



# *Installation Course*

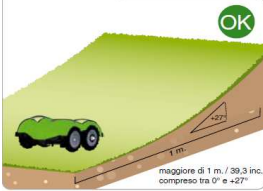


## *Lawn Mower Robot*

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# Introduction & Features

## Remember that :

Maximum coverage 400 sq.m.	However, it is a good idea to not exaggerate and bear in mind that gardens that are more complicated reduce the square meters covered by the robot.
Maximum slope limit of 27° 	The robot can mow this maximum slope limit. Remember that the main problem is the uphill climb when the robot arrives at the border and is unable to go back.

Description		Model			
		L50BEU	L50DEU	L50BUS	L50DUS
Maximum recommended surface that can be mowed					
Each daily working cycle	m2 (sq ft)	400 (4300 sq ft)			
Characteristics					
Size (W x H x D)	mm (in.)	409 x 199 x 335 (16,10 x 7,83 x 13,19 in)		488 x 287 x 488 (19,21 x 11,30 x 19,21 in)	
Robot weight (inc. battery)	kg	7,9	8,2	10,3	10,6
Cutting height (Min-Max)	mm (in.)	34-40 (1,34-1,58 in) Adjustable with 1 6-mm spacer (0,24 in)		48-72 (1,88-2,84 in) Adjustable with 4 6-mm spacers (0,24 in)	
4-pronged blade diameter	mm (in.)	250 (9,84)			
Drive system		4WD			
Electric motors	V	cc (25,2V)			
Cutting blade speed	RPM	4000 Cut		2200 Maintenance	
Ground speed	Me- ters/ minute	16 (52,48 ft.)			
Suggested maximum slope	°	27° according to lawn condition			
Ambient working temperature		-10°(14 F) (Min)		+50° (122 F) (Max)	
Measured sound output	dB(A)	72(Max) - 65(Lawn maintenance)			
Water protection class	IP	IP21			
Electric features					
Charger (for lithium batteries)		Classe 2 (Min 90 - 264Vac) AC current (typ.) 1.2A/115Vac 0.7A/230Vac Input Frequency range 47 - 63Hz			
Battery type and charger					
Rechargeable Li-Ion battery	V-A	25,2V - 6,9Ah			
Charger	V-A	29,3 Vcc - 2,0 Ah			
Minimum recharging time and method		3 hours - manual			

# Start-up / Installation

## Getting Started

### Recharge the Robot

First, recharge the Robot. It will come in handy at the end of installation for checking the correct functioning of the lawn mower.

### Fix the garden



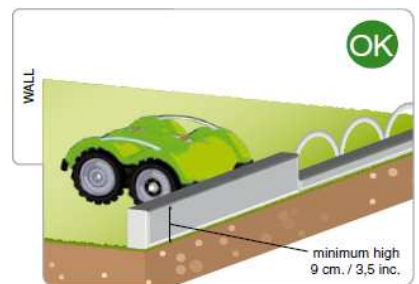
Before starting the Robot, the customer must be instructed on how to fix up the lawn.

The most common problems are small holes, small toys, and rocks, basically all objects which cannot be detected as an obstacle and which pass under the body of the robot and may be picked up by the cutting blade.

### Sprinkler system

Watch out for the sprinkler system; make sure the sprinkler heads do not protrude from the grassy surface. This may damage the cutting blade.

### Marking boundaries



The garden must be checked and adjusted so that the robot has enough space for recognising when there is no grass. Carefully follow the above points for the correct and safe use of the robot.

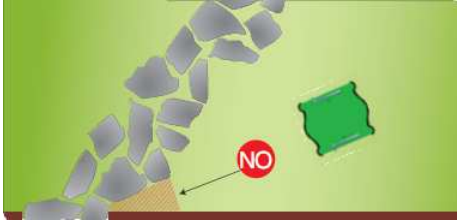
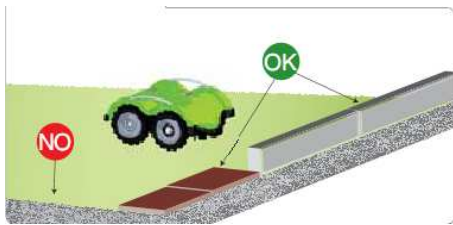


The robot moves in both directions and changes its forward direction only if the following events are verified

