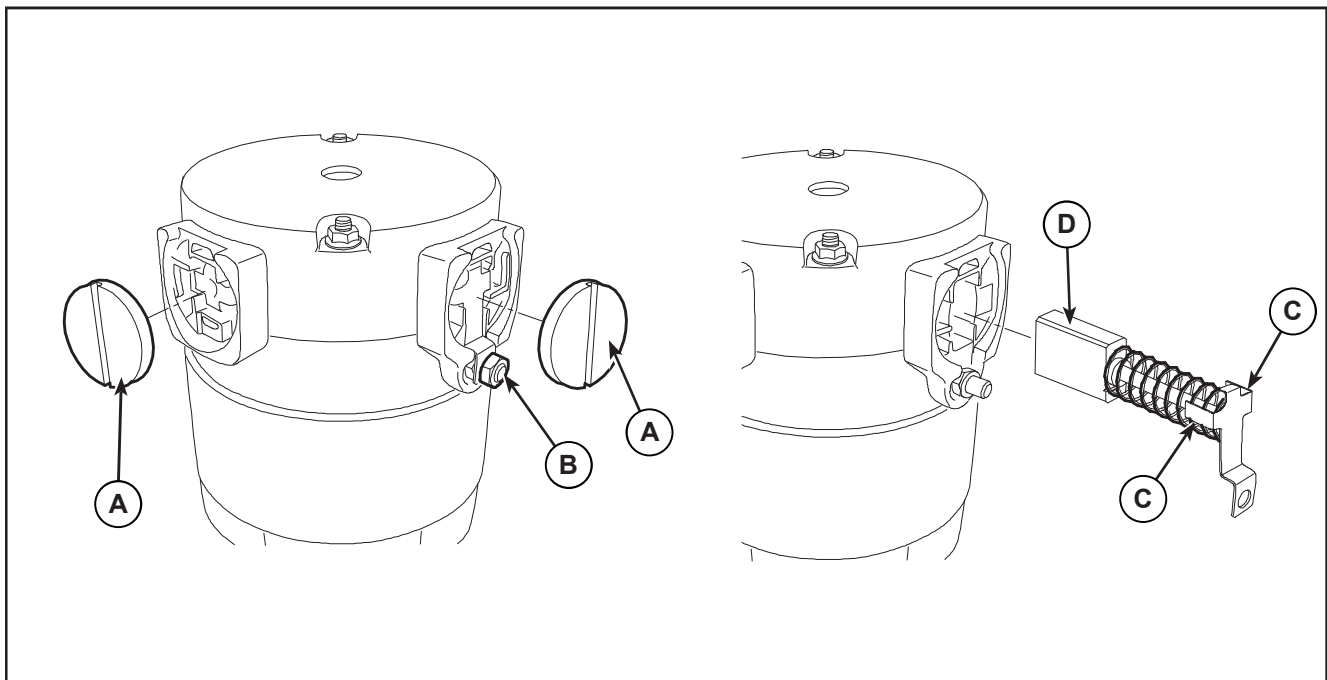


Figure 11:

Brush Motor Disassembly/Assembly

Disassembly

1. Remove the brush deck.
2. Working at the bench, remove the screw (A) (Figure 12) of the brush motor.
3. Use a puller to remove the brush hub (B).
4. Remove the screws (C).
5. Remove the brush motor (D).
6. Recover the key (E).

Assembly

7. Assemble the components in the reverse order of disassembly.



Note: For further information on deck components see the Spare Parts List.

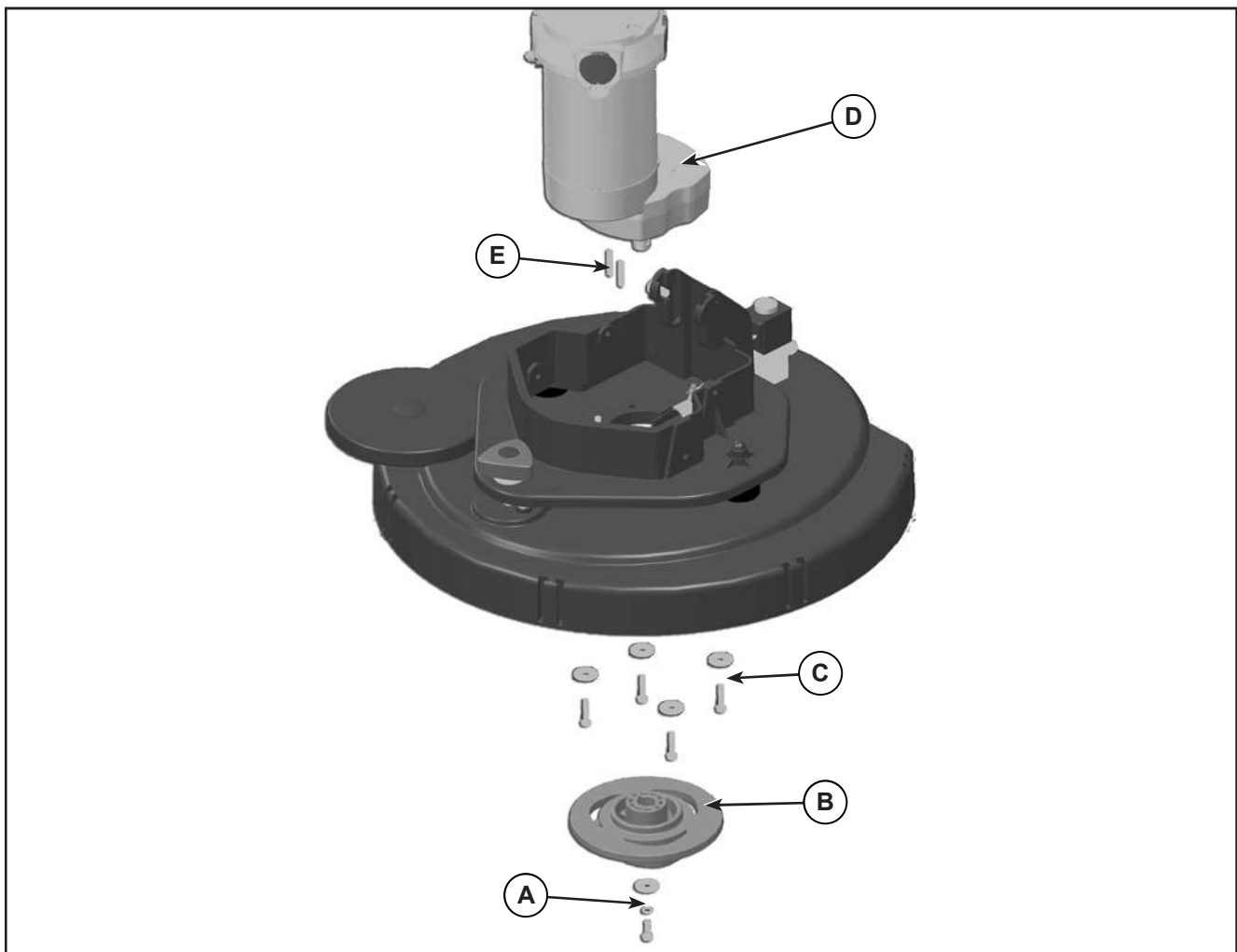


Figure 12:

Brush Deck Actuator

Remove

1. Lower the brush deck.
2. Switch off the machine and disconnect the battery connector.
3. Remove the cover and disconnect the actuator connector (A) (Figure 13).
4. Unscrew the screw (B) of the lower pin, retaining the bushings.
5. Remove the screws (C), retaining the plates (D).
6. Remove the actuator (E).

Installation

7. Assemble the components in the reverse order of disassembly.

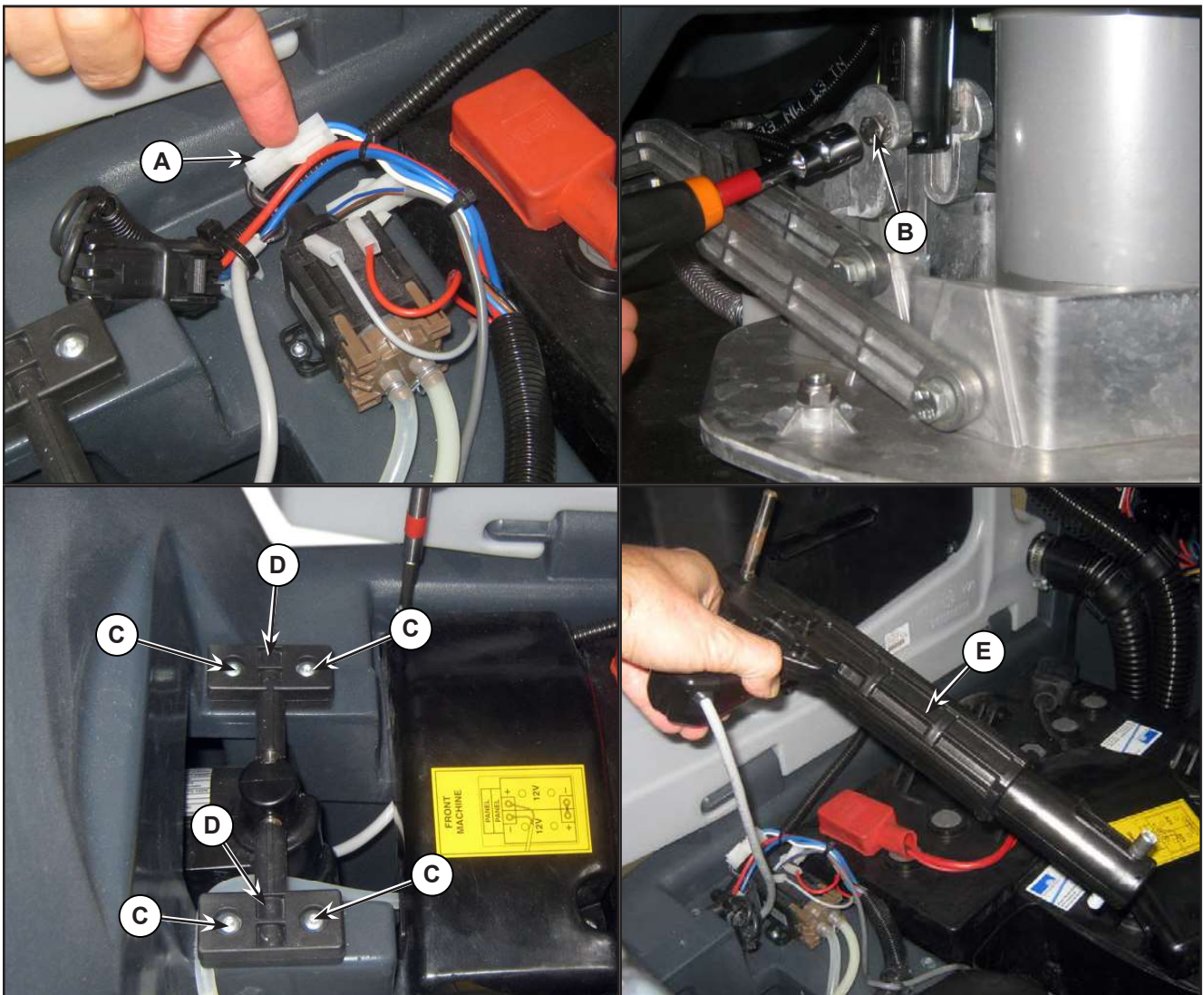


Figure 13:

Specifications

Description / Model		SC500	
		DISC	REV
Cleaning width		20 in (530 mm)	
Brush/pad diameter		20 in (530/508 mm)	
Brush pressure with extra-pressure function turned off		33 lb (15 kg)	
Brush pressure with extra-pressure function turned on		66 lb (30 kg)	
Brush deck right/left offset		65 / 15 mm (2.5 / 0.6 in)	
Brush distance from the floor (when lifted)		1.6 in (40 mm)	
Brush motor power		0.6 hp (450 W)	
Brush rotation speed		155 rpm	
Protection class		IP 20	
Insulation class		F	
Actuator technical data	Strength	300 N	
	Maximum load	600 N	
	Regulated travel	3.3 in (85 mm)	
	Total travel	4.7 in (120 mm)	
	Maximum speed	16 mm/s	
	Voltage	24V	
	Protection class	IP 44	
	Insulation class	B	
	No-load current draw	0.5A	
	Full-load current draw	3A	

34 - Scrub System, REV

Functional Description

The REV brush system can be operated by the operator.

The REV brush has a movement with distinctive orbital movements and anticlockwise rotation.

The REV allows the surface concerned to be washed/cleaned by the movement of the brush. The main component of the system is the deck where the brush or the pad suitable for the type of surface to be cleaned is installed.

The brush deck is fixed to the machine with a support to which the electrical actuator and two anchor levers are applied.

The electrical actuator (M5) lifts and lowers the deck. The operating and washing pressure depends on the weight of the deck. The actuator also permits the extra pressure function. Extra pressure is selected via the button on the User interface controller.

Brush rotation occurs only when the REV motor (M1) is driven by the Main machine controller (EB1) following activation of the paddle.

Transmission of motion from the gear motor to the brush occurs via an eccentric system which provides the orbital movement.

The system, once activated, uses the solution coming from the solution system, to wash the floor.

In case of REV motor overload, a safety system stops the brush to prevent continuous overload.

If the overload takes place when the extra pressure function is on, the system automatically turns the extra pressure function off. If the overload persists, the brush stops.

The overload is detected by monitoring the current flow sum on the REV motor. If the motor current reaches the value stored in the parameter “VS1” and if the overload persists, the REV motor will stop following a delay which varies on the basis of the extent of the overload.

To start scrubbing again after a brush stop due to overload, turn the machine off. Then restart the machine.

In summary, operation of the REV motor (M1) requires the following conditions/inputs:

- Brush function on
- Forward paddle pressed
- Battery level not in critical condition with flashing segments.

