



Husqvarna
Group



Workshop manual

Husqvarna®: Automower® 115H

GARDENA®: SILENO city, smart SILENO city,
SILENO life, smart SILENO life

McCULLOCH®: ROB S400, ROB S500, ROB S600

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1 Introduction

1.1 Document description

The Workshop manual is intended for dealers and service personnel, and is a supplement to the Operator's Manual. The following system is used in Workshop manual to make it easier to use:

- Text written in *italics* is a text that is shown on the display or in the menus in the Autocheck service program.
- Text written in **bold** is one of the buttons on the keypad of the product or a button on Autocheck service program.
- Text written in *UPPERCASE* and *italics* refer to the position of the main switch and the different operating modes available in the product.

1.2 Servicing tools

Always use original tools recommended by the manufacturer.

2 Safety

2.1 Safety definitions

Warnings, cautions and notes are used to point out specially important parts of the manual.



WARNING: Used if there is a risk of injury or death for the operator or bystanders if the instructions in the manual are not obeyed.



CAUTION: Used if there is a risk of damage to the product, other materials or the adjacent area if the instructions in the manual are not obeyed.

Note: Used to give more information that is necessary in a given situation.

2.2 General safety instructions



WARNING: Keep your hands and feet away from the rotating blades. Never put your hands or feet close to or under the machine when the motor is running.



WARNING: Apply a new warning label if a warning symbol on the product is damaged or missing.



WARNING:

The original design of the product must not be modified without the expressed permission of the manufacturer.

Unauthorized modifications and/or components can result in serious disruptions and the risk of personal injuries.

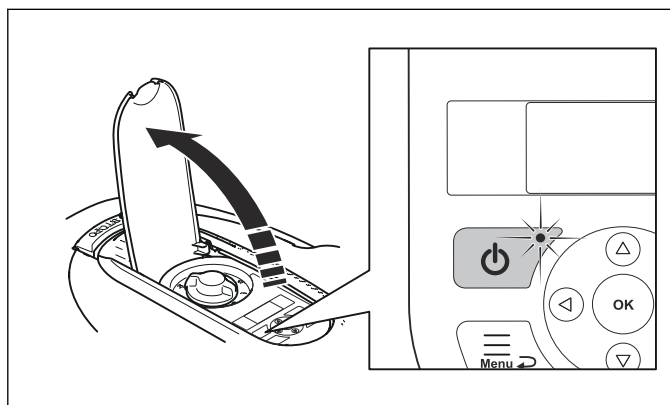
Only use original spare parts.

2.3 Special safety instructions

2.3.1 Maintenance



WARNING: The product must be switched off before any maintenance is done. The product is disabled when the indicator lamp on the keypad is not lit.



CAUTION: Never use a high-pressure washer to clean the product. Never use solvents for cleaning.

2.3.2 In the event of a thunderstorm

If there is a risk of a thunderstorm, all connections to the charging station must be disconnected. This is done to avoid damage to the circuit board in the charging station.

2.3.3 Battery safety



WARNING: Lithium-ion batteries can explode or cause fire if disassembled, short-circuited, exposed to water, fire, or high temperatures. Handle carefully, do not dismantle, open the battery or use any type of electrical/mechanical abuse. Avoid storage in direct sunlight.

For more information about the battery, refer to Technical data in the Operator's manual.

2.4 Symbols on the product

These symbols can be found on the product. Study them carefully.



WARNING: Read the user instructions before operating the product.



WARNING: Operate the disabling device before working on or lifting the product.

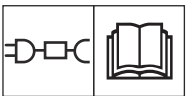
It is only safe to carry out inspection or maintenance on the product when the product is disabled. The product is disabled when the lamp on the keypad button is not lit.



WARNING: Keep a safe distance from the product when operating. Keep your hands and feet away from the rotating blades.



WARNING: Do not ride on the product. Never put your hands or feet close to or under the product.



Use a detachable power supply as defined on the rating label next to the symbol.



This product conforms to the applicable EC Directives.



Noise emission to surroundings. The product's emissions are set out on the rating plate on the inside of the hatch and in the technical data. Refer to the Operator's manual.



It is not permitted to dispose this product as normal household waste. Ensure that the product is recycled in accordance with local legal requirements.



The low voltage cable must not be shortened, extended or spliced.

Do not use a trimmer nearby the low voltage cable. Be careful when trimming edges where the cables are placed.

Operate the disabling device before you use or lift the product.

3 Product and installation

3.1 Main components for installation

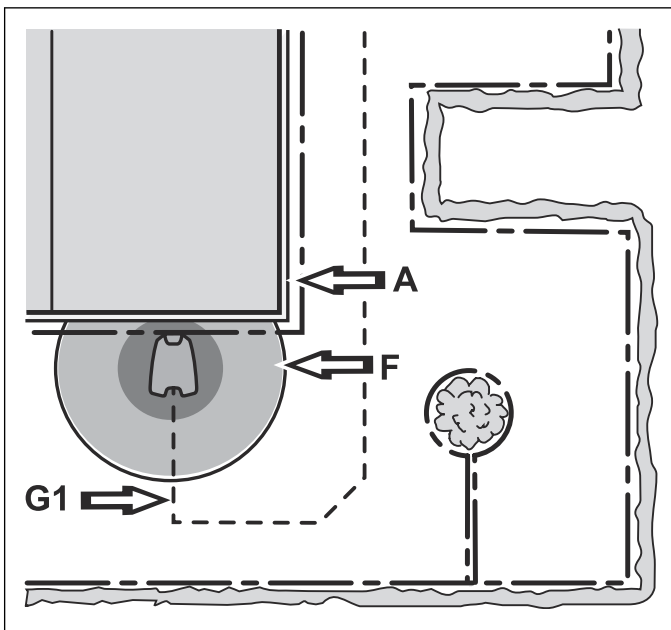
The robotic system involves 4 main components:

- Product
- Charging station
- Power supply
- Loop wire

Go to the manufacturer's website or read the Operator's manual for further descriptions about the product and the installation.

3.2 The loop system's control signals

The loop system consists of boundary wire and guide wire connected to the charging station. Some models have several guide wires. The loop system essentially comprises these different signals:



- A signal, sets the boundary for the working area.
- F signal, is generated by a loop in the charging station so that the product knows that it is in the vicinity of the charging station.
- Guide signal, leads the product to the charging station, but can also be used to guide the product from the charging station to a remote area.

To check the A, F and Guide signals, refer to the *Loop signal on page 41*.

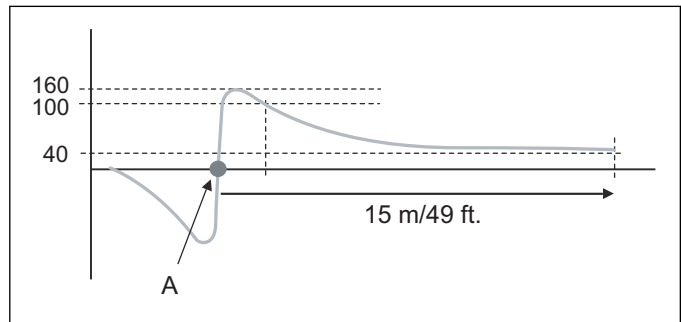
3.3 LED indicator lamp on the charging station

The loop system's status is easily checked using the LED indicator lamp on the charging station. Refer to *Loop signal on page 41*.

3.4 Boundary loop

The strength of the A signal varies depending on the distance. The strength of the signal is high close to the wire. The strength subsequently diminishes the farther away from the wire you get. Outside the working area the signal is negative and its strength diminishes more

rapidly. Signal quality should always be 100% for satisfactory function.



The strength of the signal is affected by the size of the working area, islands, headlands, passages and corners. The signal can also be affected by magnetic objects in the ground or in nearby walls and buildings. Examples of magnetic objects are iron fences, iron girders and reinforcement bars. Grass areas laid on concrete roofs can therefore lead to a weaker signal.

The A signal's reception and amplification can vary by +/- 10% from one product to another. This means that at the same point in an installation, one product can display A=90 and another one A=100. The charging station's circuit board and the product's loop sensor can also give certain variations between different products.

3.4.1 To test the boundary loop

The product displays the *No loop signal* message if an attempt is made to start the product before the installation is complete.

However, it is possible to test the product before the installation is completed by doing one of the following:

- Connect a short, temporary loop around the product.
- Temporarily deactivate the product's loop detection. Refer to *Tools - Special settings on page 11*.

3.4.2 Obstacles

Obstacles are demarcated by routing the boundary wire from the outer edge of the working area in towards the object, around it and then back.



CAUTION: The boundary wire must not be crossed on its way to and from an island.

Note: If the obstacle is relatively large compared to the working area, it may have an impact on the product inside the entire working area.

3.5 Guide loop

The guide wire, together with the part of the boundary loop that comprises the return to the charging station, is called the guide loop. The current in the guide loop

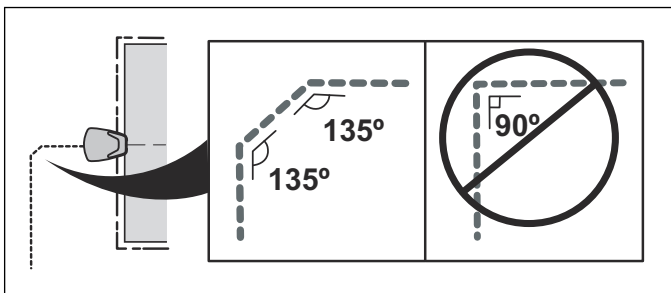
always goes from the guide wire to the left in the connection between guide wire and boundary loop.

The strength of the guide signal varies like the A signal depending on the distance to the guide loop. Inside the guide loop the signal is positive and the strength subsequently diminishes the farther away from the wire you get. Outside the guide loop, the signal is negative and the strength of the signal diminishes more rapidly.

Note: The product always tracks the left side of the guide wire when facing the charging station, i.e. the product follows the negative values on the guide signal.



CAUTION: Do not lay the guide wire at 90° angles or less. Lay the wire in two 135° angles.



3.6 Charging station

The placement of the charging station must be well planned in order to give the best installation and operation of the product. Refer to *Installation - Charging station* in the Operator's Manual.

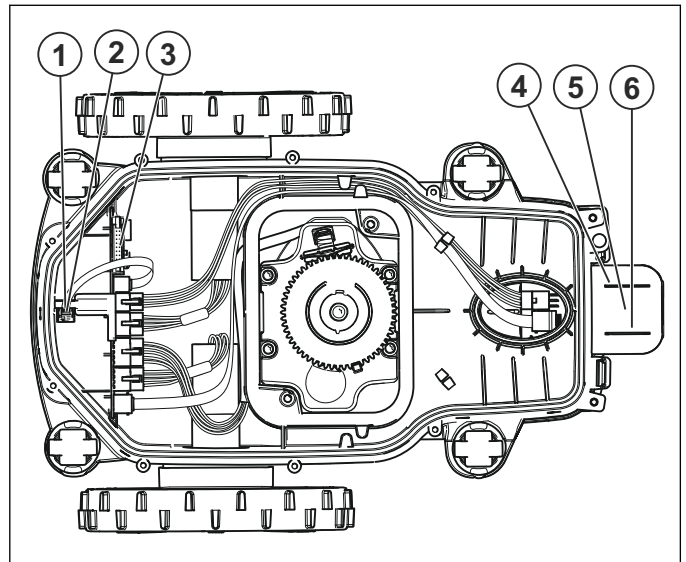
Note: The battery is spared if charged in the lowest possible ambient temperature. Consequently, it is beneficial if the charging station is placed where it is shaded, especially during the warmest parts of the day.

When the battery level has dropped to 600 mAh or the battery voltage has dropped to 17.5 V, the product shuts down the blade motor and starts searching for the charging station.

The product always follow a guide wire to the charging station. Installing a guide wire is therefore mandatory.

3.7 Sensors

There are several types of sensors in the product:



1. Front Lift sensor
2. Front Loop sensor
3. Tilt sensor
4. Rear Lift sensor
5. Rear Loop sensor
6. STOP sensor



CAUTION: Some sensors consists of a Hall sensor and a magnet. Since the magnets have a south and a north pole, it is important that the magnet is fitted correctly.

Note: There are no sensors for collision in the product. Collision detection is registered from the power variation of the wheel motors.

3.7.1 Tilt sensor

The tilt sensor is a sensor on the main board that detects the product's inclination in relation to the horizontal plane. The X-angle indicates front to rear inclination, and the Y-angle indicates left to right inclination. The value from the tilt sensor is used, among other things, to correct the speed of the drive wheels when mowing in steep slopes.

3.7.2 Lift sensors

The lift sensors detect if the product is being lifted off the ground. This is done with the help of the mechanical design and magnets. If a lift signal is indicated, the blade disc stops immediately. The product tries extrication maneuvers by reversing and turning several times.

3.7.3 Loop sensors

The loop sensors measure the signals that the charging station sends along the boundary loop (A signal), the guide loop (guide signal) and the baseplate (F signal). The signals are used to control the product and keep the product inside the working area. However, the product

can only detect the signals if it has been paired with the charging station. Refer to *Loop signal on page 41*.

3.7.4 STOP sensor

The STOP sensor detects if the **STOP** button is pushed down. If the STOP signal is indicated, the product and the blade disc stop immediately.

Note: There is a magnet and a Hall sensor in the **STOP** button, which means that there is no connection between the hatch and the **STOP** button.

3.8 Testing the installation

Note: Turn off ECO mode before carrying out below tests.

As a part of the installation, selected settings for the installation should be tested. The test is carried out with the *Lawn coverage* test.

3.8.1 Test: Lawn coverage

Note: The *Test: Lawn coverage* can only be used once the product has calibrated the guide wire. In other words, the product must have left the charging station on at least one occasion, either in *Auto* mode or in connection with the start-up sequence.

The *Test: Lawn coverage* function is used to test if the product can follow the guide wire or the boundary loop at the selected corridor width out from the charging station.

The *Test: Lawn coverage* can also be used to measure the distance from the charging station to a remote area. The distance, stated in meters, is shown in the product display when STOP is pressed. How to do the test is described in the Operator's manual.

3.9 SensorControl/Lawn shield

Note: SensorControl for GARDENA® SILENO life and smart SILENO life and Lawn shield for McCULLOCH® are the same function. This function is not available for the Husqvarna® model.

When SensorControl/Lawn shield is activated, the product automatically adjust its mowing times based on how fast the grass grows. This is decided by continuously measuring the blade disc resistance and comparing that to a mean value. If the resistance is higher than the mean value, the product is allowed to work for a longer time, and the other way around. It takes a full day of mowing before the mean value can be calculated, and during this time it will not affect the mowing time.

Note: The mean value will be reset if the product has been switched off for more than 50 hours, if the settings are reset, or if the cutting height is adjusted.

The SensorControl/Lawn shield does not make the product work more than the timer settings, only less. The product will always perform at least one mowing cycle per day, only after that the mowing time is reduced by the SensorControl/Lawn shield.

3.10 Safe operation in slopes

The product adjusts its operation automatically based on factors such as the slope angle and travel direction.

If the slope is too steep, the product moves rearwards and turns to try to find a less steep slope. If after 2 attempts the product cannot find a less steep slope, it stops and the display indicates that the stop is caused by a steep incline.

Slopes that exceed the specified maximum inclination can normally only be reached in very favourable conditions. Accessibility on steeper slopes than specified cannot be guaranteed.

3.11 New loop signal

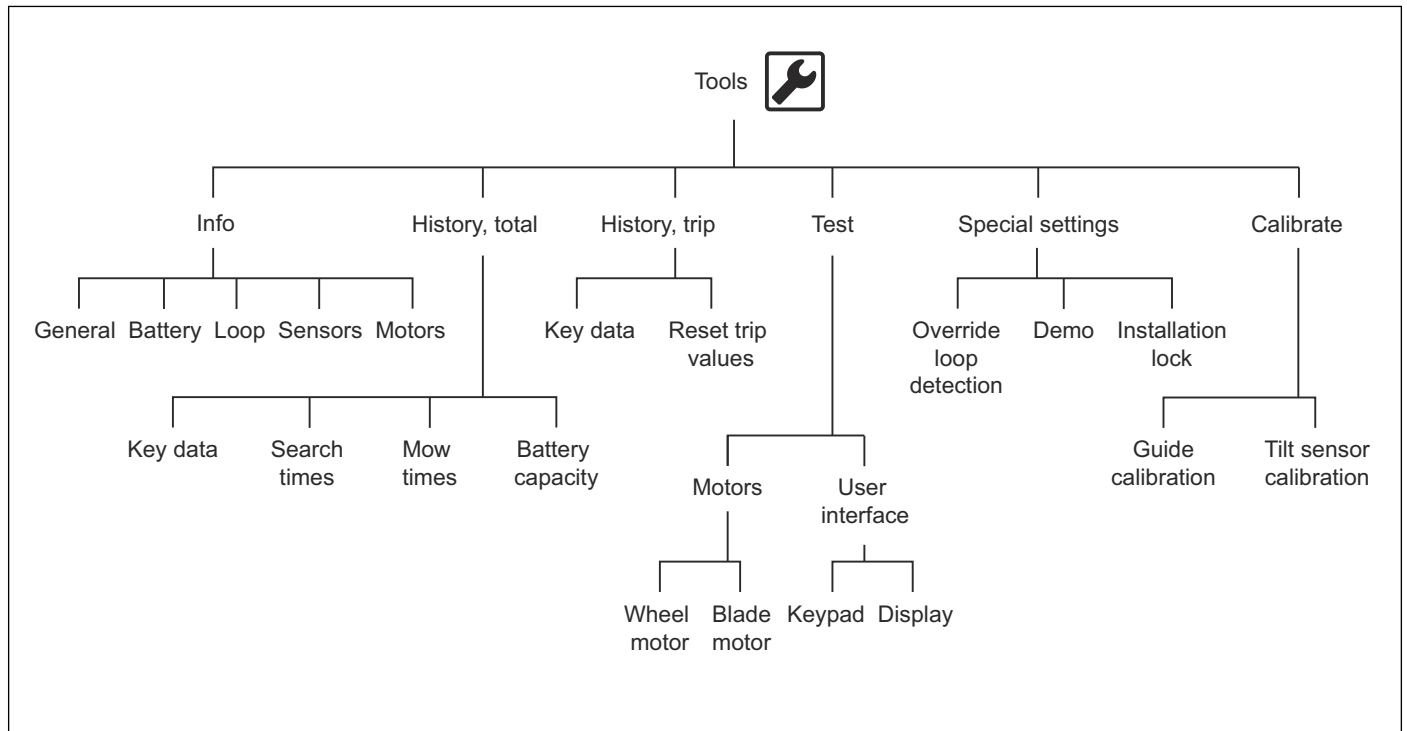
In rare cases, there may be a reason to change the loop signal. For example, if two nearby installations have the same loop signal they can interfere with each other.