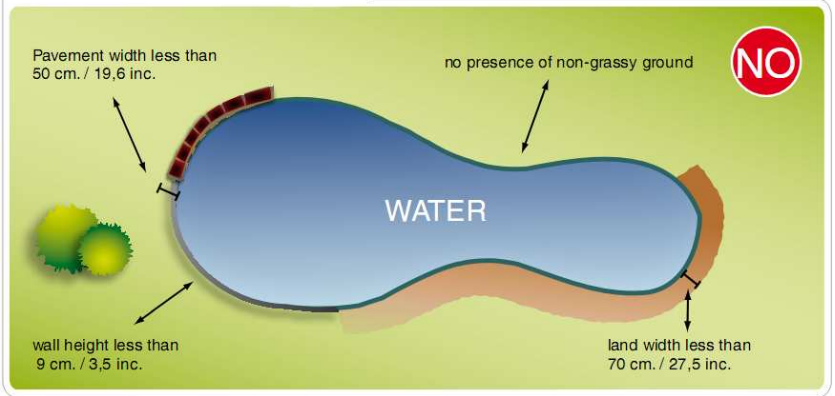
- No grass.
- Gradual slope exceeding 27-30°.
- Rapid slope exceeding 15-20°.
- Knocks to the body detected by the current of the wheel motors.
- Too much adsorption of the wheel motor.

The figures to the left show how to mark the boundaries of the lawn so that the robot does not go outside the area to mow.

If there are areas which are dangerous for the robot (e.g. a pool, pond, abyss, stairs going down, a sudden and steep descent) adjustments must be made to prevent the robot from being damaged. The first figure shows an incorrect situation.

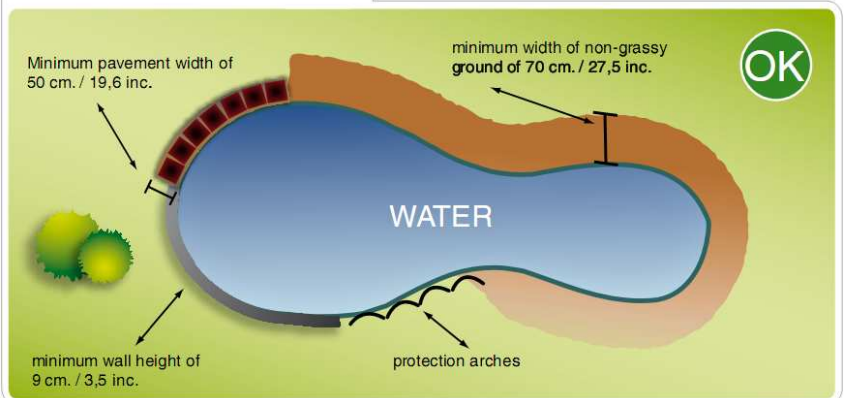


#### INAPPROPRIATE POOL PREPARATION



The figure below shows a correct installation.

#### APPROPRIATE POOL PREPARATION



#### **i** Important

the foliage is usually detected as grass. In case of foliage, we suggest to increase the distance from the edge by about 20 cm (7,88 inc).

**Turning off the cutting blade. The robot turns off the cutting blade due to the following reasons**

- Tall grass or slow motor speed.
- A handle was touched.
- The robot exceeded a 30° slope
- The inclination of the robot has changed too quickly.
- If both handles are touched, the robot will stop the wheels and cutting disc.

#### Power Supply Unit



**Position the power supply unit according to the following rules:**

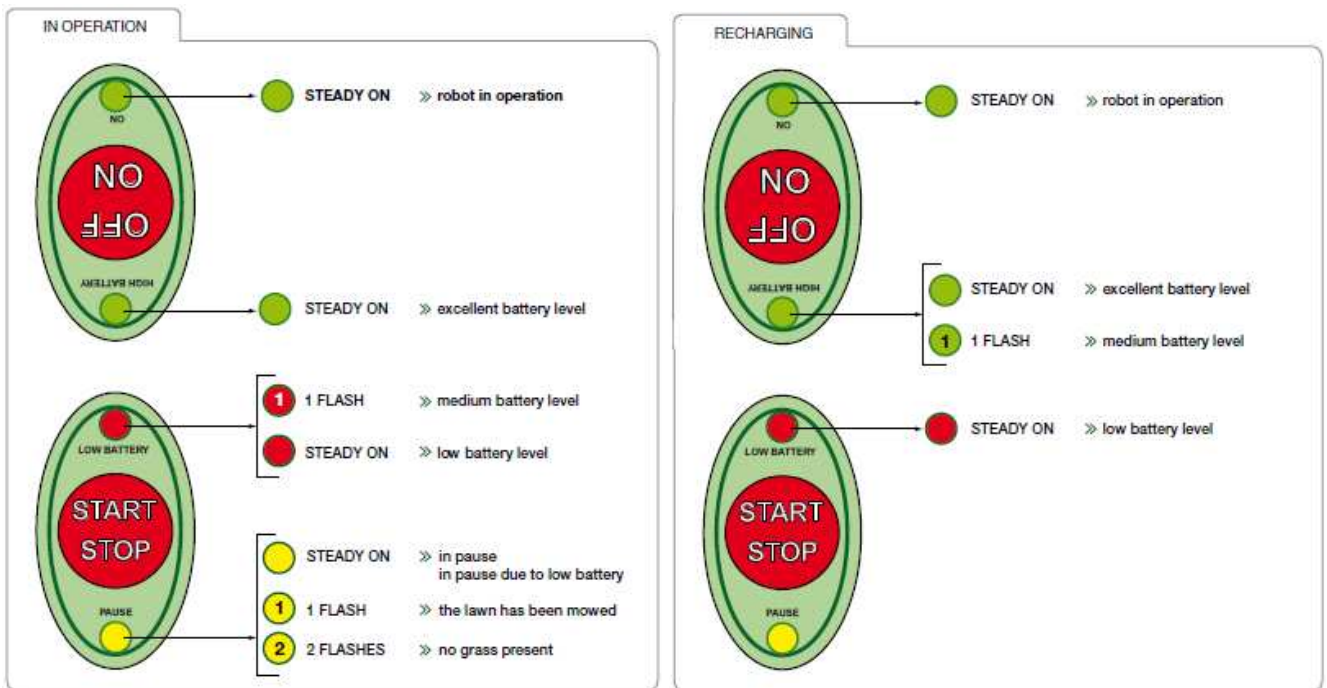
- Position it in an area not exposed to water and rain
- Preferably, indoors
- If placed outdoors, make sure it is placed in a well-ventilated box away from direct sunlight and water.
- It must be positioned in a well-aired area