Wiring Diagram

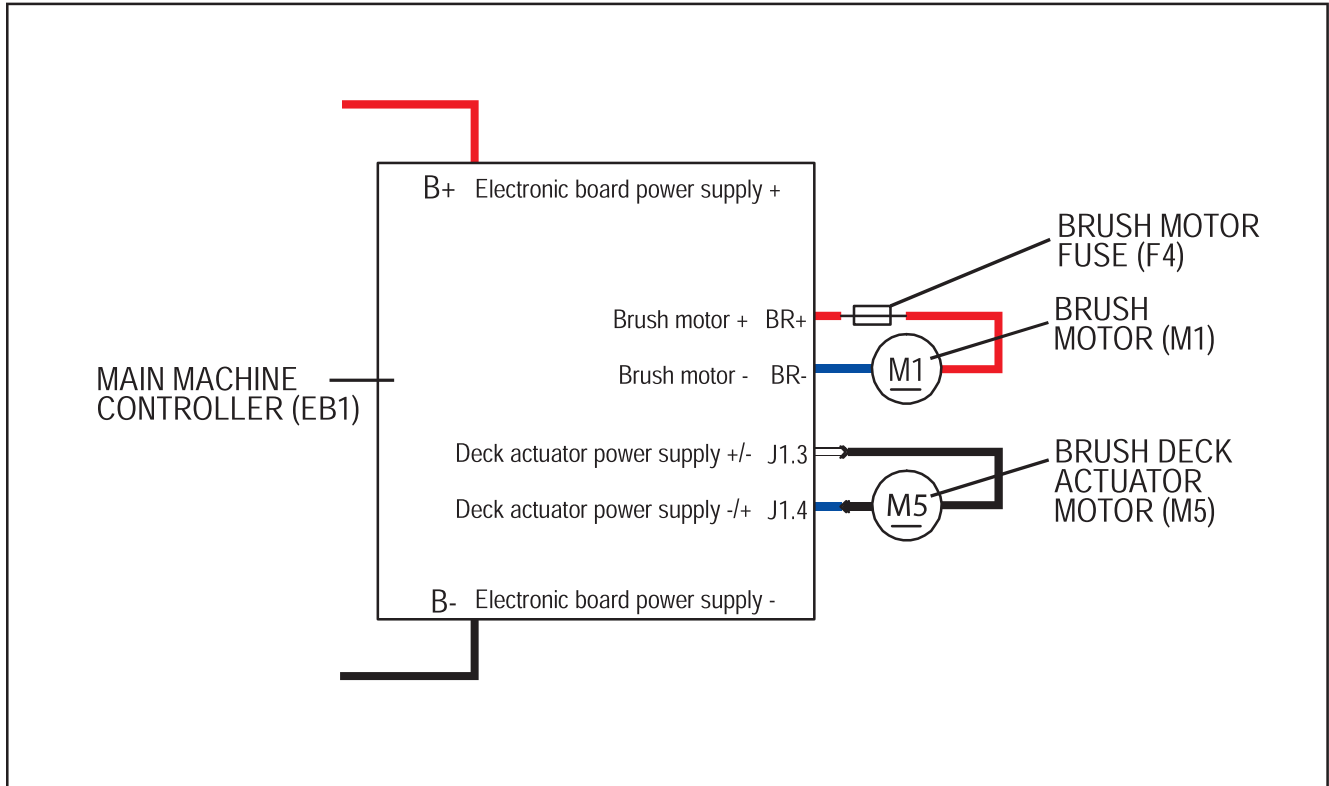


Figure 1:

Brush Deck Actuator System

The brush deck actuator of SC500 is a new generation actuator developed by SIR and ITALSEA and it is controlled directly by the Main machine controller (EB1) without electromechanical limit switches. ITALSEA patented the system to control the actuator. Basically the system uses deeply measurements of the current flow in the actuator to know its position in real time.

The actuator is mechanically proof of the end of stroke because of it reaches the end of stroke with limited voltage applied and so with a limited speed and force.

The actuator moves and stops in 3 defined positions:

1. **RETRACTED**: fully retracted end of stroke (deck lifted)
2. **WORK**: intermediate position (deck on the floor, normal work condition)
3. **EXTRAPRESSURE**: fully extended end of stroke (deck on the floor with extrapressure given pressing the actuator integrated spring)

The actuator is powered at 50% PWM (about 12Vdc) near the end of strokes or during the machine switch-on reset feature, otherwise at 100% PWM (24Vdc)

The machine switch-on reset feature moves the actuator from the position where it was the last time the machine was switched off to the **RETRACTED** position.

The quotes of the actuator strokes, with a tolerance of ± 2 mm are: stroke **RETRACTED-WORK** = 2.5 in (63 mm), stroke **RETRACTED-EXTRAPRESSURE** (end to end) = 3.8 in (98 mm).

There are time out limits and amperometric limits related to the different phases of the movement as follow:

Movement from:	To:	PWM	AMP limit	Alarm if AMP limit reached	Timeout
Extrapressure	Work	100% (=24Vdc)	4A per Time>1sec.	Yes	7.5 sec.
Work	Retracted – 0.4 in (10 mm)	100%(=24Vdc)	4A per Time>1sec.	Yes	15 sec.
Retracted – 0.4 in (10 mm)	Retracted	50%(=12Vdc)	2A per Time>1sec.	Not (Main machine controller assumes the actuator reaches the end of stroke)	
Reset (during machine switch on)		50%(=12Vdc)	2A per Time>1sec.	Not (Main machine controller assumes the actuator reaches the end of stroke)	25 sec.

Component Locations

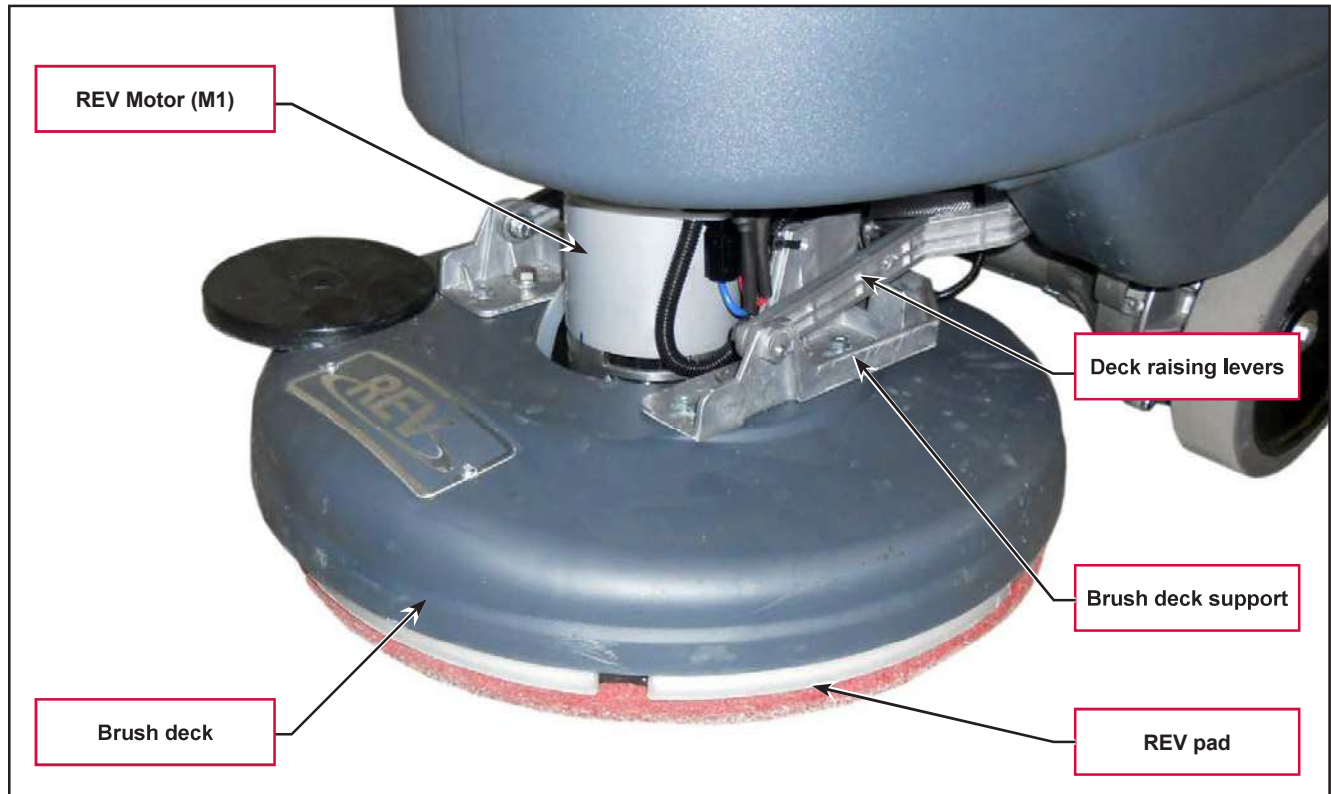


Figure 2:



Figure 3:



Figure 4:

Maintenance and Adjustments

Brush Installation/Removal



CAUTION: Ensure that the machine is off with the ignition key removed before installing or removing the REV system brush.

1. With the REV deck raised, install the pad (A) (Figure 5) or the brush (C), depending on the type of treatment to be performed:
 - Place the pad (A) under the deck and press it until it is fastened with the Velcro of the drive disc (B).
 - Place the brush (C, optional) under the deck, and then match the centering pins (D) to the respective holes of the drive disc (B), and then engage the brush with the mounting screws (E).
2. To remove the pad or brush, proceed in the reverse order.

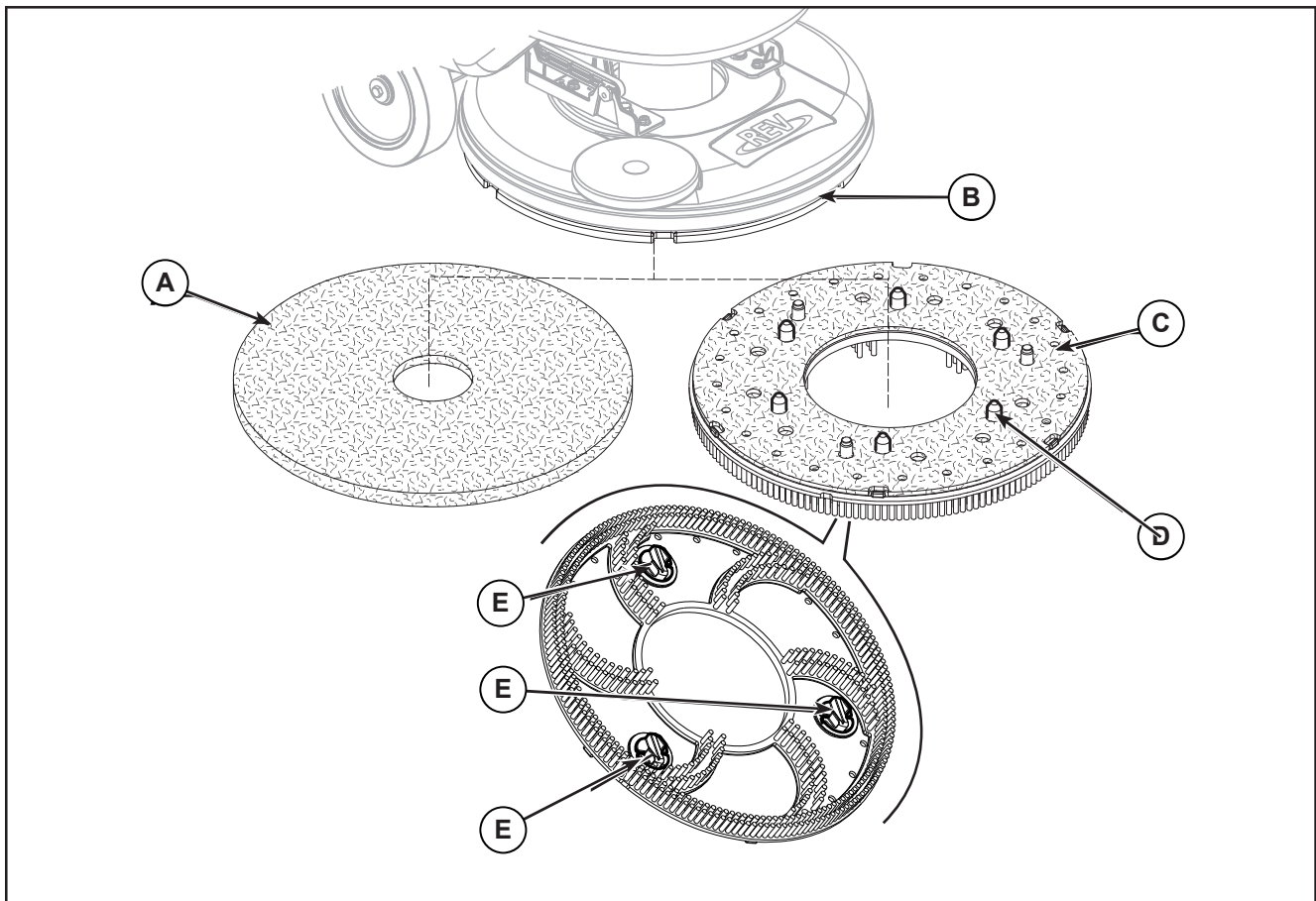


Figure 5:




Troubleshooting

Trouble	Possible Causes	Remedy
The brush does not clean properly	The brush is excessively worn	Replace
The brush does not turn		See the chapter Control System, Main machine controller (EB1) Error Codes
	Brush motor fuse (F4) broken	Replace
	REV motor carbon brushes worn	Replace
	Faulty REV motor	Repair or replace
	Wiring damaged	Repair
It is not possible to raise/lower the brush		See the chapter Control System, Main machine controller (EB1) Error Codes
	Deck raising/lowering actuator (M5) broken	Replace
	Break in actuator wiring	Check the connections according to the instructions in the Electrical System chapter, Troubleshooting paragraph
	Main machine controller (EB1) damaged	Replace
The deck is transmitting too much vibration to the machine	Deck vibration dampers worn.	Replace.

REV Motor Current Draw Test



WARNING: This procedure must be performed by qualified personnel only.

1. Drive the machine on a level floor.
2. Remove the brush.
3. Lift the machine so that the deck no longer touches the floor once lowered.
4. Disconnect the drive system connector (A) (Figure 6) on the Main machine controller (B) to disable machine movement.
5. Turn on the machine by the key and the button .
6. Press the One-Touch button  to lower the brush deck.
7. Apply the amperometric clamps (C) to an electrical wire (D) of the motor.
8. Activate the brush by pressing the paddle, then check that the REV motor current draw is between 3 and 4A at 24V.
9. Deactivate the brush by releasing the paddle and raise the brush deck by pressing the One-Touch button .
10. Remove the Amp clamp (C).
11. If the amperage is higher, perform the following procedures to detect and correct the abnormal amperage:
 - Check the REV motor carbon brushes.
 - Remove the REV motor then check the condition of its components.
12. If the above-mentioned procedures do not lead to a correct amperage, it is necessary to replace the motor.