1. Select a new loop signal via the menu in the display.

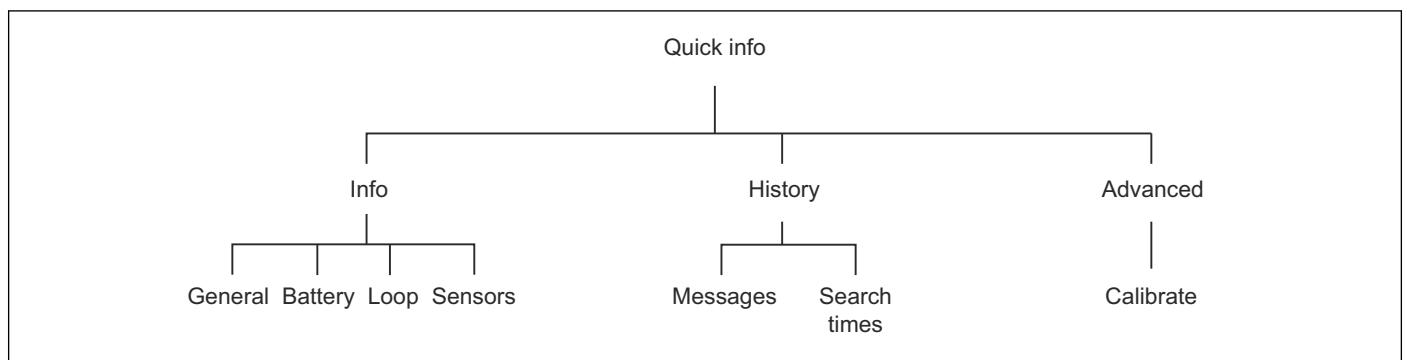
Note: A new loop signal has to be generated when the product returns to its ordinary charging station, for example after service if a charging station other than the customer's has been used. Refer to *Actions on page 14*.

4 Special menus

4.1 Tools menu overview



4.2 Quick info overview



4.3 Tools menu (Expert mode)



The *Tools menu* is an expert view, where additional information and special settings are available.

When the main menu is displayed:

1. Push and hold down the **arrow left** key and **arrow right** key for 2 seconds to access the *Tools menu*.

For more information about the product's display menus, refer to the chapter about the Menu structure in the Operator's manual.



WARNING: Do not return the product to the customer with an activated *Tools menu*. Always switch off the product with the **ON/OFF** button so that the main menu is reset to normal mode.

4.3.1 Tools - Info

The *Info* menu shows the current status of the product's subsystems.

4.3.1.1 Tools - Info - General

The *Tools - Info - General* menu has 2 sections: *SW* and *Prod*.

The *Info - General - SW* menu shows:

- *Article number* for software package.
- *Main*: The version of the MSW (Main Software) program (also called the main program).
- *HMI*: The version of the HMI (Human Machine Interface) program.
- *SUB*: The version of the SSW (Subdevice Software) program.
- *COM*: The version of the Communication Board program.
- *RADIO*: The version of the radio module program.

The *Info - General - Prod* menu shows:

- *Total running*: The total hours the product has used the wheel motors (cutting and searching).
- *Mower s/n*: The product's serial number. This number must correspond with the serial number on the inside of the hatch.
- *Prod. date*: The product's date of manufacture.
- *MCB s/n*: The main circuit board's serial number. This is not linked to the product's serial number.
- *MCB prod*: The main circuit board's date of manufacture.
- *COM s/n*: The communication board's serial number. This is not linked to the product's serial number.

4.3.1.2 Tools - Info - Battery

The *Tools - Info - Battery* menu shows:

- *Voltage*: The battery's voltage level. About 20.5 V indicates a fully charged battery and about 17 V indicates a flat battery.
- *Charges*: The accumulated number of charge cycles since date of manufacture, or since the counter was reset.
- *Charge level*: Shows the state of charge for the battery. When the battery is fully charged, the charge is approximately 1 700 mAh. When the charge has dropped to approximately 1 000 mAh the product returns to the charging station.
- *Current*: Shows nominal regulated charge current to and from the battery. A positive value indicates that the battery is charging and a negative value indicates that the product is using current from the battery.
- *Temp*: Shows current temperature in the battery.
- *Capacity*: Shows the maximum capacity for the battery.

4.3.1.3 Tools - Info - Loop

The *Tools - Info - Loop* menu has 3 sections:

- *A-loop* shows the loop signal from the boundary loop measured through the loop sensors in the product. The value should lie between approximately 40 and 320 to ensure good functionality. The closer to the loop the product is, the higher the value. When the product is directly over the loop, the value is 0 and when the product is outside of the loop, the value is negative.
- *G/F* shows the loop signals from the Guide and the field for F. To ensure good functionality, the value for the Guide signal should be (-) 70-120 beside each guide wire.
- *Quality* shows the loop system's signal quality. The loop signals can only be correct interpreted if the value is 100%. If the value is lower, the loop system does not function correctly and thus none of the displayed signals are correct.

4.3.1.4 Tools - Info - Sensors

The *Tools - Info - Sensors* menu has 2 sections:

- *Status*
- *Temperature*

The *Info - Sensors - Status* menu shows:

- *Lifted*: When the body is lifted up the lift sensor is activated and the product display shows *Yes*.
- *Tilted*: When the product is standing horizontally the value should be max ± 3 . Inclination up and to the left is shown as negative values.
- *Normal position*: *Yes* indicates that the product is standing in a normal position and *No* indicates that the product is upside down.

The *Info - Sensors - Temperature* menu shows:

- *Product temperature*: Measured by a temperature sensor on the main circuit board.
- *LCD temperature*: Measured by a temperature sensor on the main circuit board.

4.3.1.5 Tools - Info - Motors

The *Tools - Info - Motors* menu has 2 sections:

- *Wheel motor*
- *Cutting motor*

The *Info - Motors - Wheel motor* menu shows:

- *Speed* for the left/right wheel motor.
- *Current (mA)* for the left/right wheel motor.
- *Power (%)* for the left/right wheel motor.

The *Info - Motors - Cutting motor* menu shows:

- *Speed* of the cutting motor.
- *Current (mA)* for the cutting motor.
- *Average current (mA)* for the cutting motor.

4.3.2 Tools - History, total

4.3.2.1 Tools - History, total - Key data

The *Tools - History, total - Key data* menu shows:

- *Total running*: The total time in hours that the wheel motors have been running.

Note: Includes also time when the product is running without mowing.

- *Total mowing*: The total time in hours that the blade motor has been running.
- *Total search time*: The total time in hours that the product has been in search mode. This means the time from starting to search for the charging station, until the product has docked. Depending on the installation and working area, it is normal with 10-20% search time of the total running time.
- *Total charge time*: The total time in hours when the product has been charging.
- *Chargings*: The total number of complete chargings. A complete charging is defined as a charging that proceeds for more than 20 minutes, and is terminated when the charge current is less than 300 mA.

4.3.2.2 Tools - History, total - Search times

The *History, total - Search times* menu has 2 sections:

- *Overview*: Shows the average, max and min search time of the last 12 searches.
- *Search times*: Shows each of the last 12 searches.

4.3.2.3 Tools - History, total - Mow times

The *History, total - Mow times* menu has 2 sections:

Note: The mow time is defined as the time that the blade motor has been running.

- *Overview*: Shows the average, max and min mow time of the last 12 mowing operations. The menu shows each of the last 12 mowing operations.
- *Mow times*: Shows each of the last 12 mowing operations.

4.3.2.4 Tools - History, total - Battery capacity

The *History, total - Battery capacity* menu has 4 sections: Test 1, 2, 3 and 4. Each of the 4 most recent battery tests are saved in *Battery capacity*. For each of the tests the following is shown:

- Date: The date of the test
- Time: The time of the test
- Chargings: The number of complete chargings at the time of the test.
- Capacity: Measured battery capacity (mAh) during the test.

4.3.3 Tools - History, trip

The *History, trip - Key data* has the same information as in *History, total - Key data*. However, in *History, trip - Reset trip values* it is possible to reset all values, just like for a trip meter in a car.

4.3.4 Tools - Test

Note: The battery voltage should be at least 18 V when testing the wheel and blade motors

4.3.4.1 Tools - Test - Motors

The *Tools - Test - Motors* has 2 sections: *Wheel motor* and *Blade motor*.

- *Wheel motor*:
 1. Lift the product so that the drive wheels are off the ground.
 2. Increase (**Arrow up** key) the power to 80% and block each drive wheel in different positions. Check that the motor starts again when the blocking is released.
 3. Increase the power to 100% and check that the speed in each wheel is at least 50 cm/s, 20 in./s.
 4. Block each wheel and check that the motors' gearboxes are not slipping. When blocking, the speed should be 0 cm/s. Also listen for abnormal sounds from the gearbox.
 5. Decrease (**Arrow down** key) the power to 0%.
 6. Push the **Back** button to exit the test.

Note: If a wheel motor fails to start and is very difficult to rotate by hand, the fault is most likely either in the main circuit board or in the wheel motor.

Note: If the wheel motor needs help by hand to start, and the wheel motor stops as soon as the wheel is blocked, the fault is in the main circuit board and not in the wheel motor.

- *Blade motor*:



WARNING: The blade rotates during the blade motor test. Keep your hands and feet at a safe distance.

1. Push **OK** to start the blade motor test.
2. Check the displayed values of *Speed* and *Current*. The speed is normally 2500 rpm. The current is normally 350 mA +/- 100 mA.
3. Push the **Back** button to exit the test.

4.3.4.2 Tools - Test - User interface

The *Tools - Test - User interface* menu shows:

- *Keypad*:
 1. Push the **OK** button to start the keypad test.
 2. Push any button. The display indicates which button is pressed down.
 3. Push the **Back** button to exit the test.
- *Display*:
 1. Push the **OK** button to start the display test. The display flashes on and off.
 2. Push the **Back** button to exit the test.

4.3.5 Tools - Special settings

Note: The *Tools - Special settings* contains settings that are only available for service personnel.

The *Tools - Special settings* menu shows:

- *Override loop detection*: The setting temporary turns off the product's loop detection to be able to run the product without charging station and boundary loop. The function is automatically reset when the **ON/OFF** button on the product is switched off.
- *Dema*: The setting is ideal for installations in shops or exhibitions. The product alternates between short periods of operation, docking and charging. The function is automatically reset when the **ON/OFF** button on the product is switched off.
- *Installation lock*: If the installation settings lock is activated, it is not possible to change any settings in the *Installation* menu.

Note: The installation settings lock must be deactivated to be able to change any of the installation settings in the main menu.

4.3.6 Tools - Calibrate

The *Tools - Calibrate* menu shows:

- *Guide calibration*: The guide wire is calibrated automatically during the first start-up sequence. A manual calibration may however be necessary, if for example the charging station installation is changed. Place the product in the charging station and start the calibration.
- *Tilt sensor calibration*: If the product does not operate as expected in slopes it might help to calibrate the tilt sensor. Place the product on a horizontal surface and start the calibration.

4.4 Quick info (Limited Tools menu)

The *Quick info* menu is a limited *Tools menu*.

When the start page or the main menu is displayed:

1. Push and hold down the **Back** button for 2 seconds to access the *Quick info* menu.

4.4.1 Quick info - Info

The *Quick info - Info* menu has the same sub-menus as in *Tools*, except for the sub-menu *Motors*. Refer to *Tools menu (Expert mode) on page 9*.

4.4.2 Quick info - History

The *Quick info - History* menu has 2 sections: *Messages* and *Search times*.

The *History - Messages* menu shows:

- *Fault messages*: The 50 last fault messages
- *Info messages*: The 50 last information messages.

The *History - Search times* menu show the same sub-menus as in *Tools - History, total - Search times*. Refer to *Tools - History, total on page 10*.

4.4.3 Quick info - Advanced

The *Quick info - Advanced* menu shows the *Calibrate* menu. It has the same sub-menus as in *Tools - Calibrate*. Refer to *Tools - Calibrate on page 12*.

4.5 Retrieve the PIN code

If the PIN code for the product is forgotten, the right code can be found. In the input mode for PIN code, hold down the **OK** button for 3 seconds. A combination of 12 letters and the product's serial number will then be displayed.

If the mower is locked for a while due to an incorrectly entered PIN code, you have to wait before making another attempt and the letter combination can be read.

The letter combination can be different at different attempts on the same mower with the same PIN code.

Contact the sales company and state the letter combination and serial number. They can then identify the right PIN code. Push the **Back** button to exit the function.

5 Autocheck service tool

Autocheck 3 is a PC tool developed for the service of the robotic lawn mowers from Husqvarna Group. It is a tool for troubleshooting as well as a database of sold products and service history. Autocheck also includes technical documentation and service bulletins. Autocheck 3 supports all G3 (Generation 3) and G4 (Generation 4) products. Autocheck EXP is still applicable for G2 (Generation 2).

The product is connected to the computer using a USB service cable.

5.1 Installation and login

Autocheck 3 supports Windows OS 7 and later. Compatibility with other operating systems cannot be guaranteed.

5.1.1 Getting log in credentials

The log-in credentials determine the set of capabilities available within Autocheck 3.

To get Autocheck log-in credentials, either contact your local sales support, or order Autocheck through the Dealer Portal (requires access).

Note: Distributors can request access to Autocheck through the Husqvarna IT service portal. Access to Husqvarna IT service portal can be ordered through the Husqvarna sales representative.

5.1.2 Installing Autocheck 3

Autocheck 3 is available for downloading from the manufacturer's support site.

1. Select *AFTER SALES – Service tools – Autocheck 3 – SW installation*.
2. Download Autocheck 3 according to the instructions on the Support site.
3. Run the installation file.

When the installation is complete, an Autocheck 3 shortcut is created on the desktop.

Contact your regional Husqvarna Group contact person if you lack access to the Support site.

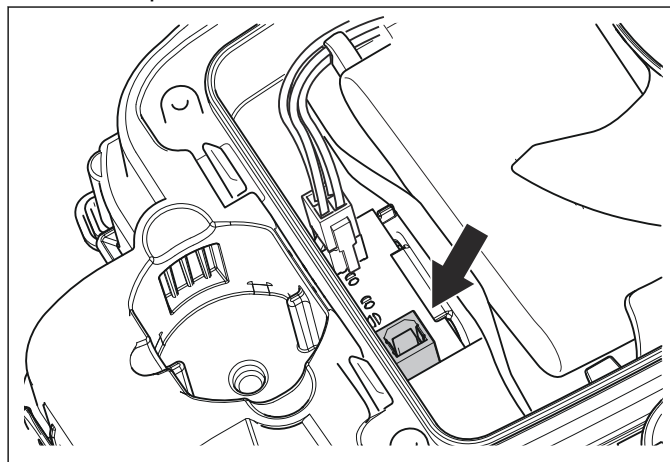
5.1.3 Log in to Autocheck 3

1. Double-click on the Autocheck icon.
2. Enter your username and password, refer to *Getting log in credentials on page 13*.
3. Choose country and select *OK*.

Note: At the first log-in after installation, Autocheck requires access to internet for user and password validation.

5.2 Connect the product

1. Remove the battery cover. Refer to *To replace the battery on page 24*.
2. Connect the service cable between your computer and the product:



3. Start Autocheck on your computer.
4. Switch on the product with the **ON/OFF** button.
5. After finishing the work in Autocheck, disconnect the cable.
6. Refit and fasten the battery cover. Refer to *To replace the battery on page 24*.

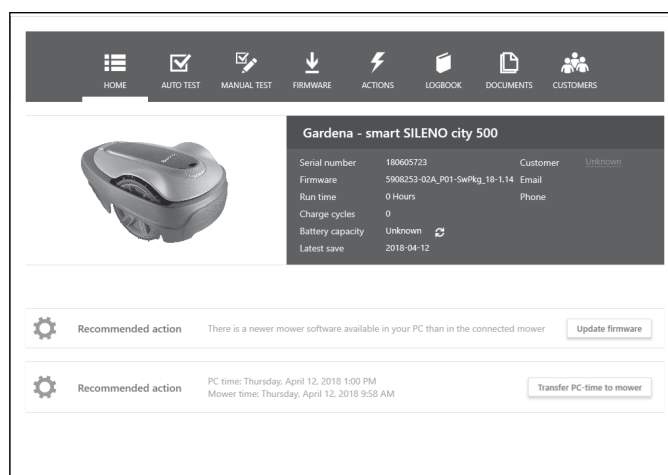
Contact between Autocheck and the product is usually established automatically and confirmed through the product's unique identification number.

If the text *Connected mower: None* is displayed in Autocheck, contact with the product has not been established:

- Check that the cable is correctly connected both in the computer and in the product.
- Check that the **ON/OFF** button is switched on.

5.3 How to use Autocheck 3

The program's main functions are grouped in a number of menus.



- *Home*

- *Auto test*
- *Manual test*
- *Firmware*
- *Actions*
- *Log book*
- *Documents*
- *Customers*

5.3.1 Home

When the product is connected to Autocheck an overview is presented in the *Home* menu. Recommended actions are also shown, for example recommended firmware updates.

5.3.2 Auto test

Auto test is suitable to use for a fast and overall status of the product. In the *Auto test* menu you can select or deselect tests. All tests run in a sequence after you push *Start Auto test*. During the tests there are animations guiding you what to do.

After the *Auto test* the results are presented in a list. When clicking on a test there is more information presented on the screen. It is also possible to print a report of the test result.

5.3.3 Manual test

When using the *Manual test* you select, start and stop the different tests by yourself. The result is shown live on the screen and there are no test reports available. *Manual test* is appropriate to use when you want to test a specific component and allow it to work for a certain period.

5.3.4 Firmware

In the *Firmware* menu Autocheck updates the product software if necessary.



CAUTION: Always let Autocheck complete a started programming process. An interrupted programming can block the main circuit board or HMI circuit board.

5.3.5 Actions

The *Actions* menu shows:

- *Reset*: Contains reset functions, for example *Reset charge cycles counter* and *Reset period time*. *Reset charge cycles counter* should be done when the product has a new battery. *Reset period time* should be done before the product is returned to the customer (if there is a need to create a new loop signal between the product and the charging station).
- *Unit replacement*: Has the functionality to set the product serial number if the main circuit board is exchanged.
- *Remote HMI*: Contains additional functions like *Demo mode* and *Override loop detection*. It is also possible to get the *Security code* from the product.

5.3.6 Log book

The *Log book* contains the *Fault memory* where, for example, the product's error codes can be found. Additional Log book functions are continuously implemented.

5.3.7 Documents

When a product is connected to Autocheck, only the relevant technical documentation for that model is shown. It is however possible to uncheck the box for the connected product and search for all available documents in , for example spare parts lists, service bulletins, workshop manuals, and operator's manuals.

5.3.8 Customers

In the customer's menu a list of all the customers and their products is available. The list is only saved locally.