## User interface (LED)

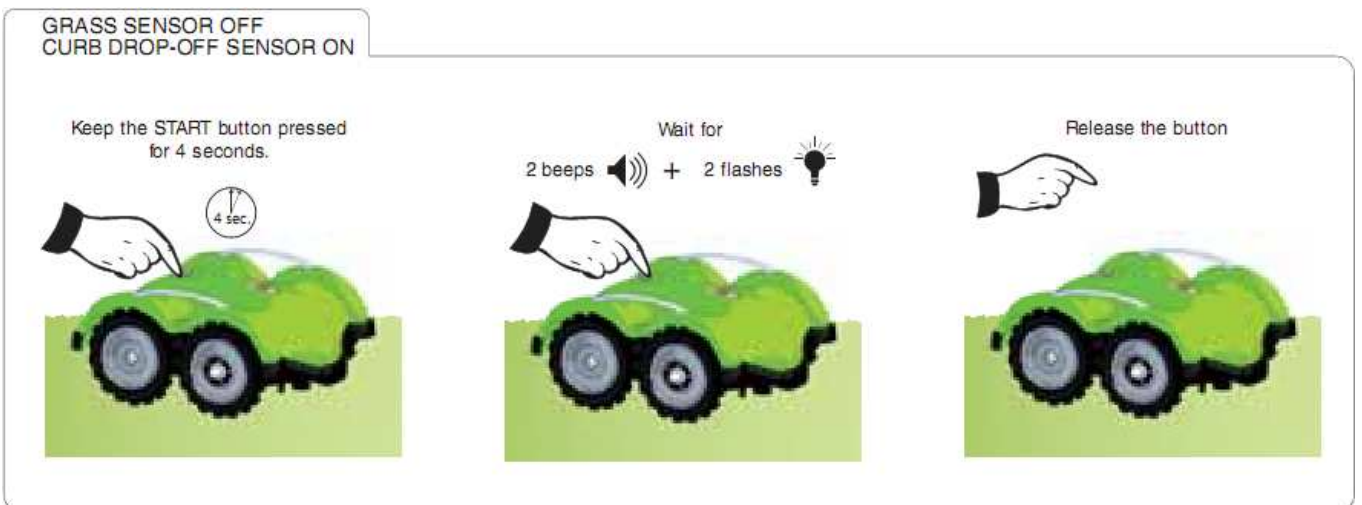
The keyboard consists of only two keys, an ON/OFF key and a key to start and stop the robot.

The LED always shows the status of the robot. The LEDs relating to the batteries show their charge level when the robot is running and when it is in Pause.

Two LEDs must be checked when the robot stops. The “ON” LED and the “Pause” LED  
During normal operating conditions the LED (ON) must be turned on and steady and the LED (Pause) shows the reason why the robot has stopped.

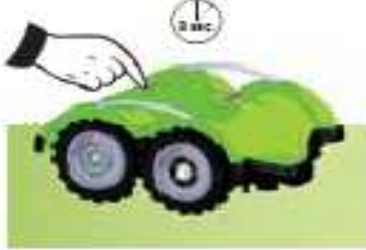


The robot can be started by activating or deactivating the grass detectors and/or the curb drop off detectors



GRASS SENSOR ON  
CURB DROP-OFF SENSOR OFF

Keep the START button pressed for 8 seconds.