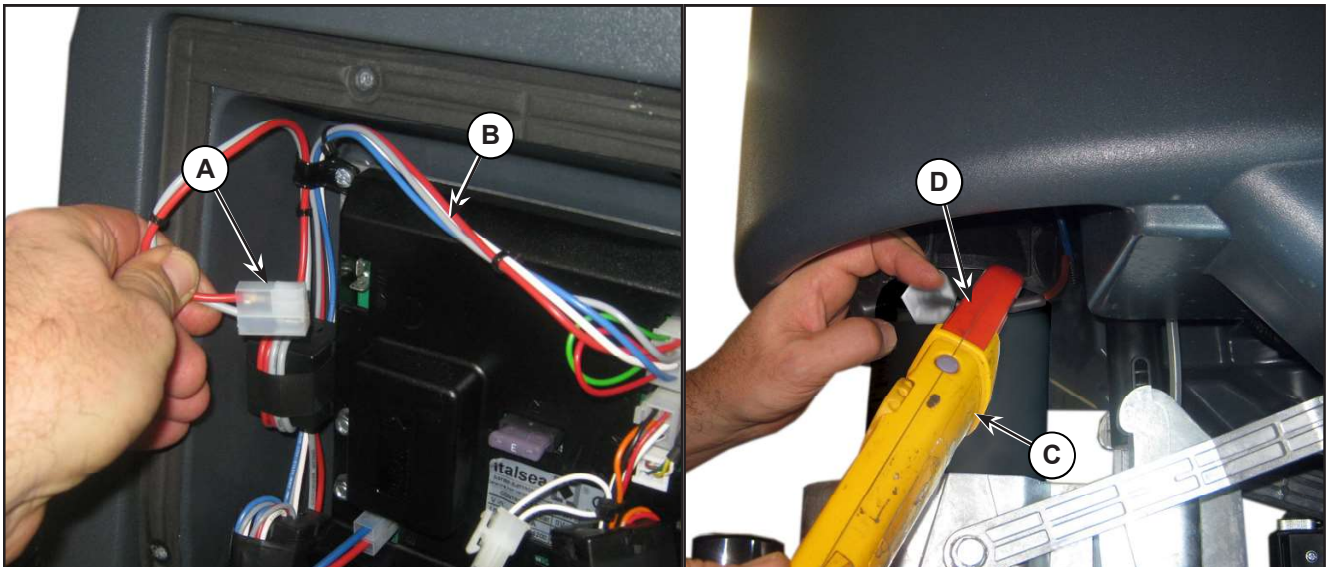




Figure 6:

Removal and Installation

REV Deck

Disassembly

1. Drive the machine on a level floor or on a hoisting system to facilitate the disassembly procedures.
2. Turn on the machine by the key and the button .
3. Lower the brush deck by pressing the One-Touch button .
4. Switch off the machine and disconnect the battery connector.
5. Undo the screw (A) (Figure 7) on the pin of the actuator (B); retain the bushing.
6. Unscrew and disconnect the connection (C) on the solenoid valve (D).
7. Disconnect the detergent supply hose (E) from the solenoid valve.
8. Remove the cover (F) (Figure 8), then disconnect the hose (G) from the detergent pump (H).

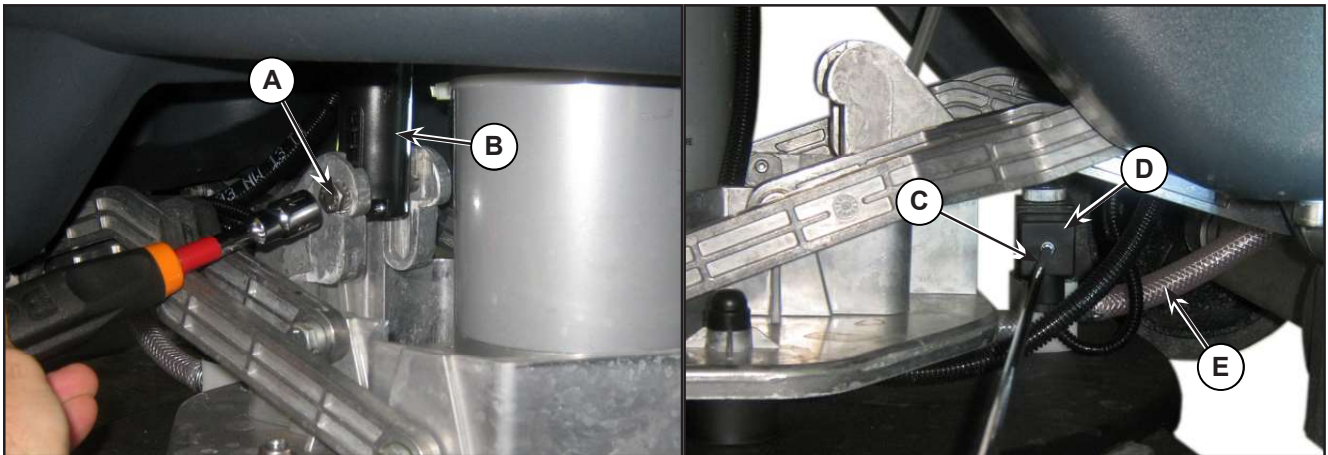


Figure 7:

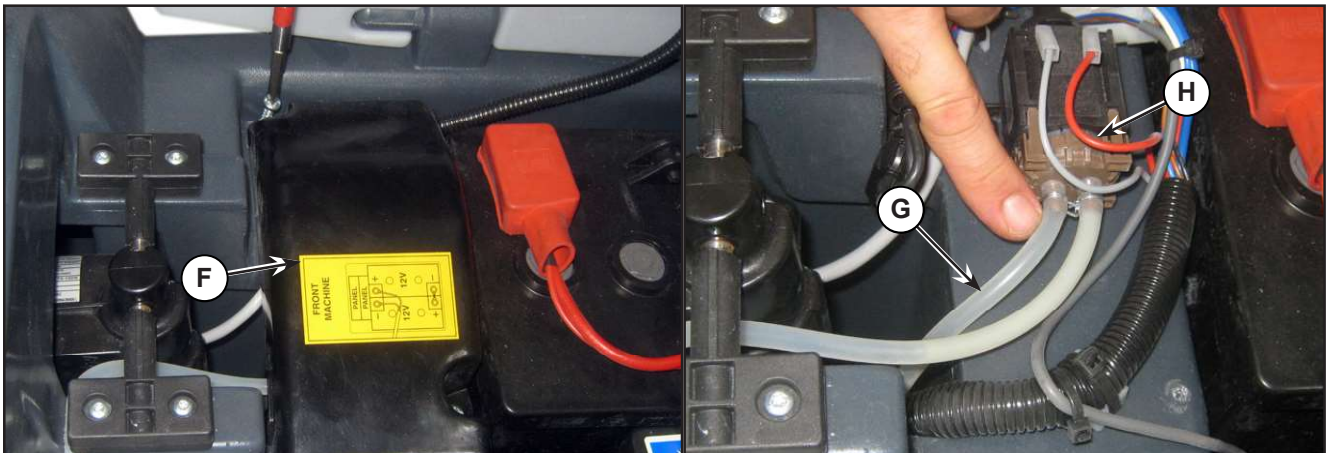


Figure 8:

9. Remove the 2 screws (I) (Figure 9) fastening the deck raising levers (J), retaining the bushings and washers.
10. Disconnect the REV motor power supply connections (K).

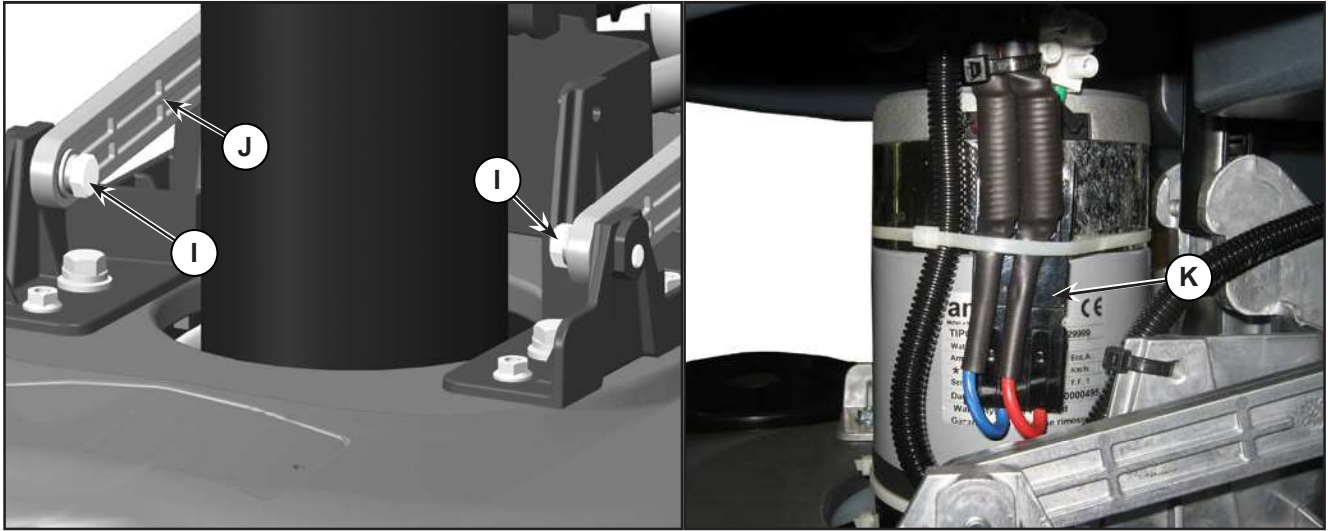


Figure 9:

11. Extract the REV deck (L) (Figure 10) from beneath the solution tank.

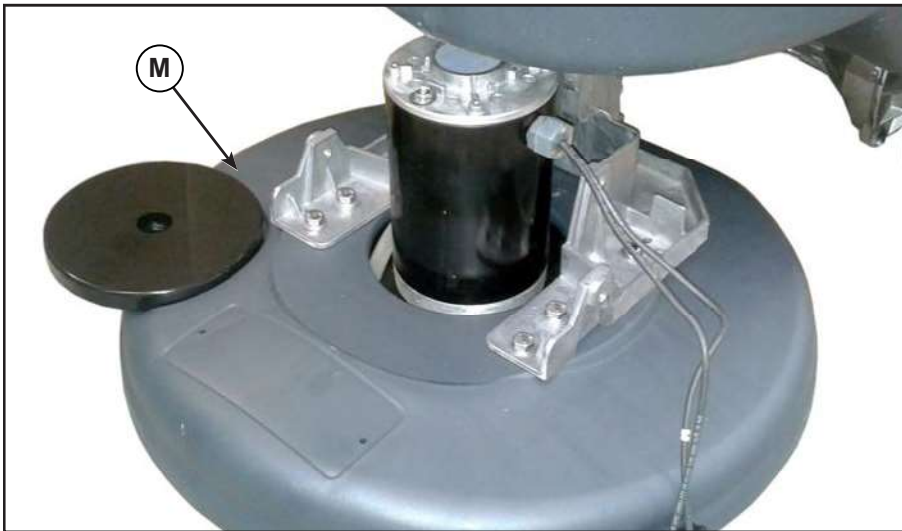


Figure 10:

Assembly

12. Assemble the components in the opposite order they were removed in, ensuring the REV motor power supply cable polarities are correct.

Checking/Replacing REV Motor Carbon Brushes

1. Remove the REV deck.
2. Place the deck on a workbench.



Note: The motor cannot be removed with the REV deck fitted to the machine.

3. Remove the connector holder.
4. Remove the wire mounting nut and the rubber gasket.

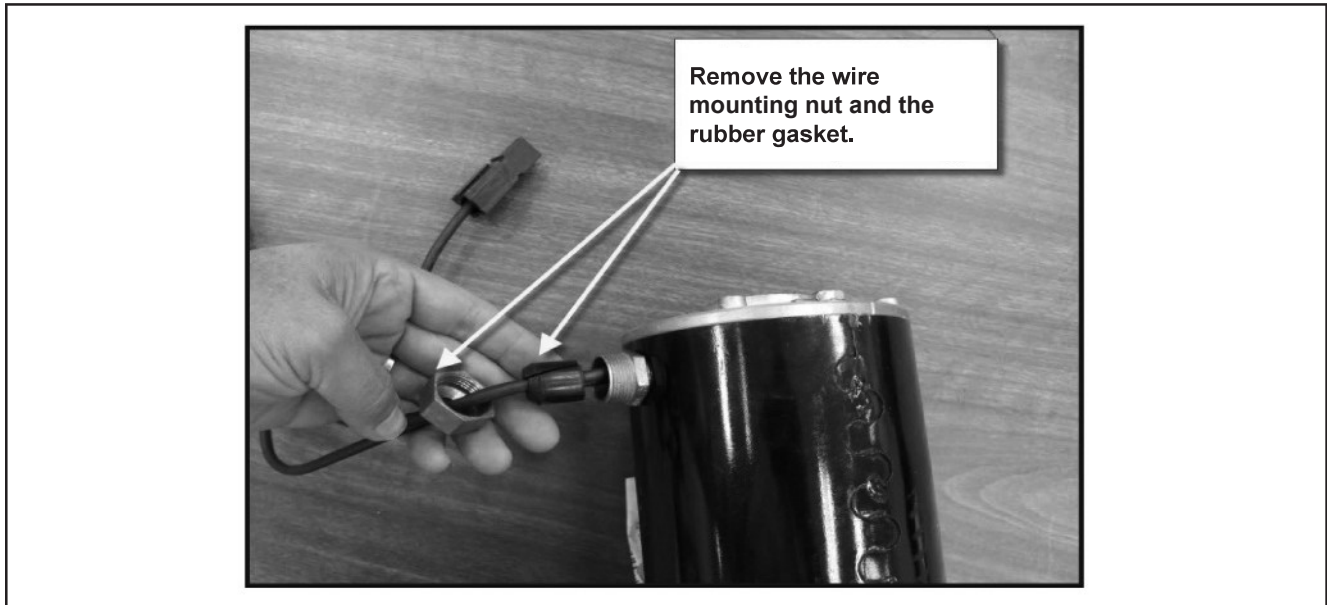


Figure 11:

5. Remove both nuts.

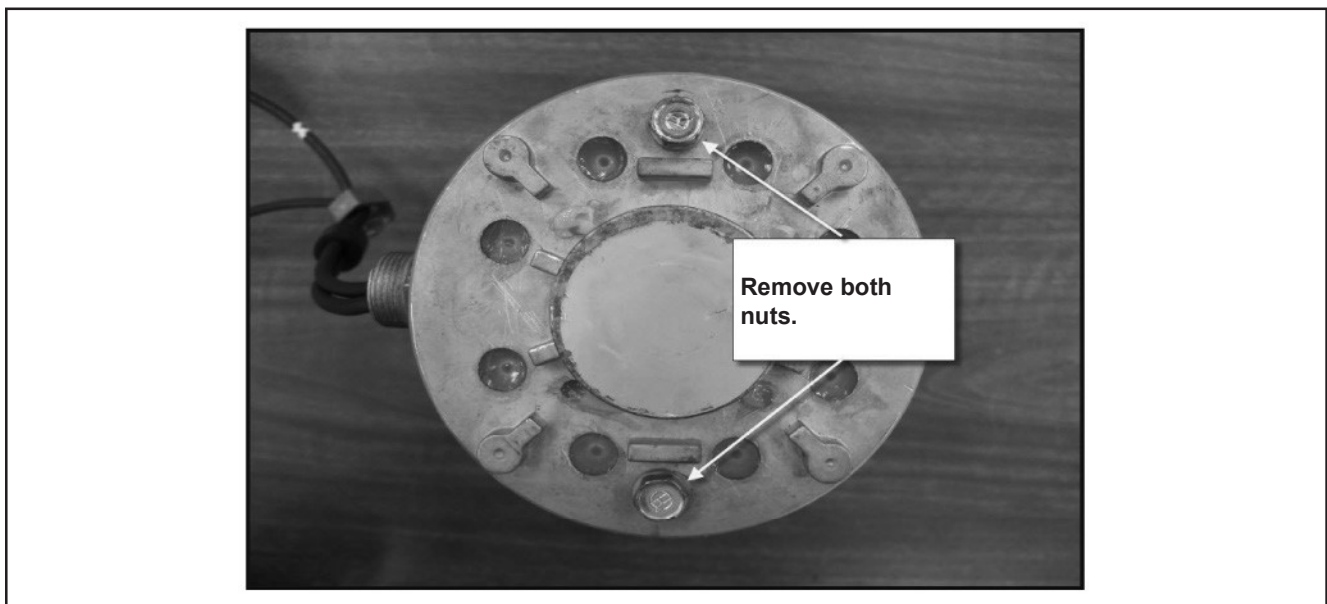


Figure 12:

6. Remove the top cover.



Figure 13:

7. Replace the carbon brushes.

- Before disassembly, note the spring position when the carbon brush is being pushed back.
- Remove the carbon brush and the spring.
- Install the new carbon brush and the spring in the proper carbon brush housing. Route the wire through the carbon brush housing. Place the rear end of the carbon brush in the spring “cup” so that the spring unrolls with the carbon brush pushed back once installed.

