



Husqvarna®



TECHNICAL MANUAL

HUSQVARNA AUTOMOWER®



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The Technical manual for the Husqvarna Automower® is a supplement to the Operator's manual. The Manual contains in-depth information about the Automower® and its peripheral equipment.

The Technical manual is intended for dealers, service personnel, etc.



WARNING

Under no circumstances may the original design of the Automower® 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.

Always use original spare parts.

Automower® website:

www.automower.com

Support for dealers:

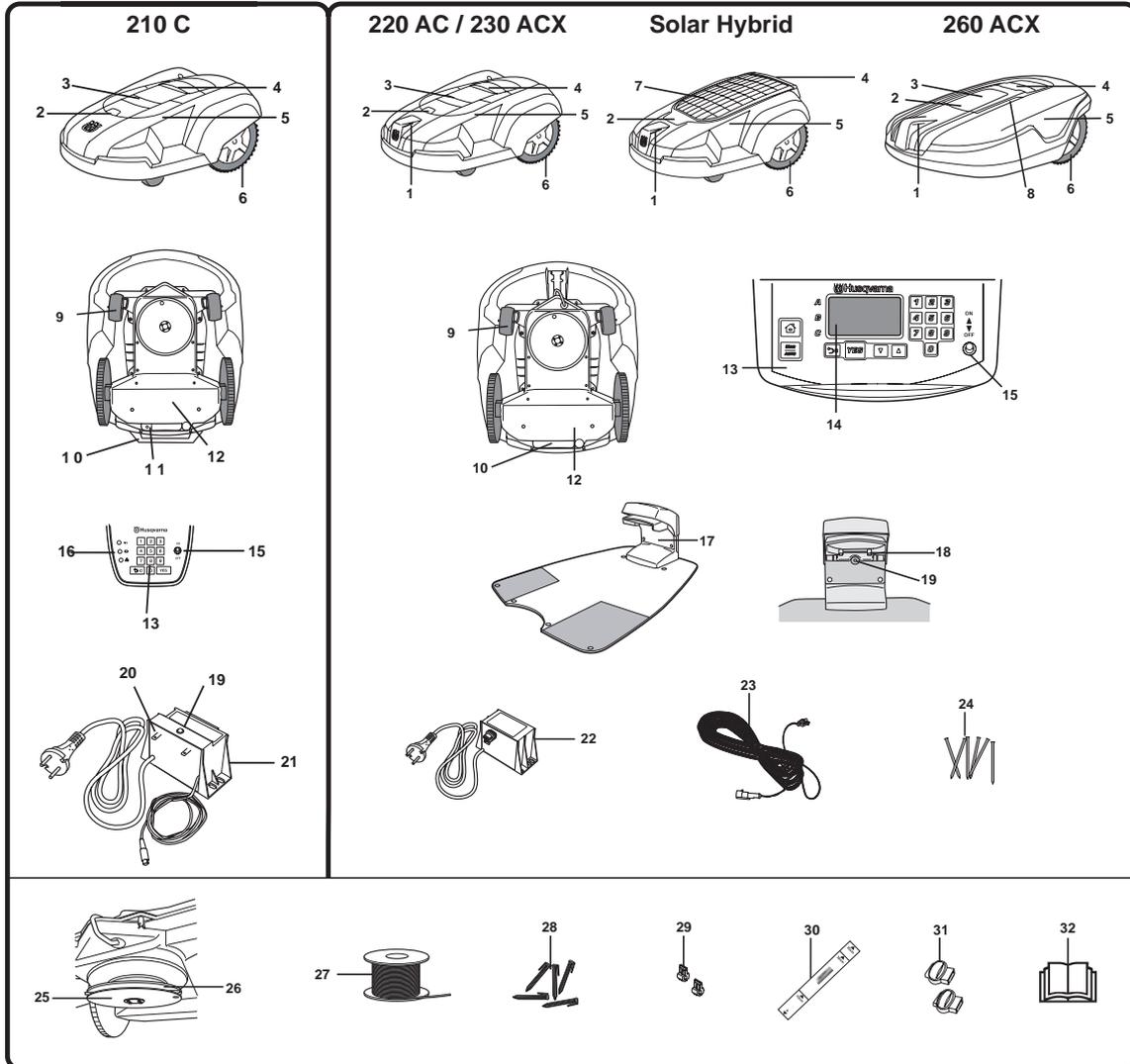
support.automower.com

Husqvarna AB has a policy of continuous product development and therefore reserves the right to modify the design and appearance and function of products without prior notice.

1. FUNCTION

1. Function

1.1 Automower® What's what?



The numbers in the picture correspond to:

- | | |
|---|---|
| 1. Charging strip | 17. Charging station |
| 2. Catch button to open the cutting height adjustment cover | 18. Contact strip |
| 3. Cutting height adjustment cover | 19. LED for operation check of boundary wire |
| 4. Stop button | 20. Connection for boundary wire |
| 5. Body | 21. Loop generator/charger |
| 6. Drive wheel | 22. Transformer with power cord |
| 7. Solar cell panel and cutting height adjustment cover | 23. Low voltage cable |
| 8. Ultrasonic sensors | 24. Nails for securing the charging station |
| 9. Front wheel | 25. Skid plate |
| 10. Handle | 26. Blade disc |
| 11. Charger contact | 27. Loop wire for the boundary wire and guide wire |
| 12. Chassis box with electronics, battery and motors | 28. Staples |
| 13. Keypad | 29. Connector for loop wire |
| 14. Display | 30. Measurement gauge to help install boundary wire |
| 15. Main switch | 31. Solderless coupler for loop wire |
| 16. Indicator lights | 32. Operator's Manual |

1. FUNCTION

1.2 Introduction

This Technical handbook contains important information about the mower and its function, how you install it and several installation examples. It also contains information about special menu functions in the mower, the service program Autocheck, repair instructions and fault tracing.

The following system is used in the Technical handbook to make this easier:

- Text written in *italics* corresponds to the text shown on the mower's display or in the menus in the service program Autocheck. A reference to another part of the Technical handbook is also shown in *italics*.
- Words written in **bold** refer to one of the buttons on the mower's keypad or a button in the service program Autocheck.
- Words written in *UPPERCASE* and *italics* refer to the position of the main switch and the different operating modes on the mower.

1. FUNCTION

1.3 Technical data

Table 1: Technical Data

Data	210 C	220 AC	230 ACX	Solar Hybrid	260 ACX
Dimensions					
Length	76 cm (28.0")	71 cm (28.0")	71 cm (28.0")	71 cm (28.0")	80 cm (32")
Width	55 cm (21.7")	55cm (21.7")	55 cm (21.7")	55 cm (21.7")	71 cm (28.0")
Height	30 cm (11.8")	30 cm (11.8")	30 cm (11.8")	31 cm (12.2")	31 cm (12.2")
Weight	10.1 kg (22 lbs)	9.0 kg (20 lbs)	10.7 kg (23 lbs)	10.0 kg (22 lbs)	13,5 kg (30 lbs)
Electrical system					
Battery	NiMH special battery 18V / 3 Ah	NiMH special battery 18 V / 2.2 Ah	NiMH special battery 18 V / 4.4 Ah	NiMH special battery 18 V / 2,2 Ah	NiMH special battery 18V / 6,0 Ah
Transformer	230V (120V) / 24V	230V (120V) / 24V	230V (120V) / 24V	230V (120V) / 24V	230V (120V) / 24V
Mean energy consumption at maximum use	9 kWh/month, mowing three times a week	25 kWh/month, in a working area of 1,800 m ² (0.5 acre)	40 kWh/month, in a working area of 3,000 m ² (0.75 acre)	20-25 kWh/month in a working area of 2,200 m ² (0.6 acre)	54 kWh /month in a working area of 5500 m ² (1.5 acre)
Noise emissions					
Measured noise level	62 dB (A)	62 dB (A)	62 dB (A)	62 dB (A)	64 dB (A)
Guaranteed noise level	64 dB (A)	64 dB (A)	64 dB (A)	64 dB (A)	69 dB (A)
Mowing					
Mowing system	Three, pivoted cutting knife blades	Three, pivoted cutting knife blades	Three, pivoted cutting knife blades	Three, pivoted cutting knife blades	Five, pivoted cutting knife blades
Blade motor speed	2500 rpm	2500 rpm	2500 rpm	2500 rpm	1750 rpm
Power consumption during cutting	36 W +/- 20%	30 W +/- 20%	42 W +/- 20%	32 W +/- 20%	60 W +/- 20%
Cutting height	2 – 6 cm (0.8"-2.5")	2 – 6 cm (0.8"-2.5")	2 – 6 cm (0.8"-2.5")	2 – 6 cm (0.8"-2.5")	2 – 6 cm (0.8"-2.5")
Cutting width	22 cm (8")	22 cm (8")	22 cm (8")	22 cm (8")	32 cm (13")
Working capacity	500 m ² (0.15 acre) (+/- 20 %) mowing three times a week	1,800 m ² (0.5 acre) (+/- 20 %)	3,000 m ² (0.75 acre) (+/- 20 %)	2,200 m ² (0.6 acre) (+/- 20 %)	5500 m ² (1.5 acre) (+/- 20 %)

1. FUNCTION

1.4 Mower program Automower®

The behaviour of the Husqvarna Automower® is controlled by a microprocessor and software. The software, the mower program, manages all information and the operation of the mower.

This Technical Manual for Automower® covers edition 2.7x of the mower program.

1.4.1 Find out the version number

This section does not apply to 210 C. See chapter 4. Autocheck, Service program to find the version for 210 C.

Go to the Quick Check function:

1. Turn **ON** the main switch on the Automower®.
2. When the main menu is displayed: Hold down the **0** button for two seconds.

The version (edition and program type) is stated on the two uppermost rows, for example 02.71 and 260 ACX GSM CD.

3. Hold down the **Arrow back** button to return to the main menu.

It is important that the Automower® is programmed with the correct version of the mower program. The version consists of both the edition and the program type. The edition states how new the mower program is. Husqvarna works constantly to improve the behaviour and performance of the mower, which results in new program editions. The program type provides information about which type of mower program Automower® is programmed with. The control box fitted on the mower and whether the mower is equipped with any extra equipment determine which program type the mower is to be programmed with.

260 ACX GSM CD
Ver: 02.71 B:36 U:00
Date: Nov 26 2009

Chargings OK 15
Efficiency 98%
Searching 5%
Fault, number 4

Table 2: Version of the mower program

Control box from year	Control box version	Version of the mower program		File name	Production/aftermarket
		Edition	Program type		
2003	28	2.33	m/2003	Ver0233TH.S	- / x
2007-2010	36	2.50	m/2003-2005	Ver0250_220XZ.S	- / x
2004	29 & 30	2.50	m/2004	Ver0250TE.S	- / x
2005	32	2.50	m/2005	Ver0250AE.S	- / x
2006	33	2.70	m/2006	Ver0270_220LZ_CD.S	- / x
2007-2010	36	2.70	210 C CD	Ver0270_210LZ_CD.S	x / x
2007-2010	36	2.70	220 AC CD	Ver0270_220LZ_CD.S	x / x
2010	36	2.70	220 AC GSM CD	Ver0270_220LZ_CD_GSM.S	- / x

1. FUNCTION

Table 2: Version of the mower program

Control box from year	Control box version	Version of the mower program		File name	Production/aftermarket
		Edition	Program type		
2007-2009	36	2.70	230 ACX	Ver0270_230LZ.S	- / x
2010	36	2.70	230 ACX CD	Ver0270_230LZ_CD.S	x / x
2007-2009	36	2.70	230 ACX GSM	Ver0270_230LZ_GSM.S	- / x
2010	36	2.70	230 ACX GSM CD	Ver0270_230LZ_CD_GSM.S	- / x
2008-2010	36	2.61	SOLAR	Ver0261_SOLLZ.S	- / x
2008-2010	36	2.62	SOLAR GSM	Ver0262_SOLLZ_GSM.S	x / x
2009-2010	36	2.71	260 ACX CD *	Ver0271_260LZ_CD.S	x / x
2009-2010	36	2.71	260 ACX GSM CD *	Ver0271_260LZ_CD_GSM.S	x / x

The different designations of the program types above mean the following:

- GSM = mower program with GSM functionality. See 1.14 SMS function on page 23.
- CD = mower program with supplemental wheel motor drive. Supplemental drive involves more precise tracking patterns and reduced drifting, particularly turning on steep hills.
- * = the mower program is also available in a special version for large, open and flat areas, such as football fields. This special version can be selected when programming Autocheck.