5.4 Programming circuit boards

If a programming process fails or is interrupted this can block the product's main circuit board or HMI circuit board. If the circuit board cannot communicate or be programmed in the usual way, it can be put in a so-called boot mode. This should only be done if the usual programming procedure does not succeed.

5.4.1 Programming a blocked HMI circuit board

1. Switch off the **ON/OFF** button.
2. Connect the USB cable to the product and computer.
3. Start Autocheck.
4. Push the **arrow down** key, and keep it pressed in until the programming process is finished.
5. Switch on the **ON/OFF** button on (at the same time as keeping the **arrow down** key pushed).
6. Follow the instructions about the firmware in Autocheck (keep the **arrow down** key pushed).
7. When the programming process is ended, release the **arrow down** key.

5.4.2 Programming a blocked main circuit board

1. Switch off the **ON/OFF** button.
2. Connect the USB cable to the product and computer.
3. Start Autocheck.
4. Lift and hold the product by the front edge so that the lift sensor is activated.
5. Switch on the **ON/OFF** button (while at the same time lifting the product by the front edge).
6. Start programming within 10 seconds.

5.4.3 Programming a new main circuit board

If the main circuit board is replaced, the new main circuit board must be programmed. The main circuit board includes information about the product's serial number.

Note: A new main circuit board may for safety reasons only be assigned one serial number which is never changed. It is therefore very important that the new main board gets the correct serial number.

There are 3 options when programming a new main circuit board:

- **Select product from the Log book**

Select product from the Log book and the serial number and operating data is transferred automatically to the new main circuit board. This requires that the product previously has been connected to Autocheck.

- **Enter the serial number manually in Autocheck**

If the product never was connected to Autocheck, the serial number must be entered manually in the *Actions - Unit replacement* menu. It is then very important to enter the correct serial number.

- **Use Service mode**

If the main circuit board is replaced when troubleshooting, and you are not sure if the main circuit board will be kept in the product, it is possible to temporarily skip to enter the serial number and use the main circuit board in a so-called *Service mode*. As long as the product is in the *Service mode*, the *Service mode* text flashes in the display.



WARNING: Do not return the product to the customer in *Service mode*.

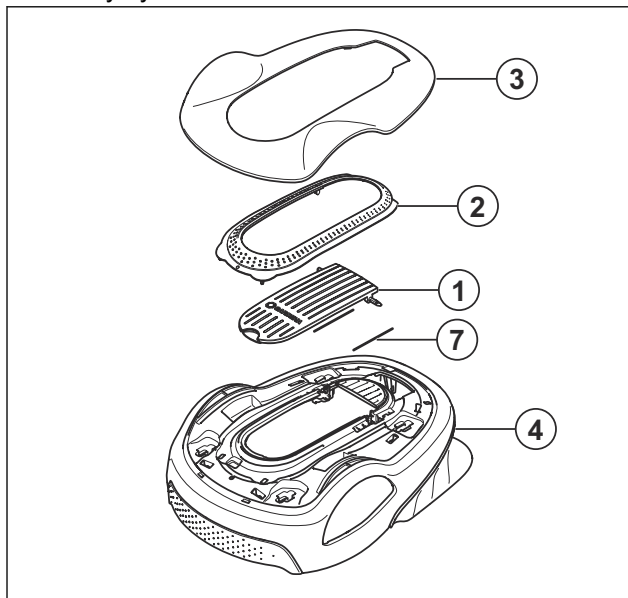
6 Repair instructions

This chapter describes how to repair and change spare parts. Refer to the Illustrated parts list (IPL) at the manufacturer's support website.

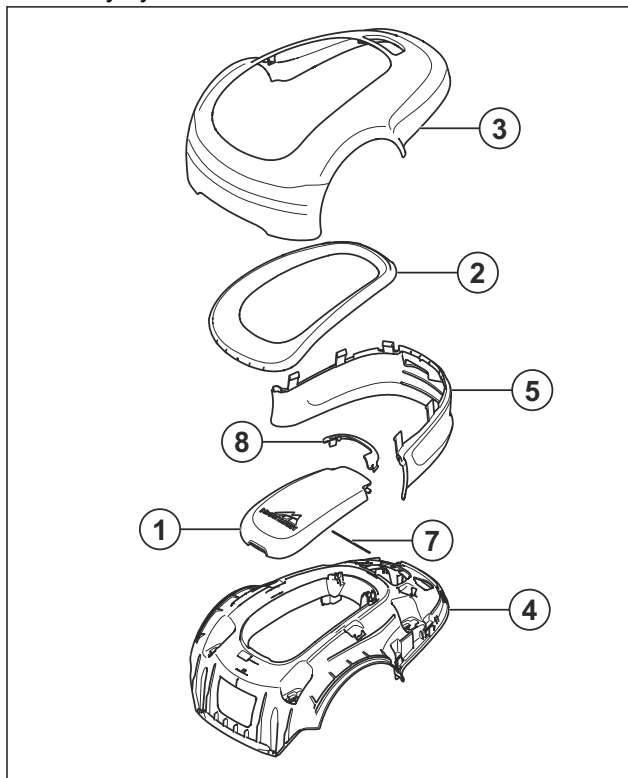
6.1 The body system

The body system differs between the models, both in design and which parts that are included. The body system is structured mechanically around the following modules:

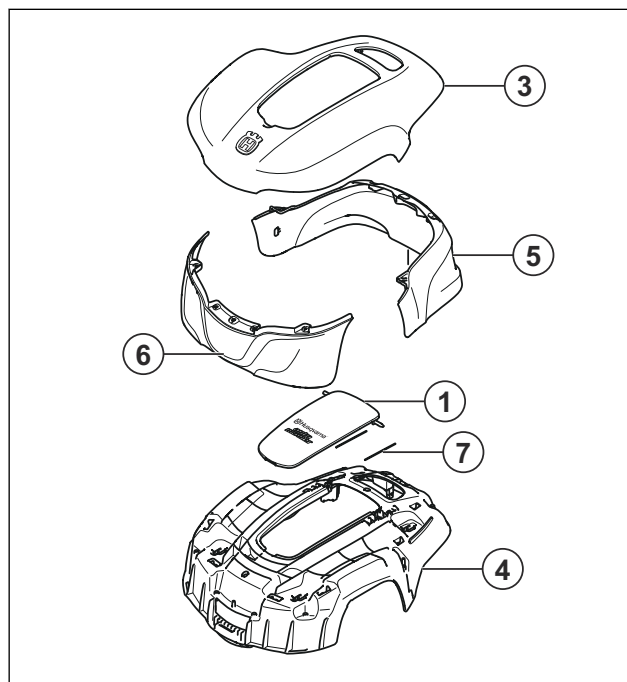
- The body system - GARDENA®



- The body system - McCULLOCH®



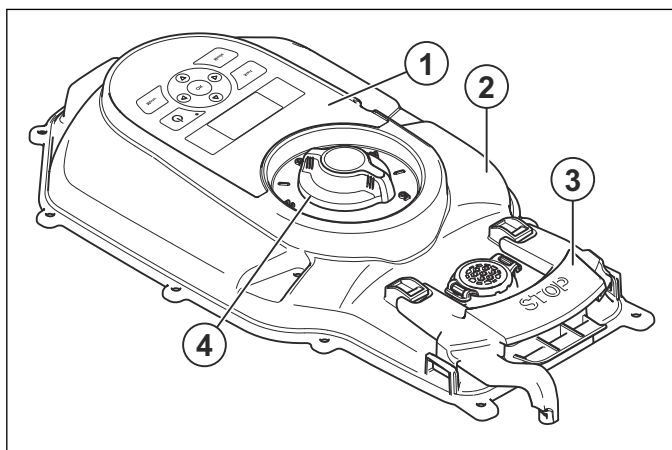
- The body system - Husqvarna®



1. Hatch
2. Frame
3. Top cover
4. Body
5. Bumper, rear
6. Bumper, front
7. Springs/spring with sleeve
8. Cap

6.2 The upper chassis

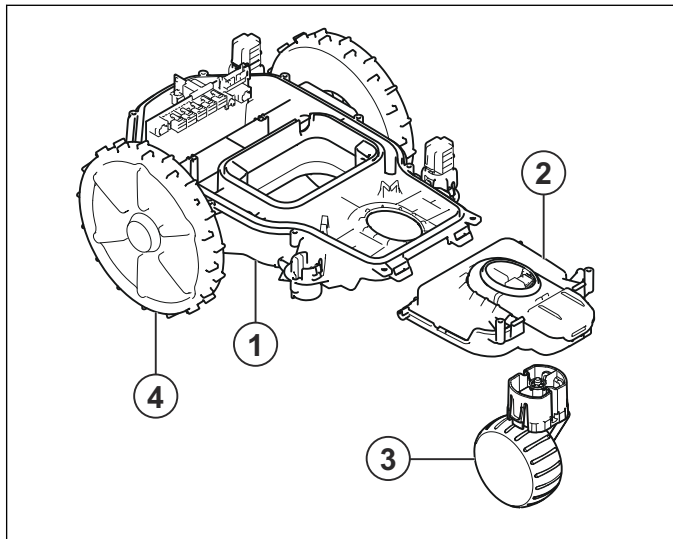
The upper chassis is structured mechanically around the following modules:



1. Keypad
2. Upper chassis
3. STOP button
4. Height adjustment knob

6.3 The lower chassis

The lower chassis is structured mechanically around the following modules:

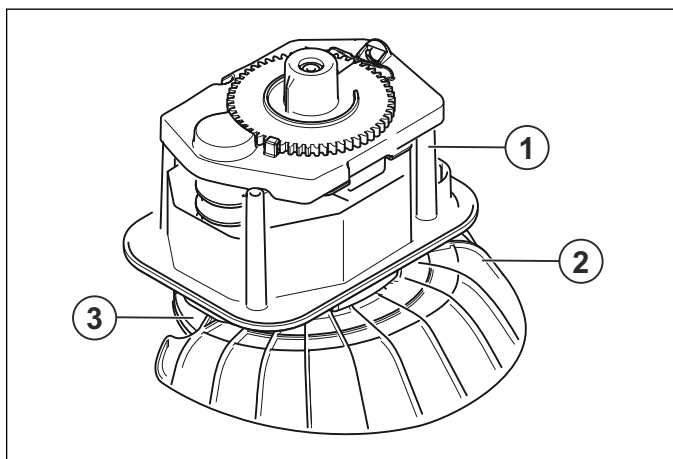


1. Lower chassis
2. Rear housing module
3. Rear wheel / Rear wheels (only for GARDENA® SILENO life and smart SILENO life and Husqvarna®)
4. Front wheels

Note: There are 2 sealing strips between the upper and lower chassis. Always replace the sealing strips when the product is opened.

6.4 The cutting system

The cutting system is structured mechanically around the following modules:



1. Cutting module
2. Guard
3. Blade disc


6.5 To mount screws

It is important to mount the screws correctly. Incorrect mounted screws may harm the product.

Note: Read the section about how to mount screws in plastic before starting any maintenance. Refer to *To mount screws in plastic on page 29.*

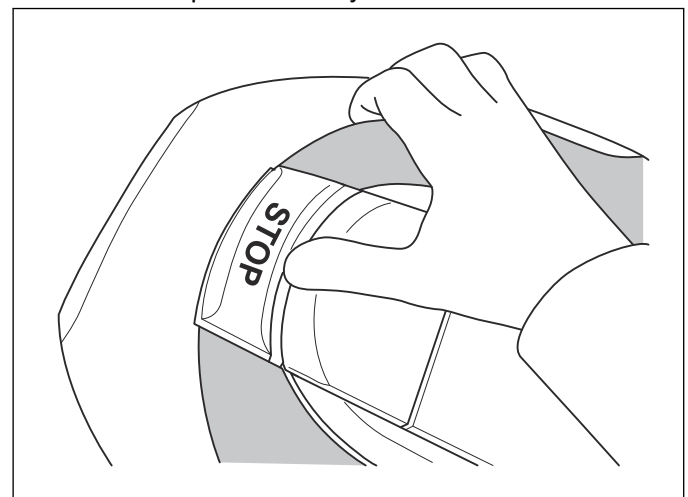
Note: Always use the recommended torque to mount the screws. Refer to *Screw fasteners on page 32.*

6.6 To disassemble the body system

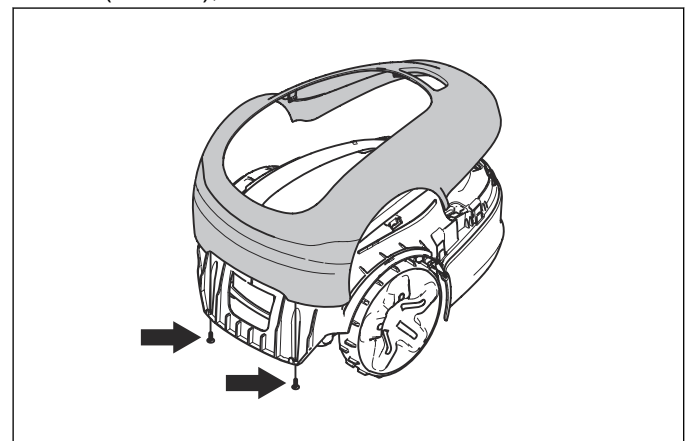
 **CAUTION:** Clean grass and dirt from the product before you disassemble it.

Note: This section describes how to disassemble all parts of the body. For service or changing of spare parts all steps may not be needed.

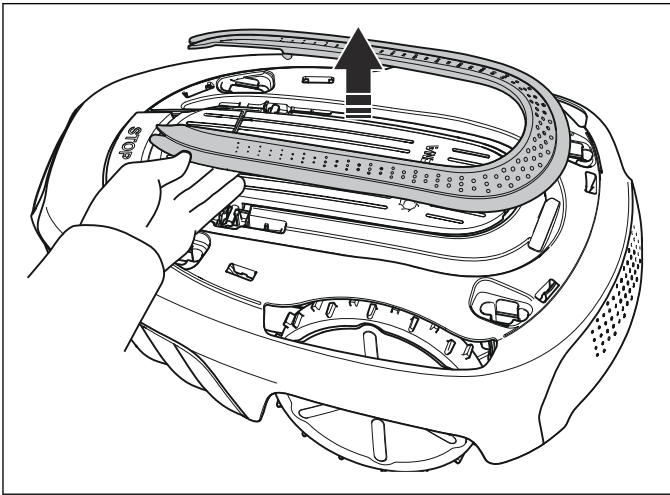
1. Push the **ON/OFF** button to disable the product. The product is disabled when the indicator lamp is not lit.
2.
 - a) For GARDENA® and Husqvarna® the top cover is attached to the body by clips. Pull the top cover up clockwise by hand and remove it.



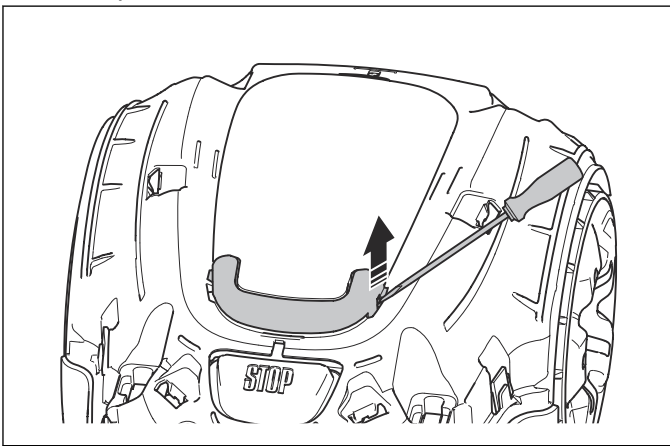
- b) For McCULLOCH® the top cover is attached by 2 screws into the body. Loosen the 2 screws, (Torx 20), and remove it.



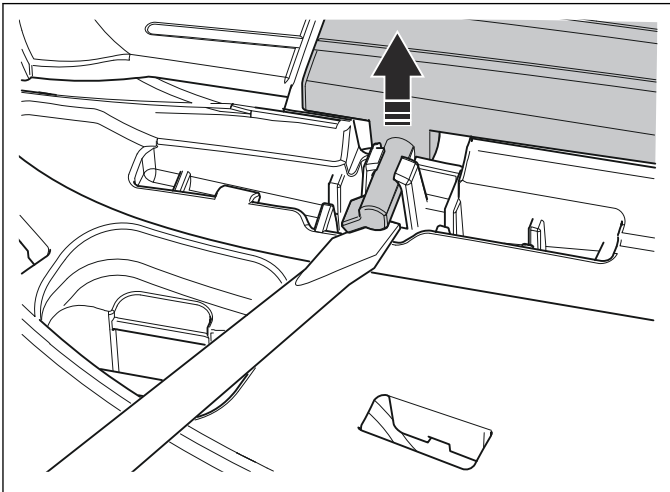
3. Only for GARDENA® and McCULLOCH®, lift up the frame.



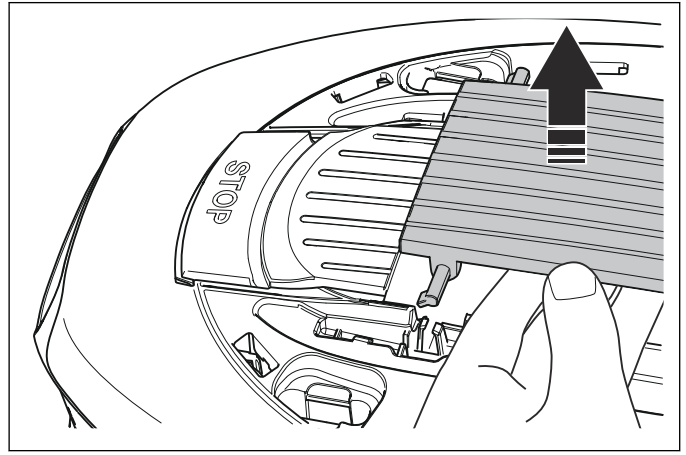
4. Only for McCULLOCH®, remove the cap by pushing the clips with a screwdriver.