Wait for  
3 beeps + 3 flashes

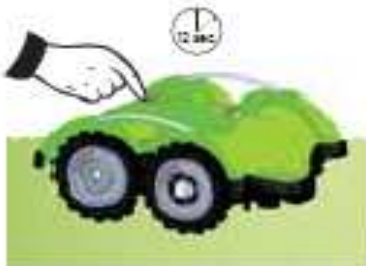


Release the button.



GRASS SENSOR OFF  
CURB DROP-OFF SENSOR OFF

Keep the START button pressed for 12 seconds.



Wait for  
4 beeps + 4 flashes



Release the button.



If the robot breaks down, the LED (ON) will flash indicating the reason for the malfunctioning. As shown in the table below.

**WHEN A ROBOT STOPS, THE FIRST THING TO UNDERSTAND IS THE CONDITION OF THE "ON" LED AND THE "PAUSE" LED**

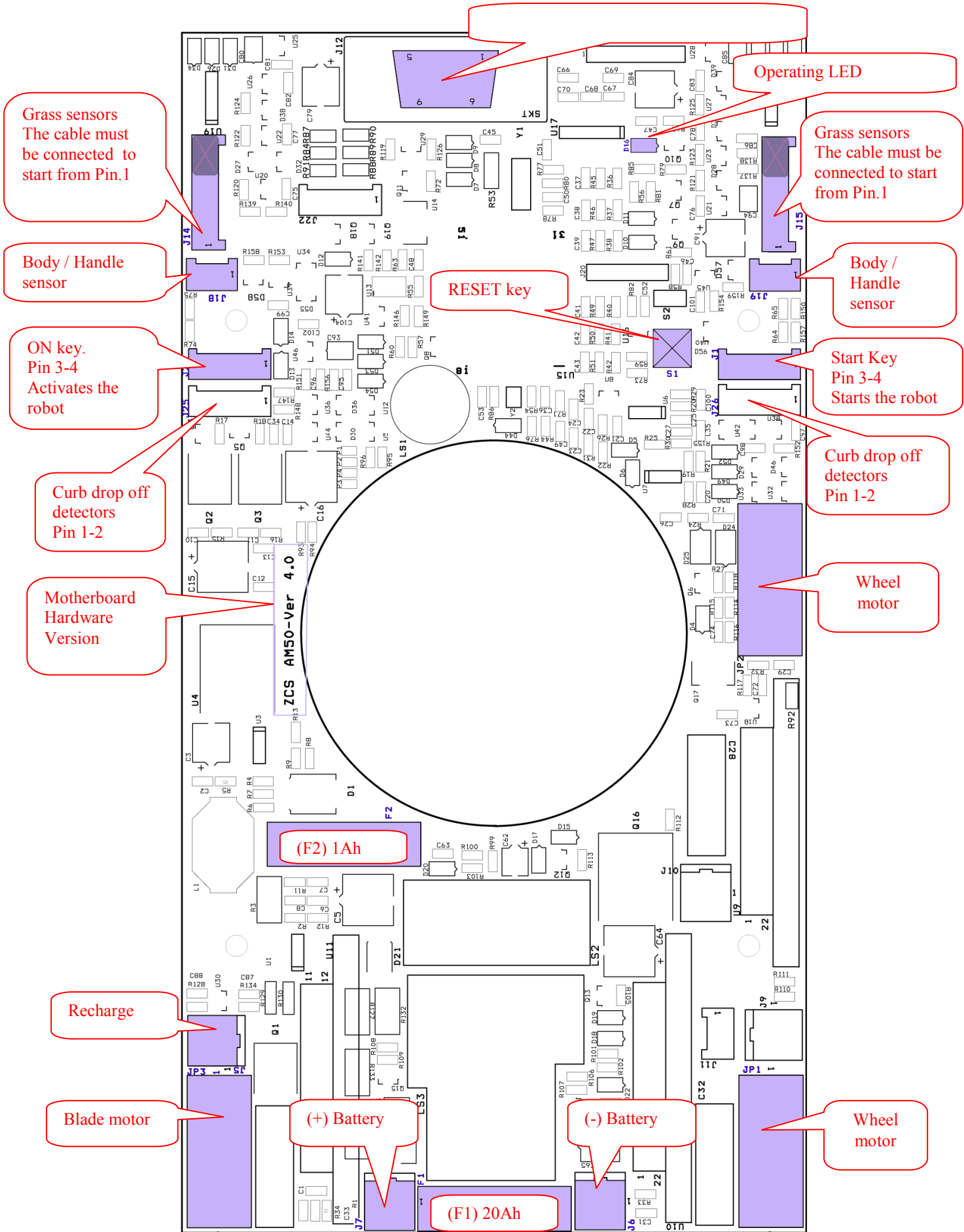
**Attention !!!** : When the robot is switched on if all the leds are switched on, it means that the final test hasn't been achieved. We must make the final test as described here below.