1.5 Mowing technique

The Automower® mowing system is based on an efficient and energy saving principle. Unlike many traditional lawn mowers, Automower® cuts the grass instead of striking it off.

Mowing in different weather

We recommend you allow the Automower® to mainly mow in dry weather to obtain the best possible result. Automower® can even mow in the rain, however, wet grass easily collects on the mower and the risk of slipping on steep slopes is greater.

When there is a risk of a thunder storm, the 230 V (120V) plug should be removed from the mains socket and the boundary wire disconnected from the charging station.

1. FUNCTION

Blades

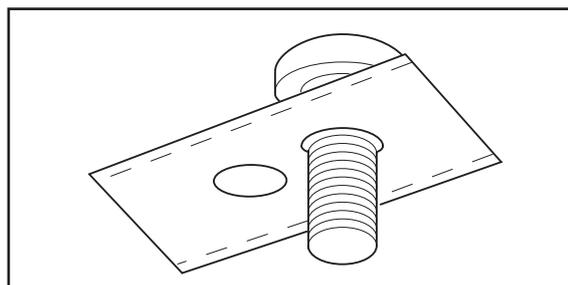
The blades must be in good condition to obtain the best mowing result. In order to keep the blades sharp for as long as possible it is important to keep the lawn free from branches, small stones and other objects.

Poor or dull blades can result in the grass bending instead of being mown, the tops become frayed and Automower® may find it difficult to mow a large working area. Besides, the lawn can become extremely rumpled and uneven.

It is more important to have well-kept and sharp blades on an Automower®, than on a conventional lawn mower. It is the principle of the Automower® cutting the grass instead of knocking it off that makes this difference. The double ground blades and a mower program that rotates the blade disc in both directions increase the life of the blades.

All five blades and screws must be replaced at the same time to ensure the cutting system is balanced.

There are several different types of mower blades to choose from as accessories, with different features. Use Husqvarna AB approved blades only, see the table.

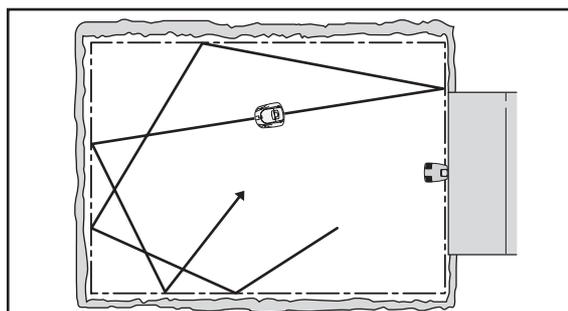


Blade type	Quantity/Packaging	Part number
<i>Stainless steel</i> (two-toothed, stainless)	9	535 13 87-01
	30	535 13 88-01
	500	505 12 78-01
<i>Carbon steel</i> (two-toothed, can be sharpened)	9	535 13 87-02
	30	535 13 88-02
	500	535 12 78-02
<i>Carbon steel</i> (two-toothed, reversible, extra robust, can be sharpened)	9	522 85 16-02
	30	522 85 17-02
	300	522 85 18-02

CAUTION! Dull knives of type 535 13 87-01, 535 13 88-01 and 505 12 78-01 should not be polished or sharpened and then reused. This will reduce the risk of an imbalanced mowing system.

Irregular mowing pattern

The Automower® mows the lawn in an irregular pattern. This gives a very even mowing result. In addition, there are no distinctive tracks left in the lawn, which is often the case when using a conventional lawn mower.



1. FUNCTION

1.6 Square mode cutting

This section does not apply to 210 C.

Sometimes the Automower® can change the mowing pattern and start to mow in a square pattern instead. This is called square mode cutting. The purpose of square mode cutting is to quickly get the same length of grass over the entire working area.

When an Automower® starts square mode cutting this means it has perceived the lawn in one area to be longer and/or thicker than before. The length/thickness of the lawn in the area does not need to differ that much from the other areas for the Automower® to start square mode cutting. Sometimes the difference is hardly visible.

The Automower® always attempts to keep the blade disc at an even speed. Different degrees of power are used for this depending on the length/thickness of the grass. Automower® compares the instantaneous power with an average power value from the last 8 hours of mowing. This means that, when Automower® enters an area where the lawn is longer/thicker than before, the instantaneous power will differ from the average power and the Automower® will then start square mode cutting.

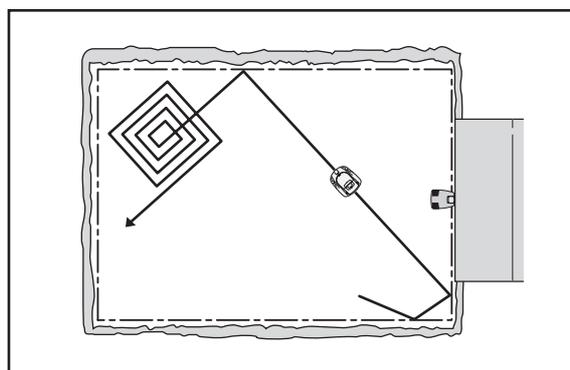
The limit values for when the Automower® should start square mode cutting is set at the factory at 70% for 230 ACX and 50% for 220 AC and Solar Hybrid. For the 260 ACX, square mode cutting is not activated at the factory. The limit value can be set for all mowers in Autocheck. The value can also be set under *Tools-Special settings- Square mode cutt.* (shortcut 5-6-1) on the mower, except for the mower with GSM software. A higher value results in less square mode cutting. It is also possible to switch the function off completely.

The following conditions apply in order for Automower® to start square mode cutting:

1. Automower® must be in *AUTO*-mode.
Square mode cutting is deactivated in *MAN*-mode.
2. Automower® must have been in uninterrupted operation (= the main switch set to *ON*) for at least 8 mowing hours, which represents an overall running time (mowing+charge) of approximately 13-14 hours.

When the mower is switched off using the main switch, and is left switched off for at least 4 hours, this time counter is reset. When for example, the Automower® is switched off using the main switch each night it will never, in principle, perform square mode cutting.

3. The instantaneous power consumption to maintain the speed of the blade disc must deviate from the average power by the set factor (e.g. 50 %). Consequently, the lawn in one area must always be longer/thicker than before.



1. FUNCTION

When an Automower® seems to perform square mode cutting too often:

- The lawn in the working area is cut very short. This means the average power is set very low and the Automower® will then start square mode cutting more often/easier.

When an Automower® rarely seems to perform square mode cutting:

- The mower has been turned off using the main switch for more than 4 hours, which has reset the time counter.
- An object has wound itself around the skid plate or the blade disc, which means the power consumption has increased, and the Automower® then interprets this as the grass being longer/thicker than before.

1.7 The loop system's control signals

The loop system, consisting of the boundary wire connected to the charging station, basically comprises five different signals A-signal, F-signal, N-signal, Guide 1 and Guide 2 (for 210 C only the A-signal applies).

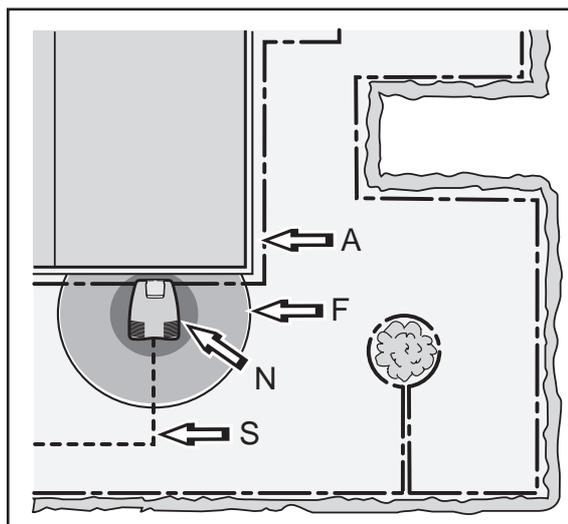
See *Loop (5-2-4)*, page 38 to check the F and N-signals.

A-signal =

The signal that the charging station transmits over the loop and which demarcates the working area for the Automower®. Coded information is transmitted via the A-signal to the mower. This is unique for each individual installation.

When there is no A-signal, for example with a break in the boundary wire or in the power supply to the charging station, the Automower® stops and displays the fault message *No loop signal*.

When the LED on the charging station (loop generator/charger for 210 C) is lit with a steady light this indicates that there is power and that the boundary wire is intact. See the table on page 14 for other indications.



1. FUNCTION

F-signal =

Remote signal from the charging station which has a range of 6 – 7 metres. The signal is generated by the large coil in the charging station plate. The F-signal guides the mower in the direction of the charging station.

When there is no F-signal, the Automower® will not be able to find the charging station. The mower will eventually stop and display the fault message *Low battery voltage*.

N-signal =

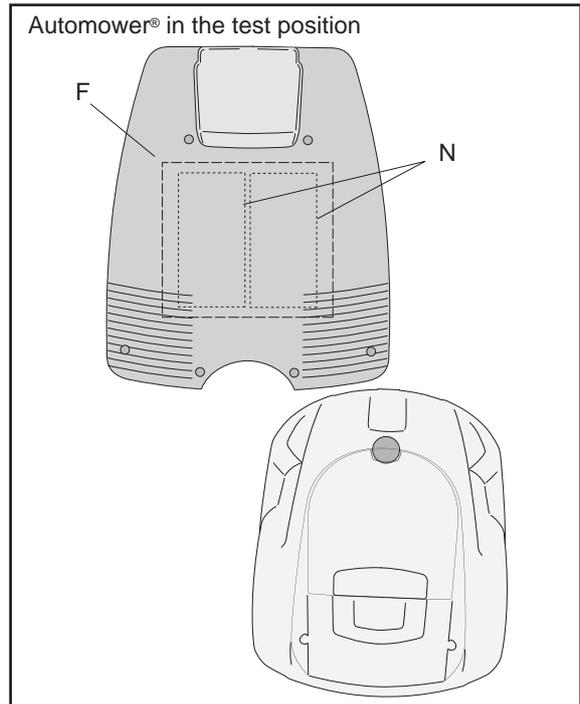
Near signal from the charging station with a range of approximately 1 metre. The signal is generated by the two small coils in the charging station plate. The N-signal guides the Automower® directly into the charging station, so that the charging strips and contact strips make contact.

The Automower® cannot enter the charging station when there is no N-signal. The mower will eventually stop and display the fault message *Low battery voltage*.

Guide 1 and Guide 2 =

Signal that the charging station transmits out through the guide wires. The Guide 1 and Guide 2-signals lead the mower along each Guide wire to or from a remote area. Guide 1 and Guide 2 are marked at the rear of the charging station. Guide 2 is only available for 230 ACX, Solar Hybrid and 260 ACX.

Automower® can not follow the guide wire if there is no Guide-signal.



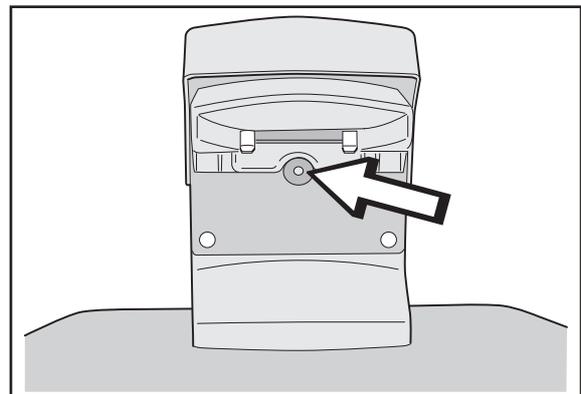
1.8 Loop signal strength

Double flashing can be remedied with a Signal amplifier (522 42 58-01) which is available as an accessory.