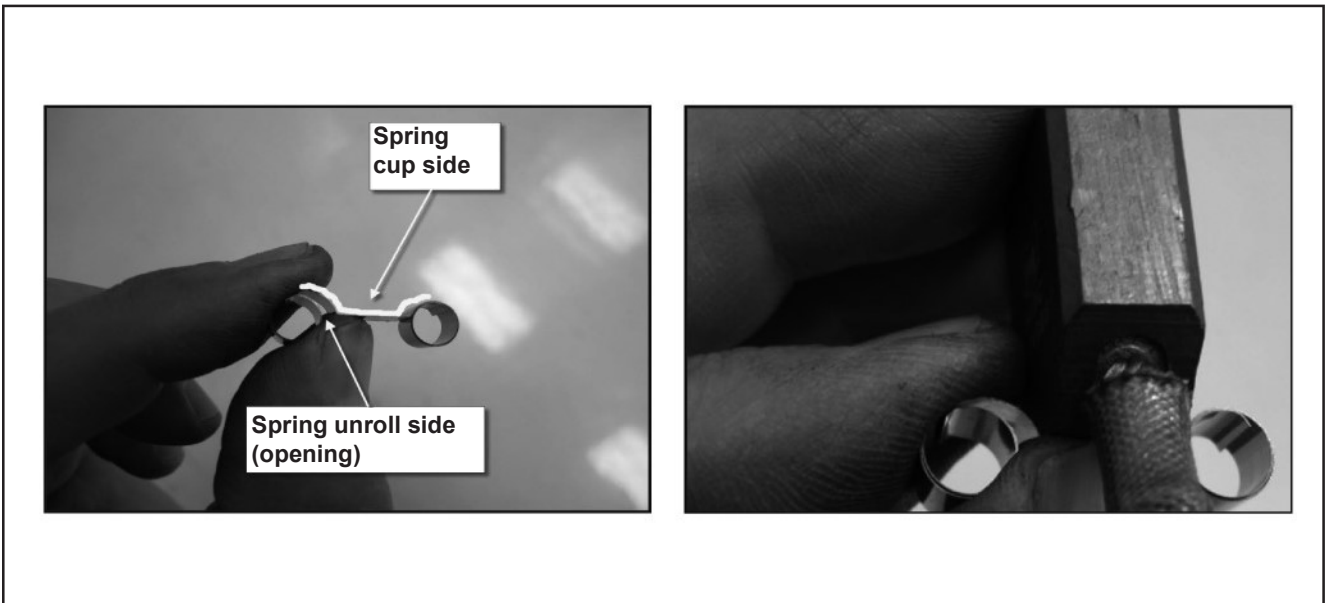


Figure 14:

- Push the carbon brush back against the spring and insert a paper clip through the access hole in the deck. (Remove the silicone sealant from the holes). The wire must pass through the holes of the brush holder in front of the brush to press the carbon brush against the spring.

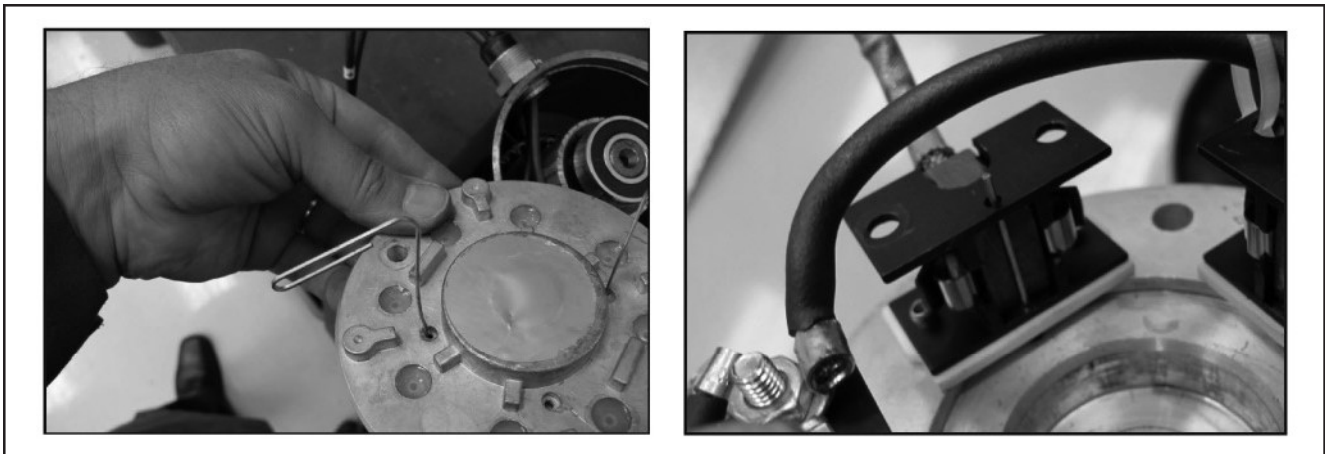


Figure 15:

- Install the other three carbon brushes.
8. Install the wave washer.
 9. Install the top cover.
 - Install it far enough so that the carbon brushes make contact with the collector when the temporary support wires are removed. Then remove the temporary wires.

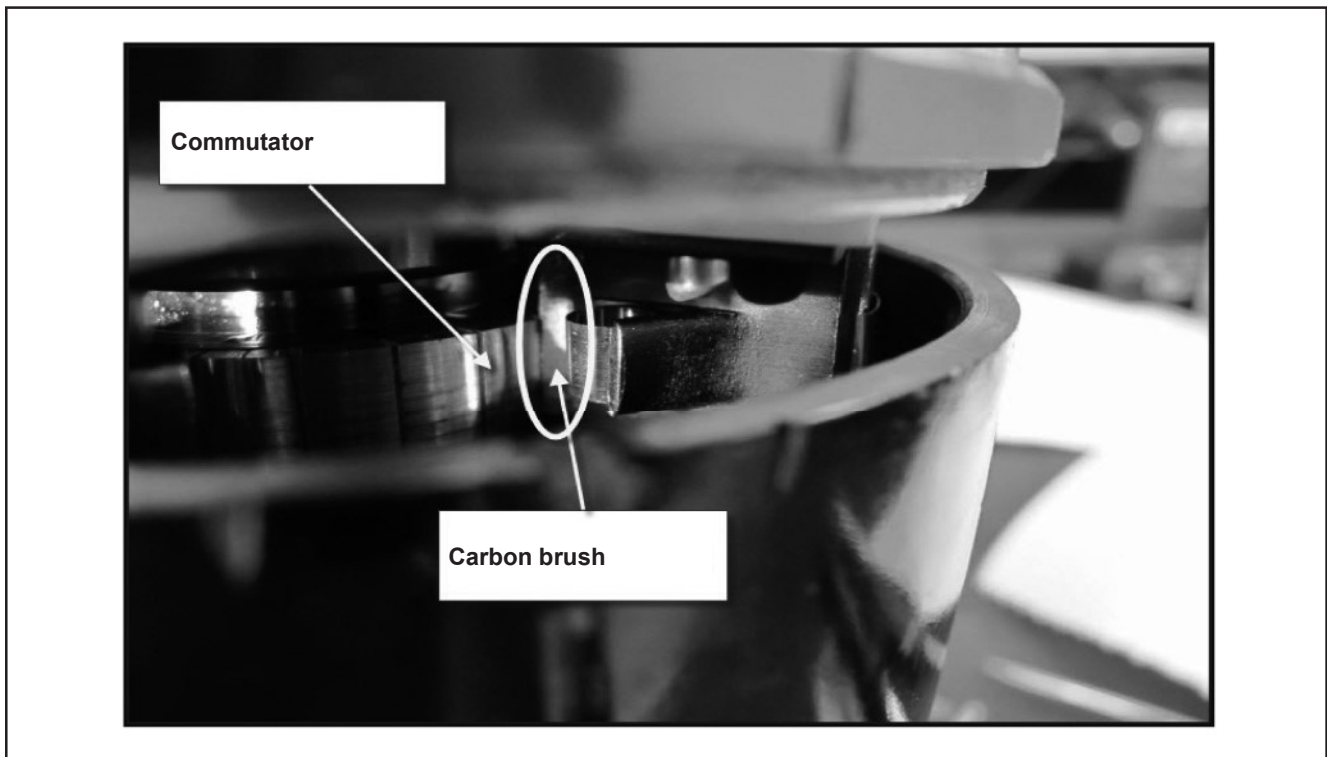


Figure 16:

- Install the top cover.
- Install the nuts.
- Seal the wire mounting holes with silicone sealant.

Brush Deck Actuator

Remove

1. Lower the brush deck.
2. Switch off the machine and disconnect the battery connector.
3. Remove the cover and disconnect the actuator connector (A) (Figure 17).
4. Unscrew the screw (B) of the lower pin, retaining the bushings.
5. Remove the screws (C), retaining the plates (D).
6. Remove the actuator (E).

Installation

7. Assemble the components in the reverse order of disassembly.

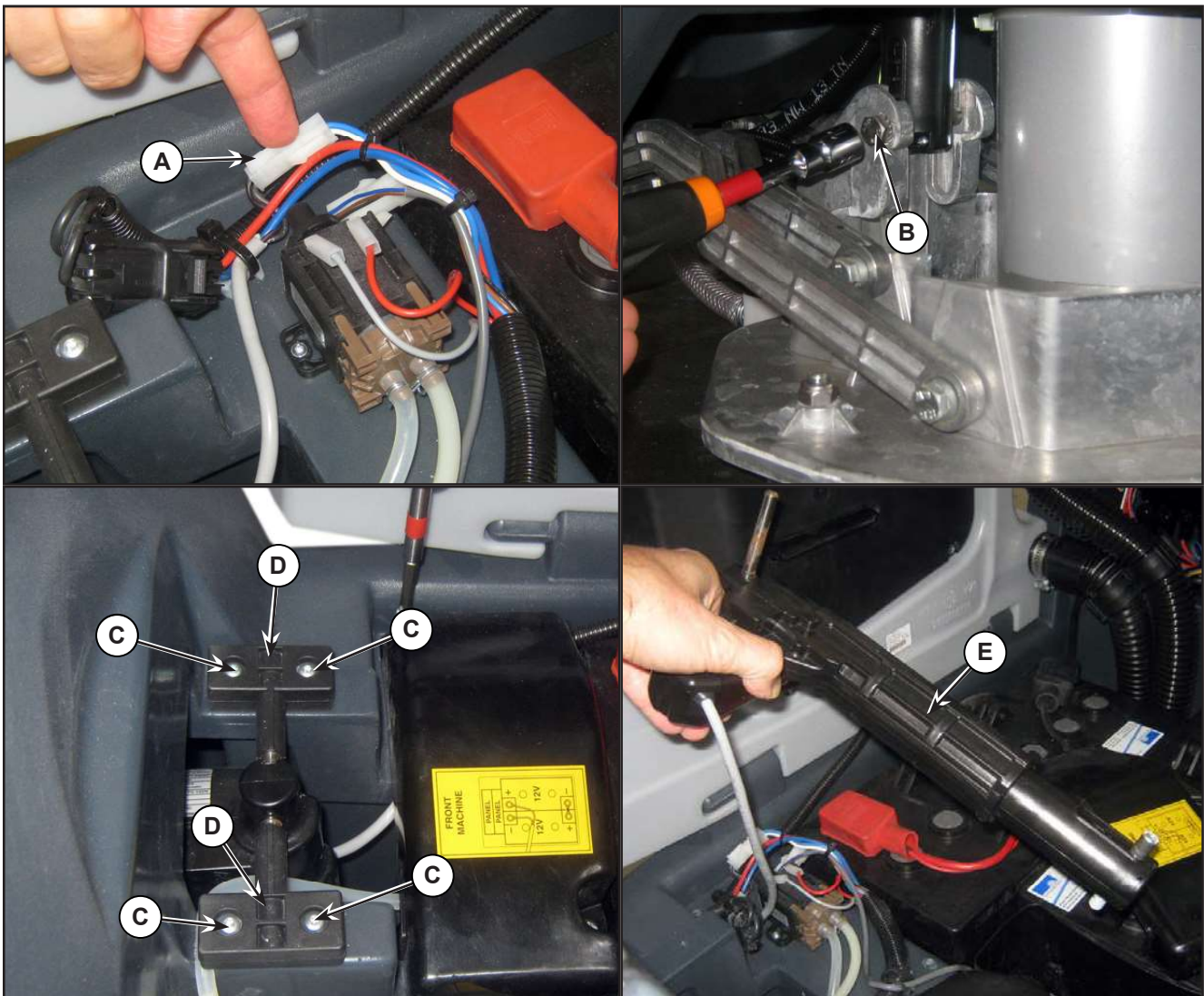


Figure 17:

Specifications

Description / Model		SC500	
		DISC	REV
Cleaning width		20 in (530 mm)	
Brush/pad diameter		20 in (530/508 mm)	
Brush pressure with extra-pressure function turned off		49 lb (22 kg)	
Brush pressure with extra-pressure function turned on		66 lb (30 kg)	
Brush deck right/left offset		100 / 25 mm (3.9 / 1 in)	
Brush distance from the floor (when lifted)		1.9 in (48 mm)	
REV motor power		0.9 HP (670 W)	
Rotation speed		2200 RPM	
Insulation class		H	
Insulation class		F	
Actuator technical data	Strength	300 N	
	Maximum load	600 N	
	Regulated travel	2.5 in (63 mm)	
	Total travel	3.8 in (98 mm)	
	Maximum speed	24V	
	Voltage	IP 44	
	Protection class	B	
	Insulation class	0.5A	
	No-load current draw	3A	
	Full-load current draw	3A	

38 - Squeegee System

Functional Description

The squeegee system cleans the liquid off the floor, which is then collected by the recovery system.

The squeegee is mounted on castors and the weight of the system presses it down on the floor.

The squeegee is attached with two quick-fastening handwheels which fit in the slots of the squeegee support. In case of fixed obstacles, the quick-fit system allows for squeegee immediate removal.