5. Remove the hatch by using a flat screwdriver.

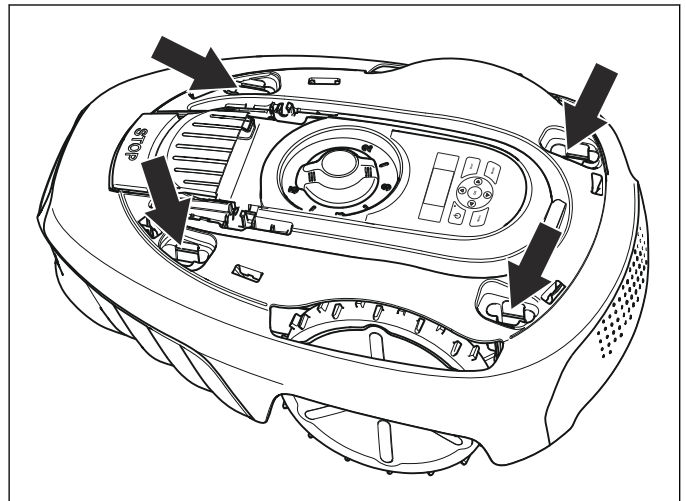


6. Detach it on one side and then pull it out by hand.

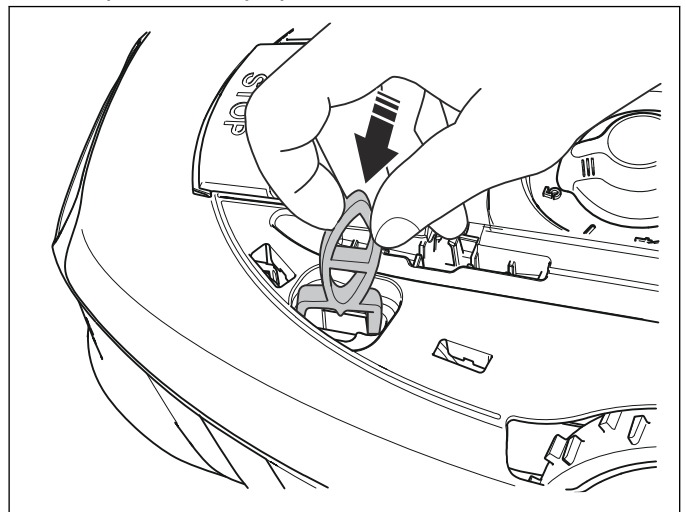


Note: The springs for the hatch differ between the models. GARDENA® and Husqvarna® have two springs. McCULLOCH® has one spring with sleeve.

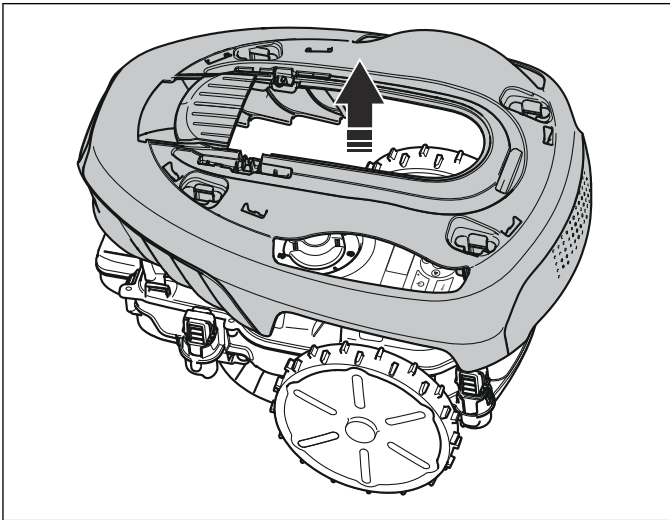
7. Locate the 4 positions where the body system is attached.



8. Push the special tool down in 1 of the 4 positions, and pull the body up.



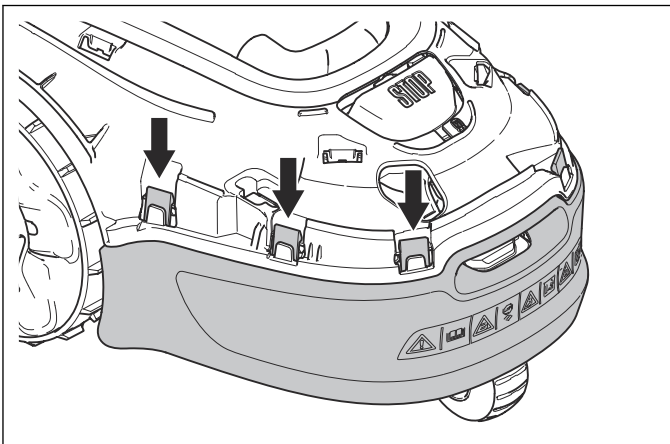
9. Continue with the remaining positions while holding the body up.



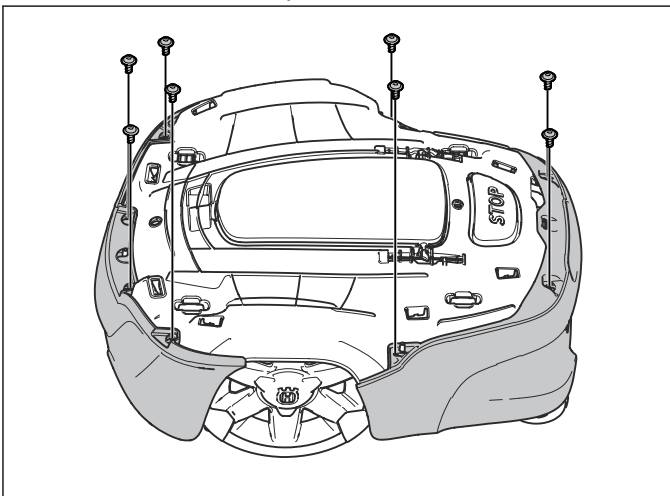
10. Lift up and remove the body.

11.

- a) Only for McCULLOCH®. The bumper rear is attached to the body with clips. Push the clips with a screwdriver and loosen it all the way around.



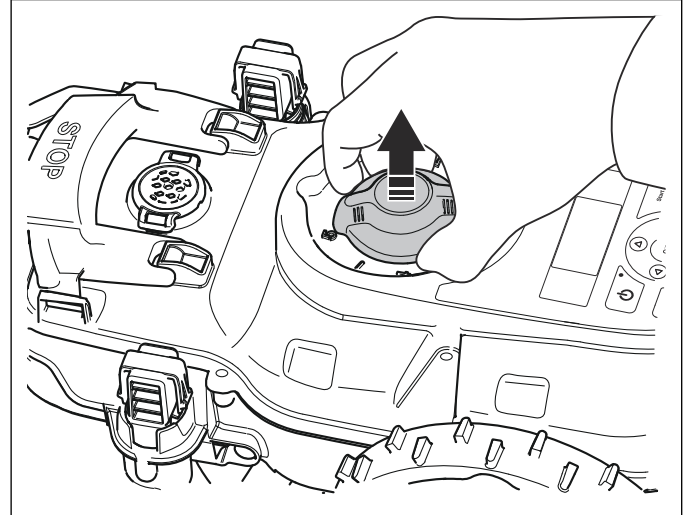
- b) Only for Husqvarna®. The bumper rear and bumper front are attached to the body with screws. Loosen the 8 screws (Torx 20) and remove the bumpers.



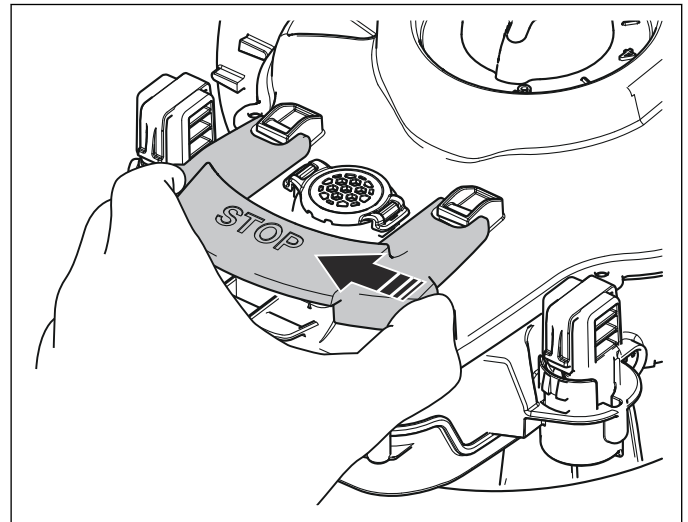
6.7 To disassemble the upper chassis

Note: This section describes how to disassemble all parts of the upper chassis. For service or to replace spare parts all steps may not be needed.

1. Disassemble the body system. Refer to *To disassemble the body system on page 17.*
2. Pull up the knob of the cutting height adjustment.

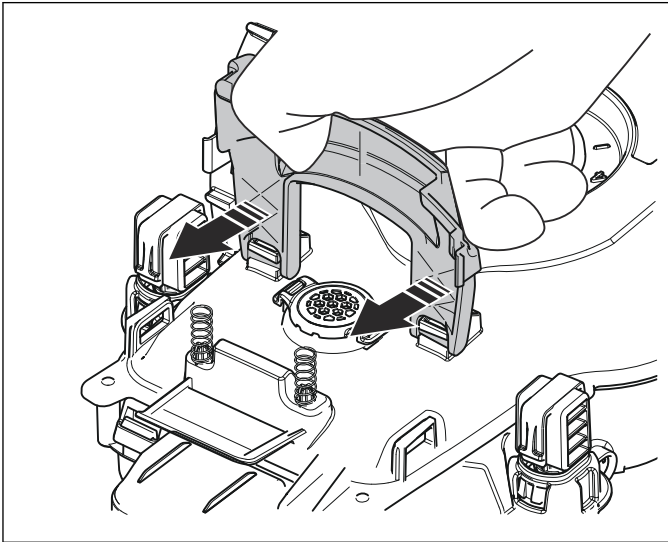


3. Push the clips inwards to remove the **STOP** button.

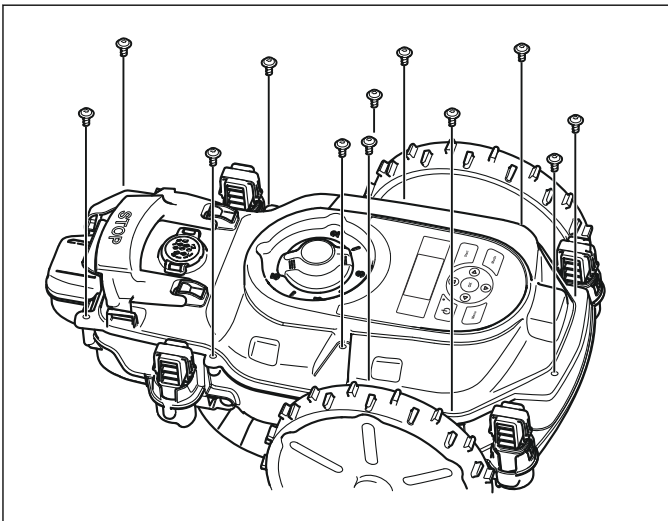


4. Lift up the **STOP** button.

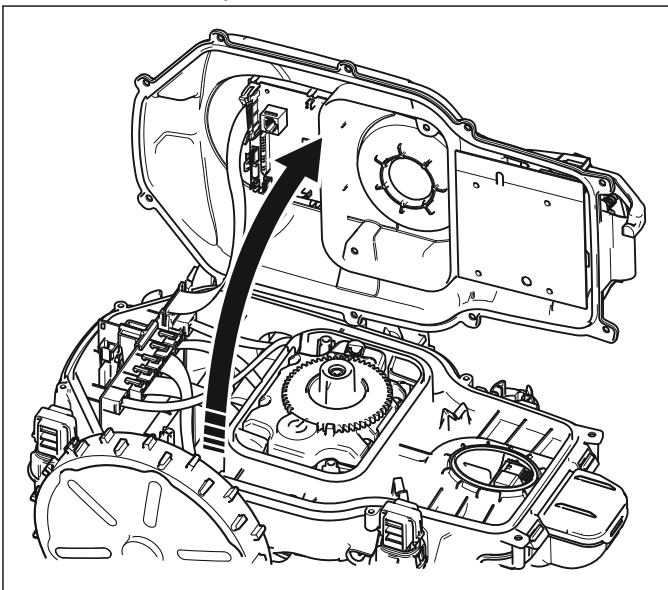
5. Pull the **STOP** button backwards.



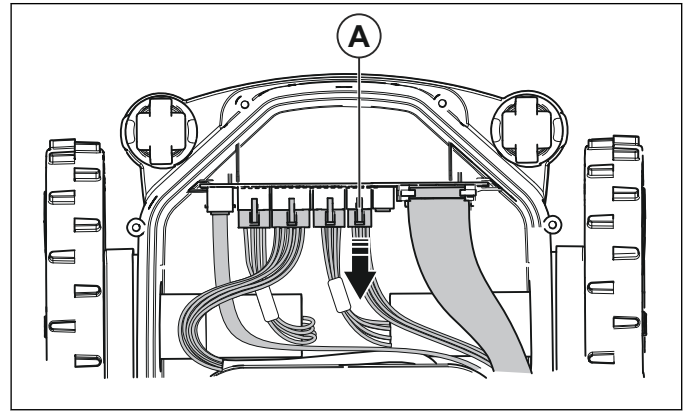
6. Loosen all 12 screws (Torx 20) and remove them.



7. Lift up the upper chassis and place it vertically on the side of the product.

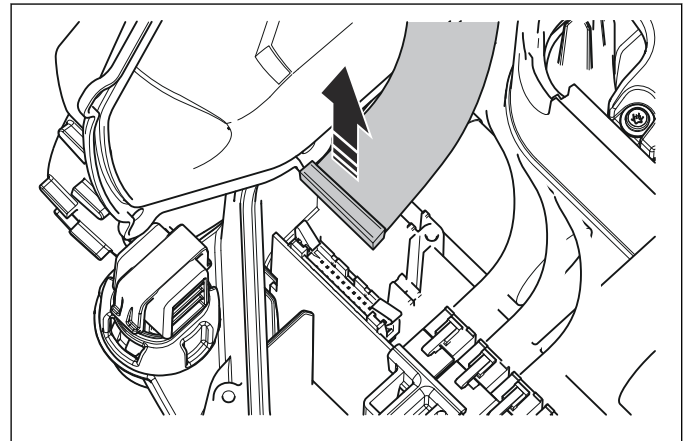


8. Disconnect the power cable (A) from the main circuit board.



CAUTION: Always disconnect the power cable first to avoid current spikes that may harm the circuit boards or the battery.

9. Disconnect the HMI cable and remove the upper chassis.



6.8 The circuit boards

These are the circuits boards in the product:

- Main circuit board
- HMI circuit board
- COM circuit board (only for GARDENA® smart system models)
- Front sensor circuit board
- Rear sensor circuit board

The circuit boards contain the electronics and software required to control the product's functions.

The main circuit board, the HMI circuit board and the COM circuit board contain their own separate software. If any of these boards are replaced, they have to be programmed via Autocheck.

The other circuit boards do not have any software, and do not need to be programmed after a replacement.



CAUTION: Pull the connect and not the cable.



CAUTION: To avoid electrostatic discharge in electronic components always earth yourself

before you start to work on electrical components.



CAUTION: Do not touch the circuit board's components or pin terminals.

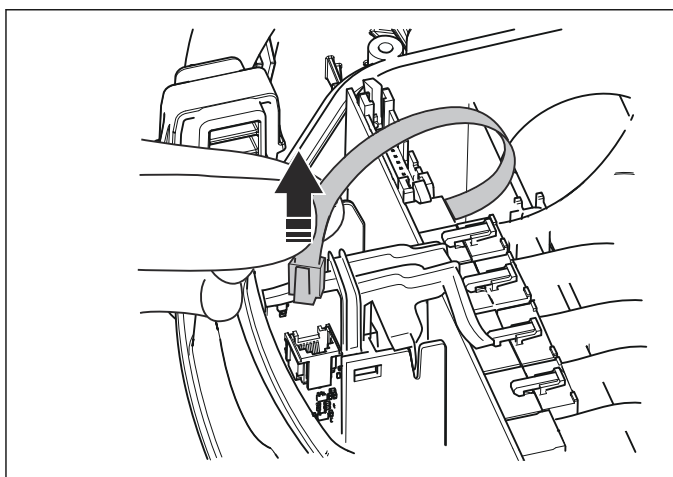
6.8.1 To replace the front sensor circuit board



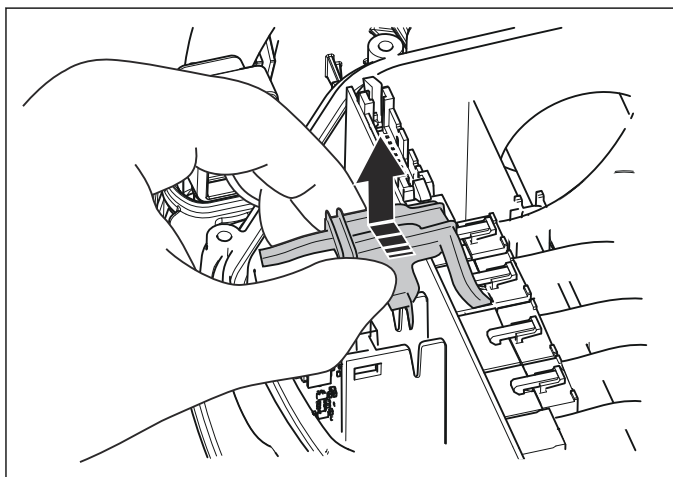
CAUTION: Some sensors consists of a Hall sensor and a magnet. Since the magnet have a south and a north pole, it is important that the magnet is oriented correctly.

The front sensor circuit board contains the front loop sensor and the front lift sensor. The sensors cannot be replaced separately. The entire front sensor circuit board must be replaced as a unit.

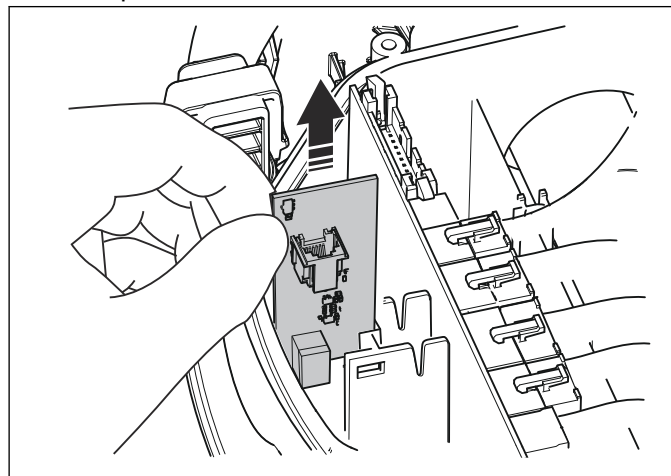
1. Disassemble the body system. Refer to *To disassemble the body system on page 17.*
2. Disassemble the upper chassis. Refer to *To disassemble the upper chassis on page 19.*
3. Disconnect the cable from the front sensor circuit board.



4. A plastic clip holds the front sensor circuit board and the main circuit board in position. Push the 2 clips to remove it.