The loop is most easily controlled using the LED in the charging station (or the 210 C loop generator). Check the loop signal by checking what the green LED is indicating.

- Solid light = the signal is good.
- Flashing every other second = break in the loop and no signal available.

Flashing twice every other second = weak signal. This may be due to the fact that the boundary wire is beyond 500 m or the wire is damaged.

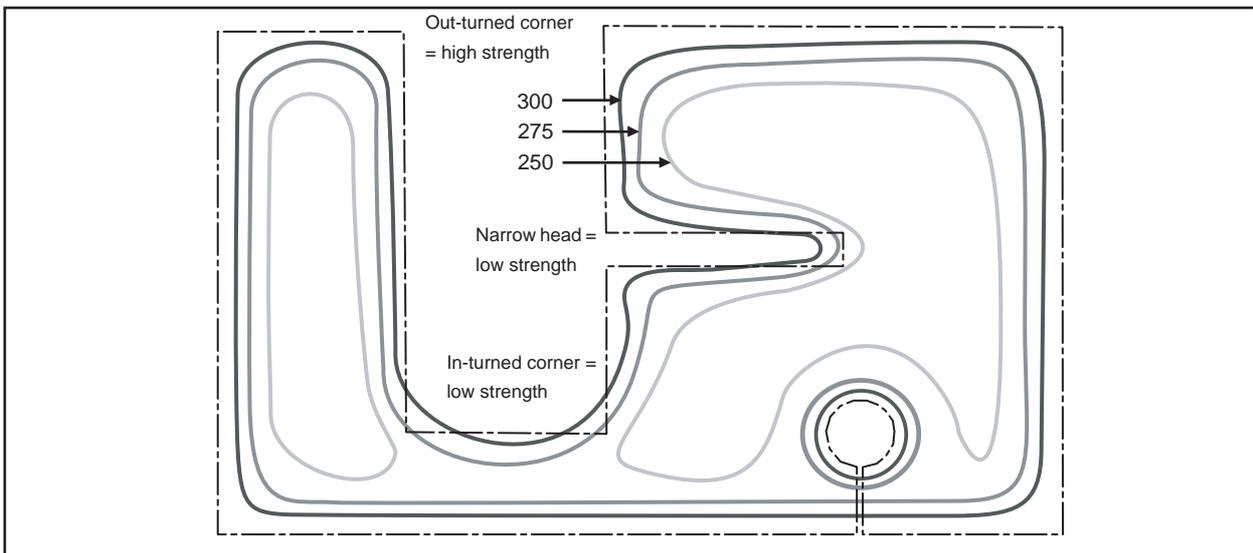


1. FUNCTION

1.8.1 Boundary wire

The signal strength on the boundary wire is constant at a loop length of up to about 500 metres (1600 ft). However, when the loop is longer than 500 metres (1600 ft), the strength can start to depreciate even if it may still be adequate. For installations where a longer boundary wire of up to 800 metres is required, we recommend a Signal amplifier (522 42 58-01), which is available as an accessory.

The strength of the loop signal varies depending on the distance to the wire. Directly by the wire the signal strength is high. The strength then depreciates the further you come from the wire. Outside of the loop the signal is negative and its strength depreciates quicker. The signal from the boundary wire is called the A-signal. See the picture below for examples of high and low signal strengths.

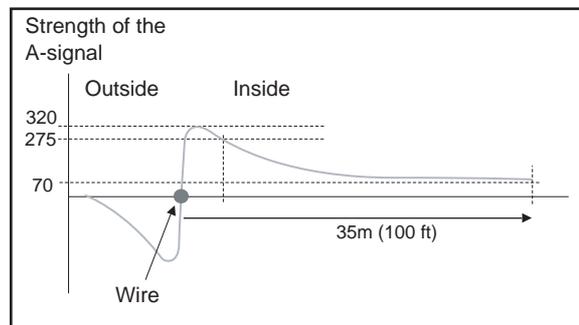


Examples of high and low signal strengths

The strength of the A-signal also varies along the boundary wire depending on the proximity to other parts of the loop. The strength of the signal is affected by the size of the working area, islands, heads, passages and corners. The signal may also be affected by magnetic objects in the ground or in surrounding walls and buildings. The signal will weaken in these areas. For example, a grassed area on a concrete roof.

In small installations or sub-areas, narrow passages and out-turned corners the strength of the signal is higher. In large installations, heads that point in towards the area and in-turned corners the strength of the signal is lower.

When the signal is amplified or weakened, it is normal that low respective high signal strengths are not always available along the entire length of the boundary wire.



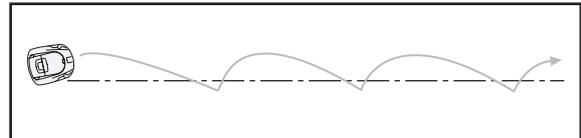
Propagation of the loop signal strength, seen from ground level

1. FUNCTION

The loop signal's reception and amplification in the mower can also vary by +/- 10% from one mower to another. This means that at the same point in an installation one mower may show A=250 and another A=275. The charging station's circuit board and the mower's loop sensor can also show some variation between different machines.

This means that the Automower® (not 210 C) will not follow the boundary wire at the same distance everywhere along the loop, even if the set corridor width is the same. The mower will, for example, take a short cut in corners and not always be able to negotiate passages.

Should the Automower® (not 210 C) not find the right loop signal strength when searching for the charging station, it will look for the strength by running in a saw tooth pattern along the boundary wire and in this way search the area closest to the loop. The behaviour is recognised through the Automower® running for a short distance, stopping, searching, running for a short distance again, stopping, searching, running for a short distance again, stopping, searching and so on.



Saw tooth pattern

IMPORTANT INFORMATION

The solution to the problem above is to increase the corridor width for the boundary wire. The mower then searches for a lower signal level.

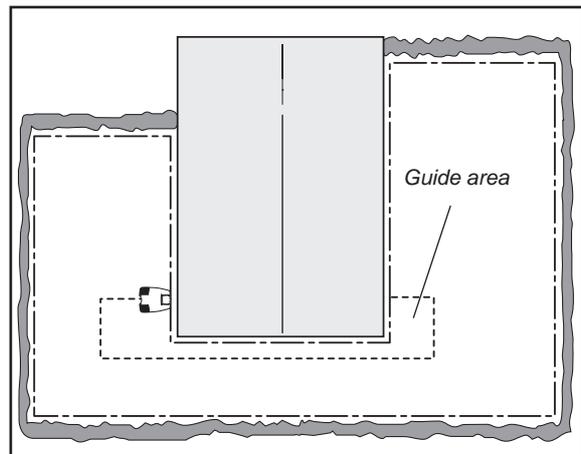
If the Automower® (not 210 C) does not find the right loop signal strength when it leaves the charging station to follow the loop to a remote area, it will start to mow directly instead.

1.8.2 Guide loop

This section does not apply to 210 C.

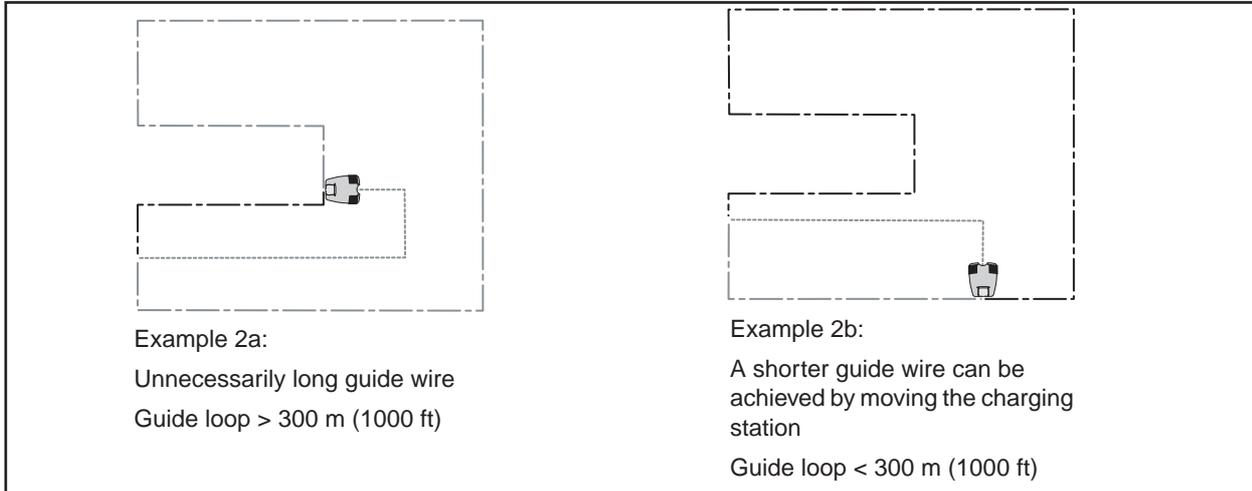
The guide wire together with the part of the boundary wire that makes up the return to the charging station is known as the guide loop. The current in the guide loop always goes to the left in the connection between the guide wire and the boundary wire. The signal from the guide wires are called Guide 1 and Guide 2 (Guide 2 only applies to 230 ACX, Solar Hybrid and 260 ACX).

The strength of the Guide signal varies like the A-signal depending on the distance to the guide wire. Inside the guide loop the signal is positive and its strength diminishes the further from the cable you come. Outside the guide loop the signal is negative and its strength diminishes more rapidly. The area inside the guide loop is called the guide area. Automower® always follows on the left-hand side of the guide wire in the direction towards the charging station, i.e., the mower follows the negative value on the Guide signal.



1. FUNCTION

The strength of the signal in the guide loop is dependent on the length of the loop. Consequently, the guide loop should be as short as possible, preferably no longer than about 300 metres (1000 ft). See the picture below for examples of guide wire installation.



The longer the guide loop the lower the signal strength and the harder it is for the Automower® to follow the guide wire. A lower signal strength means that the mower, with a given corridor width, will be run closer to the guide wire. Should the strength of the signal become too low, the Automower® may, for example in a closed corner, stop following the guide wire.

To reduce the risk of the mower losing contact with the wire in the corner, it is recommended to avoid placing the wire at 90 degree angles. It is better to place the wire at 2 x 135-degree angles, see the figure above.

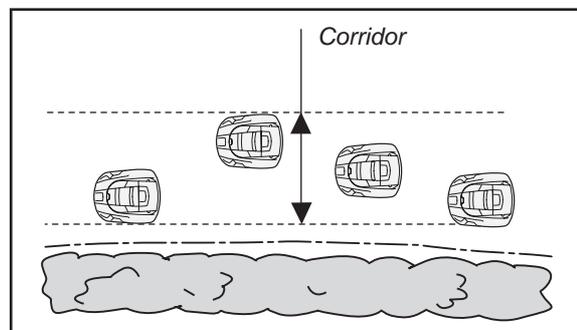
The strength of the Guide signal also varies along the guide wire depending on the closeness to other parts of the guide wire and is affected by islands, heads, passages and corners.

1.9 Corridor width

This section does not apply to 210 C.

The corridor width determines the maximum distance from the boundary wire or the guide wire that the Automower® is permitted to run when it follows the loop or the wire on route to or from the charging station. A low corridor width value represents a narrow corridor while a high value represents a wide corridor.

With a narrow corridor the Automower® always runs close to the boundary wire respective guide wire. With a wide corridor the Automower® varies how it runs, i.e. close to and further from the boundary wire respective guide wire. A wide corridor reduces the risk of tracks forming.

