

# Workshop Manual

## Battery Mowers Diagnostic

### COLLECTOR 132/136/140 AE



For internal use only!





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# 1. Introduction

## IMPORTANT

**Before starting the diagnostics, separate the upper and lower parts of the mower by removing 4 screws from the bottom of the mower. For safety reasons, before disassembly, remove the battery. Some diagnostic activities will require the presence of a battery, which will be indicated in their description.**

This manual contains methods of diagnosing individual elements of the mower. To carry out them, a universal multimeter is required and the ability to use it in the basic range (voltage, resistance, circuit continuity measurement).

The main elements of the machine that will be analyzed are:

1. **Battery,**
2. **Battery holder and safety key,**
3. **Switch,**
4. **Control unit,**
5. **Motor.**

## 2. Diagnostic

### 2.1 Battery

The battery has four leads and a panel with a button and LEDs indicating the state of charge.

To fully check the condition of the battery:

- Charge the battery so that the LED indicator shows full charge
- Turn on the multimeter and set it to DC voltage measurement (V)
- Connect the measuring tips to the extreme battery terminals,
- The reading should indicate a voltage equal to or greater than the nominal battery voltage indicated on the label (20V).





## 2.2 Battery holder and safety key

### **IMPORTANT**

***The measurement requires the connection of the battery and the safety key. Take appropriate precautions when measuring with a battery. After completing the measurements, remove the battery again.***



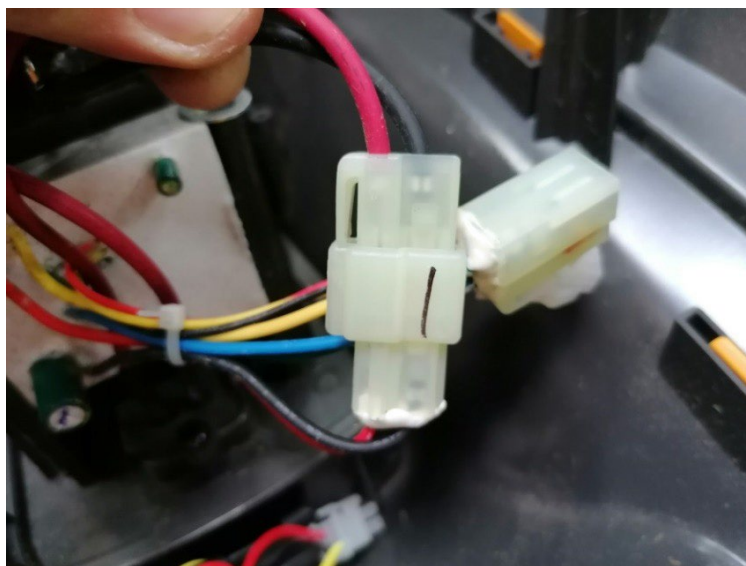
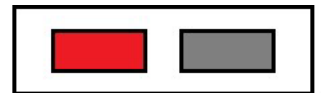
Make sure that the battery (Collector 132) or the batteries (Collector 136 and 140) and the safety key are correctly fitted.

Turn on the multimeter and set it to DC voltage measurement (V)

Connect the meter ends to a two-pin cube so that the colors of the wires in the mower match the colors of the multimeter probes.

Take the measurement with the cube connected and disconnected.

In both cases the measurement should be > 20V (for Collector 132 series) or >40V (for Collector 136 and 140 mowers)



If the voltage on the disconnected plug is too low - Retry the test on another good battery to exclude battery damage. Check the contacts of the battery socket and the safety key.

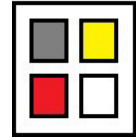
If the voltage at the disconnected plug is normal, but drops rapidly after connection, replace the control module.