5. Pull up the front sensor circuit board and remove it.

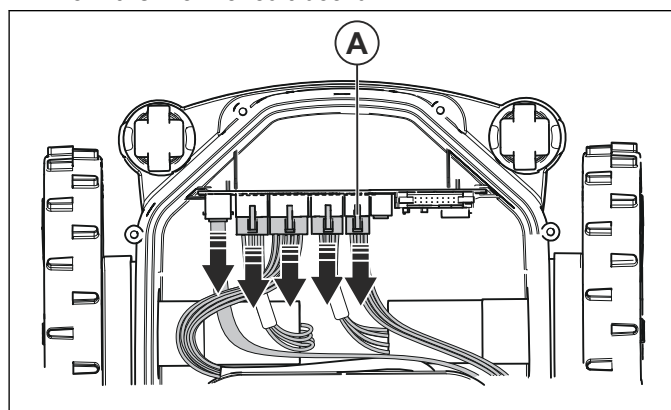


6. Fit the new front sensor circuit board.
7. Refit the plastic clip.
8. Reconnect the cable.
9. Reassemble the upper chassis and the body system. Refer to *To assemble the upper chassis and the body system on page 28.*

6.8.2 To replace the main circuit board

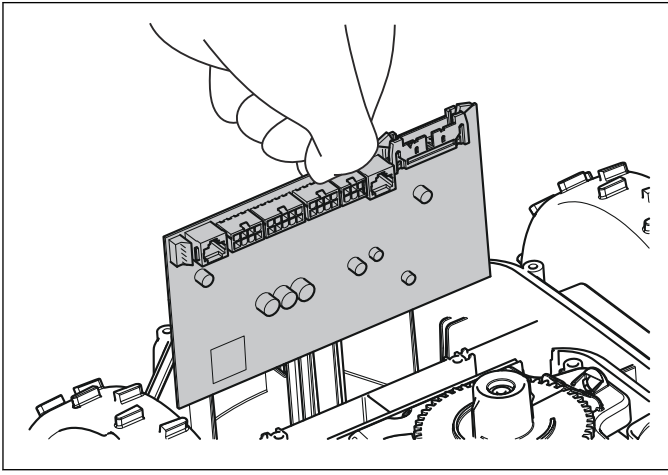
The product's operating information is stored in the main circuit board. The Autocheck service program saves this information in the log book and then transfers it back to the product again when the main circuit board has been replaced.

1. Connect the product to Autocheck before replacing the main circuit board. The operating data is then saved automatically.
2. Disassemble the body system. Refer to *To disassemble the body system on page 17.*
3. Disassemble the upper chassis. Refer to *To disassemble the upper chassis on page 19.*
4. Disconnect the power cable (A) and all other cables from the main circuit board.



5. Remove the plastic clip. Refer to step 4 in *To replace the front sensor circuit board on page 21.*

6. Pull up the main board and remove it.



CAUTION: If the board is to be checked in order to evaluate the guarantee, it should be placed in a bag with protection against ESD (electrostatic discharge).

7. Fit the new main circuit board.
8. Refit the plastic clip.
9. Connect all cables to the main circuit board. Check that the cables are connected to the correct place.
10. Reassemble the upper chassis and the body system. Refer to *To assemble the upper chassis and the body system on page 28*.
11. Connect the product to Autocheck. Select the correct serial number in the log book. Autocheck automatically transfers the operating information saved in the log book.
12. If the current product for any reason is not in the log book in Autocheck, the serial number must be entered manually. The serial number is printed on the rating plate on the inside of the hatch.



CAUTION: Check that the correct serial number is entered. It can only be entered once.

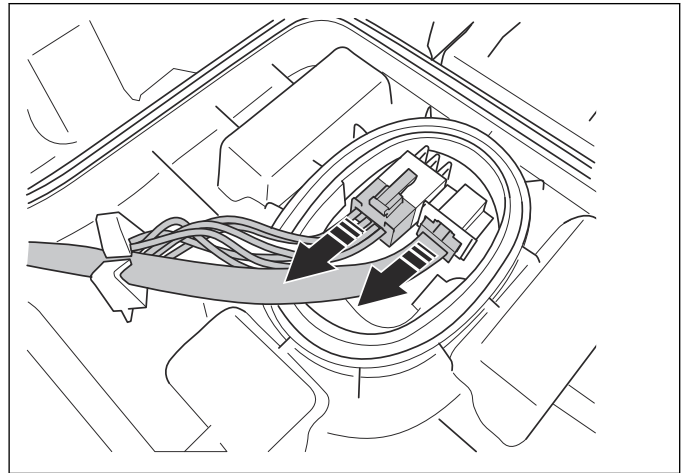
13. If the main circuit board is replaced when troubleshooting and you are not sure if the new main circuit board will be kept in the relevant product, it is possible to temporarily program the main circuit board in a so-called Service Mode. Refer to *Programming a new main circuit board on page 15*.

6.8.3 To replace the rear sensor module

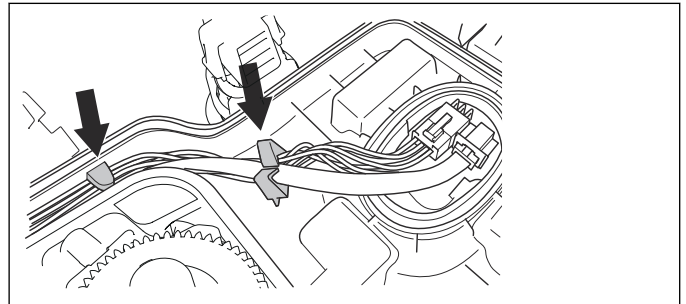
The circuit board in the rear sensor module contains the rear loop sensor, the rear lift sensor and the STOP sensor. The sensors cannot be replaced separately. The entire rear sensor module must be replaced as a unit.

1. Disassemble the body system. Refer to *To disassemble the body system on page 17*.
2. Disassemble the upper chassis. Refer to *To disassemble the upper chassis on page 19*.

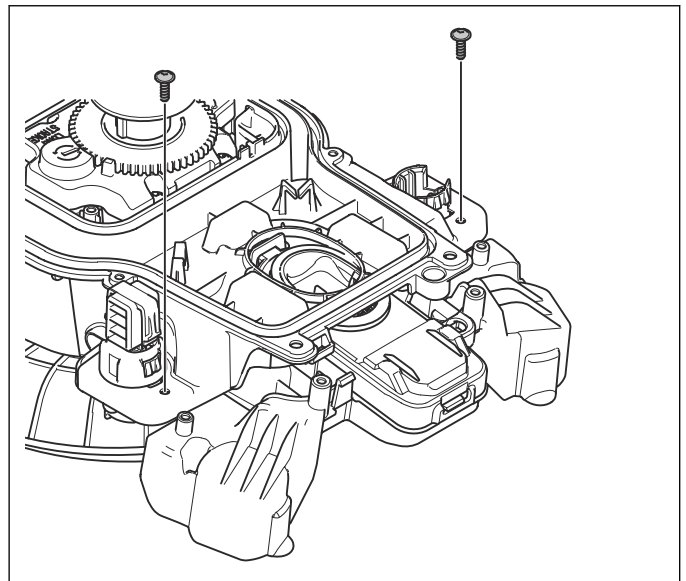
3. Disconnect the power cable and the signal cable from the rear sensor module.



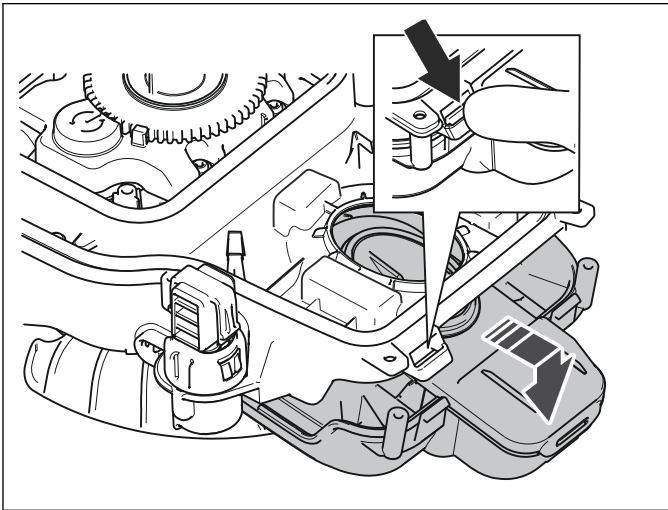
4. Remove the cables from the 2 clips that hold the cables in position.



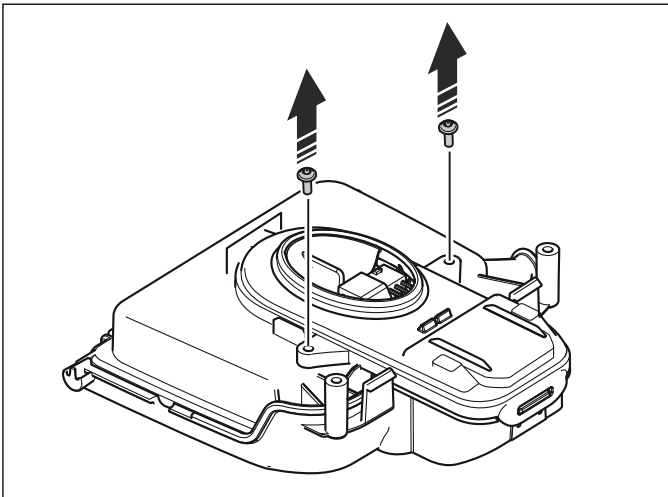
5. Only for Husqvarna®, loosen the 2 screws into the lower chassis.



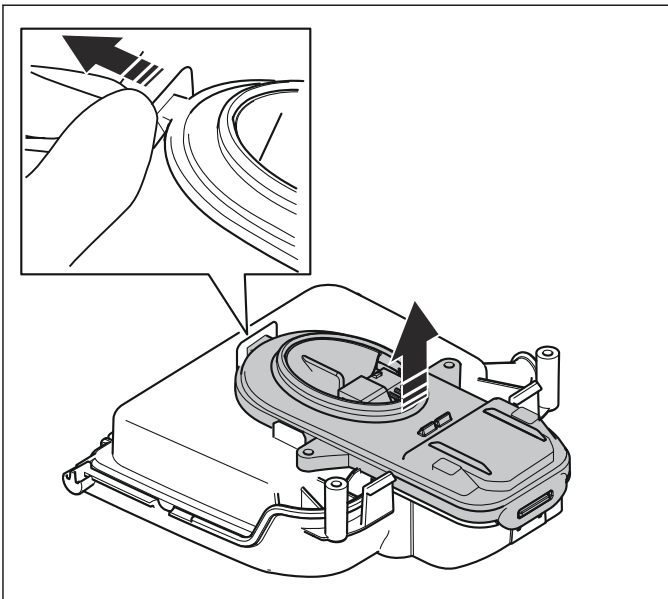
6. Push down the clips that hold the rear housing module in place. Pull out the rear housing module backwards and downwards.



7. Loosen the 2 screws that hold the rear sensor module to the rear housing module.



8. Push the front clip, and then gently pull the rear sensor module backwards.

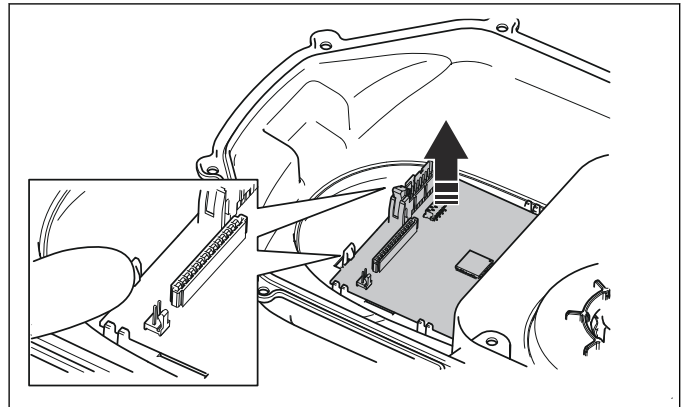


9. Disconnect the cable from the rear sensor module.
10. Connect the cable to the new rear sensor module and fit into the rear housing module.

11. Reassemble the rear housing module into the lower chassis.
12. Reassemble the upper chassis and the body system. Refer to *To assemble the upper chassis and the body system on page 28*.

6.8.4 To replace the HMI circuit board

1. Disassemble the body system. Refer to *To disassemble the body system on page 17*.
2. Disassemble the upper chassis. Refer to *To disassemble the upper chassis on page 19*.
3. Disconnect the cable on the HMI circuit board.
4. The HMI circuit board is held to the upper chassis by 2 clips. Push the clips and lift up the HMI circuit board.



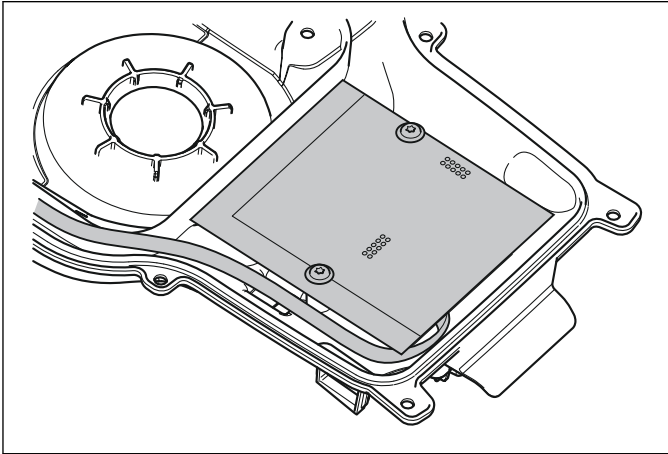
5. Fit a new HMI circuit board into position.
6. Reconnect the cables to the HMI circuit board.
7. Reassemble the upper chassis and the body system. Refer to *To assemble the upper chassis and the body system on page 28*.
8. Connect the product to Autocheck to program the HMI circuit board. Refer to *Autocheck service tool on page 13*.

6.8.5 To replace the COM circuit board

Note: Only for products including GARDENA® smart system.

1. Disassemble the body system. Refer to *To disassemble the body system on page 17*.
2. Disassemble the upper chassis. Refer to *To disassemble the upper chassis on page 19*.

3. The COM circuit board is held by 2 screws or 2 clips (depending on model). Loosen the 2 screws (Torx 20) or push the 2 clips and remove the circuit board.



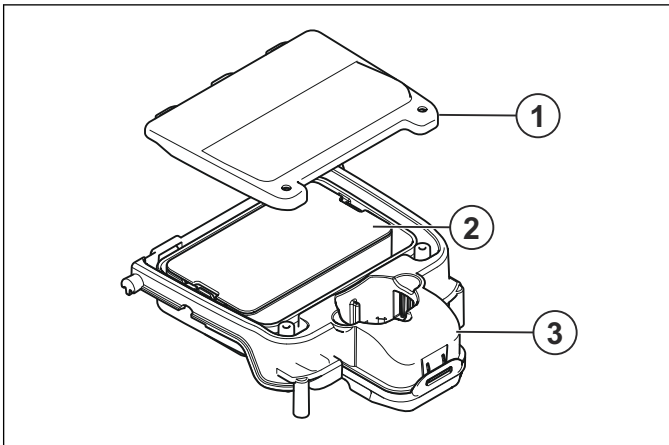
4. Disconnect the cable from the circuit board and reconnect it to the new board.
5. Fit the new board using the 2 screws or the 2 clips.



CAUTION: Make sure that the board is oriented correctly. The components and cable connectors shall face the upper chassis.

6. Reassemble the upper chassis and the body system. Refer to *To assemble the upper chassis and the body system on page 28*.
7. Connect the product to Autocheck to program the COM circuit board. Refer to *Autocheck service tool on page 13*.

6.9 The battery system



1. Battery cover
2. Battery
3. Rear housing module



WARNING: Use only original batteries recommended by the manufacturer. Product safety cannot be guaranteed with other batteries. Do not use non-rechargeable batteries.

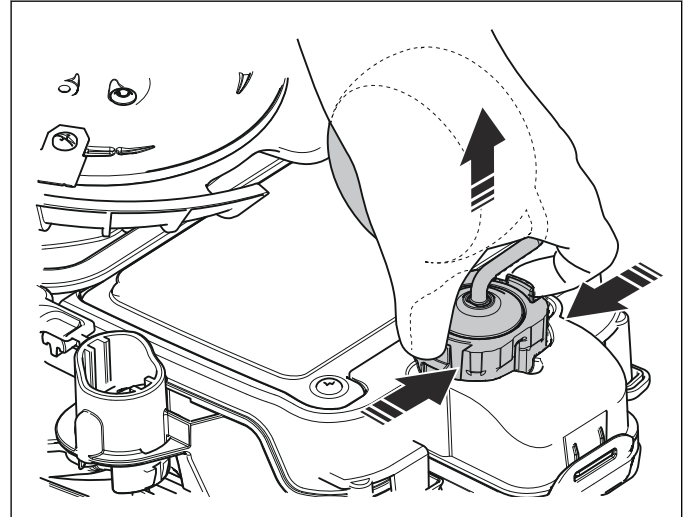
The battery is considered to be fully charged when the battery reaches 80% of the total capacity. To charge the

battery to 100% would take too long since the charging current is low. The most rational way of using Li-ion batteries is therefore to stop charging at 80%. The maximum utilised capacity is thus 80% of the battery's total capacity.

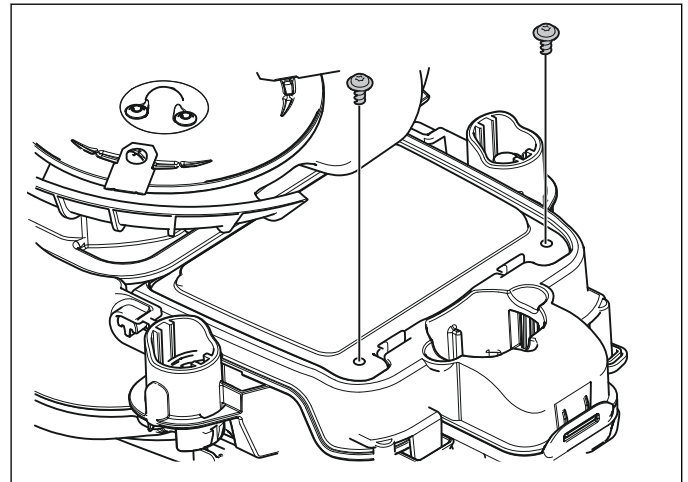
The battery is maintenance-free, but has a limited life span. The battery is expected to last for 3000 - 4000 charging cycles. The normal charging current is 1.3 A.