The squeegee can be raised and lowered by the operator using just their foot on the squeegee support footrest thanks to a mechanism consisting of two levers and a gas spring.

The angle of the squeegee and the correct adherence of the blades on the floor can be adjusted with a knob.

The front blade has an opening in the bottom edge so the squeegee can collect the water on the floor. The design and the central duct make it easy for the squeegee to clear the water. The bottom edge of the blade is smooth.

All 4 functional edges of each blade can be used before it needs replacing.

Component Locations

(Model No.: 9087352020, 9087354020, 9087350020, 9087351020, 9087353020, 9087355020)

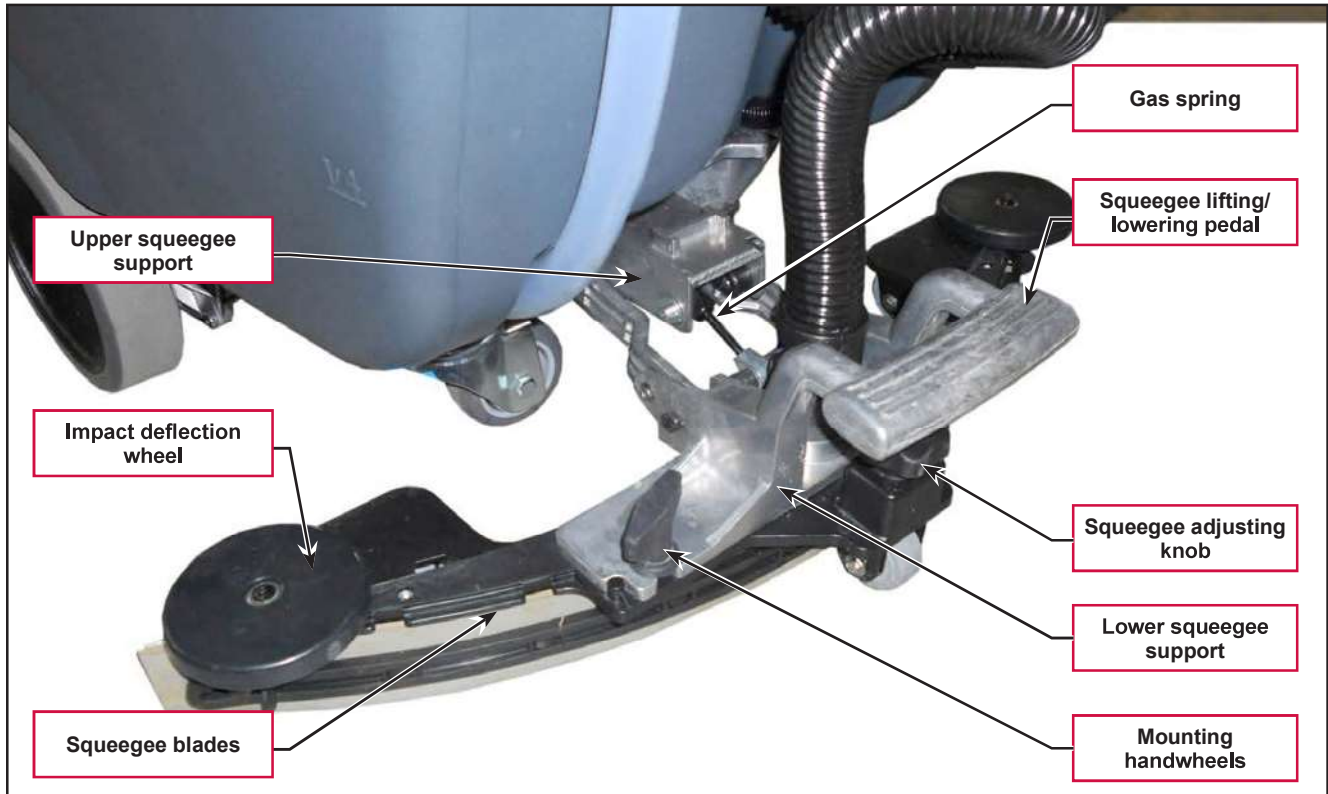


Figure 1:

(Model No.: 9087403020, 9087404020, 9087400020, 9087401020, 9087405020, 9087402020)

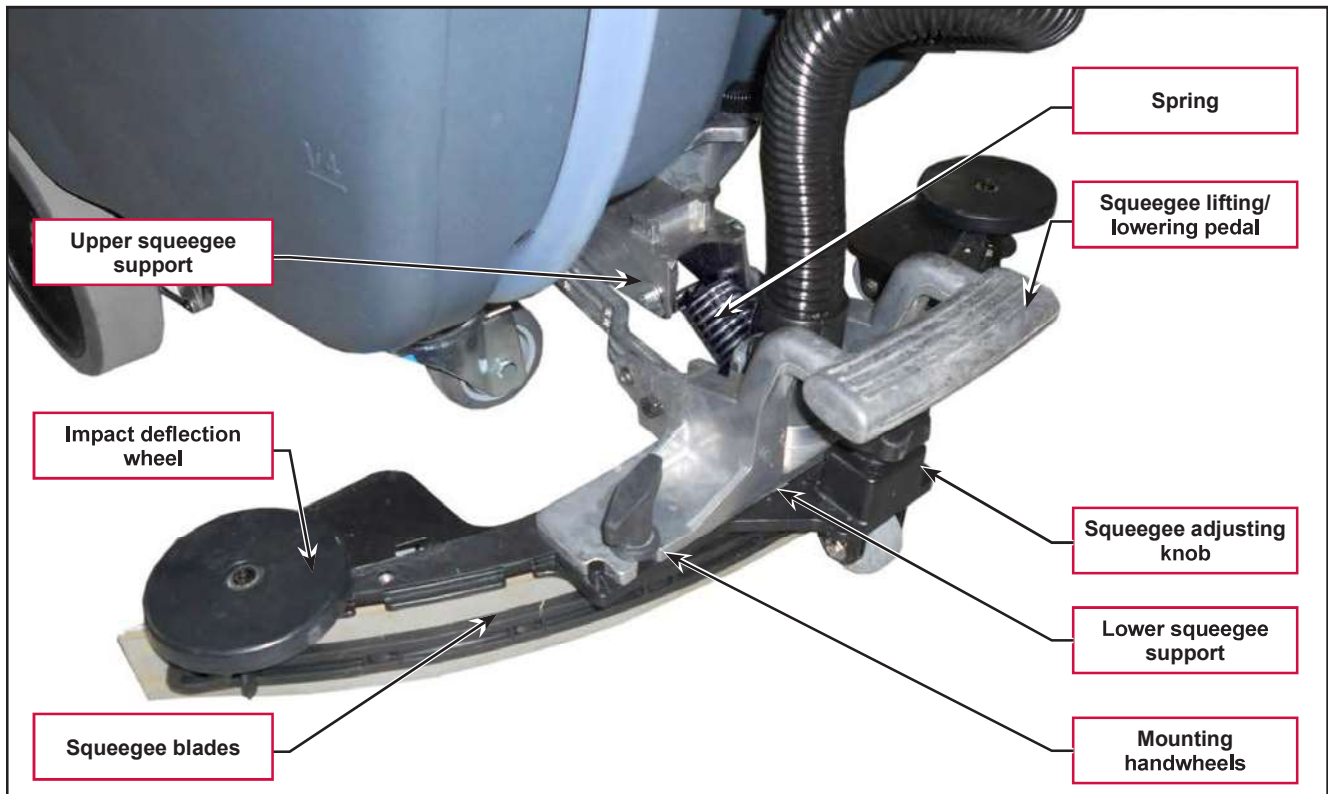


Figure 2:

Maintenance and Adjustments

Squeegee cleaning



Note: The squeegee must be clean and its blades must be in good conditions in order to get a good drying.



WARNING: It is advisable to wear protective gloves when cleaning the squeegee because there may be sharp debris.

1. Drive the machine on a level floor.
2. Ensure that the machine is off and the ignition key has been removed.
3. Loosen the handwheels and remove the squeegee.
4. Wash and clean the squeegee. In particular, clean the compartments (A) (Figure 2) and the vacuum hole (B). Check that the front blade (C) and the rear blade (D) are integral and free from cuts and lacerations; if necessary replace them.
5. Assemble in the reverse order of disassembly.

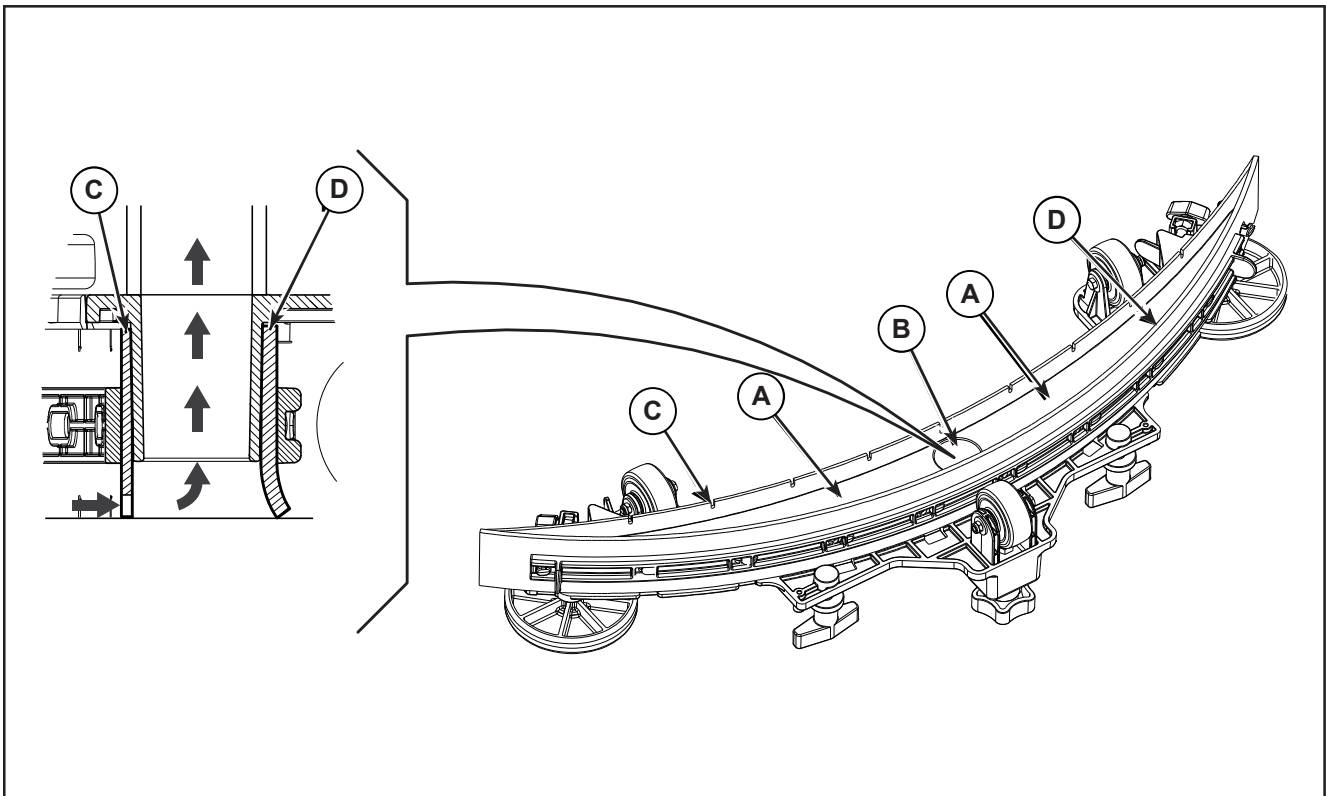


Figure 3:

Checking/Replacing the Squeegee Blades



Note: The squeegee must be clean and its blades must be in good conditions in order to get a good drying.



WARNING: It is advisable to wear protective gloves when cleaning the squeegee because there may be sharp debris.

1. Clean the squeegee as shown in the previous paragraph.
2. Check the condition of the front (C) (Figure 3) and rear (D) blades, ensuring there are no cuts and tears; if necessary, replace them as shown below. Check that the front corner (E) of the rear blade is not worn; otherwise, turn the blade to replace the worn corner with one of the three remaining intact corners. If the other corners are worn too, replace the blade according to the following procedure:
 - Using the tab (F), release and remove the elastic strap (G) from the fasteners (H), then turn or replace the rear blade (D).
 - Install the blade in the reverse order of removal. Fix the elastic strap (G) to the fasteners (H) starting from one side. Constrain to the fastener one by one, with the hand (M) blocking the elastic strap before the fastener and pulling with the other hand (N) for fixing
 - Unscrew the handwheels (I) and remove the strap (J), then turn or replace the front blade (C).
 - Install the blade in the reverse order of removal.
3. Install the squeegee on the support and screw down the handwheels.
4. Lower the squeegee to the floor to check the height of the blades, proceeding as follows:
 - Check that the lip (K) of the front blade (C) and the lip (L) of the rear blade (D) are resting as shown in the figure.
 - Use the knob to make adjustments.

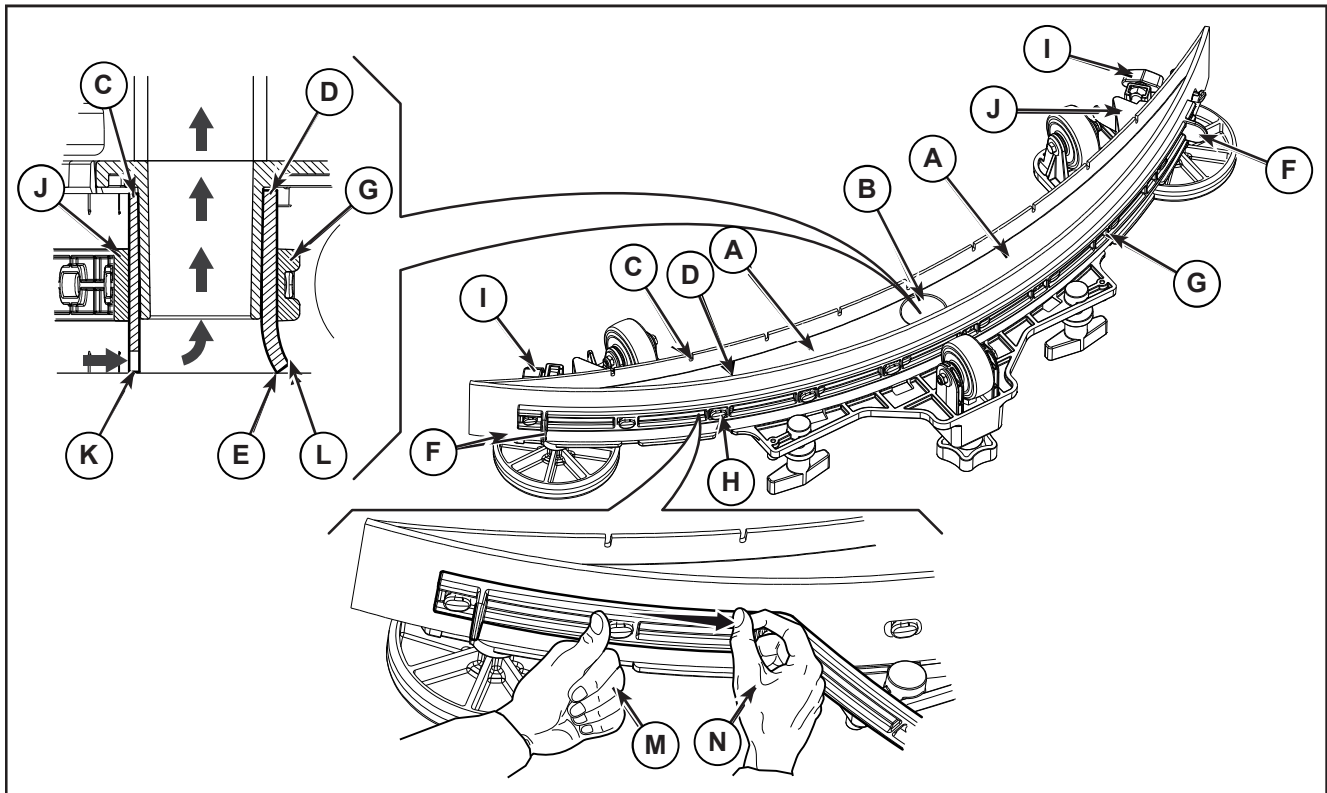


Figure 4:

Troubleshooting

Trouble	Possible Causes	Remedy
Suction of dirty water is insufficient or non-existent	Squeegee or vacuum hose blocked or damaged	Clean or repair/replace
The squeegee leaves lining on the floor or does not collect water	There is debris under the blade	Remove
	Squeegee blade lips damaged or worn	Replace
	Squeegee not balanced	Adjust with the relevant handwheel
Squeegee will not raise	Gas spring worn out.	Replace.