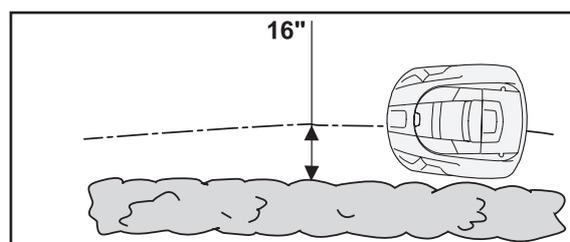


1. FUNCTION

In general the widest possible corridor should always be used. Apart from a reduced risk of tracks forming, it is also easier for the Automower® to follow the boundary wire or guide wire. The mower does not need to stop as frequently to search for the signal and with that runs more smoothly. On the other hand, if there are narrow passages in the working area that the Automower® needs to pass through, it is necessary to use a narrow corridor.

Corridor width 0 means that the Automower® straddles the boundary wire respective guide wire. As there are often flower beds, hedges and walls along with the boundary wire *Corridor width 0* is not normally recommended. Nevertheless, if you still want to use this setting the boundary wire should be laid 40cm (16") (50 cm (20") for 260 ACX) from fixed objects, instead of the normal 35cm (14") (40cm (16") for 260 ACX).

In small installations and in narrow passages the strength of the loop signal will be higher. Automower® will then run closer to the boundary wire respective guide wire, if a low corridor width is set. The length of the guide loop also affects the distance. Note that the values in the table are approximate and can always vary in different installations.



1.10 Search method to find the charging station

This section does not apply to 210 C.

Automower® can be set to search for the charging station in three different ways: Irregular, Follow loop in and Follow guide wire. With the help of setting options in the menu *Garden - Follow loop - Follow loop in* (shortcut 3-2-2) three search methods can be combined to optimise the search for the charging station. The required search method or methods depend on the shape of the garden.

Search method Irregular is a basic method to search for the charging station and works well in open areas. There is no risk of tracks forming. Search method Follow loop in can however give significantly shorter search times in more complex installations with different areas separated by passages or openings.

Automower® always starts a search for the charging station with an Irregular search method, under the condition that none of the delay times for the boundary wire or the guide wires are set to 0 minutes.

When there is a guide wire installed and the delay time for the guide wire has elapsed, Automower® will start to search for it and follow it into the charging station. If the delay time for the boundary wire also elapses before the Automower® has found the charging station, the mower will also start to search for the boundary wire. Should the mower then find and start to follow the boundary wire, it continues with this even if it finds the guide wire.

1. FUNCTION

In order to quickly test an installation, the delay times for the boundary wire and the guide wires should be temporarily set to 0 minutes. Automower® will not then make an Irregular search, but will directly start to search for the boundary wire and guide wires.

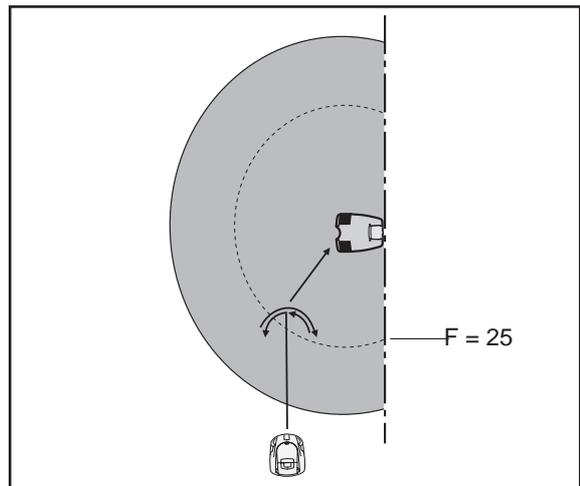
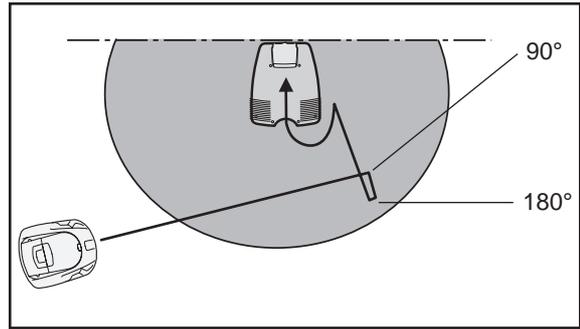
The Irregular search method means that the Automower® runs in an irregular pattern until it finds the F-field some 6 metres from the charging station, or until the value of the F-signal is higher than 2. When the Automower® is in the F-field, it turns 180° respective 90° to find the N-signal and the charging station.

When the mower follows the boundary loop, it drives a short way into the F-field and fixes its bearing when the F-value reaches 25 (which corresponds to 4 m (13 ft) from the charging station, see figure). Depending on the fixed bearings, the mower either leaves the boundary loop and starts to orientate itself towards the charging station, through 90/180 degree turns, or continues to follow the boundary loop once more towards the charging station.

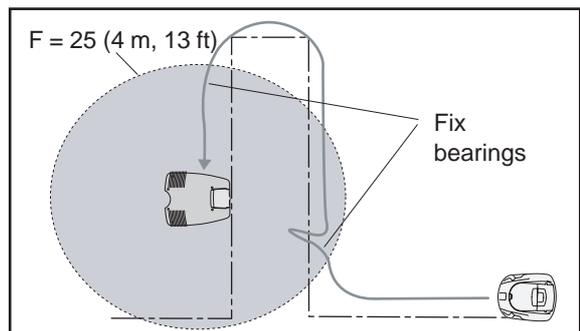
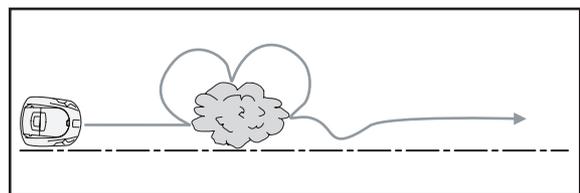
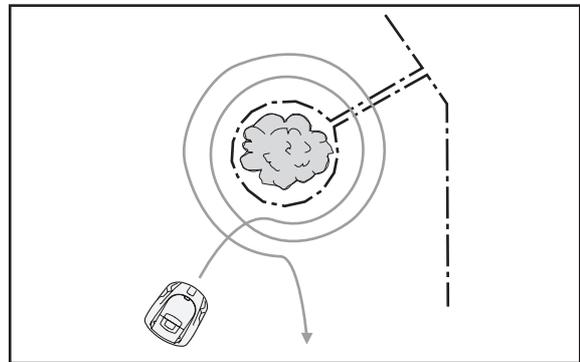
When the boundary wire is laid around an island, the Automower® follows the loop around the island about two turns before leaving the island and continuing to run until it finds the boundary wire in another location.

Should the Automower® hit an obstacle when following the boundary wire it passes this by making one or more turns around the obstacle.

Depending on the placement of the charging station, the Automower® may be forced to leave the F-field to reach the charging station. The mower then follows the boundary wire out of the F-field. First it runs 10 metres (30 ft) from the F-field in one direction before it turns and follows the boundary wire 20 metres (60 ft) from the F-field in the other direction. Should the Automower® then not reach the F-field, it turns for a third time and follows the boundary wire in the first direction until it reaches the charging station.



Automower® fixes its bearings



1. FUNCTION

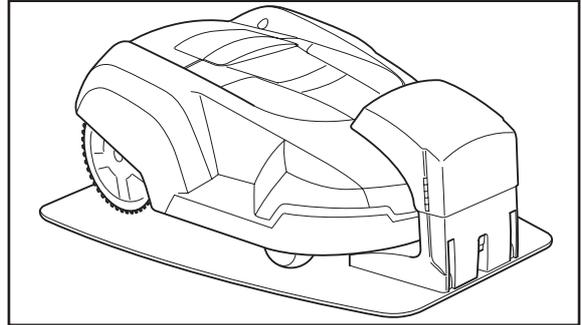
1.11 Docking and charging

This section does not apply to 210 C.

When the battery level becomes too low, the Automower® switches off the blade motor and starts to search for the charging station. When the mower receives the N-signal and enters the charging station, this is called docking.

When the charging strips on the Automower® make contact with the contact strips on the charging station, the mower stops and charging begins. The message *Charging* is shown on the display.

A fault message is displayed when docking fails or when charging does not work correctly, see table 6.2.4 *Fault symptoms during Docking* på sidan 111.



1.12 Battery

The available capacity drops with a rising ambient air temperature. The mower adapts itself to this and returns to the charging station earlier (Does not apply to 210 C).

Battery charging is normally monitored by the control box via a temperature sensor in the battery. The temperature of the battery rises during the entire charging process. When the battery is fully charged, the temperature rises and charging stops (does not apply to 210 C). In general, charging also stops if the battery temperature exceeds 53° C. The mower is considered to be fully charged when charging is stopped.

On 210 C charging is stopped at 48 °C (118 °F) or when the mower has been charged for 15 hours.

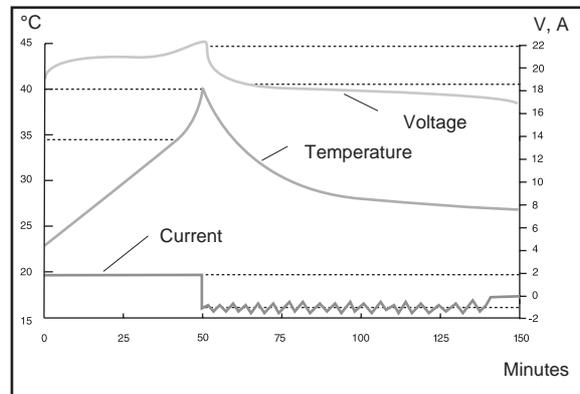
For 260 ACX, charging stops when the battery temperature exceeds 52° C at night (between 9:00 p.m. and 8:00 a.m.), or exceeds 48° C during the day. If the battery temperature exceeds 43° C when the mower docks at the charging station, the 260 ACX will rest and defer its charging until the battery temperature has dropped below 43° C again. As the temperature drops, the display will show 0 A as the charging current. If the STOP button is pressed during this period, the charge is reabsorbed despite the high battery temperature.

In summary, the charging times at higher ambient temperatures will be somewhat longer than normal.

Normal charging currents for the different models are:

- 1,0 A for 210 C
- 1,75 A for 220 AC
- 4,0 A (2 x 2,0 A) for 230 ACX
- 2,1 A for Solar Hybrid

7.0 to 5.0 A (2 x 3.5-2.5 A) for 260 ACX. Decreasing value as the batteries are recharged over and over.



The battery's charging cycle for 220 AC, at idle

1. FUNCTION

If the control box is blocked, for example, by unintentionally interrupting programming, battery charging is not monitored. It is then important that you charge the Automower® with caution, that is to say, for no more than 10 minutes. A blocked control box is characterised by no text being shown on the display/no LEDs are lit and the keypad does not work despite the battery being charged.

1.12.1 Battery check

If the mower's battery starts to deteriorate the Automower® will mow for shorter periods. The mower can also stop and display the fault message *Low battery voltage (Does not apply to 210 C)*. A battery check is recommended in order to establish whether the battery is spent (For 210 C it is sufficient to run the mower as usual).

It is also recommended to make a battery check with the winter service of the mower. A spent battery can then be changed before the next season starts.

In order to check the capacity of the battery it is necessary for the battery to be fully discharged. Use manual operating mode and charge the battery fully. When charging starts the battery temperature should not be more than 40 °C (104 °F). Now let the Automower® mow in manual operating mode until the battery is fully discharged. It is also possible to switch the mower from automatic to manual operating mode when it has left the charging station and started to mow. The mower ought to have a slight mowing resistance during the ongoing battery check. The cutting height should therefore be adjusted to the maximum cutting height.

If the mower has not been in operation for several weeks when the check is made, for example if the mower has been left for its winter service, at least two or preferably three battery checks ought to be made. The assessment should be based on that last made check as the first check can indicate an incorrect value. The four most recent battery tests are saved in the mower. Read the tests from Autocheck, operating history, or Battery history (shortcut 5-1-5) in the mower. For models 230 ACX and 260 ACX, which have two batteries, the individual capacity of each battery is shown (this is also the case for the 210 C, which is equipped with two batteries). Accordingly, it is possible to determine whether one or both batteries should be replaced. On Solar Hybrid the energy that the solar panel has supplied during manual operating time is also shown.