6.9.1 To replace the battery

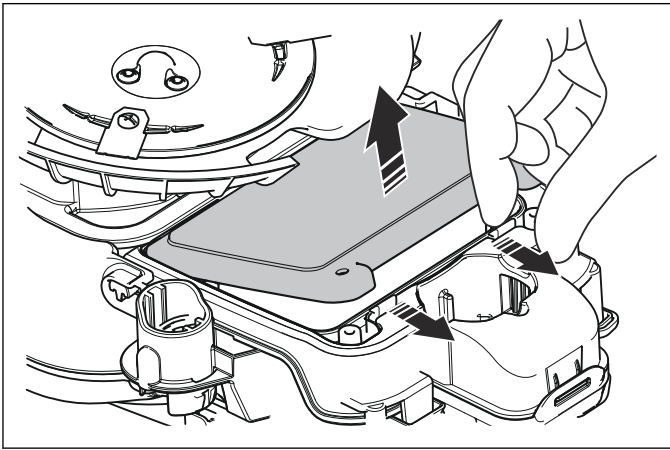
1. Set the cutting height to the lowest. Refer to *Operation - Adjust the cutting height* in the Operator's manual.
2. Push the 2 clips, and then pull the rear wheel/rear wheels up.



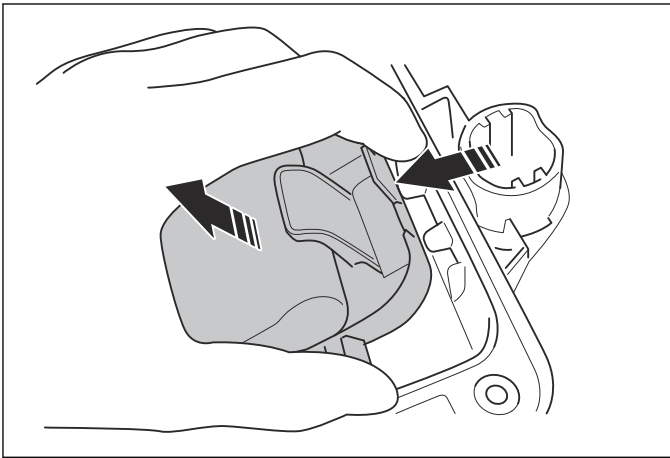
3. Loosen the 2 screws (Torx 20) holding the battery cover in place.



4. Push the 2 clips holding the battery cover and remove it.



5. Disconnect the cable from the rear sensor board.
6. Push the 2 clips and pull up to remove the battery.



7. Connect the new original battery to the rear sensor module and fit the new battery.
8. Put the battery cover into place and fasten with the 2 screws (torx 20).
9. Refit the rear wheel/rear wheels.

Note: When replacing the battery, the charging cycle counter should be reset. This is done in Autocheck.

6.9.2 To replace the charging strips on the product

When the product's battery does not recharge this may be due to worn or damaged charging strips.

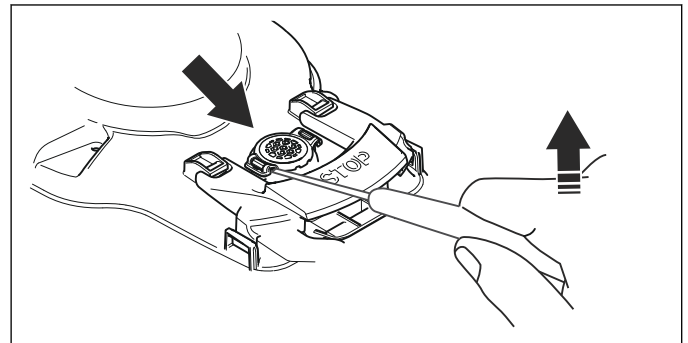
The charging strips are included in the rear sensor module. Refer to *To replace the rear sensor module on page 22*.

Also check the contact strips on the charging station. Refer to *To replace the charging tower on page 29*.

6.10 To clean and replace the ventilation filter

Note: The ventilation filter needs to be cleaned regularly and must be replaced if damaged.

1. Disassemble the body. Refer to *To disassemble the body system on page 17*.
2. Only for Husqvarna® and McCULLOCH®. Remove the STOP button, refer to step 3-5 in *To disassemble the upper chassis on page 19*.
3. Disassemble the filter cover with a small screwdriver and carefully push one side of the cover outwards.



4. If the filter is not damaged. Clean the filter carefully with a clean and soft brush and move to step 8.
5. Remove the damaged filter.
6. Clean thoroughly around the mounting surfaces.
7. Apply the new filter, ensuring the adhesive surfaces fasten properly to the chassis.
8. Refit the filter cover.
9. Only for Husqvarna® and McCULLOCH®, refit the STOP button.
10. Reassemble the body system. Refer to *To assemble the upper chassis and the body system on page 28*.

6.11 To replace the keypad

1. Disassemble the body system. Refer to *To disassemble the body system on page 17*.
2. Disassemble the upper chassis. Refer to *To disassemble the upper chassis on page 19*.
3. Peel off the keypad from the chassis.
4. Clean the chassis from glue residue.
5. Remove the protective liner from the new keypad, and press the keypad into position.



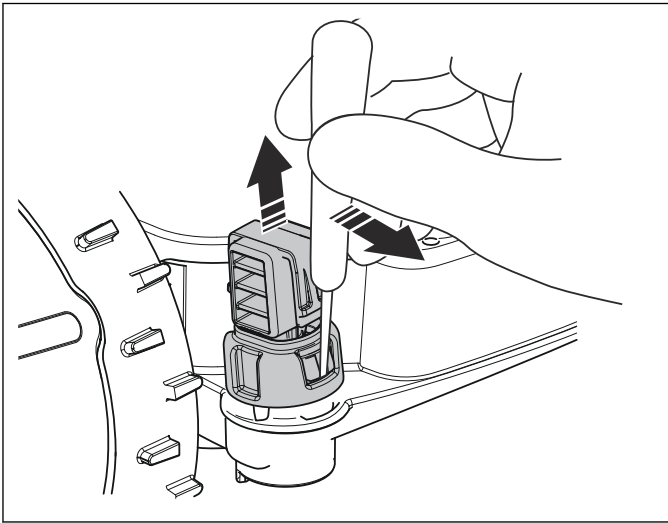
CAUTION: There must not be any loose corners or air bubbles as this can cause dirt and moisture to get in under the keypad.

6. Reconnect the new keypad to the HMI circuit board.

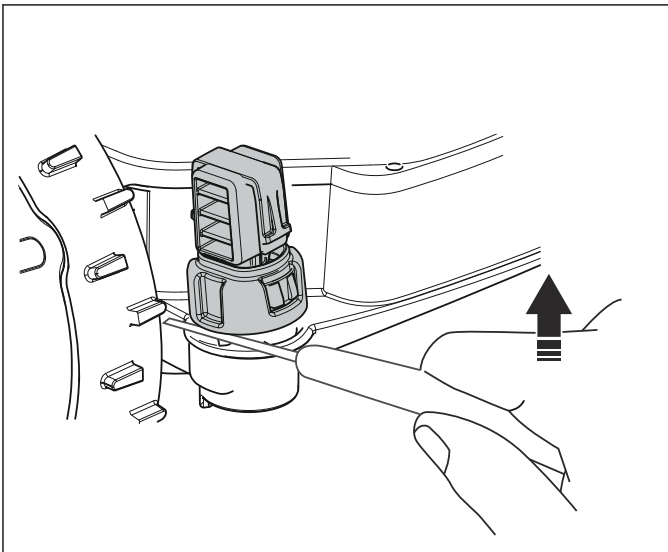
7. Reassemble the upper chassis and the body system. Refer to *To assemble the upper chassis and the body system on page 28.*

6.12 To replace the body suspension parts

1. Lift up the body suspension parts by using a small flat screwdriver. Pull the screwdriver gently backwards.

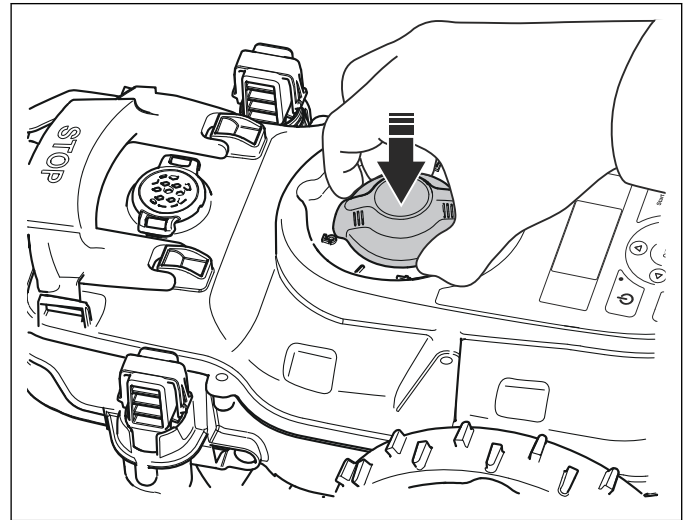


2. Put the screwdriver between the suspension system and the lower chassis. Push the screwdriver upwards and remove the suspension part.



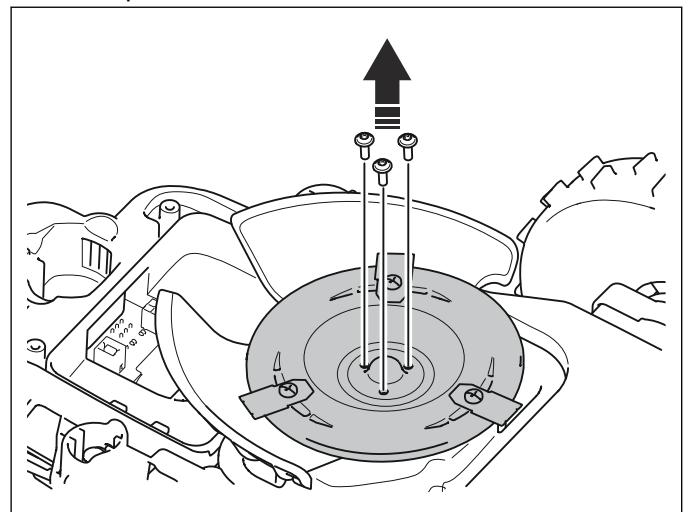
3. To assemble the body suspension parts, refit the pin into the slot and refit the ring into the correct position.

4. Push the body suspension part into the hole in the lower chassis.

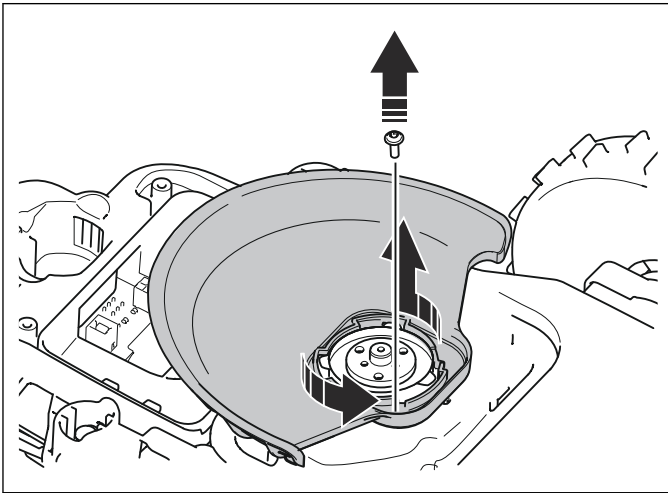


6.13 To replace the cutting module

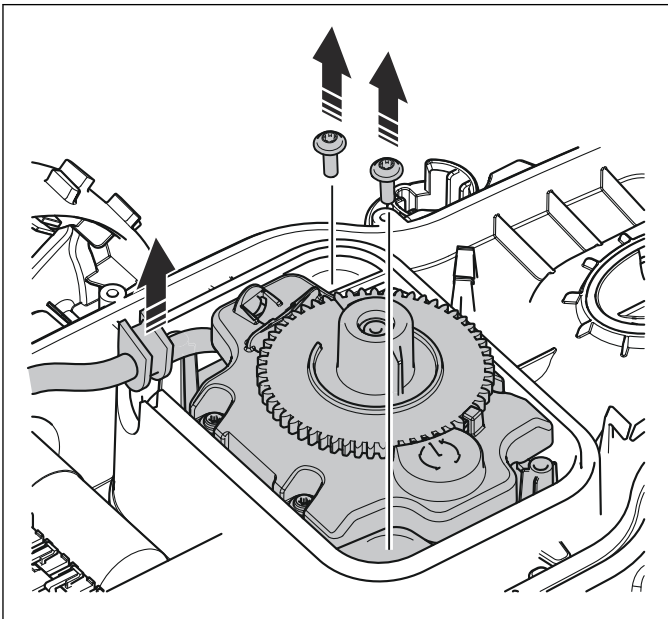
1. Set the cutting height adjustment to MAX. Refer to *Operation - Adjust the cutting height* in the Operator's manual.
2. Disassemble the body system. Refer to *To disassemble the body system on page 17.*
3. Disassemble the upper chassis. Refer to *To disassemble the upper chassis on page 19.*
4. Loosen the 3 screws (torx 20) and pull the blade disc up.



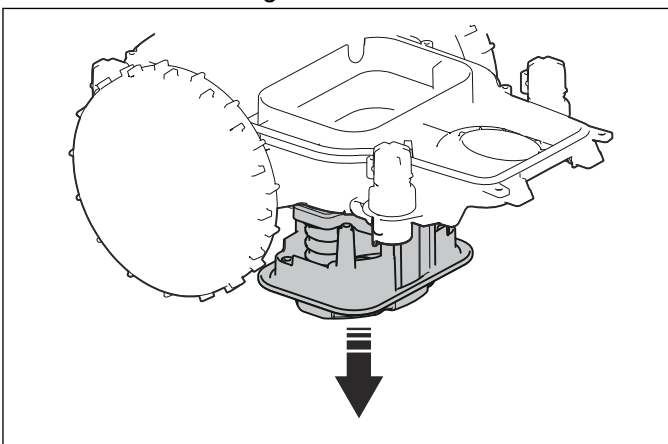
- Loosen 1 screw for the cutting guard and turn the guard counter-clockwise to remove it.



- Remove the sealing strip and the cable gland.



- Loosen the 2 screws holding the cutting module.
- Disconnect the blade motor cable from the main circuit board.
- Remove the cutting module.



- Fit the new cutting module and connect the motor cable to the main circuit board.

- Assemble the cable gland into the lower chassis, and attach a new sealing strip. Refer to *To assemble the sealing strips on page 28*.
- Reassemble the cutting guard and fasten the screw.
- Reassemble the blade disc and fasten the 3 screws.
- Reassemble the upper chassis and the body system. Refer to *To assemble the upper chassis and the body system on page 28*.

6.14 The wheel motors

The 2 wheel motors are brushless DC motors. The motors are supplied as a unit together with gearbox, wheel motor end cover, gasket, hub and cable.

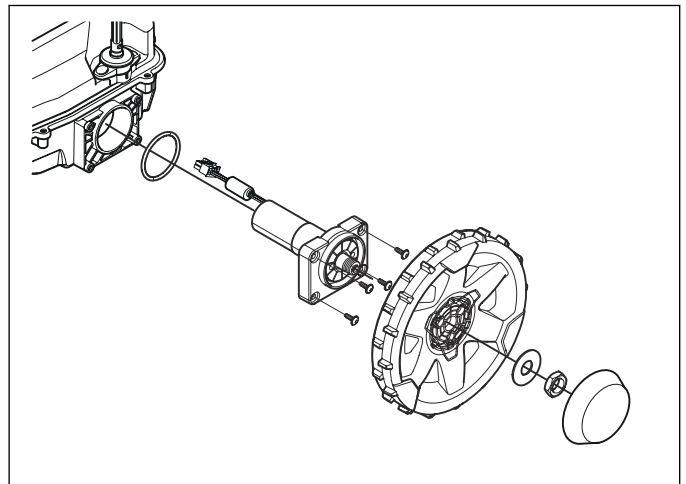
Right and left wheel motors are identical and have the same article number as spare parts. The motors have to be replaced if they are faulty.

6.14.1 To replace the wheel motor

- Disassemble the body system. Refer to *To disassemble the body system on page 17*.
- Disassemble the upper chassis. Refer to *To disassemble the upper chassis on page 19*.
- Disconnect the wheel motor cable from the main board.
- Remove the hub cap using a flat screwdriver.

Note: The hub cap differs between the models. For McCULLOCH® the clips are reached from the rear side of the wheel.

- Remove the nut and washer holding the wheel in place and remove the wheel.



- Remove the wheel motor by loosening the 4 screws (Torx 20) in the wheel motor bracket.
- Fit the new wheel motor and fasten the screws (Torx 20) with the recommended torque.
- Refit the wheel, washer and nut. Fasten the nut with the recommended torque.
- Refit the hub cap.

10. Connect the wheel motor cable to the main circuit board.
11. Reassemble the upper chassis and the body system. Refer to *To assemble the upper chassis and the body system on page 28*.

6.15 To assemble the upper chassis and the body system



CAUTION: Make sure parts are clean and that no cables are pinched.

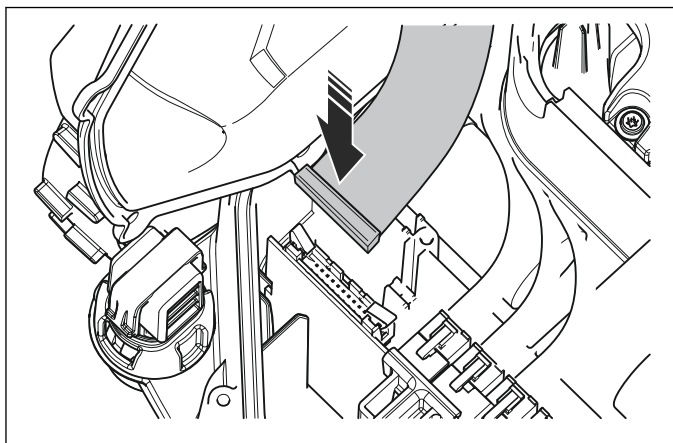


CAUTION: Always use new sealing strips before putting the product together. A used sealing strip does not provide a satisfactory seal.



CAUTION: Read about mounting screws in plastics. Refer to *To mount screws in plastic on page 29* before assemble the product. Always use the recommended torque to mount the screws. Refer to *Screw fasteners on page 32*.

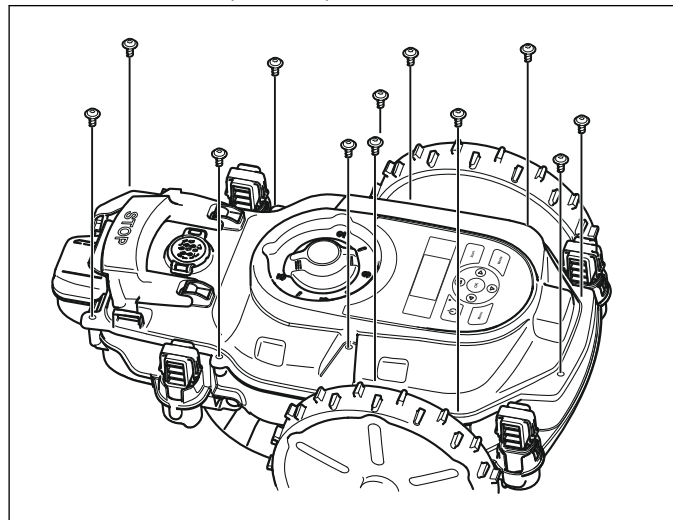
1. Fit 2 new sealing strips.
2. Connect the HMI cable to the main circuit board.