ERROR SIGNALS

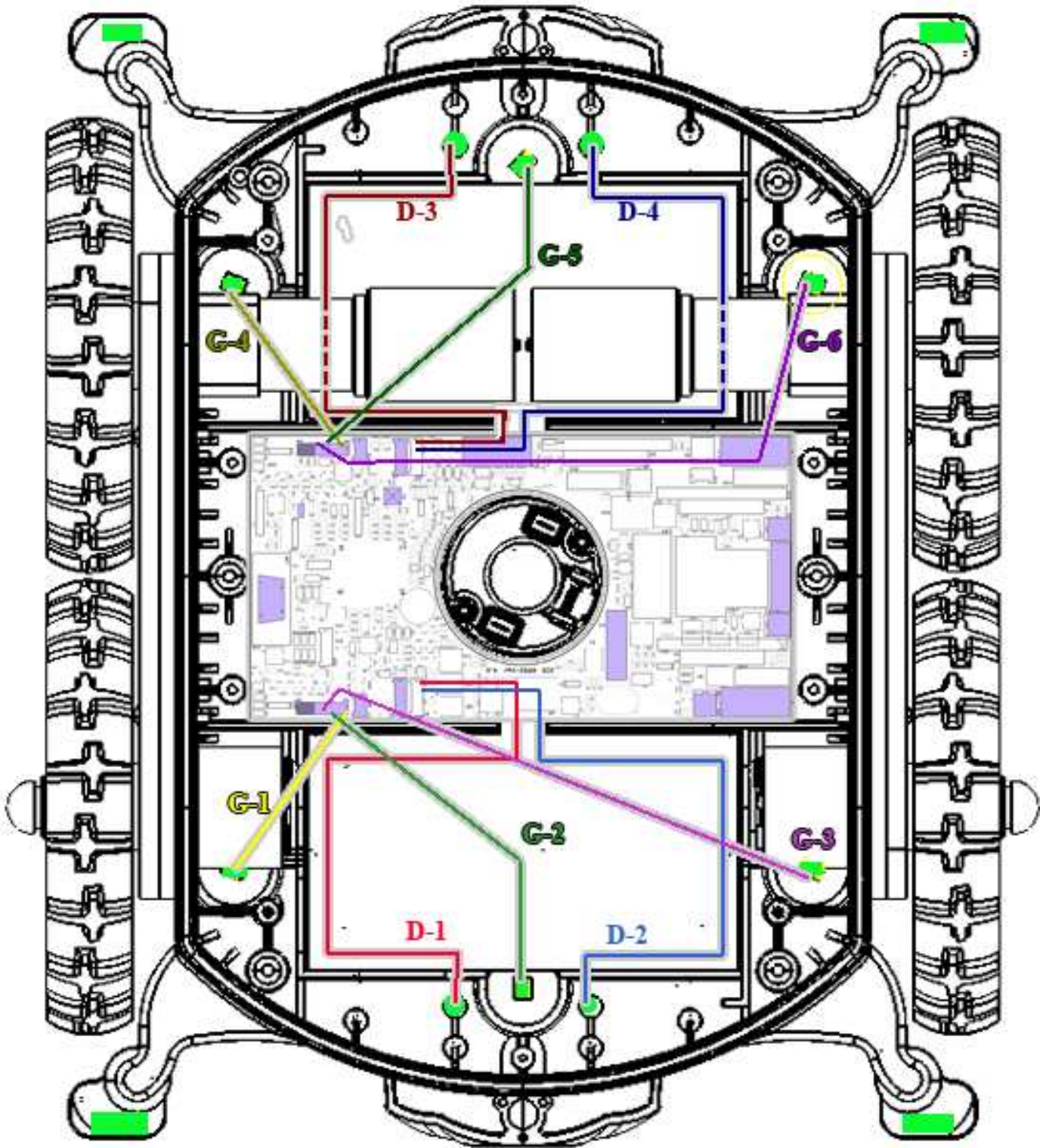


- |   |           |                              |
|---|-----------|------------------------------|
| 1 | 1 FLASH   | » right motor error          |
| 2 | 2 FLASHES | » left motor error           |
| 3 | 3 FLASHES | » blade error                |
| 4 | 4 FLASHES | » tip-over error             |
| 5 | 5 FLASHES | » curb drop-off sensor error |