Removal and Installation

Gas Spring on the Squeegee Support

(Model No.: 9087352020, 9087354020, 9087350020, 9087351020, 9087353020, 9087355020)

1. Drive the machine on a level floor or on a hoisting system to facilitate the disassembly procedures.
2. Lower the squeegee and remove it from the support.
3. Unscrew the nut (A) (Figure 4), retaining the bushings, washers and spacers (B).
4. Unscrew the screw (C), retaining the nut, washers and spacers (D).
5. Unscrew the screw (E), retaining the nut and washers.
6. Remove and replace the gas spring (F).

Assembly

7. Assemble the components in the reverse order of disassembly.

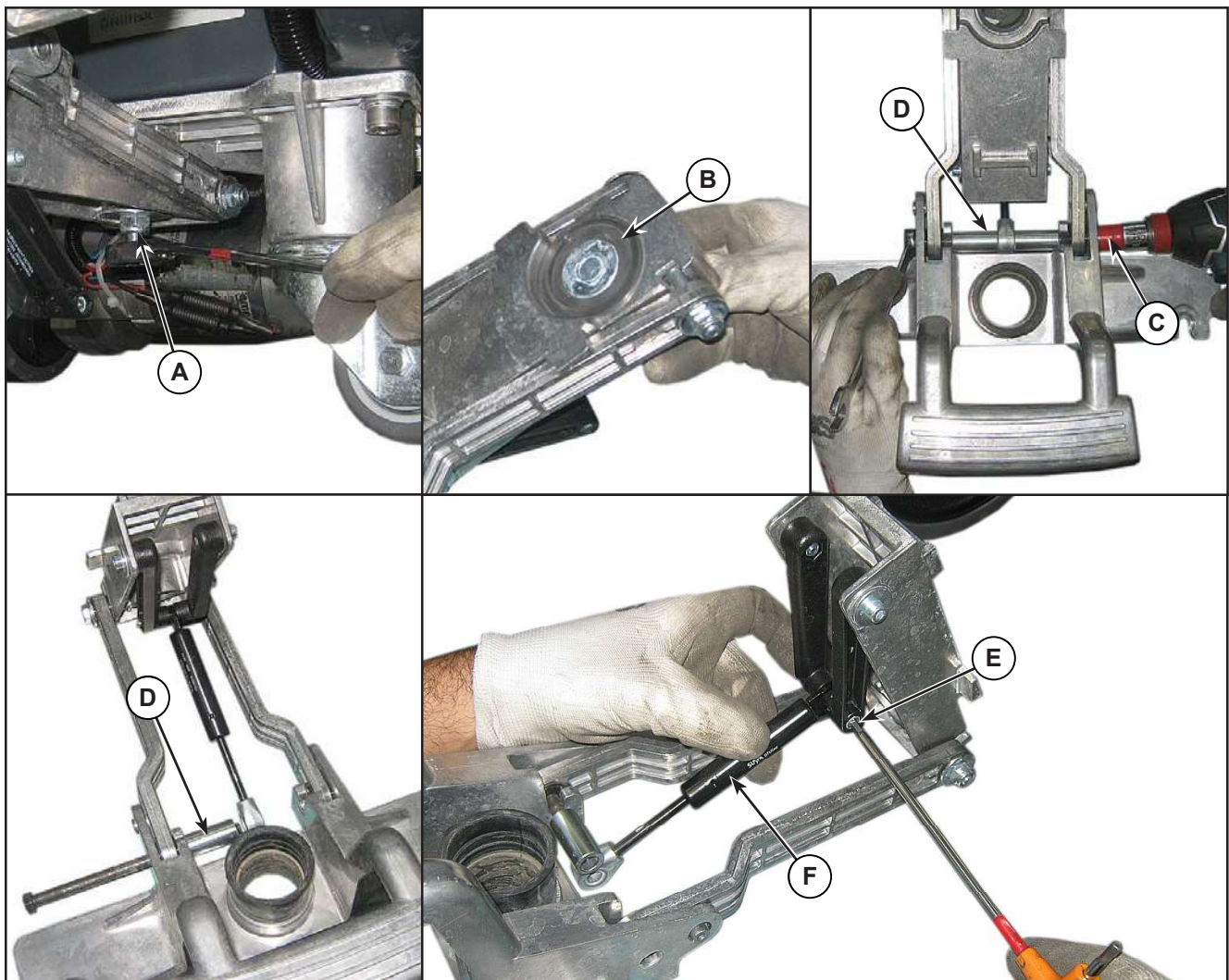


Figure 5:

Spring on the Squeegee Support

(Model No.: 9087403020, 9087404020, 9087400020, 9087401020, 9087405020, 9087402020)

1. Drive the machine on a level floor or on a hoisting system to facilitate the disassembly procedures.
2. Remove the squeegee from the squeegee support (A), then lower the squeegee support by slowly to the floor.
3. Press lightly the spring (B) then remove it with its pair of terminals.

Assembly

4. Assemble the components in the reverse order of disassembly and note the following:
 - Mount the spring with its pair of terminals as shown of the picture (C).

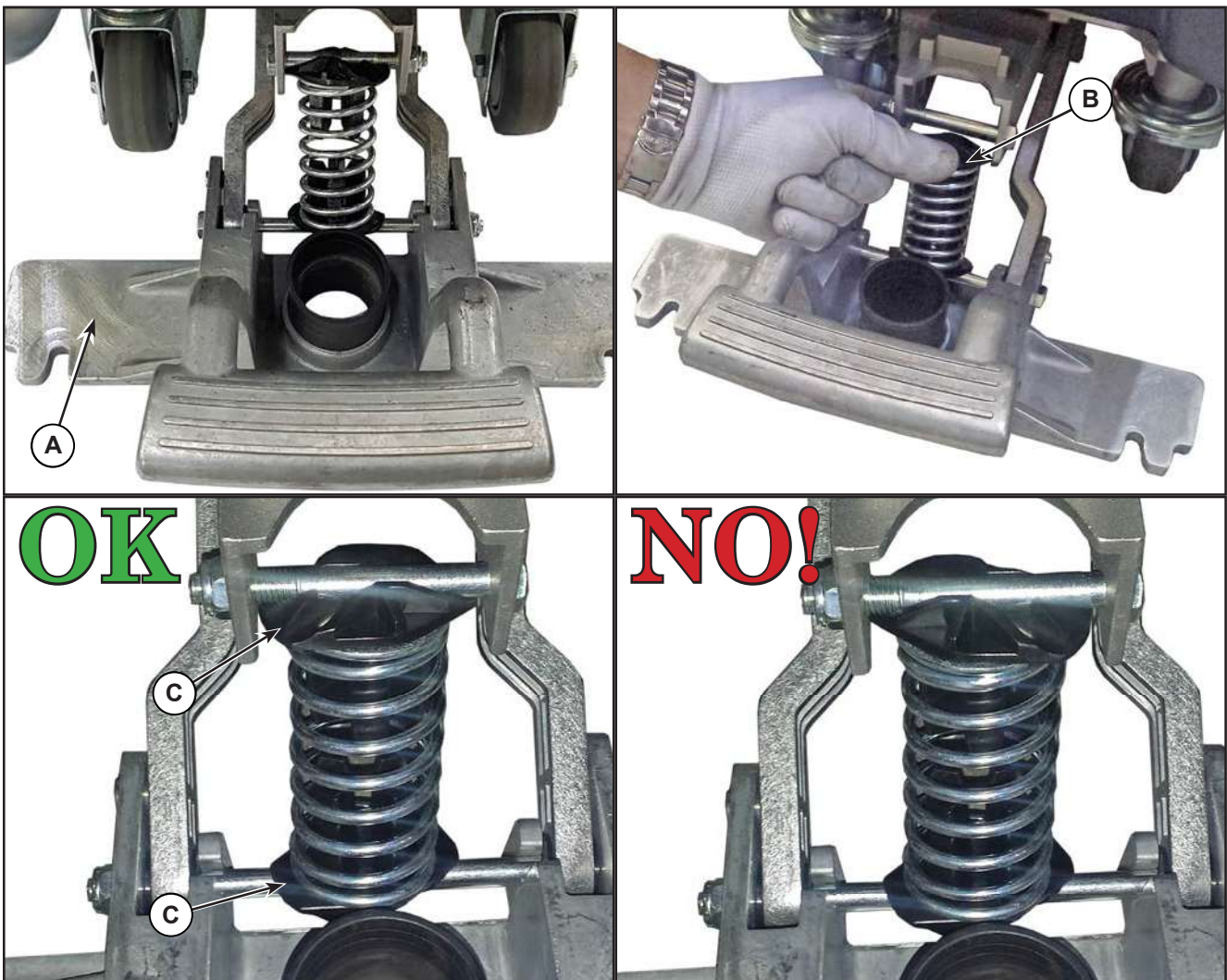


Figure 6:

Specifications

Description / Model	SC500	
	DISC	REV
Squeegee width	28.3 in (720 mm)	
Gas spring	300 N	

40 - Recovery System

Functional Description


The recovery system removes the dirty water from the floor and pipes it to a recovery tank. When the machine is running, the dirty water on the floor is collected by the squeegee blades and collected through the slots in the same, piped through the vacuum hose and into the tank by the airflow created by vacuum motor (M2). The dirty water is piped into the recovery tank, while the airflow continues to the vacuum fan.


A tank with a grid collects the largest debris going through the recovery tank hose.

The automatic float in the vacuum grid stops vacuum system motor (M2) from collecting any liquids.

When the automatic float closes and shuts down the vacuum system, the vacuum system motor noise will increase and the floor will not be dried.

The vacuum system is activated automatically with the One-Touch button . It can then be managed

independently via the vacuum button . The vacuum system is activated in full power or silent mode depending on the last mode in use before the machine was switched off. This mode can be changed by repeatedly

pressing the vacuum button . The various vacuum modes are also displayed on the multifunction display.

When the recovery tank is full it can be emptied through the drain hose.

Wiring Diagram

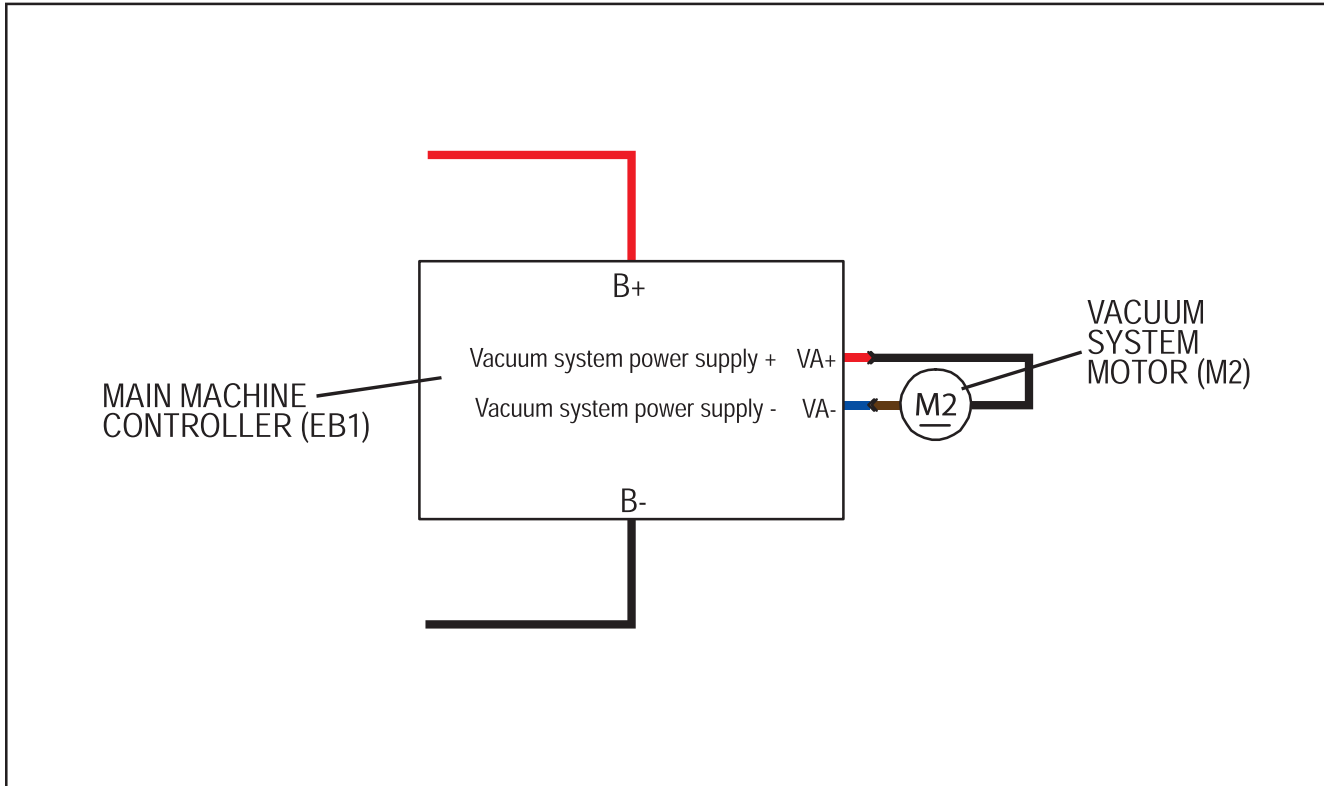


Figure 1:

Component Locations



Figure 2:

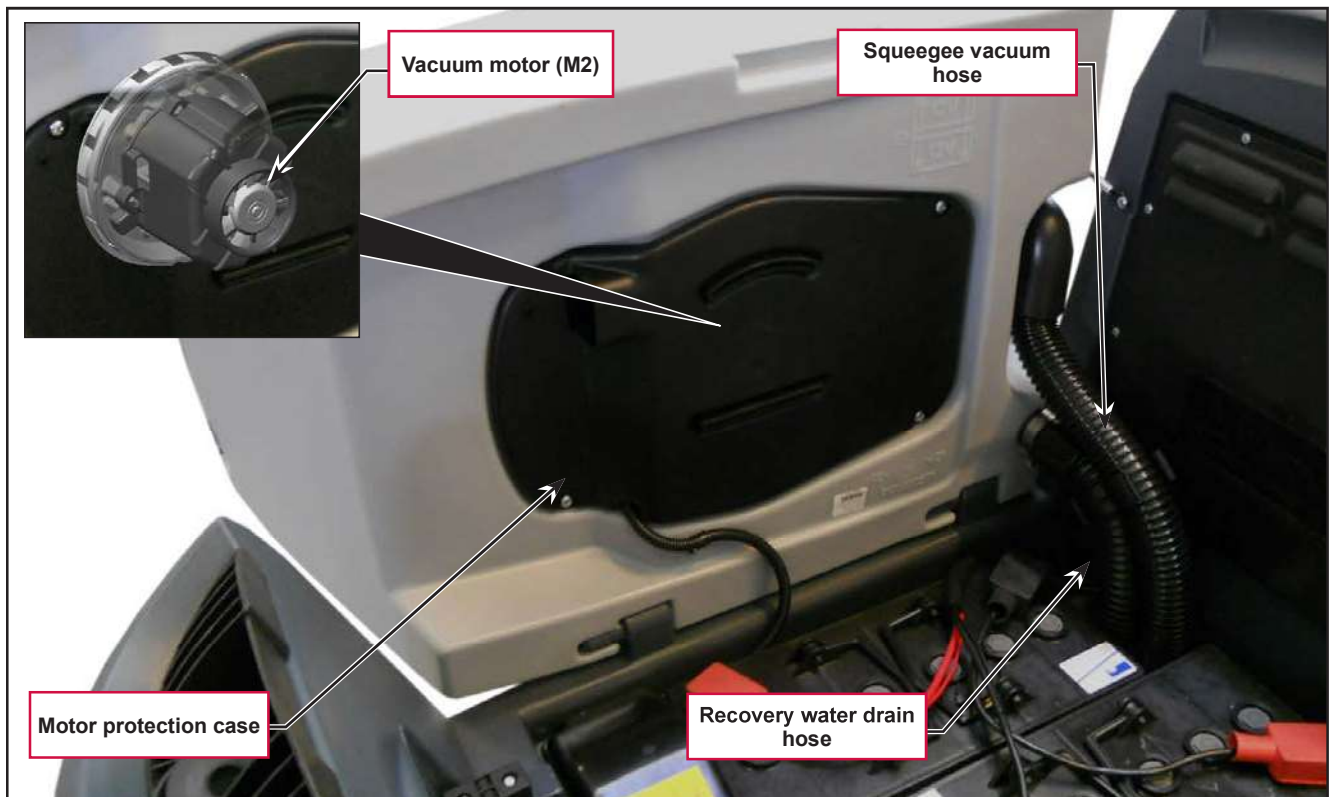


Figure 3:

Maintenance and Adjustments

Recovery Tank Cleaning

1. Drive the machine to the appointed disposal area.
2. Drain the water from the tank using the drain hose.
3. Lift the recovery tank cover.
4. Clean the vacuum grid (B) (Figure 4), release the fasteners (A), open the grid (B) and recover the float (C), then clean carefully and reinstall.
5. Remove the debris collection tank (D) and open its cover, then clean it carefully.
6. Reinstall it on the vacuum hose.
7. Reinstall the debris collection tank on the rigid tube in the tank.
8. Check the condition of the tank cover gasket (E).



Note: The gasket (E) creates the vacuum in the tank that is necessary to vacuum up the recovery water.

9. If necessary, replace the gasket (E) by removing it from its housing (F). When fitting the new gasket, position the joint (G) in the area shown in the figure.
10. Check that the seating surface (H) of the gasket (E) is in good condition, clean and suitable to form a seal with the gasket itself.
11. Close the cover.

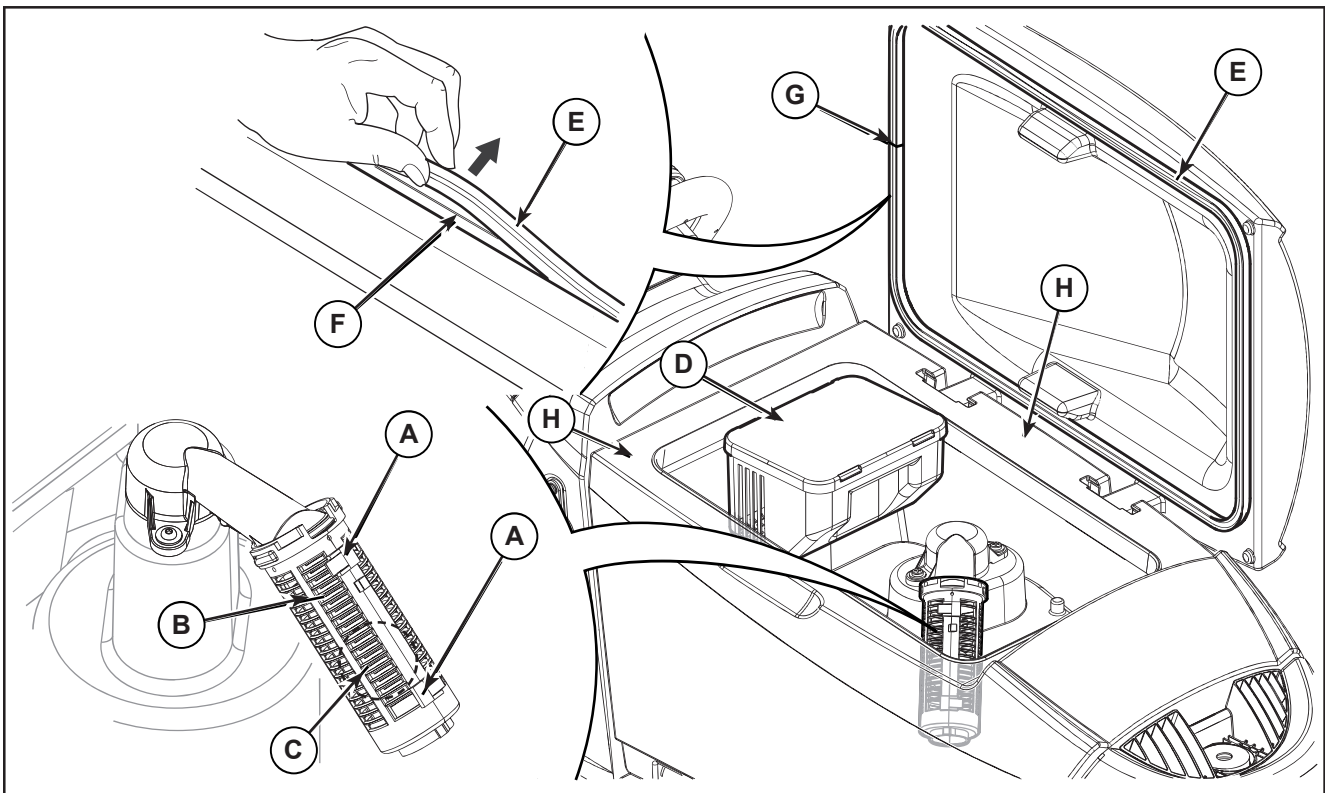


Figure 4:



Troubleshooting

Trouble	Possible Causes	Remedy
The vacuum motor will not turn on	Wiring between Main machine controller (EB1) and vacuum motor (M2) damaged	Repair
	User interface controller (EB3) faulty	Replace
	Vacuum motor faulty	Check the amperage
Suction of dirty water is insufficient or non-existent	Activation of automatic float shut-off	Drain the recovery tank
	Debris collection filter dirty	Clean
	Vacuum grid with automatic float shut-off dirty	Clean
	Tank cover not correctly positioned	Adjust
	Tank cover seal damaged or not working correctly	Clean or replace
	Vacuum motor container dirty	Clean
	Vacuum seals damaged or not working correctly	Repair or replace

Vacuum Motor Current Draw Test



WARNING: This procedure must be performed by qualified personnel only.

1. Apply the amperometric clamp (A) to a cable (B) of the batteries (Figure 5).
2. Turn on the machine by the key and the button .
3. Activate the vacuum by pressing the vacuum button .
4. Activate the vacuum and check that the current draw of the vacuum motor is between 13 and 17A at 24V.

Stop the vacuum.

Remove the amp clamp (A).

If the amperage is higher, perform the following procedures to detect and correct the abnormal amperage:

- Remove the vacuum motor (see the procedure in the Vacuum Motor paragraph), and check the condition of all its components.

If the above-mentioned procedures do not produce the correct readings for the vacuum motor amperage, the motor must be replaced (see the procedure in the Vacuum Motor paragraph).

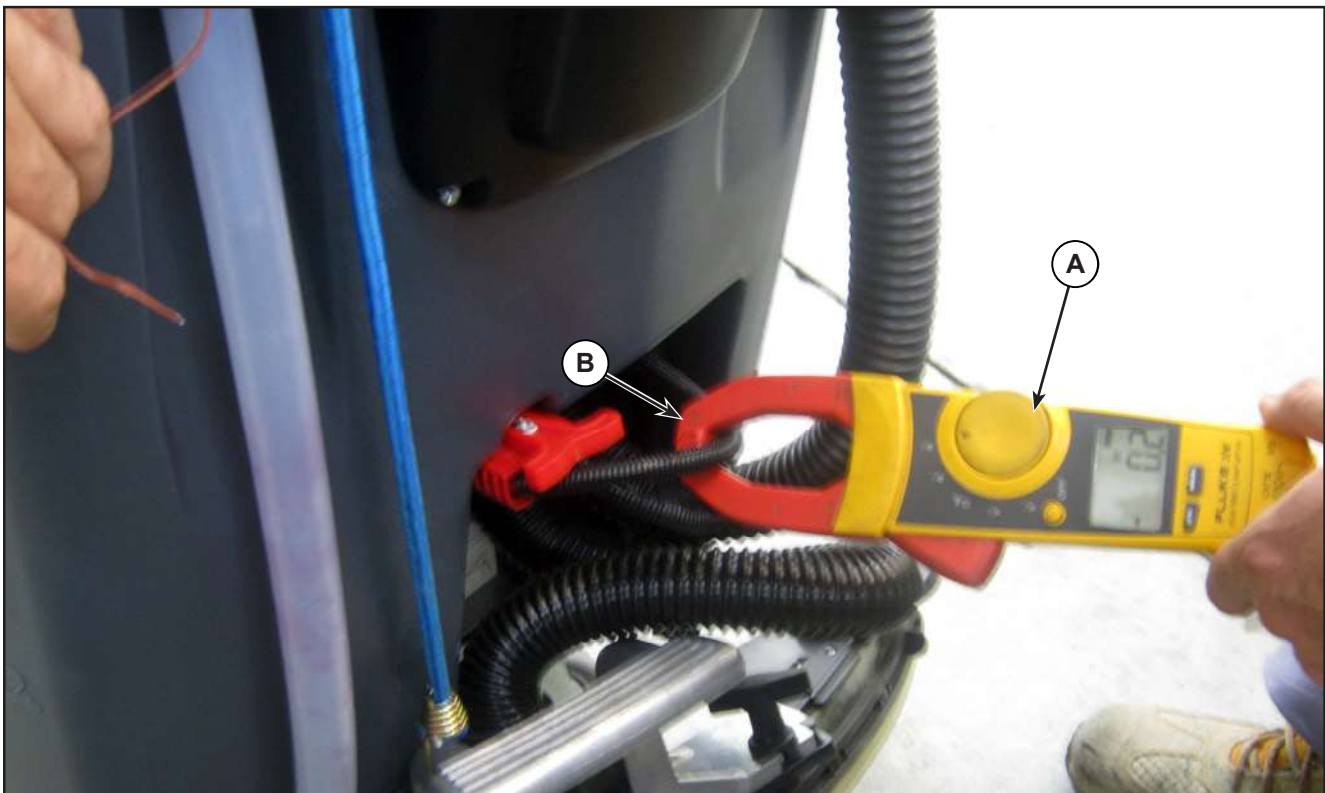


Figure 5:

Removal and Installation

Vacuum Motor Unit

Removal

1. Remove the ignition key.
2. Disconnect the red battery connector.
3. If present, drain the recovery tank, then lift it.
4. Remove the cover (A) (Figure 6), then disconnect the connector (B).

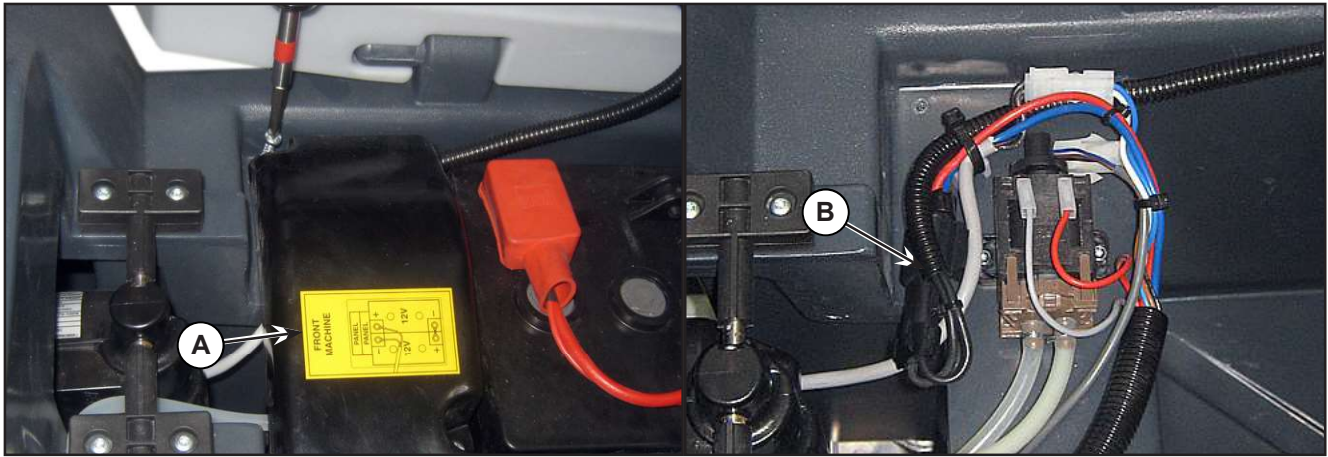


Figure 6:

5. Unscrew the 4 screws (C) (Figure 7) and remove the case (D).
 6. Unscrew the screw (E) holding the vacuum motor wiring.
 7. Unscrew the 4 screws (F) and remove the vacuum motor unit (G).
- Installation**
8. Assemble the components in the reverse order of disassembly.