In cases where a battery test cannot be performed on an installation, the test can be performed directly on the work bench via Autocheck (see 4.8.2 *Manual test* on page 68). The test is performed as above, except the mower's driving wheel and blade disc rotate freely during the test. Since resistance to the wheel drive and blade disc is in principle non-existent, discharging the battery/batteries may take several hours.

1. FUNCTION

Note that the most reliable test results can be achieved when the mower is run on an installation.

A new battery for 220 AC, 230 ACX and Solar Hybrid have a battery capacity of approximately 2200 mAh, and a new battery for 210 C and 260 ACX has a capacity of approximately 3000 mAh.

As the battery ages the battery capacity decreases. If the displayed battery capacity is about 1500 mAh or lower it is probable that the battery is spent and needs to be replaced. Note that the values are approximate and vary from mower to mower and presume that the measurement is made in accordance with the description.

Due to the measurement differences on the control box, the capacity is always given slightly higher for battery A than for battery B. The difference can be up to 400 mAh without anything unusual occurring in the control box or in the batteries.

IMPORTANT INFORMATION

Note that the threshold value of 1500 mAh is purely a guide value and that the battery capacity can vary from mower to mower. As long as the mower can mow the lawn the battery does not need replacing.

When replacing the battery, you should reset *Trip Op. counters*. The value for *Chargings OK*, which is a measurement of the age of the battery is then reset, both on the main counter and on the trip counter. A battery can normally take 1000 – 2000 charges (500 for 210 C).

1.13 Sensors

There are several types of sensors on the mowers, collision sensors, tilt sensors, lift sensors and ultrasonic sensors. These protect both the mower and the operator.

1.13.1 Collision sensor

The collision sensors are the sensors that detect when the mower collides with a fixed object. When the sensors are activated, i.e. the mower collides with an object, the mower waits and then turns to continue in a different direction. The two collision columns on the back of the mower detect the motion of the mower body in relation to the mower chassis

1.13.2 Tilt sensor

The tilt sensor senses the mower's incline in relation to the horizontal plane. X-angle indicates the incline for forward - reverse, and the Y-angle indicates the incline for left - right.

1. FUNCTION

When the Automower® rests on a completely flat surface, the values should be around +/-3. In other cases, the tilt sensor must be calibrated (see 4.8.2 *Manual test* on page 68). If the mower tilts up and to the left the values will be negative.

1.13.3 Lift sensor

The lift sensor is the sensor that senses whether the mower is being raised off the ground. This is done with the help of the mechanical device at the front of the mower. If the "lift" signal is indicated, the mower and the blade disc stop immediately. The mower will then try free itself of the obstacle that caused it to lift of the ground by backing up and turning several times.

1.13.4 Ultrasonic sensor (260 ACX)

The purpose of the ultrasonic sensors is to reduce the mower's speed before a collision with obstacles that are not protected by the boundary wire. The two sensors on the mower detect objects at a distance of approximately 50 cm (20") from the front edge of the mower body and at a depth of up to 10 cm (4") above the ground (the grass roots). The two sensors operate independently of each other. At certain angles of incidence, smooth and clean surfaces can sometimes be difficult for the sensors to detect. In these cases, the mower/sensors may entirely miss some objects and collide with them without reducing speed. This is nothing abnormal. Therefore, these types of objects should be protected with the boundary wire.

Fault handling

If the mower collides with an object at a speed of 40 cm/sec (16"/sec) or higher, more than 5 times in a row, the speed drops to 30 cm/sec (12"/sec) until the mower is stopped or begins to mow again after completed charging. When this is repeated in three mowing cycles, one after the other, an SMS message is sent "Check ultrasonic". For more information about the mower's SMS function, see 1.14 *SMS function* on page 23.

Strong rain and hard, smooth surfaces (e.g. flat walkways) can also cause the mower to reduce speed. If the mower runs at reduced speed, i.e. below 40 cm/sec (16"/sec) for more than 60 seconds, the fault message "Check ultrasonic" appears on the mower. However, the fault message only appears if the mower is actively stopped while running at a reduced speed and therefore does not constitute a real error in the sense of the mower stopping. However, if this is repeated in three mowing cycles, one after the other, an SMS message is sent "Check ultrasonic".

In the event that the message "Check Ultrasonic" appears, either via SMS or on the mower, the ultrasonic sensors should be cleaned with a dry cloth or similar, alternatively, a boundary wire should be placed around objects that cannot be detected by the ultrasound (and therefore generate the fault message).

1. FUNCTION

The sensors cannot be deactivated, i.e. you cannot turn off the ultrasound. With a function error, the mower will run at a reduced speed. Hence, there is no way to run a 260 ACX with no ultrasound at a normal speed.

1.14 SMS function

The SMS feature allows the mower to communicate with its operator. When the mower requires assistance for some reason, it will send an SMS message to a predefined mobile phone. For the SMS function to work, the mower must have a GSM module. This is a standard feature on the Solar Hybrid and 260 ACX (m/2009-2010) models. In addition to a GSM module, a SIM card is also required for all mowers. The SIM card is usually purchased by the end customer and subsequently installed in the mower by the dealer. For installing the GSM module, see *5.22 Installing GSM module* on page 100.

The GSM module can also be purchased and installed as an accessory for the 220 AC (m/2010-) and 230 ACX (m/2007-) models. In these cases, apart from the GSM module and SIM card, the mower needs to be loaded with a GSM mower program.

Note! A mower that is loaded with a GSM program will lose a number of functions, see table below.

Functions removed from the GSM mower program	Menu position
<i>Weekend timer</i>	<i>Timer</i>
<i>Settings lock</i>	<i>Settings > Safety</i>
<i>Start angle 2, End angle 2 & Proportion first</i>	<i>Installation > Exit angles</i>
<i>Sounds</i>	<i>Settings</i>
<i>Check loop</i>	<i>Installation > Advanced</i>
<i>Square mode cutting.</i>	<i>Tools > Special settings</i>
<i>Operating history</i> (reduced contents)	<i>Tools > Operating history</i>
ABC programs deactivated	

After assembly and programming, the SMS function is set up under *Settings > Safety > SMS* from the mower's menu.

To:

- Set the telephone number: Move the cursor to *Phone number* and press **YES**. Enter your mobile phone number including country code (e.g. +46(0)123456789 and confirm with **YES**.
- Activate/deactivate the SMS feature for fault messages or alarms: Move the cursor to *SMS at fault/alarm* and press **YES**. Select *YES* to activate the SMS-sending feature. Select *NO* to deactivate the SMS-sending feature.

1. FUNCTION

- Activate/deactivate time-controlled sending of SMS: Move the cursor to *Periodical SMS* and press **YES**. Select *YES* to activate time-controlled sending of SMS, confirm with **YES**. Then define how often the mower should send SMS messages about its status by entering the interval in hours (e.g. 4 h for sending an SMS every 4 hours). Select *NO* to deactivate time-controlled sending of SMS.
- Entering the PIN code for the SIM card: Move the cursor to *SIM PIN* and press **YES**. Enter the four-digit PIN code of the SIM card and confirm with **YES**.
- Testing the SMS feature: Move the cursor to *SMS test* and press **YES**. The mower will now send an SMS describing the mower's current status (probably STOPPED) to the selected mobile phone number.

Before delivering the mower to the customer, the SMS function should be tested by selecting *SMS test*, from the SMS menu as above.

1.15 Solar panel (Solar Hybrid)

The solar panel on Solar Hybrid prolongs the battery life so to speak and, depending on the light conditions, provides a longer cutting time per charge than 220 AC. In the most favourable conditions, in the middle of the day during the summer, the solar panel can produce 600-700 mA, measured from the mower itself. This corresponds to approximately half the mower's consumption during work. In practice, factors such as shade, morning, evening and night operation as well as operation during early spring and in the autumn, reduce the contribution from the solar panel.

A Solar Hybrid must, of course, be timer controlled so that it runs as much as possible during daylight hours. The power output from the battery and during cutting and searching is the mower's consumption minus the contribution from the solar panel. During charging in the charging station, and when the mower is in standby mode (the display is not illuminated), the solar panel is not connected. When the mower is in the incorrect mode, the solar panel is active, but switches off when the battery is fully charged.

2. SPECIAL MENU FUNCTIONS

2. Special menu functions

This section does not apply to 210 C.

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2. SPECIAL MENU FUNCTIONS

2.2 Quick check

When the main menu shows: Press and hold down the number **0** for two seconds to access the Quick check function.

Quick check is a display mode where you can quickly see information about the software and operating history, search times, battery, loop system and sensors. Press **YES** to switch between the different display modes. Press **Arrow back** to exit the quick check function.

The display mode for software and operating history shows:

- *Program type*: In this case 260 ACX GSM CD.
- *Ver*: The version of the mower program consists of release (02.71), control card version (B:36) and development version (U:00)
- *Date*: Date of issue.
- *Chargings OK*: The total number of chargings where the battery was fully charged.
- *Efficiency*: A measure of how large a proportion of the total operating time the Automower® spent mowing the grass.
- *Searching*: A measure of how large a proportion of the total operating time the Automower® spent searching for the charging station.

Faults, number: The total number of faults that occurred.

The display mode for mower's search times shows:

Search times: Lists the number of minutes it took the mower to find the charging station from the time the search began until the mower landed at the charging station. The total time from the past 18 searches is displayed.

The battery display mode presents:

- *Voltage*:
A value of about 21 V signifies a fully charged battery and about 18 V signifies a discharged battery.
- *Charging*:
Shows how much of the charge remains in the battery.
When the battery is fully charged, the charge is approximately 2200 mAh (220 AC, Solar Hybrid), 4400 mAh (230 ACX) or 6000 mAh (260 ACX). When the charge has dropped to approximately 700 mAh (220 AC, Solar Hybrid) or 1200 mAh (230 ACX, 260 ACX), the mower returns to the charging station.

If the ambient temperature is high, the available capacity in the battery drops. The mower adapts itself to this and then returns to the charging station earlier.

260 ACX GSM CD	
Ver: 02.71 B:36 U:00	
Date: Nov 26 2009	
Chargings OK	15
Efficiency	98%
Searching	5%
Fault, number	4

Search times		
1: 0	7: 3	13: 6
2: 5	8: 17	14: 9
3: 2	9: 3	15: 2
4: 6	10: 5	16: 2
5: 10	11: 4	17: 0
6: 1	12: 1	18: 1

Voltage:	19.7 V
Charging:	3400 mAh
Current bat A:	3670 mA
Batt. Temp A:	30°C
Current bat B:	3810 mA
Batt. Temp B:	29°C

Example: 230 ACX

Voltage:	19.7 V
Charging:	2000 mAh
Solar current:	515 mA
Current bat B:	1750 mA
Batt. Temp B:	29°C

Example: Solar Hybrid

2. SPECIAL MENU FUNCTIONS

- Current:**

Shows the nominal regulated charging current to and from the battery. A positive value indicates that the battery is taking the charge while a negative value indicates that the battery is not taking the charge. Models 230 ACX and 260 ACX display *Current* for battery A and B separately.

On Solar Hybrid current from both the solar panel and from the battery is shown. If the mower finds itself outside the charging station, a positive battery current charges the battery from the solar panel.
- Batt. Temp:**

Shows the temperature of the battery. Models 230 ACX and 260 ACX display *Batt. Temp* for battery A and B separately.

The loop system display mode presents:

- Loop signal value**

Af = The strength of the A-signal measured via the front loop sensor on the mower. The value should lie between approximately 70 and 320 to ensure good functionality. The closer to the loop the mower is, the higher the value. When the Automower® is directly over the loop the value is 0 and when the mower is outside of the loop the value is negative.

When the Automower® is in the test position, see page 39, the value for the F-signal should be above 300 and for the N-signal the value should be above 100.

To ensure the functionality of the guide wire, the Guide signal value should be (-) 250 – 320 next to the guide wire. The guide wire is named G1 for 220 AC and the guide wires are named G1 and G2 for 230 ACX, Solar Hybrid and 260 ACX.