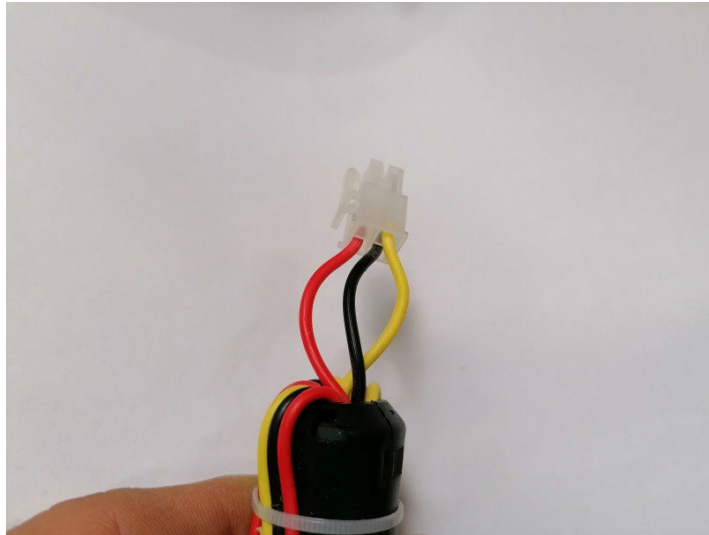
## 2.3 Switch

Measurements of the switch operation are made on the four-pin switch plug after disconnecting it from the control module.

Turn on the multimeter and set it to measure resistance ( $\Omega$ ) or continuity ( $\bullet$ )). Connect the terminals of the multimeter according to the table and measure.



Cables Color	Result (switch pressed)	Result (switch unpressed)
Red and black	0 $\Omega$ /acoustic signal	Infinity/Out of range/ no acoustic signal
Red and yellow	0 $\Omega$ /acoustic signal	Infinity/Out of range/ no acoustic signal
Black and yellow	0 $\Omega$ /acoustic signal	Infinity/Out of range/ no acoustic signal



If any measurement differs from the table, check the continuity of the switch wire, and if no damage is visible, then the switch itself.

## 2.4 Control unit

### **IMPORTANT**

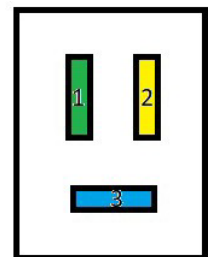
***The measurement requires the connection of the battery and the safety key. Take appropriate precautions when measuring with a battery. After completing the measurements, remove the battery again.***

Make sure the battery and safety key are properly installed.

Turn on the multimeter and set it to DC voltage measurement (V)

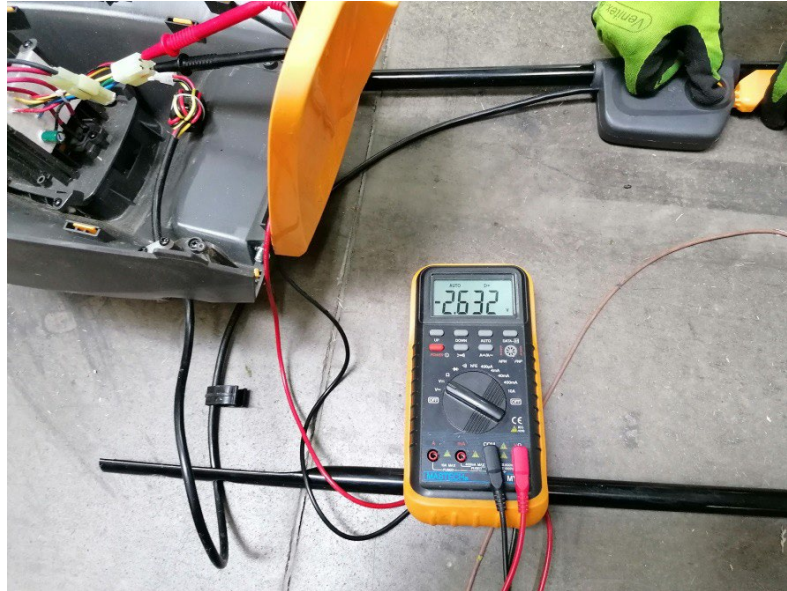
Disconnect the engine plug. Perform the measurements on the three-pin plug on the side of the control module.

Connect the terminals of the multimeter between the appropriate pins (see the table below). To read the indication, press the button and lever on the mower handle. The measurement is instantaneous and appears for about 1 second after pressing the button and lever on the mower's handle



Tip connection	Expected result
1 and 3	1 to 4V – depend of multimeter
2 and 3	1 to 4V – depend of multimeter



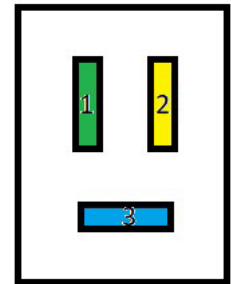


If the voltage between the pins does not appear, verify the correct operation of the button in the handle. If it is ok, replace the control module.