# Connections and Upgrade - Motherboard



Connection curb drop off and grass detectors



# Troubleshooting

## List of errors

<p>The robot does not turn on.</p>	<p><b>Reasons</b></p> <ul style="list-style-type: none"> <li>- Internal fuses are burnt</li> <li>- Problems connected to the ON key</li> <li>- Batteries are completely flat</li> </ul> <p><b>Solutions and checks</b></p> <ul style="list-style-type: none"> <li>- Connect the robot to the recharger for a few minutes</li> <li>- Check the inside fuses</li> <li>- Check the charging level of the battery</li> <li>- Disconnect the battery, reconnect it and try again. Reset the board.</li> <li>- Open the robot and assemble the body in reverse with the ON key positioned in the Start connector. (For safety purposes, run the test without the blade). Obviously, the controls will be inverted but this operation allows understanding if the key is broken or if the board is broken.</li> </ul> <p><b>Has the problem not been solved? (Spare parts to check)</b></p> <ul style="list-style-type: none"> <li>- Motherboard</li> <li>- Keyboard</li> <li>- Battery</li> <li>- Cabling</li> </ul>
<p>The robot turns on but the Start key does not work and the robot does not start.</p>	<p><b>Reasons</b></p> <ul style="list-style-type: none"> <li>- Keyboard is defective</li> <li>- Robot is charging</li> <li>- Motherboard is broken</li> </ul> <p><b>Solutions and checks</b></p> <ul style="list-style-type: none"> <li>- If connected, disconnect the robot from the recharger</li> <li>- Disconnect the battery, reconnect it and try again. Reset the board.</li> <li>- Press the "Start" key is pressed, the sound of a disconnecting or connecting relay should be heard. If this sound is heard, it is likely that the motherboard thinks it is being recharged and therefore the robot does not start.</li> <li>- An additional check for understanding if the problem relates to the motherboard or to the keyboard involves opening the robot, assembling the body in reverse with the ON key positioned in the Start connector. (For safety purposes, run the test without the blade). If the robot turns on when the "Start" key is pressed, this means that the key is working</li> </ul> <p><b>Has the problem not been solved? (Spare parts to check)</b></p> <ul style="list-style-type: none"> <li>- Motherboard</li> <li>- Keyboard</li> </ul>
<p>The robot always stays on.</p>	<p><b>Reasons</b></p> <ul style="list-style-type: none"> <li>- Keyboard is defective</li> <li>- Robot is charging</li> <li>- Motherboard is broken</li> </ul> <p><b>Solutions and checks</b></p> <ul style="list-style-type: none"> <li>- If connected, disconnect the robot from the recharger</li> <li>- Disconnect the battery, reconnect it and try again. Reset the board.</li> <li>- An additional check for understanding if the problem relates to the motherboard or to the keyboard, involves opening the robot,</li> </ul>

	<p>assembling the body in reverse with the ON key positioned in the Start connector. (For safety purposes, run the test without the blade). If the robot turns on and off when the “Start” key is pressed, then this means that the key is working and the failure should be in the motherboard.</p> <p><b>Has the problem not been solved? (Spare parts to check)</b></p> <ul style="list-style-type: none"> <li>- Motherboard</li> <li>- Keyboard</li> </ul>
<p>The robot occasionally pauses for no reason (low batteries, lawn moved, no grass or error)</p>	<p><b>Reasons</b></p> <ul style="list-style-type: none"> <li>- Keyboard is defective</li> <li>- Handles came into contact with wet objects</li> </ul> <p><b>Solutions and checks</b></p> <ul style="list-style-type: none"> <li>- Try the robot with another body and then with different Start/Pause keys.</li> <li>- Run (only temporarily) the robot with the cables of the handles disconnected from the motherboard. Of course, this test reduces the safety of the product. It is not a solution but only a test.</li> </ul>
<p>The robot occasionally turns off and when it restarts the batteries are not low.</p>	<p><b>Reasons</b></p> <ul style="list-style-type: none"> <li>- Keyboard is defective</li> <li>- Battery</li> </ul> <p><b>Solutions and checks</b></p> <ul style="list-style-type: none"> <li>- Try the robot with another body and then with different Start/Pause keys.</li> <li>- If the problem depends on the battery, the test is not simple. The robot can be started if the blade is blocked, but this is not a simple test to execute. The safest procedure is to try the robot with a fully charged battery.</li> </ul>
<p>Blade motor frequently turns off</p>	<p>This does not necessarily mean that there is something wrong with the robot.</p> <p><b>Normal reasons.</b></p> <ul style="list-style-type: none"> <li>- Slope is greater than 30° or slope of 20° is reached too quickly.</li> <li>- Grass is too tall, too much strain on the motor</li> <li>- A handle was touched.</li> <li>- No grass or zone with grass lower than the 6 sensors</li> </ul> <p><b>Reasons due to defective or worn parts.</b></p> <ul style="list-style-type: none"> <li>- Blade motor encoder</li> <li>- Motor cutting brushes worn</li> <li>- Motherboard with faulty handle sensitivity.</li> </ul> <p><b>Solutions and checks</b></p> <ul style="list-style-type: none"> <li>- Start the robot normally. If the modulation functions correctly, this should mean that the encoder is functioning.</li> <li>- Open the robot, disconnect the cabling of the handles. Retry the robot without this functionality (if the problem is resolved contact ZCS)</li> <li>- Try the robot without the cutting disc. (If the problem is resolved, the fault could be in the cutting motor or the worn brushes).</li> </ul> <p><b>Has the problem not been solved? (Spare parts to check)</b></p> <ul style="list-style-type: none"> <li>- Motor cutting brushes</li> <li>- Motor cutting encoder</li> <li>- Cutting motor</li> <li>- Motherboard.</li> </ul>

The robot does not turn correctly after doing a U-turn and makes too many turns, which affect the normal functioning of the robot.