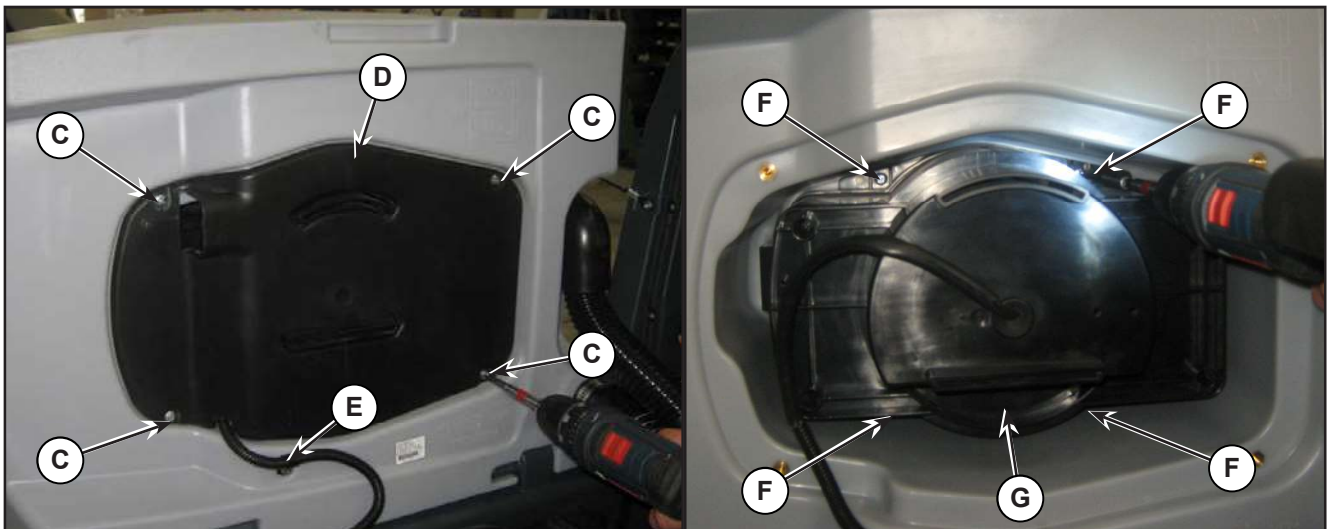


Figure 7:

Container and Vacuum Motor Disassembly/Assembly

Disassembly

1. Remove the ignition key.
2. Disconnect the red battery connector.
3. If present, drain the recovery tank, then lift it.
4. Unscrew the 4 screws (A) (Figure 8) and remove the case (B).
5. Unscrew the screw (C) holding the vacuum motor wiring.
6. Unscrew the 4 screws (D) and remove the vacuum motor unit (E).

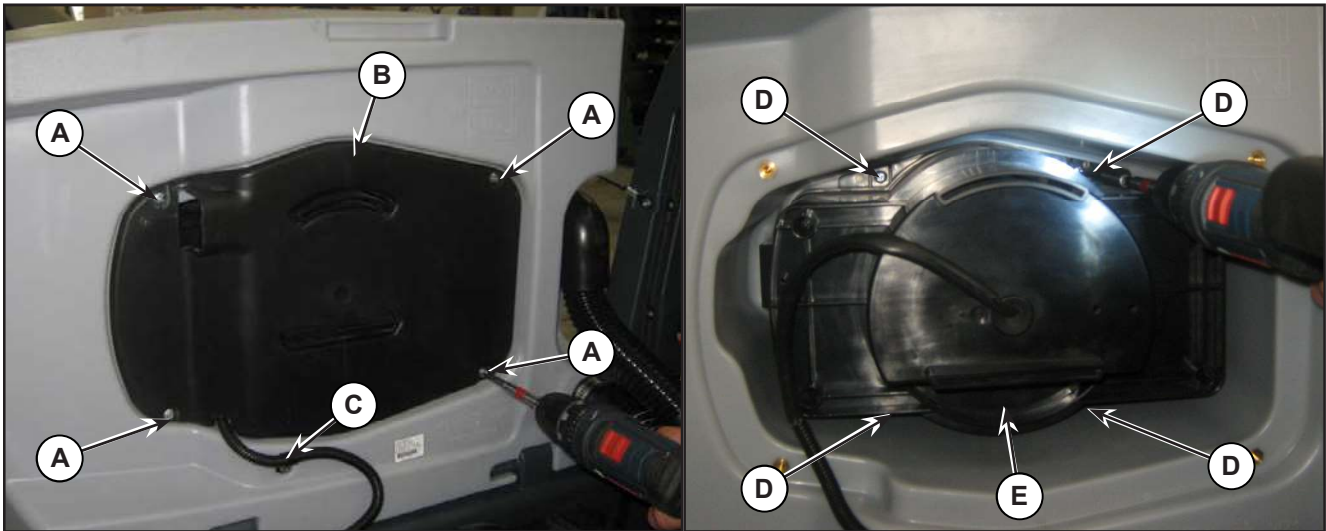


Figure 8:

7. Unscrew the 4 screws (F) and cut the retaining strap (G) (Figure 9).
8. Remove the external soundproofing support (H) from the internal soundproofing support (I).
9. Clean any dirt from the space between the two containers.
10. Remove the seal (J) and the internal support (K).
11. Clean any dirt from the space between the container and the motor.

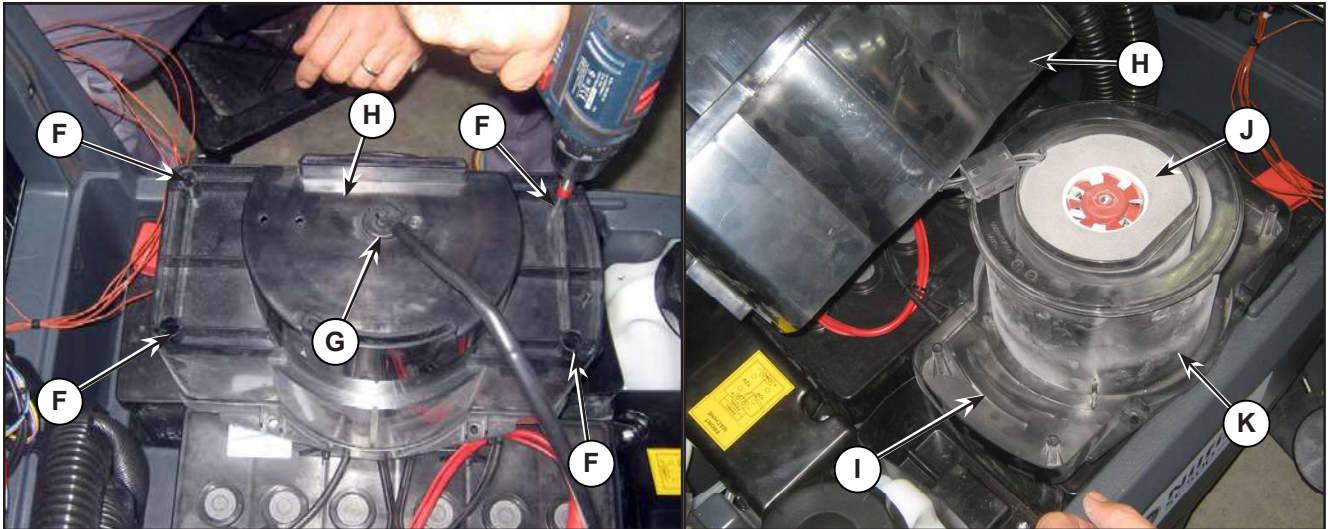


Figure 9:

12. Cut the strap (L) and disconnect the power supply (M) (Figure 10).
13. Remove the motor (N).

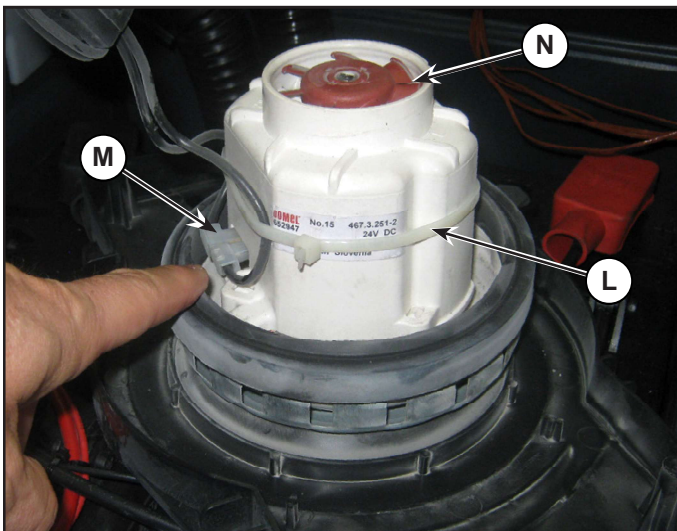


Figure 10:

14. Clean and check the condition of all seals (O) (Figure 11); replace them if necessary.

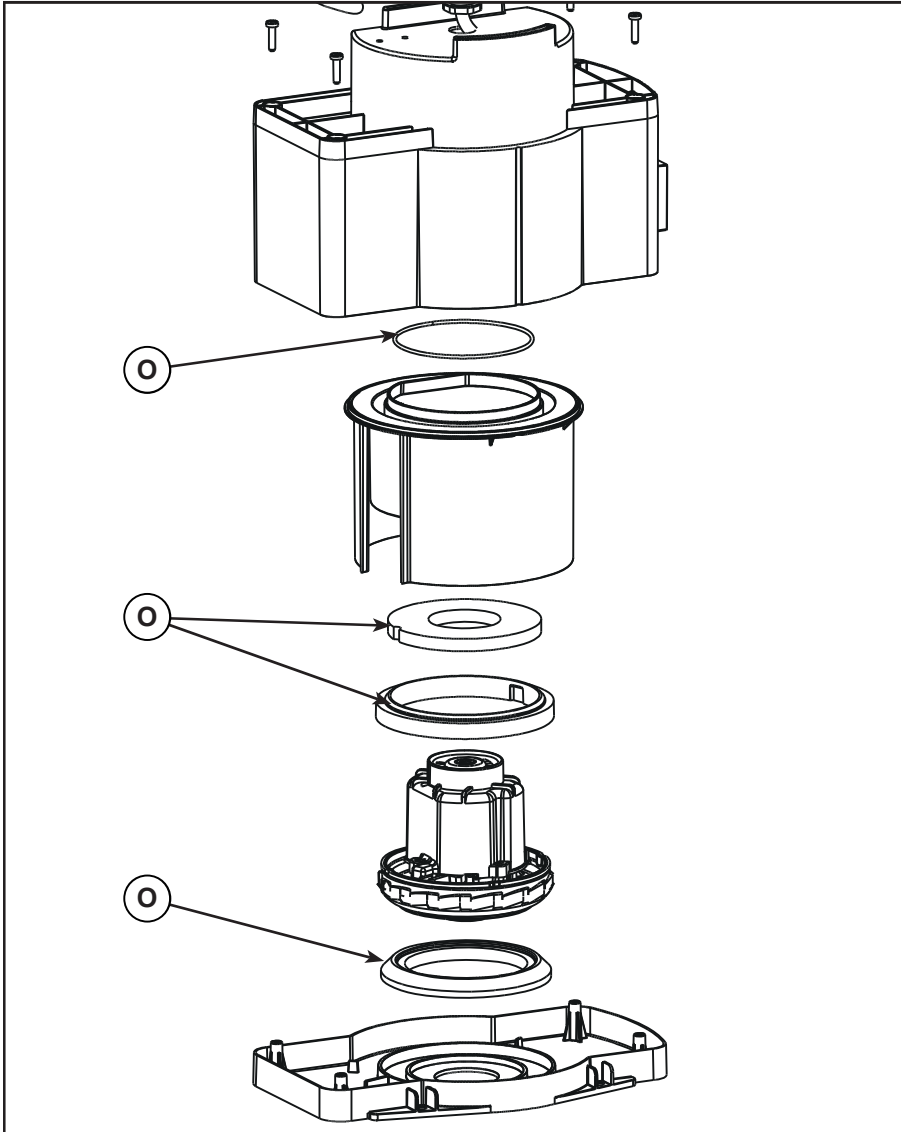


Figure 11:

Assembly

15. Check that all components are reassembled with the correct polarity and orientation.
16. Assemble the components in the reverse order of disassembly.

Specifications

Description / Model	SC500	
	DISC	REV
Recovery tank capacity	12 US gal (45 L)	
Vacuum motor technical data	0.37 hp (280 W)	
	20.8A VDC 24V	
Vacuum circuit capacity	29.9 in H ₂ O (760 mm H ₂ O)	

90 - Options

Description	Illustration
<p>ECOFLEX KIT (EU model only)</p> <p>Detergent tank</p> <p>Insert-dry brake</p> <p>Cap</p> <p>Refill cap</p> <p>Hose</p> <p>Pump detergent mix (piston pump for the old models)</p> <p>Pump detergent mix (peristaltic pump for the new models)</p> <p>Sensor water level</p> <p>Support sensor</p> <p>Hardware</p>	 <p>The illustration shows the components of the ECOFLEX KIT laid out on a white surface. On the left, there is a black electrical connector with red and black wires, a long thin white hose, and two black screws. In the center, there are two black rectangular boxes, each labeled 'Nilfisk SC500 ecoflex'. To the right of these boxes is a large white plastic detergent tank with a black cap and a grey cap. At the bottom, there are two small black components, one of which is a peristaltic pump.</p>
<p>BATTERY CHARGER KIT (EU model only)</p> <p>Charger extension UK / EU</p> <p>Cable tie plug</p> <p>Charger battery</p> <p>Support battery charger</p> <p>Hardware</p>	 <p>The illustration shows the components of the BATTERY CHARGER KIT laid out on a white surface. The central component is a black rectangular battery charger unit with a power cord and a cable with a connector. To the right of the charger is a white instruction sheet with the heading 'CARGO BATERIA A CARGAR'. Below the instruction sheet are several hardware items: a black cable tie plug, a black cable, a black support bracket, and two black screws.</p>

Description	Illustration
<p>VACUUM SYSTEM MOTOR KIT</p> <p>(All version)</p> <p>Vacuum motor group</p> <p>Tie cable</p>	
<p>USB KIT</p> <p>(Model No.: 9087412020, 9087411020, 9087410020)</p> <p>USB cable</p> <p>Plate</p> <p>Hardware</p>	

Description	Illustration
<p>TRACKCLEAN KIT-US (Advance) Kit-US with reader Kit-US without reader</p> <p>TRACKCLEAN KIT-EU (Nilfisk) Kit-EU with reader Kit-EU without reader</p>	