CAUTION: Always connect the HMI cable before the power cable avoid current spikes that may harm the circuit boards and the battery.

3. Connect the power cable to the main circuit board.

4. Fit the upper chassis to the lower chassis and fasten the 12 screws (Torx 20).



CAUTION: Fasten the screws crosswise.

5. Fit the cutting height adjustment knob.
6. Refit the **STOP** button into the clips. Refer to *To disassemble the upper chassis on page 19*.
7. Reassemble the body into the 4 positions on the lower chassis. Refer to *To disassemble the body system on page 17*.
8. Refit the hatch into the clips. Put the frame into position (not for Husqvarna®).
9.
 - a) For GARDENA® and Husqvarna®, push the top cover into position.
 - b) For McCULLOCH®, fasten the top cover with the 2 screws into the body.

6.15.1 To assemble the sealing strips

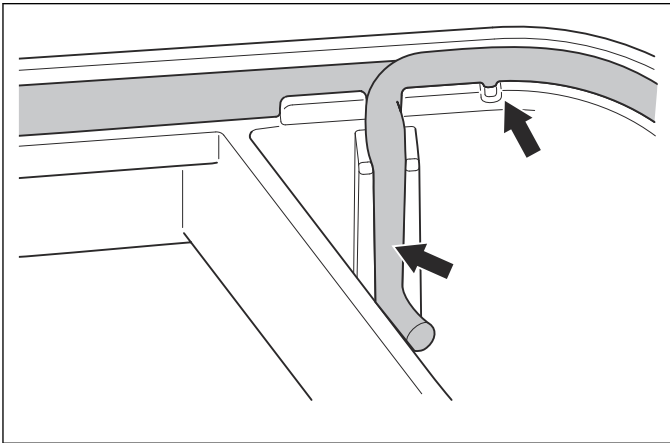
There are 2 sealing strips between the upper chassis and lower chassis. Both sealing strips must be replaced using the same technique.



CAUTION: A 5 mm sealing strip must be used. Sealing may be deficient if the wrong sealing strip is used.

1. Start by laying one end of the sealing strip in line with the marking on the chassis.
2. Continue laying the sealing strip clockwise around the lower chassis.

3. Lay the other end of the sealing strip above the first end and then out of the channel. Fasten the sealing strip in the retainer.



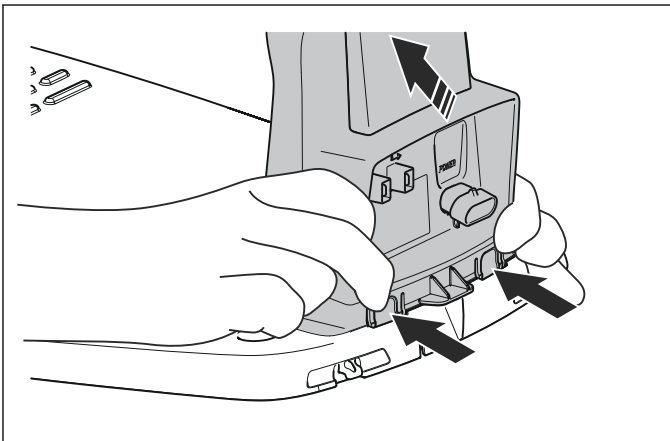
6.16 The charging station

6.16.1 To replace the charging tower

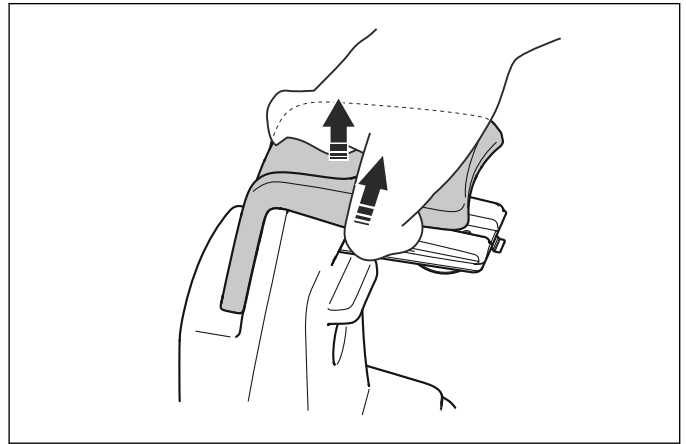
The charging tower consists of the contact strips and the charging station's circuit board. These cannot be replaced separately. The entire charging tower must be replaced as a unit.

When the product's battery does not recharge or cannot contact the charging station, this may be due to worn contact strips in the charging station. Also check the charging strips on the product.

1. Disconnect the power supply.
2. Disconnect all cables from the charging station.
3. Remove the charging tower by pushing the 2 clips and pull it up.



4. The cap is attached with one clip. Remove it by gently lifting one side of the cap.



5. Fit the cap to the new charging tower.
6. Refit the charging tower on the baseplate.
7. Connect all cables to the charging station.
8. Connect the power supply.

6.17 To mount screws in plastic



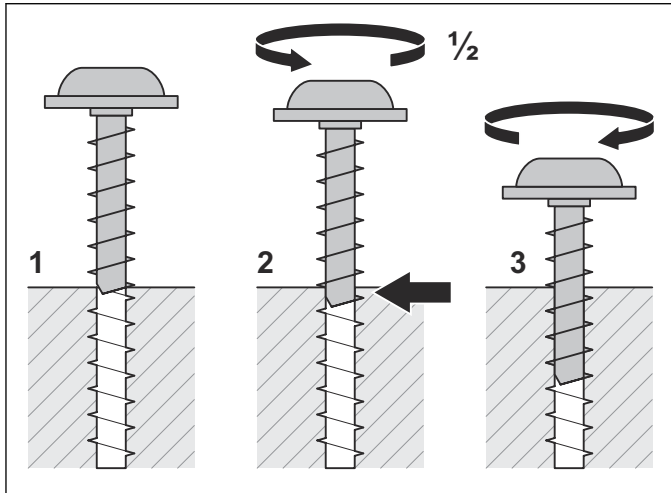
CAUTION: If the screws are mounted incorrectly, there is a risk of damaging the threads in the plastic and thereby shortening the service life of the plastic part. If threads are destroyed, the part must be replaced or thread plugs can be inserted. Refer to *To mount thread plugs on page 30*.



CAUTION: When assembling parts in plastic, always tighten the screws crosswise. This is to avoid tension in the plastic, causing malfunction or not attaining a satisfactory seal.

To ensure the threads in plastic parts are not damaged:

1. Carefully turn the screw counter-clockwise until it engages the existing threads in the plastic. The screw will fall slightly by itself when the threads are located correctly in relation to the existing threads in the plastic.



2. Screw in the screw to the correct torque as specified in *Screw fasteners on page 32*.

6.18 To mount thread plugs

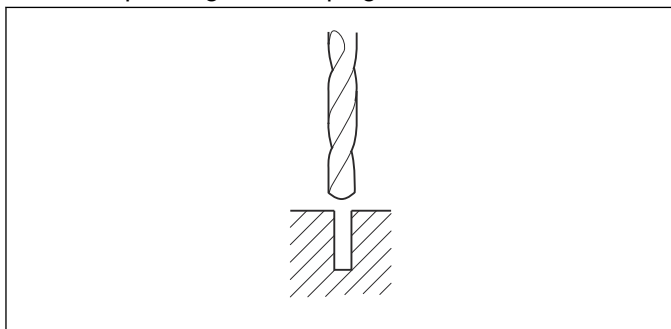
If the threads in plastic parts are worn, thread plugs can be inserted. A repair kit containing thread plugs and suitable metal screws is available to order.



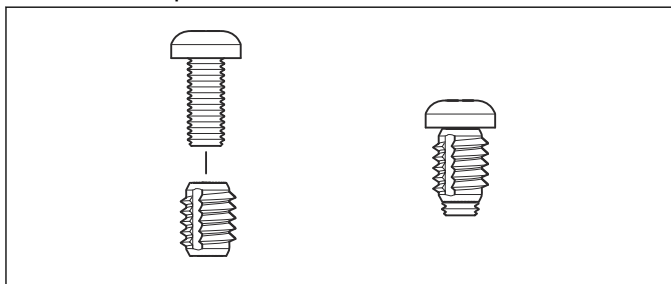
CAUTION: Fit the thread plug carefully since there is a risk that the screw bosses crack.

To mount a thread plug into a worn plastic thread:

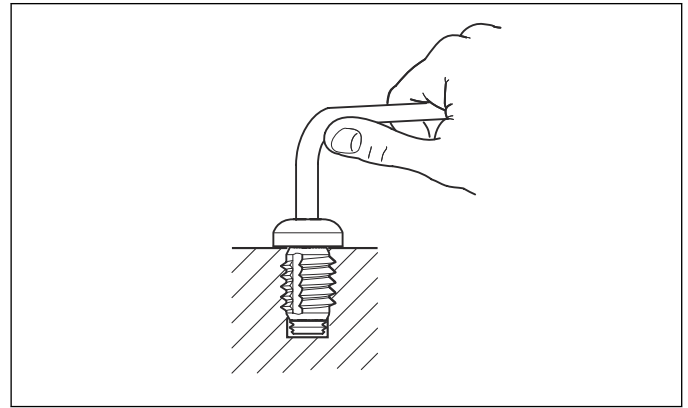
1. Make the hole bigger with a 6.6 mm drill to a depth corresponding with the plug.



2. Mount the thread plug with the screw that comes with the repair kit and screwdriver.

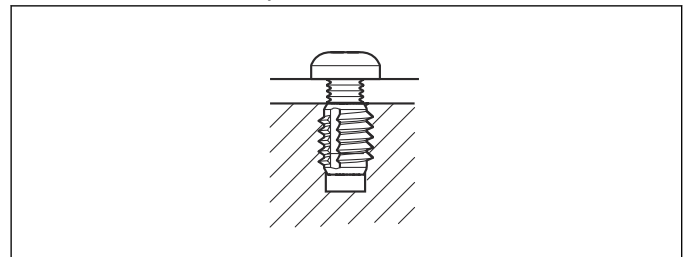


3. Make sure the plug is screwed in completely so that a good seal is obtained.



CAUTION: Tighten by hand so as not to damage the plastic.

4. Fit the plastic parts with the accompanying screw instead of the old plastic screw.



7 Service

7.1 Service schedule

The table below contains a checklist of points and actions to be taken when servicing the product. Complete service plans can be found in Autocheck.

Every year	Every 3rd year	Action	Explanation
X		Disassemble the body and clean the chassis.	Refer to <i>To disassemble the body system on page 17.</i>
X		Check the ventilation filter and clean carefully with a soft brush.	Refer to <i>To clean and replace the ventilation filter on page 25.</i>
X		Check the tightening torque of screws on the chassis.	Refer to <i>Screw fasteners on page 32.</i>
X		Check the blades and blade screws.	Refer to <i>Maintenance - Replace the blades.</i> in the Operator's manual.
X		Clean the charging station.	
X		Check and polish the charging strips on the product and the contact strips on the charging station.	Polish contact surfaces on both the product and the charging station with a fine grade emery cloth.
X		Make a complete <i>Auto test</i> in Autocheck.	Refer to <i>Auto test on page 14.</i>
X		Check that docking and charging work correctly.	Refer to <i>Symptoms during docking on page 40</i> and <i>Symptoms during charging on page 40.</i>
X		Do a <i>Battery test</i> in Autocheck and check the battery condition.	Refer to <i>Auto test on page 14.</i>
X		Charge the battery.	Always charge the battery fully before winter storage. If this is not done, the battery may be rendered useless due to voltage levels dropping too low.
X		Read the service bulletins for potential recommended updates.	Updated service bulletins can be found in Autocheck.
	X	Replace the ventilation filter.	Refer to <i>To clean and replace the ventilation filter on page 25.</i>
	X	Open the chassis and replace the chassis sealing strips.	Refer to <i>To assemble the sealing strips on page 28.</i>

7.2 Screw fasteners

All screws are made from stainless material or rustproofed with zinc plating. Article numbers are found in the spare parts list (IPL).

The tightening torque must be attained, otherwise there is not a satisfactory seal against moisture etc.

Fastener	Hardware	Tool	Tightening torque (Nm)
Cover, cutting module	Screw, 5 x 16 mm	Torx 20	1.5
Upper chassis to lower chassis	Screw, 5 x 16 mm	Torx 20	1.8
Wheel motor unit	Screw, 5 x 16 mm	Torx 20	1.8
Battery cover	Screw, 5 x 16 mm	Torx 20	1.8
Cutting module to lower chassis	Screw, 5 x 16 mm	Torx 20	1.8
Upper chassis to cutting module	Screw, 5 x 16 mm	Torx 20	1.8
Upper chassis to rear module	Screw, 5 x 16 mm	Torx 20	1.8
Cutting guard	Screw, 5 x 16 mm	Torx 20	1.8
Rear sensor module	Screw, 5 x 16 mm	Torx 20	1.8
Gearwheel, cutting system	Screw, 5 x 16 mm	Torx 20	1.8
Blade disc	Screw, M4 x 8 mm	Torx 20	1.8
Blades	Screw, M4 x 10 mm	Flat/cross screwdriver	1.8
Wheel nut	Nut M16	24 mm hexagon	1.8
Wheel brush holder*	Screw, 5 x 16 mm	Torx 20	1.5
COM circuit board**	Screw, 5 x 16 mm	Torx 20	2.0
Top cover to body***	Screw, 5 x 16 mm	Torx 20	1.8
Bumper, rear and front****	Screw, 5 x 16 mm	Torx 20	1.8
Rear housing module to lower chassis****	Screw 5x16 mm	Torx 20	1.8

*accessory

**only smart SILENO city, smart SILENO life

***only McCULLOCH®

****only Husqvarna®

8 Troubleshooting

8.1 Messages

The table below contains fault and information messages which can appear in the product.

Note: Refer to the Operator's manual for more information about how to rectify errors.

Messages			
Number	Message	Cause	Action
BATTERY			
11	Low battery	The product cannot find the charging station.	Break in the guide wire. Check the LED on the charging station. Refer to <i>Loop signal on page 41</i> .
			Change the position of the guide wire. Refer to <i>Installation - Installation of the guide wire</i> in the Operator's manual.
			Check the installation settings about how to find the charging station.
		The battery is spent.	Perform a battery test. Refer to <i>Auto test on page 14</i> .
12	Empty battery	Refer to number 11 above	Refer to number 11 above
30/66	Battery problem	Battery not connected properly, or faulty	Disassemble the product and check that the battery is properly connected. Refer to <i>To replace the battery on page 24</i> .
		Wrong type of battery	Use only original batteries recommended by the manufacturer.
		The main circuit board is faulty	Refer to <i>The circuit boards on page 20</i> .
58	Temporary battery problem	Wrong type of battery.	Use only original batteries recommended by the manufacturer.
60	Temporary battery problem	Battery temp sensor defective.	Replace the battery. Refer to <i>To replace the battery on page 24</i> .
		Wrong type of battery.	Use only original batteries recommended by the manufacturer.
62/63	Temporary battery problem	Battery temp sensor gives low or high temperature reading.	Replace the battery. Refer to <i>To replace the battery on page 24</i> .

Messages			
Number	Message	Cause	Action
MOTORS			
20/21	Wheel motor blocked, right/left	Grass or other object has wrapped around the drive wheel.	Check the drive wheel and remove any objects.
22/23	Wheel drive problem, right/left	The wheel motor is faulty	Check the wheel motors' function when idling.
		The main circuit board is faulty	Replace the main circuit board. Refer to <i>To replace the main circuit board on page 21.</i>
		The cabling to the wheel motor is damaged	Check whether the damage is repairable. Otherwise replace the wheel motor.
35/36	Wheel motor overloaded, right/left	Grass or other object has wrapped around the drive wheel.	Check the drive wheel and remove any objects.
25	Cutting system blocked	Grass or another object may have become wrapped around the blade disc.	Check the blade disc and remove any object.
		The blade disc is lying in a pool of water.	Move the product and rectify the cause of water collecting in the working area.
		The blade motor is defective.	Make sure the blade motor has the right speed. Refer to <i>Tools - Test on page 11.</i>
		The main circuit board is defective.	Replace main circuit board. Refer to <i>To replace the main circuit board on page 21.</i>
		The cabling to the blade motor is damaged or faulty.	Check whether the damage is repairable. Otherwise replace the blade motor.

Messages			
Number	Message	Cause	Action
INSTALLATION			
2	No loop signal	Boundary wire broken.	Check the signal given by the LED on the charging station. Refer to <i>Loop signal on page 41</i> .
		The boundary wire is not connected to the charging station	Check that the boundary wire connectors are fitted properly to the charging station.
		The power supply is not connected.	Check the wall socket connection and whether an earth-fault breaker has tripped. Check that the low voltage cable is connected to the charging station.
		The power voltage cable is damaged or not connected	Check that the low voltage cable is not damaged. Check that it is properly connected to the charging station and to the power supply.
		The pairing between the product and the charging station is broken.	Put the product in the charging station and generate a new loop signal.
		The boundary wire is laid in the wrong direction around an island.	Check that the boundary wire has been laid according to the instructions. Refer to <i>Installation - Boundaries within the working area</i> in the Operator's manual.
		Disturbances from metal objects (fences, reinforcement steel) or buried cables.	Try moving the boundary wire and/or creating additional islands in the working area.
		ECO mode is activated and the product has attempted to start outside the charging station.	Put the product in the charging station, start the product and close the hatch.
1	Outside working area	The boundary wire connections to the charging station are crossed.	Check that the boundary wire is connected correctly to the charging station.
		The boundary wire is too close to the edge of the working area.	Check that the boundary wire has been laid according to the instructions.
		The working area slopes too much at the boundary wire.	Check that the boundary wire has been laid according to the instructions.
		The boundary wire is laid in the wrong direction around an island.	Check that the boundary wire has been laid according to the instructions. Refer to <i>Installation - Boundaries within the working area</i> in the Operator's manual.
		The product finds it hard to distinguish the signal from an installation close by.	Put the product in the charging station and generate a new loop signal.
		Disturbances from magnetic objects (fences, reinforcement steel) or buried cables close by.	Try moving the boundary wire and/or creating additional islands in the working area.
9	Trapped	The product has got caught in something.	Free the product and rectify the reason.