NB. The robot cannot control the direction and therefore it is normal that it continues to turn.

**Reasons**

- Loose belt
- Wheel motor with worn brushes
- Wheel motor with problems

**Solutions and checks**

- Check the tightening of the belt. If loose, tighten the screws of the motor and of the free block by applying a medium Loctite adhesive
- Check the brushes of the wheel motor
- After allowing the robot to operate, open the body and check the temperature of the wheel motors which must be the same. If a motor is a lot hotter, this means that it is under too much strain.

**Has the problem not been solved? (Spare parts to check)**

- Wheel motor
- Mechanical part
- Motherboard

The motherboard has been disassembled or the wheel motors have been disassembled and afterwards the robot does not detect that there is no grass until the back sensors exit from the border.

**Reasons**

- The cables or connections of the wheel motor were inverted

**Solutions and checks**

- Check that the connections on the board and wheel motor are correct. (The red cable must be facing upwards) as shown in the figure.

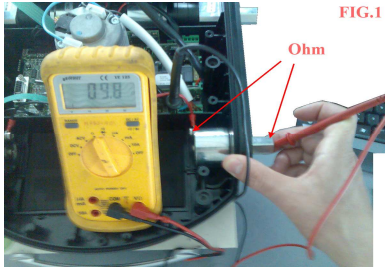
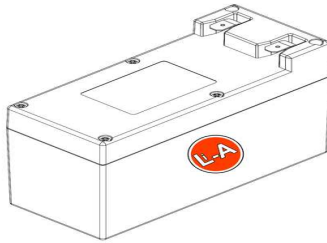


To check the correct functioning it is necessary to turn on the robot and press the “Start” key. The first movement is executed in the direction opposite to the recharging knobs. As indicated by the arrow in the figure.



**Problems with reduced operating times**

Obviously, the first evaluation that must be made is based on the life of the battery. In case of a new or recent battery, carry out the following checks:

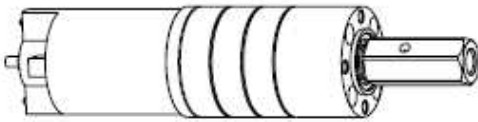


- On the Battery there must be the label “Li-Type A” or “Li-Type B” with a version come out later than “2009-04-16”
- Clean the blade and grass residuals
- Clean and check the recharging knobs as well as the impedance of the recharging knobs as showed in the picture
- Recharge the robot all night long and check the first operating cycle.
- Recharge the robot all night long. Disconnect the recharging knobs and measure the voltage with a tester on the knobs of the wheels. The voltage must be approximately 29.1-29.4Volt
- Measure the recharging connectors when they are disconnected from the wheel knobs. The voltage must be approximately 29.2-29.4Volt

The fault may be in:

- Power Supply Unit
- Battery
- Recharging cable
- Motherboard
- Cutting motor
- Blade

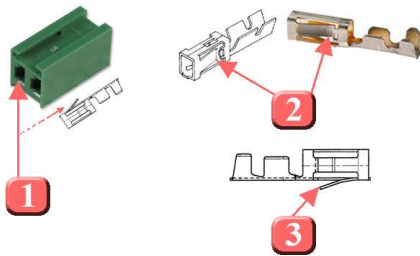
**Wheel motor error. One or two flashes of the “ON” LED**



The fault may be in:

- motor
- Worn brushes
- Cable on the wheel motor
- Motherboard
- Blocked belt
- Objects blocking its movement