- Quality:**

The loop signals can only be interpreted if the *Quality* value is 100 %. When the value is 99 % or lower, the loop system does not function correctly and with that, the displayed values for the signals will not be correct.
- Restarts:**

Within 5 – 10 seconds after the function starts, the restart value stabilises. When the value continues to change this indicates that the system is affected by interference or is defective.

Press **YES** to display further information in this display mode. The Ar-signal is then shown instead, i.e. the loop signal measured through the rear loop sensor. The guideline values of approximately 70 – 320 also apply for Ar. Press **YES** to exit this display mode.

Af: 250	
G1: -250	F: 320
	N: 110
Quality:	100%
Restarts:	0

Example: 220 AC

Af: 250	
G1: -250	F: 320
G2: 280	N: 110
Quality:	100%
Restarts:	0

Example: 230 ACX, Solar Hybrid, 260 ACX

2. SPECIAL MENU FUNCTIONS

The sensors display mode presents:

- **Collision:**
To test the collision sensors: Hold the handle on the underside of the Automower®. Press on different parts of the body. The display shows *None, Both, Left* or *Right*. Continue to press on the body until you see that both collision sensors work.
- **Lift:**
To test the lift sensor, lift up the front part of the body. When the body is lifted up, the lift sensor is activated and *YES* is shown on the mower's display. When the mower is in the lowered position *NO* is shown.
- **Tilt X and Tilt Y:**
When Automower® is horizontal the values should be max ± 3 . Inclination up and to the left give a negative values.
- **Mower position:**
States *Mower normal pos.* or *Mower reversed*.
- **Ultrasonic (only 260 ACX):**
Indicates mower's distance to closest obstacle. A correct value is between 40 and 300 cm (16" and 120").

Collision:	NONE
Lift:	NO
Tilt X: 0	Tilt Y: 0
Mower normal pos.	
Ultrasonic distance:	57 cm

Example: 260 ACX

2.3 Discover the PIN code

If you forget the PIN code for an Automower® or when a mower is blocked because an incorrect code has been stated, you can find out the right code:

1. In input mode for the PIN code, or when the main menu is displayed: Hold down the **9** key for five seconds, a combination of five letters will then be displayed.
2. Contact the national service organisation and state the letter combination. They can then identify the right PIN code.
3. Press **Arrow back** to exit the function.

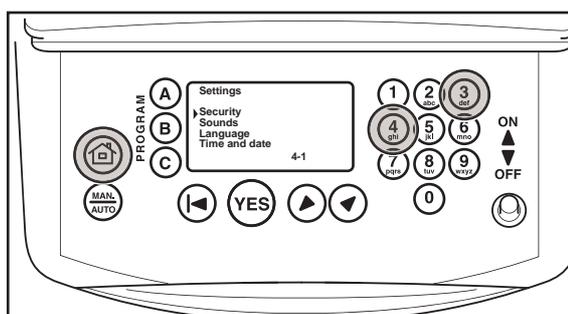
CDDFA

2.4 The Tools Menu

Over and above the menus described in the operator's manual for Automower®, there is another menu called *Tools*. This is found on the *Expert* user info level. The menu *Tools* contains, among others, the possibility to test components of a mower and information about different operating data.

To show the *Tools* menu:

1. Place the cursor on *Settings* and press **YES**.
2. Press the **Home**, **4** and **3** buttons simultaneously, i.e. at the same time but in the stated order.

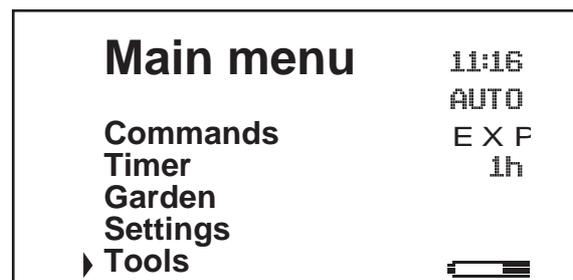


2. SPECIAL MENU FUNCTIONS

Tools is shown at the bottom and *EXP* is stated on the right-hand side of the display.

IMPORTANT INFORMATION

If you have displayed the *Tools* menu during a service, make sure you hide it before returning the mower to the customer.

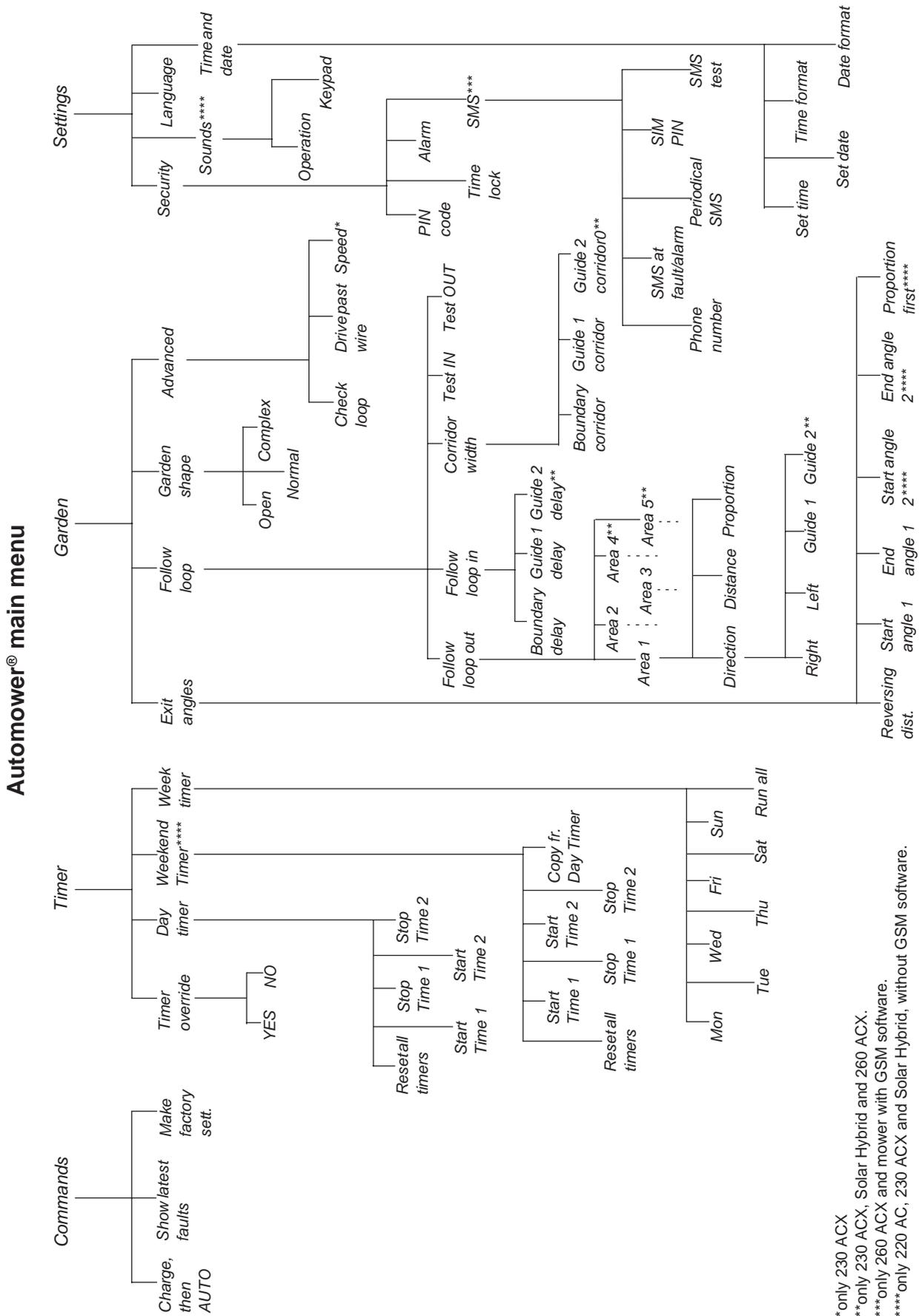


To hide the *Tools* menu:

1. Place the cursor on *Settings* and press **YES**.
2. Press, in the same way as earlier, **Home**, **4** and **3** simultaneously.

2. SPECIAL MENU FUNCTIONS

2.5 Automower® main menu, menu overview



* only 230 ACX

** only 230 ACX, Solar Hybrid and 260 ACX.

*** only 260 ACX and mower with GSM software.

**** only 220 AC, 230 ACX and Solar Hybrid, without GSM software.

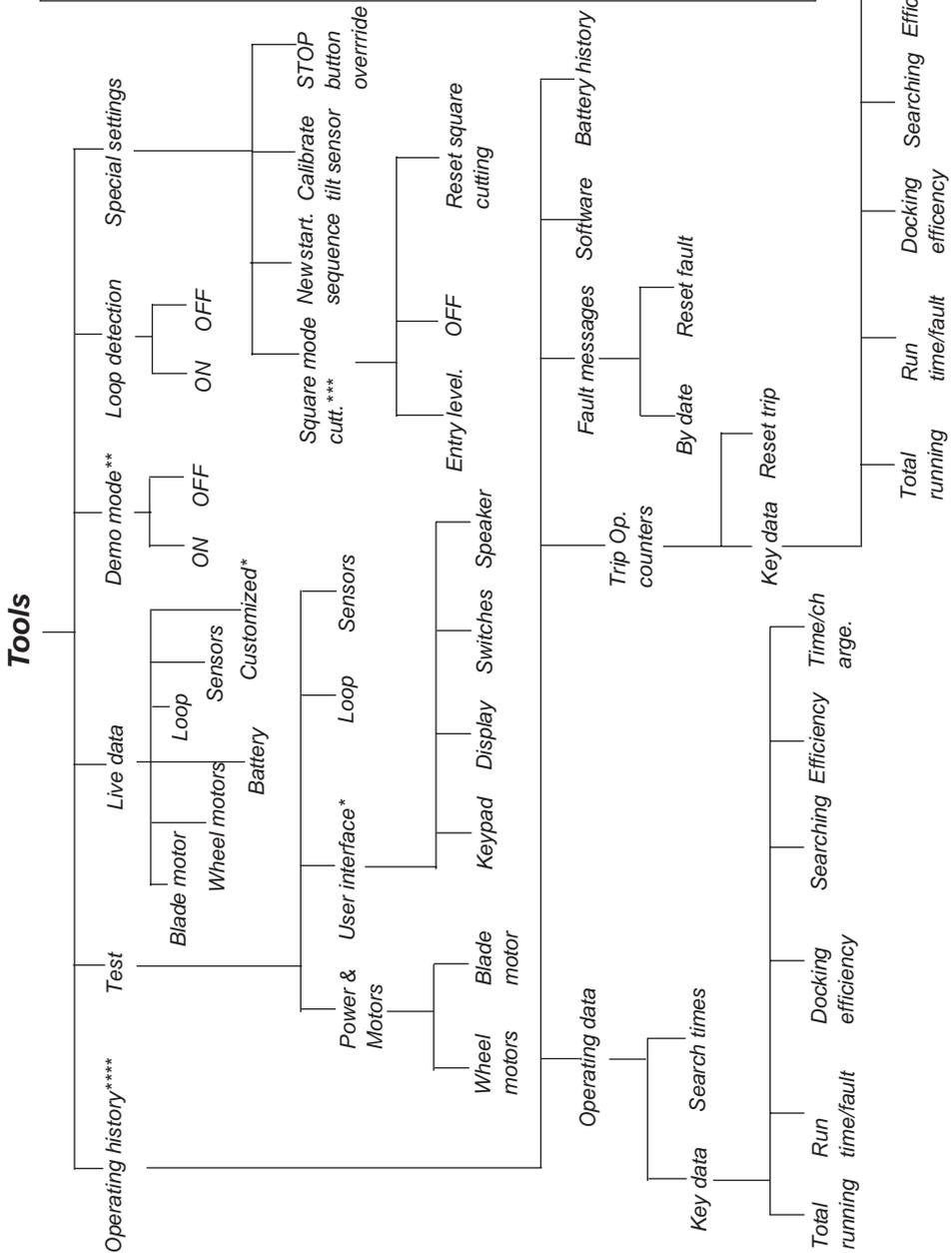
2. SPECIAL MENU FUNCTIONS

2.6 The Tools menu, an overview

Expert mode
 In the settings menu: Press **Home + 4 + 3** simultaneously, but in the stated order.
 The **Tools** menu then becomes available in the main menu.