Messages			
Number	Message	Cause	Action
INSTALLATION			
15	Mower lifted	The lift sensor has been activated due to the product getting stuck.	Free the product and rectify the reason.
		One of the lift sensor magnets is inverted or missing.	Check the magnet. Refer to <i>Lift sensors on page 7</i> .
		The lift sensor is faulty.	Check the lift sensor. Refer to <i>Lift sensors on page 7</i> .
13	No drive	The product has got caught in something.	Free the product and rectify the reason for the lack of drive. If it is due to wet grass, wait until the lawn has dried before using the product.
		The working area includes a steep slope.	Check the maximum guaranteed slope. Steeper slopes should be isolated.
		The guide wire is not laid at an angle on a slope.	Lay the guide wire at an angle across the slope.
10	Upside down	The product is leaning too much, or has turned over.	Turn the product the right way up and rectify the reason.
50	Guide not found	The product is no longer receiving signals from the guide wire.	Check connection of guide wire to charging station. To locate a break in a wire, refer to <i>To find a break in the boundary loop on page 42</i> .
56	Guide calibration accomplished	Guide wire calibration has been successful.	No action.
57	Guide calibration failed	Guide wire calibration has failed.	Check that the guide wires are installed according to instructions. Then carry out a new calibration. Refer to <i>Tools - Calibrate on page 12</i> .

Messages			
Number	Message	Cause	Action
INTERNAL DIAGNOSTICS			
18/19	Collision sensor problem rear/front	The product is trapped.	Free the product and rectify the reason.
4	Loop sensor problem, front	The cabling to the sensor circuit board is faulty or has come loose.	Check the levels for the A signal. Refer to <i>Tools - Info on page 9</i> .
		The front loop sensor circuit board is faulty.	
5	Loop sensor problem, rear	The main circuit board is faulty.	Check the levels for the A signal. Refer to <i>Tools - Info on page 9</i> .
32	Tilt sensor problem	The tilt sensor has incorrect values	Calibrate the tilt sensor. Refer to <i>Tools - Calibrate on page 12</i> .
			Replace the main circuit board. Refer to <i>To replace the main circuit board on page 21</i> .
27	Settings restored	User settings failed to save and the product has been reset to factory settings.	If the fault occurs repeatedly, program the product with the most recent main program. Refer to <i>Firmware on page 14</i> .
			If the fault occurs repeatedly, even using the most recent main program, replace the main circuit board. Refer to <i>To replace the main circuit board on page 21</i> .
28	Memory circuit problem	Resetting settings has failed.	Program the product with the most recent main program. Refer to <i>Firmware on page 14</i> .
			Replace the main circuit board. Refer to <i>To replace the main circuit board on page 21</i> .
38/501	Electronics problem	Communication problems between the HMI circuit board and main circuit board	Restart the product by switching off the ON/OFF button, wait 10 seconds and then switch on the ON/OFF button.
			Make sure the cable between the HMI circuit board and main circuit board is connected properly. Check also that the cable is not damaged, pinched, or that the connector is not damaged.
			Replace the HMI circuit board. Refer to <i>To replace the HMI circuit board on page 23</i> .
			Replace the main circuit board. Refer to <i>To replace the main circuit board on page 21</i> .
502	Electronics problem	HMI circuit board memory problem	Replace the HMI circuit board.
503	Electronics problem	Keypad problem	Make sure the cable between the HMI circuit board and the keypad is properly connected.
			Replace the keypad. Refer to <i>To replace the keypad on page 25</i> .
			Replace the HMI circuit board.

Messages			
Number	Message	Cause	Action
INTERNAL DIAGNOSTICS			
504	Electronics problem	Display problem	Replace the HMI circuit board.
505	Electronics problem	The parameter for the type of product is different in the HMI circuit board and main circuit board.	The parameter can only be entered at the initial programming of the main circuit board. It may not be changed afterwards. Replace the main circuit board and ensure that the correct product model is selected.
			A used HMI circuit board can only be used if it has previously been fitted to the same type of product. You can not use an HMI circuit board from an other model.

Messages			
Number	Message	Cause	Action
CHARGING STATION			
17	Charging station blocked	An object is obstructing the product.	Remove the object.
		The baseplate is bent.	Ensure that the baseplate is placed on level ground.
		The contact between the charging strips and contact strips may be poor and the product has made a number of attempts to charge.	Put the product in the charging station and check that the charging strips and contact strips make good contact.
16	Stuck in charging station	There is an object in the way of the product preventing it from leaving the charging station.	Remove the object.
		The product slides on the baseplate.	Clean the baseplate.
37	Charging current too high	The battery is being charged with too high current.	Fault in the power supply, or wrong type of power supply or charging station is being used.
26	Invalid sub-device combination	Unknown combination of software versions in the HMI circuit board and the main circuit board.	Program the product with the most recent main program. Refer to <i>Firmware on page 14</i> .

Messages			
Number	Message	Cause	Action
MESSAGES WITHOUT ERROR CODE			
NA	Needs manual charging	The product is set to the <i>Secondary area</i> operating mode.	Put the product in the charging station. This behaviour is normal and no further action is required.

8.2 Symptoms

The most commonly occurring symptoms are described below. All symptoms are grouped by the situation where they occur most often.

1. Mowing
2. Searching
3. Following the guide wire
4. Docking
5. Charging
6. Miscellaneous

Note: Refer to the Operator's manual for more information about how to rectify errors.

8.2.1 Symptoms during mowing

Symptom	Cause	Action
Uneven mowing results	The product works too few hours per day.	Increase the working hours.
	Working area too large.	Try to limit the working area or extend the working time.
	Blunt blades.	Replace all the blades and screws so that the rotating parts are balanced.
	Long grass in relation to the set cutting height.	Increase the cutting height and then gradually lower it.
	Incorrect lawn coverage settings.	Check the lawn coverage settings and optimise them for the installation.
	Does not follow the guide wire to the areas specified.	Check the guide signal. Refer to <i>Tools - Info on page 9</i> .
	Accumulation of grass by the blade disc or around the motor shaft.	Check that the blade disc rotates freely and easily. If not, the blade disc may need to be removed and grass and foreign objects removed.
	SensorControl/Lawn shield reduces the mowing time too much.	Check and change the settings. Refer to Operator's manual.
The product runs at the wrong time	The start and stop times for mowing are incorrect.	Adjust the start and stop time settings for mowing.
	SensorControl/Lawn shield reduces the cutting time.	Check and change the settings. Refer to Operator's manual.
The product vibrates	Wrong number of blades creates an imbalance.	Make sure there are no blades missing or that more than one blade is mounted on the same screw.
The product mows for shorter periods than usual between charges	Grass or a foreign object is blocking the blade disc or wheels. The cause may also be lower battery capacity.	Remove and clean the blade disc. Perform a battery test to determine the battery's capacity. Refer to <i>Battery test on page 42</i> .
Both the mowing and charging times are shorter than usual	Lower battery capacity.	Perform a battery test to determine the battery's capacity. Refer to <i>Battery test on page 42</i> .
The product travels in a small circle or one wheel locks up when turning instead of rotating backwards.	The wheel motor's gearbox is slipping.	Check the wheel motors' function when idling. The battery voltage should be more than 18 V in this test. Check that both wheel motors start with 50% power. Then increase the power to 100%. At 100% the speed of each wheel should be at least 35 cm/second. Check that the motors' gearboxes are not slipping by blocking each wheel. In connection with blocking the speed should be 0 cm/second. Replace the wheel motor if there is a fault.
The product does not react when pushing the STOP button	An object or dirt under the STOP button.	Remove the object or clean under the STOP button.

8.2.2 Symptoms during searching

Symptom	Cause	Action
The product runs, but the blade disc does not rotate	The product is searching for the charging station. The blade disc does not rotate when the product is searching for the charging station.	This behaviour is normal and no action is required.
The product does not find the guide wire when it is searching for the charging station.	The guide loop is broken.	Check the guide signal, as well as the settings for following the guide wire. Refer to <i>Tools - Info on page 9</i> .

8.2.3 Symptoms during docking

Symptom	Cause	Action
The product detects the F signal, but cannot dock	Dirt/leaves/grass in the charging station is preventing the product's charging strip from making contact with the charging station's charging strip.	Clean the charging station.
	Malfunction in the charging station's circuit board or in the F-wire.	Replace the charging tower (includes a new circuit board). Refer to <i>To replace the charging tower on page 29</i> .
The product drives straight into the charging station	The product cannot detect the F field and therefore does not turn in front of the charging station.	Check the LED on the charging station and the instructions about how to troubleshoot the loop signal. Refer to <i>Loop signal on page 41</i> .

8.2.4 Symptoms during charging

Symptom	Cause	Action
Both the mowing and charging times are shorter than usual	Low battery capacity.	Perform a <i>Battery test</i> to determine the battery's capacity. Refer to <i>Auto test on page 14</i> .
The product never leaves the charging station	The parking mode is activated.	Restart the product on main or secondary area.
	Schedule settings are preventing the product from leaving the charging station.	Check the Schedule settings. Also check that the clock shows the current time.
	The product never becomes fully charged.	Check that the product is receiving the charging power. Check that the value for the current corresponds with the guideline values. If the charging strips appear to be burnt or coated, clean them using a fine grade emery cloth. Check that the rear sensor module and the charging tower are correctly connected, and that they are not damaged. If the problems remain, try the following: <ul style="list-style-type: none"> • Replace the charging tower. • Replace the rear sensor module.
	The power supply is faulty.	Check that the product is receiving the charging power. Check that the value for the current corresponds with the guideline value in <i>The battery system on page 24</i> .

8.2.5 Miscellaneous symptoms

Symptom	Cause	Action
The display is lit but the keypad does not lead to any reaction	The main circuit board is faulty.	Reprogram the main circuit board using Autocheck. Refer to <i>Programming a blocked main circuit board on page 14</i> .
	Faulty keypad.	Replace the keypad. Refer to <i>To replace the keypad on page 25</i> .
The display shows the Loading program text	The HMI circuit board is blocked.	Program the product using Autocheck.
The display flashes or shows incorrect information	The HMI circuit board is blocked.	Program the product using Autocheck.

8.3 Loop signal

Note: Refer to the Operator's manual for more information about how to rectify errors.

When measuring loop signal strength the product should be placed in the charging station. Use the *Tools - Info - Loop* menu function to check that the signal strength is within the expected values. The test provides a quick answer to if the charging station generates all signals and if the product can detect these signals. Refer to *Tools - Info - Loop on page 10*.

8.3.1 To troubleshoot the loop signal

Always start by checking the LED in the charging station. This usually provides a good indication of where troubleshooting should begin.

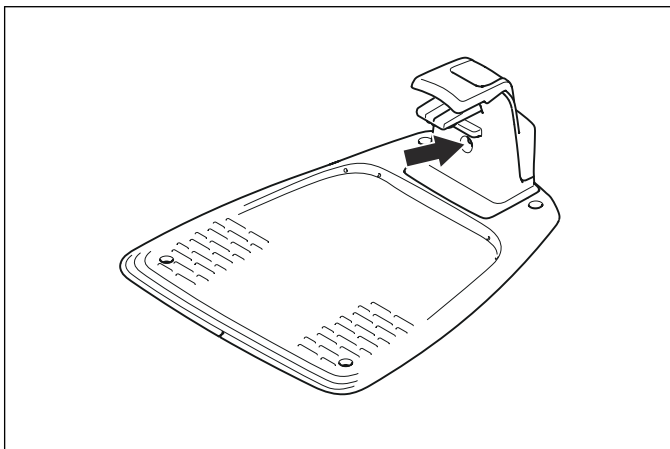


Table 10: Colours in the charging station's LED

Colour	Status
Solid green light	All signals are OK
Green flashing light	ECO mode
Blue flashing light	Malfunction in the boundary loop
Yellow flashing light	Malfunction in the guide wire
Red flashing light	Malfunction in the charging station signal
Solid red light	Fault in the circuit board, or incorrect power supply in the charging station.

In the event of faults in the charging station follow the instructions in the Operator's manual and below.

8.3.1.1 Solid green light

The LED in the charging station is solid green, but neither the front or rear loop sensor detects any loop signal:

1. Generate a new loop signal. Test the product and continue with step 2 if the product still cannot find the loop signal.
2. Replace the charging tower. Refer to *To replace the charging tower on page 29*.

8.3.1.2 Green flashing light

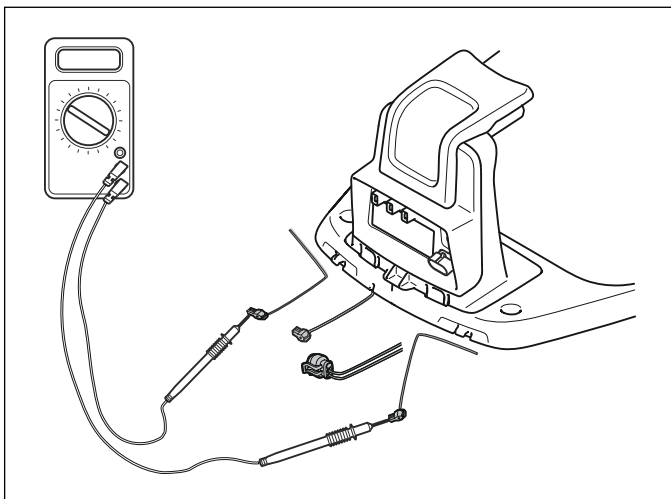
ECO mode is enabled in the product and no loop signals are therefore being transmitted in the loop wires. If the product has been removed from the charging station manually without pushing STOP before, ECO mode may still be enabled (green flashing light) so that the loop system is not transmitting any signals. To start the loop system manually:

1. Place the product in the charging station and push the **STOP** button.

8.3.1.3 Blue flashing light

A blue flashing light is most likely a break in the boundary loop.

1. Check the connections to the charging station.
2. Disconnect all cables from the charging station.
3. Measure the resistance in the boundary wire using a multimeter. The resistance value for a non-faulty boundary wire should be between 0-20 Ohm.



- Value >20 Ohm: Indicates a break in the boundary loop. Identify and repair the break. Refer to *Boundary loop on page 6*.
- Value <20 Ohm: Indicates that the boundary loop is intact. Replace connectors to the charging station. Replace the circuit board in the charging station if the fault remains. Refer to *To replace the charging tower on page 29*.

8.3.1.4 Yellow flashing light

A yellow flashing light indicates malfunction in the guide wire.

1. Check that the guide wire connector is properly connected to the charging station.
2. Replace the guide connector.
3. Break in the guide wire: Find out where the break is. Replace the damaged section of the guide wire and splice the ends using an original coupler.

8.3.1.5 Red flashing light

A red flashing light is most likely an interruption in the F-wire in the charging station's antenna.

1. Replace the charging tower. Refer to *To replace the charging tower on page 29*.

8.3.1.6 Solid red light

A solid red light is probably a fault in the circuit board, or an incorrect power supply in the charging station.

1. Check the power supply.
2. Replace the charging tower. Refer to *To replace the charging tower on page 29*.

8.4 To find a break in the boundary loop

A break in the loop wire is normally due to physical damage to the wire, e.g. using a spade while gardening. In countries with ground frost, also sharp stones that move in the ground can damage the wire. Breaks can also be due to too high a tension in the wire during installation.

Cutting the grass very short immediately after the installation can damage the wire's insulation. Certain damage to the insulation may not cause disruptions until several weeks or months later. To avoid this, always

select the maximum cutting height the first week after installation and then lower the height one to two steps at a time every week until the desired cutting height has been reached.

A wire break can be found by using a break detection tool from the manufacturer or with the manual method that is described in the Operator's manual.

The procedure involves gradually halving the distance of the loop where the break may have occurred until there is only a very short section of the wire left.

8.5 Battery test

If the product's battery starts to perform poorly, the product mows for shorter time periods. The product can also stop and show the *Low battery* message.

Note: A battery test can be run on the workbench with Autocheck, but the most reliable test result is achieved when the product is run in an installation.

8.5.1 To perform a battery test

1. Fully charge the battery.
2. The product should have a low level of cutting resistance during the battery test. The cutting height should therefore be set to maximum.
3. Allow the product to mow in manual operating mode until the battery is completely flat.
4. When the battery has run down the product stops. The result of the battery test is then saved automatically and can be found in Autocheck or in the *Tools menu*.

8.5.2 To evaluate the battery test

A new battery has a total capacity of about 2100 mAh but is charged to a maximum of 1700 mAh. The test results from a battery test on a new battery are thus normally around 1,600 to 1700 mAh.

As the battery ages the battery capacity decreases. If the battery capacity displayed is approximately 1,000 mAh or lower, it is possible that the battery is poor and needs to be replaced. The assessment should be based on the most recently conducted test as the first test can show an incorrect value. It is therefore more practical to perform a battery test in connection with the product's normal operation or in connection with it having recently been in operation.

Note: The values are approximate and vary between different products and batteries.

Note: If the product has not been in operation for more than two months, at least two and preferably three battery tests should be carried out.

9 Transportation, storage and disposal

9.1 Transportation

The supplied Li-ion batteries obey the Dangerous Goods Legislation requirements.

- Obey all applicable national regulations.
- Obey the special requirement on package and labels for commercial transportations, including by third parties and forwarding agents.

9.2 Cleaning



CAUTION: Never use a high-pressure washer to clean the robotic lawnmower. Never use solvents for cleaning.



WARNING: The **ON/OFF** button must be switched off. Wear gloves when cleaning the underside of the body.

1. Disassemble the body to clean the body, display cover and chassis more meticulously.
2. Disassemble the blade disc to enable more thorough cleaning.

Note: It is important to clean off any grass and dirt between the chassis and the blade disc as well as between the blade disc and the blades.

3. Run the Blade motor test. Listen for abnormal sounds when the blade motor is running.
4. Test the different cutting height settings while running the blade motor.

9.3 Winter storage

Before the product is put away for the winter, the following should be done:

1. Switch off the product with the **ON/OFF** button.
2. Clean the product.
3. Remove the blade disc and clean around the blades and around the motor shaft.
4. Disassemble the drive wheels and remove grass and other objects from the motor shafts. Clean the wheels' drive tread. Fit the wheels again.
5. Fully charge the product.



CAUTION: The battery must be charged fully before winter storage. If the battery is not fully charged it can be damaged and in certain cases be rendered useless

- Keep the product in a dry, frost free space.
- Keep the product with all wheels on level ground during storage, or use an original wall hanger.

- If you keep the charging station indoors, disconnect and remove the power supply and all the connectors from the charging station. Put the end of each connector wire in a container with grease.
- If you keep the charging station outdoors, do not disconnect the power supply and the connectors.

9.4 Environmental information



It is not permitted to dispose this product as normal household waste. Obey the local recycling requirements and applicable regulations. The battery must be removed from the product before it is scrapped.

9.5 Removal of battery for recycling

For removal of the battery for recycling, refer to the Operator's manual.

10 Technical data

10.1 Technical data

For the technical data, refer to Operator's manual and the manufacturer's website.



**Husqvarna
Group**

ORIGINAL INSTRUCTIONS

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