**Blade motor error. Three flashes of the “ON” LED**



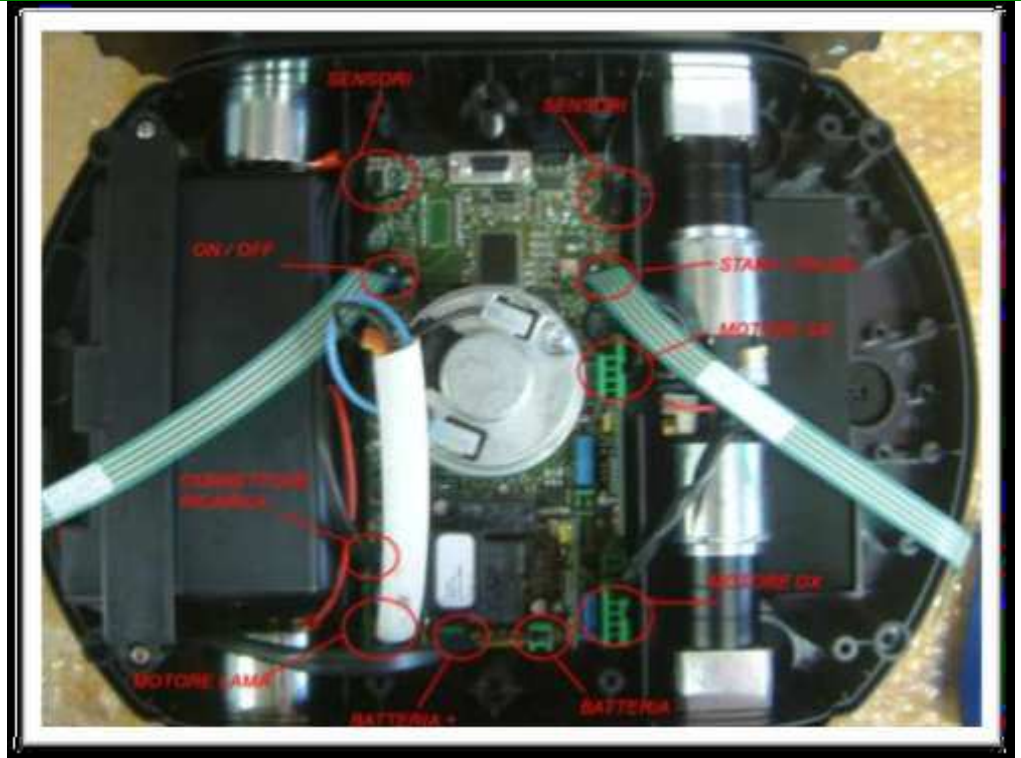
The fault may be in:

- Hitting of a rock
- Burnt motor
- Encoder
- Worn brushes (replace the brushes)
- Motherboard
- Motor wires broken or disconnected due to vibrations of the BLADE. As for the motors manufactured before W25/09 we must check the pin as indicated in the picture

# Mechanical assembly operations

## Assembly operations

### Motherboard connections

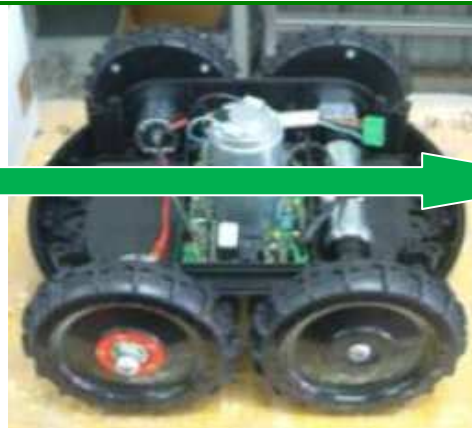


### Wheel motors

Make sure the motherboard is connected correctly. The red cable of the motor must be facing upwards.



- Once connected, check the correct functioning by turning on the robot and pressing the “Start” key. The first movement is executed in the direction opposite to the recharging knobs. As indicated by the arrow in the figure.



**Cutting motor**

**Pay attention to the cables above the motor. An incorrect connection causes an incorrect rotation of the cutting motor. Respect the colours of the wires and the placement as shown in the figure.**



**NO**

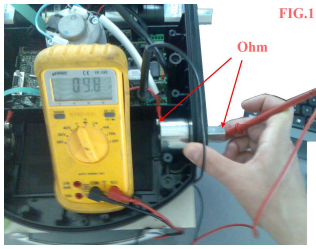


**SI**



# Revision and Winter Service

## Revision for updating the robot



Each time the robot is repaired, it is recommended to:

- Update the robot version using the robot programmer.
- Check the impedance (OHM) of the recharging knobs and the cable. It must be lower than 1-2 Ohm. Maybe we must install a contact spring (050Z04400A) as indicated in the picture.
- Check the condition of the batteries.
- Check that the screws of the blade are well secured. And the screws fastening the motor.
- Clean the recharging knobs with sandpaper.
- Clean and sharpen the blade.
- Check that the seal gaskets are secure.

### Operations during winter storage

- Check/Replace the brushes of the blade motor.
- Check/Replace the brushes of the wheel motor.
- Test the wear and tear of the battery and recharge it for 24 hours after the test.
- Check the fastening screws of the wheel motor and of the shaft that idles.
- Check the distribution belt and maybe it must be changed. We must evaluate the possibility to change the complete Pulley Kit and the belt with the new model
- Install, if it is not there, the contact spring (050Z04400A) as indicated in the picture.
- Check the keyboard it mustn't be detached or raised up. In this case we must change it in order to prevent water leakages inside the robots.