Quick check
 In the main menu: Press and hold the **0** key down for 2 seconds. Press **YES** to switch between the different display modes. Press **Arrow back** to exit the quick check function.

Discover the PIN code
 In the main menu: Press and hold the **9** key down for 5 seconds.
 A combination of letters is displayed.
 Contact the national service organisation and state the letters.



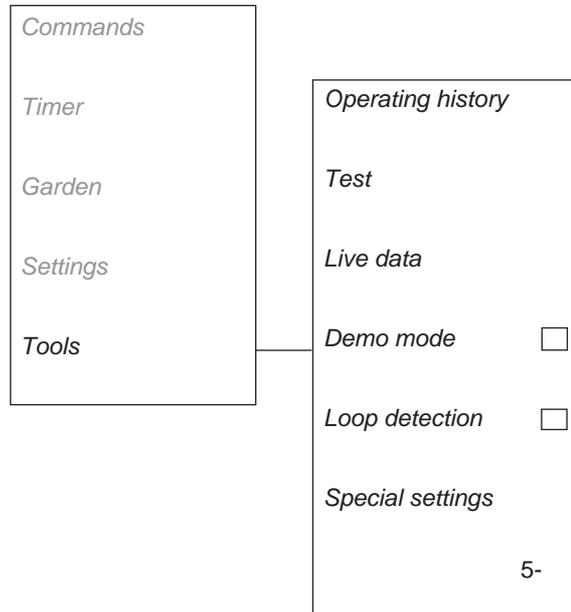
*only 220 AC.
 **only 220 AC and 230 ACX , without GSM software.
 ***only 220 AC, 230 ACX and Solar Hybrid, without GSM software.
 ****only 220 AC; 230 ACX and Solar Hybrid.

2. SPECIAL MENU FUNCTIONS

2.7 The Tools menu, functions

Via the *Tools* menu you can access data about the mower's function, test functions and special settings. As in other menus the selections you make are shown as a numerical series in the bottom right corner of the display. Select:

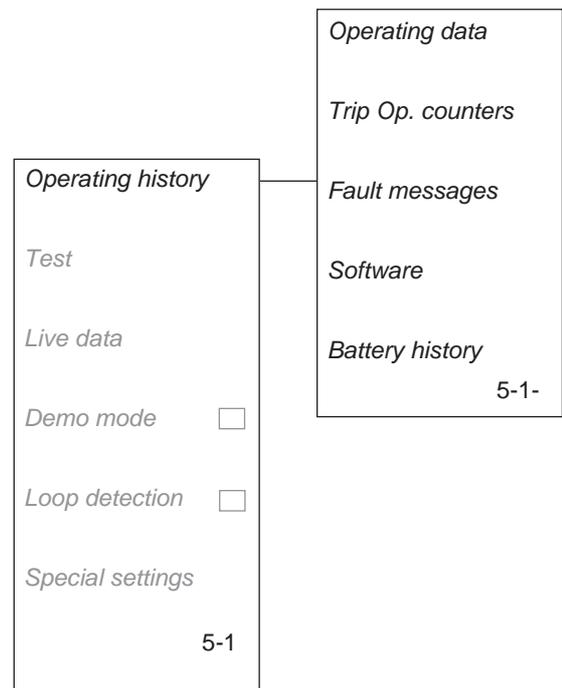
- **Operating history (5-1),**
to show key data, this give an overview of a mower's age and function.
- **Test (5-2),**
to actively test the mower's different components and functions.
- **Live data (5-3),**
to study an Automower® in operation, i.e. when it is not in test mode, but is checked by its own mower program.
- **Demo mode (5-4),** (only 220 AC and 230 ACX , without GSM software)
to be able to demonstrate the Automower® without mowing.
- **Loop detection (5-5),**
to turn off the mower's loop detection and in doing so be able to run the Automower® without installing the boundary wire.
- **Special settings (5-6),**
to adjust the square mode cutting function, return the mower back to the start-up sequence, calibrate the tilt sensor and override **STOP** button.



2.7.1 Operating history (5-1)

Only on 220 AC, 230 ACX and Solar Hybrid. For 260 ACX, this information is displayed via Autocheck. You can use the values shown in this sub-menu to see how well the mower has worked. When a value deviates from the norm, this may be due to an installation defect or a fault on the mower.

The sub-menu consists of four part menus that contain information about the mower's operation.

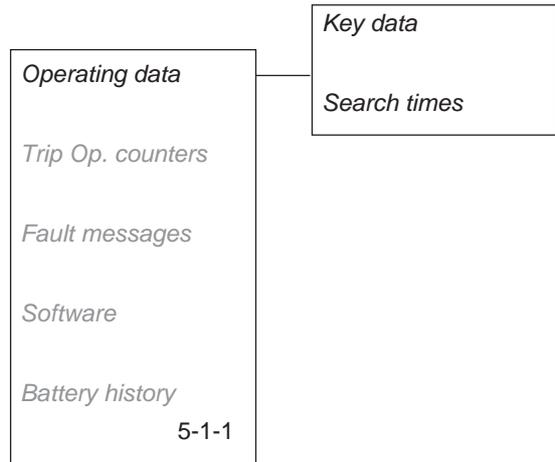


2. SPECIAL MENU FUNCTIONS

Operating data (5-1-1)

This part menu contains information about:

- *Key data*
- *Search times*



Key data

- *Total running (h) =*

Total running is defined as the accumulated time in hours that the wheel motors have run. This means the time when the Automower® runs without mowing is also included in the running time. The time stated here is the time stated in the main menu.

- *Run time/fault (h) =*

an average time of how many hours the Automower® has run for each fault message displayed. Run time/fault is the total running time divided by the number of occurring faults.

- *Docking efficiency (%) =*

a measurement of on how many occasions when the Automower® has reached the N-field this has resulted in a successful docking.

Docking efficiency should be as high as possible. Normally the value for docking efficiency is about 90 % or higher.

- *Searching (%) =*

a measurement of how much of the total running time that the Automower® has searched after the charging station.

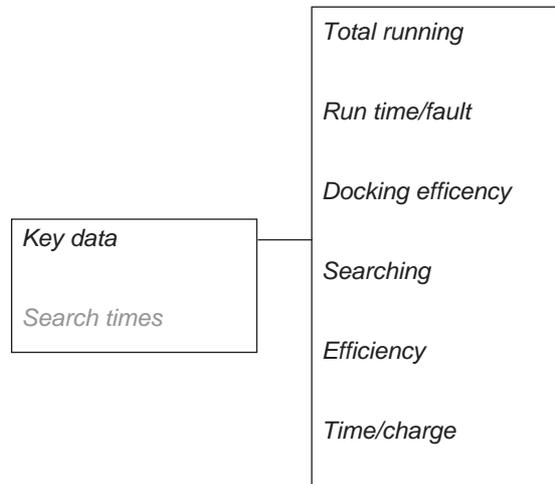
The value for searching varies depending on the size of the working area and the design of the installation. You should aim for the lowest possible searching value. Depending on the installation, it is normal for the mower to search between 10 – 20 %.

- *Efficiency (%) =*

a measurement of how much of the total operating time that the Automower® has mown the lawn. Efficiency is the mowing time divided by the charging time+running time.

- *Time/charge (min) =*

an average time for how long each charging period has taken.



2. SPECIAL MENU FUNCTIONS

Search times

Information about how long a search for the charging station has taken. The list shown contains the times of the last 18 search events.



Trip Operation counters (5-1-2)

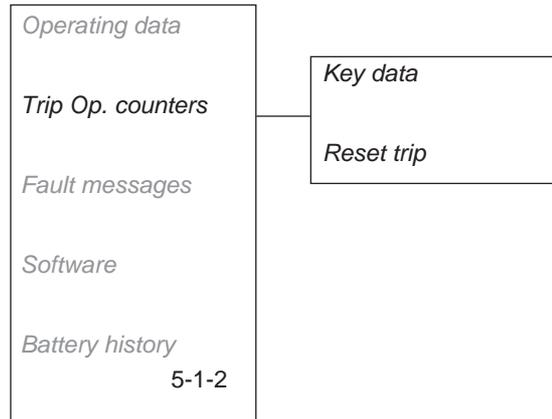
Trip Op. counters contains the same information as *Operating data* above. The difference is that in *Trip Op. counters* it is possible to reset all values, just as a trip meter in a car.

To reset:

- Place the cursor on *Reset trip* and press **YES**. Now press **YES** to the question *Reset trip operation counters?*.

All values are reset and the date of the reset is shown in the right-hand column of the display.

NOTE! When *Trip Op. counters* is reset, the value for *Chargings OK*, is also reset, i.e. the battery's age, both in the main counter and in the trip counter. If the value for *Chargings OK*, see page 35, is to remain an indicator of the battery's total age, *Trip Op. counters* should only be reset when replacing the battery.



Fault messages (5-1-3)

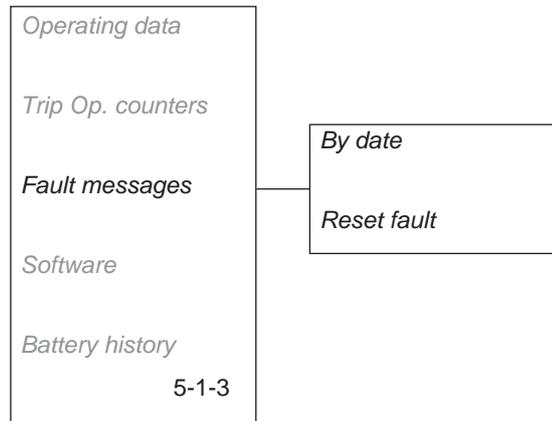
This part menu contains the following information:

By date

a list containing 50 of the latest registered fault messages sorted by date with the last fault to occur first. Each message is shown with the date and time. Switch between fault messages by using **Arrow up** or **Arrow down**.

Reset fault

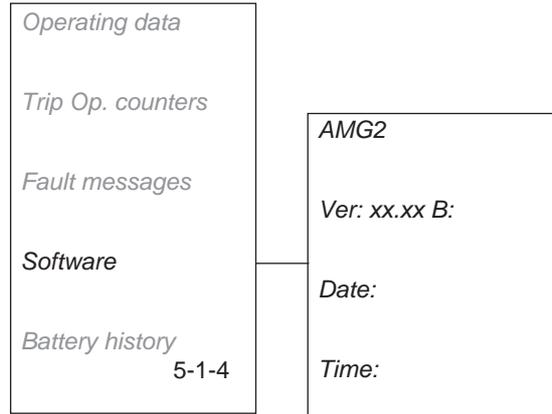
a function to delete all saved fault messages. To reset: Place the cursor on *Reset fault* and press **YES**. Now press **YES** when asked *Reset fault counter?*. The message *Clearing fault log* is shown for a few seconds.



2. SPECIAL MENU FUNCTIONS

Software (5-1-4)

This sub-menu contains information about the software (mower program's) version, the control box version and date of issue. The version consists of both the edition and the program type. The edition number is stated as a combination of four numbers, for example, *Ver 02.71*. The program type states which type of mower program Automower® is programmed with. *B* states the control box version.

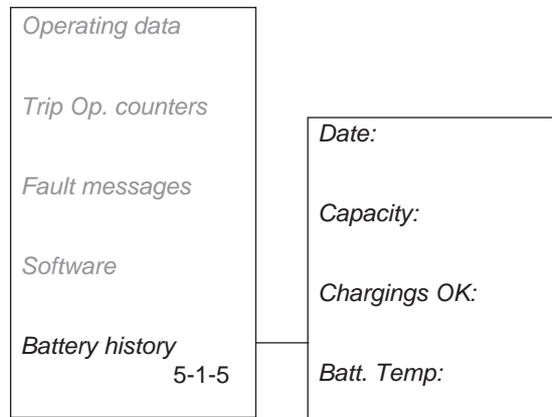


Battery history (5-1-5)

This sub-menu contains information about the battery's capacity. In order to check the capacity of the battery, the battery needs to be fully discharged.