### 2.5 Motor

The electric motor has three outputs with a plug. The diagnostics consists in a series of measurements on the electrical plug after its previous disconnection from the control module.

Electric motor has plug with 3 cables. Before measurement disconnect plug from control unit. Measurement should be done on motor side plug.

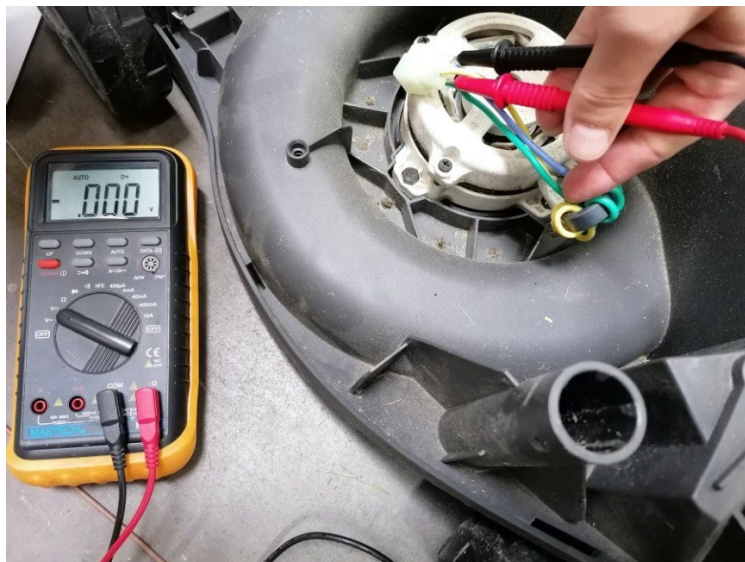


#### 2.5.1 Winding resistance measurement:

The view of the electric motor plug is shown in the adjacent drawing. Turn on the multimeter and set it to the resistance measurement ( $\Omega$ ).

Connect the multimeter between the terminals (polarity does not matter):

Tip connection	Expected result
1 and 2	<1 $\Omega$
2 and 3	<1 $\Omega$
1 and 3	<1 $\Omega$





A measurement deviating from the indications in the table (at any point) indicates a damage to the motor winding.

### 2.5.2 Winding induction measurement:

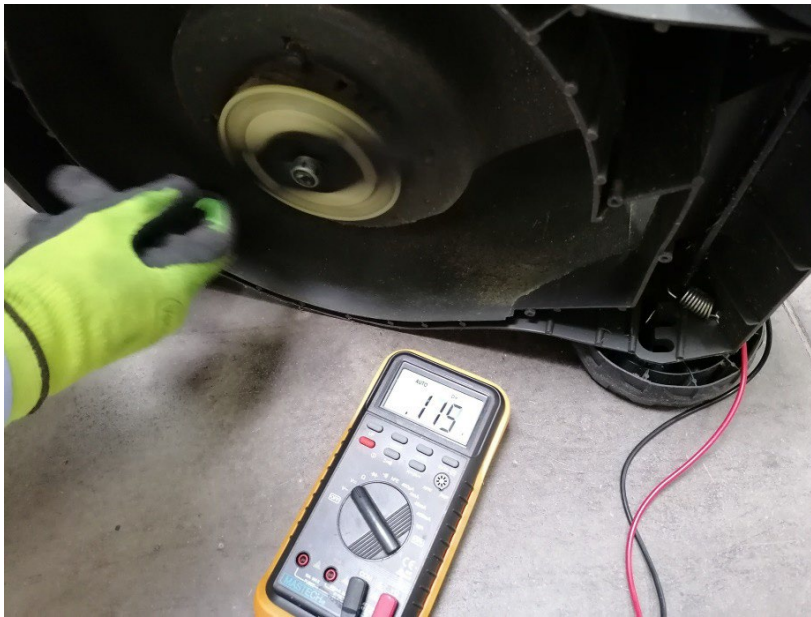
The view of the electric motor plug is shown in the adjacent drawing.

Turn on the multimeter and set it to DC voltage measurement (V)

Turn the mower so that you can turn the blade by hand.

Connect the multimeter between the terminals (polarity does not matter). Take measurements by turning blade by hand:

Tip connection	Expected result
1 and 2	>0,01V
2 and 3	>0,01V
1 and 3	>0,01V



The voltage values read out during the tests may change, but they should be higher than the 0V value. With the blade stopped, the voltage value should be 0V.