For more information, see *Battery check* on page 20. The four most recent battery checks are saved in *Battery history*.

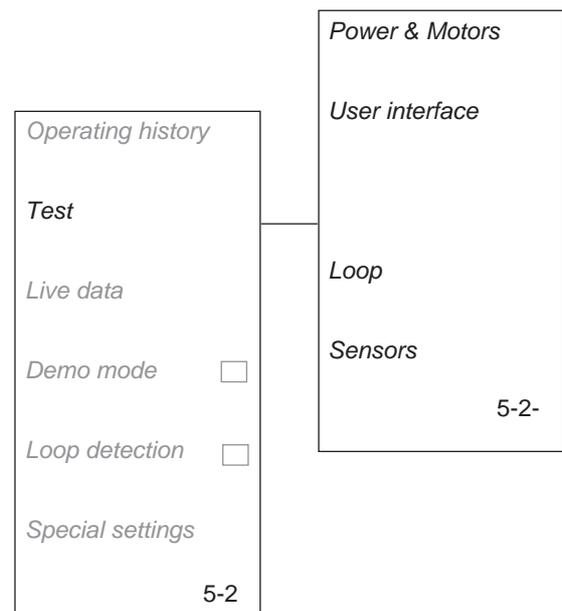
Switch between the four display modes by using **Arrow up** or **Arrow down**.



2.7.2 Test (5-2)

You can use this function to manually test how well the components in the Automower® work. The values are shown on the display during testing.

The sub-menu consists of four part menus which address the test of power and motors, user interface, loop and sensors.



2. SPECIAL MENU FUNCTIONS

Power & Motors (5-2-1)

This part menu contains the following test functions:

Wheel motors

The battery voltage should be at least 18 V when testing the wheel motors.

Place the cursor on *Wheel motors* and press **YES** to start the test. Grip the handle on the underside of the Automower® and lift up the rear wheels. The following is shown on the display during the test:

- *Power*: xx %
- *Speed L*: xx cm/s
- *Speed R*: xx cm/s
- *Voltage*: xx.x V

Use **Arrow up** and **Arrow down** to increase respective decrease the wheel force.

- Increase the force to 80 % and block respective drive wheels in at least ten different positions over the wheel revolution. Check that the motor starts again once blocking is released.
- Increase the power to 100% and check that the speed of each wheel is at least 45 cm/second for the 220 AC and Solar Hybrid, and the speed is 60 cm/second for the 230 ACX and 260 ACX. The mower should be fully charged when performing the test.
- Check to make sure that the motors' gearboxes do not slip by blocking respective wheels. When blocked the speed should be 0 cm/second. Listen for unusual noises from the gearbox

NOTE! If you need to help the wheel by hand in order for the wheel motor to start and the wheel motor stops as soon as the wheel is blocked, the fault is in the control box.

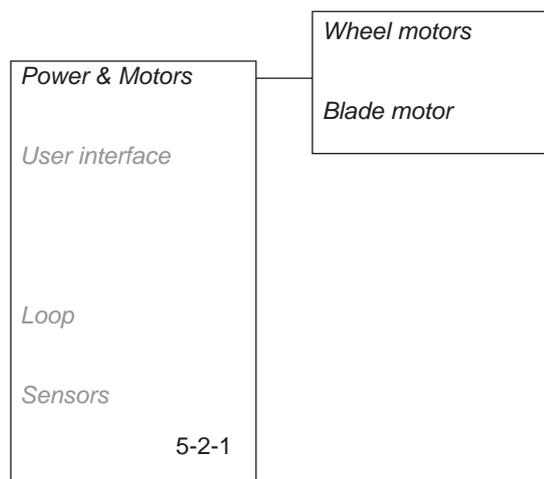
NOTE! When a motor does not start and is extremely difficult to turn by hand, except from the wheel motor, the control box may be faulty.

- Inspect the cabling and electrical connectors on the wheel motors and to the mower's control box. If the mower program in the mower is version 2.3x or older (220 AC and 210 C), or 2.4x (230 ACX), it is more likely that a wheel motor fault is due to a defective control card, rather than a defective wheel motor.

Press **Arrow back** to exit the test.

Blade motor

Place the cursor on *Blade motor* and press **YES** to start the test.



2. SPECIAL MENU FUNCTIONS



WARNING

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

Four values are shown on the display:

- *Current: xx*
= an indicator of how much power is needed to maintain 2500 rpm (1750 rpm for 260 ACX). In idling mode position, the normal value is approximately 40-150 (for 260 ACX the value is approximately 60-200).
- *Average current: xx*
= same type of indication value as above, but measured as an average value during approximately 8 hours of mowing time. A high value indicates that the blade disc is blocked.

The current and average current are the values compared and the difference between them determines whether the Automower® should start square mode cutting or not.

- *Speed: xxxx rpm*
The normal speed is approximately 2,500 rpm (1750 rpm for 260 ACX).
- *Voltage xxV*
The battery voltage should be at least 18V in order to evaluate the function of the cutting motor.

Press **Arrow back** to exit the test.

User interface (5-2-2)

This sub-menu, which is only available on 220 AC, contains the following test functions:

Keypad

The button being tested is shown on the display and the position *ON* or *OFF*. *ON* should be displayed when the button is pressed down and *OFF* when the button is released.

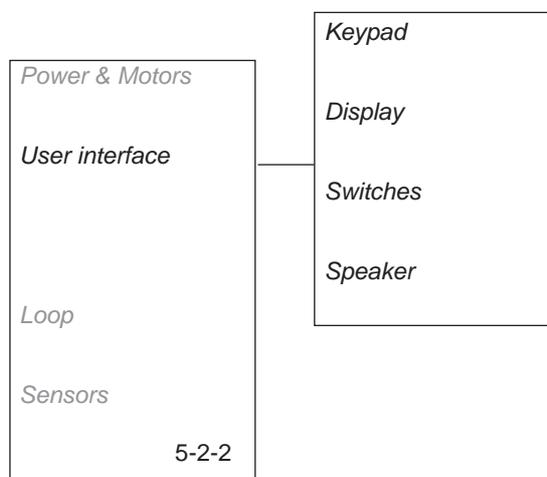
Press the **Return arrow** to end the test.

Display

Press **YES** repeatedly to light and dim all pixels and to light a grid.

When one or more pixels do not light or dim as above the display is defective.

Press **Arrow back** to exit the test.



2. SPECIAL MENU FUNCTIONS

Switches

Turn the main switch *ON* and *OFF*. *ON* should be shown on the display when the switch is turned to the *ON* position. When the switch is in the *OFF* position, *OFF* should be shown.

Close the control panel cover to test the stop button. When the cover is closed *ON* should be shown on the display. Now press down the stop button and *OFF* should be shown. On Solar Hybrid the stop button is connected in series to the panel cover's switch.

Press **Arrow back** to exit the test.

Speaker

Place the cursor on *Speaker* and press **YES**. The speaker should sound. If not, it is defective.

Press **Arrow back** to exit the test.

Loop (5-'2-4)

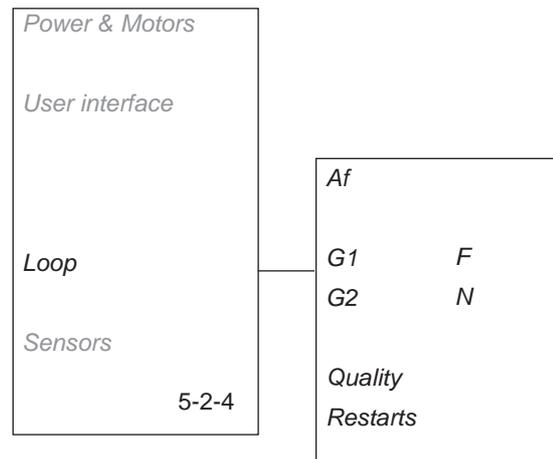
The test must be performed where there is a charging station and boundary wire installed to get correct values when testing the loop.

Place the cursor on *Loop* and press **YES**. Now read the signal values.

- *Af* = The strength of the A-signal measured via the front loop sensor on the mower. The value should lie between approximately 70 and 320 to ensure good functionality. The closer to the loop the mower is, the higher the value. When the Automower® is directly over the loop the value is 0 and when the mower is outside of the loop the value is negative.

Ar = The strength of the A-signal measured via the rear loop sensor on the mower. *Ar* is shown when you press **Arrow up**. The guideline values of approximately 70 – 320 also apply for *Ar*.

- *G1* and *G2* = The strength of the guide signal for each guide wire measured via the front loop sensor and close to the guide wire. To the left of the guide wire, in the direction towards the charging station, the value is negative and to the right of the wire the value is positive. The guide wire is named *G1* for 220 AC and the guide wires are named *G1* and *G2* for 230 ACX, Solar Hybrid and 260 ACX. To ensure the functionality of the guide wire, the value should be (-) 250 – 320 next to the guide wire.
- *F* = an indication of the F-signal strength. The F-signal is generated by the large coil in the charging station plate.
- *N* = an indication of the N-signal strength. The N-signal is generated by the two small coils in the charging station plate.
- *Quality* = an indication of the loop's overall function. The normal value is 100 %. Another value indicates there is a system malfunction.



Loop system reminder:

The charging station generates four signals, one to the boundary wire, one to the guide loop and two to the coils in the plate.

A-signal: Signal that demarcates the working area. Normal value for the A-signal: about 70 – 320.

Guide signal: Signal that delimits the guide area. Default value for the Guide signal next to the guide wire: about (-) 250 – 320.

F-signal: Remote signal that helps the Automower® to find the charging station. Normal value for F with Automower® in the test position: Over 300.

N-signal: Near signal that guides the Automower® into the charging station. Normal value for N with Automower® in the test position: Over 100.

The loop signals can only be interpreted if the Quality value is 100 %. When the value is 99 % or lower, the loop system does not function correctly and with that, the displayed values for the signals will not be correct.

2. SPECIAL MENU FUNCTIONS

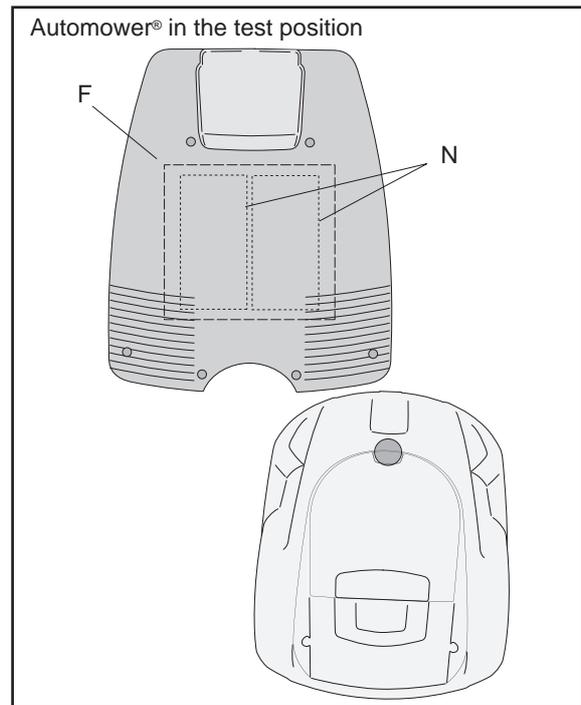
- *Restarts* = an indication that the loop system is restarting. Within 5 – 10 seconds after the function starts, the restart value stabilises. When the value continues to change this indicates that the system is affected by interference or is defective.

The value for Ar is shown when you press **Arrow up**. When the rear loop sensor is malfunctioning the Ar value is constant and the *Quality* value is 0 %.

The Automower® must stand in a special test position to receive usable values when testing the F- and N-signals. This means the nose of the mower is partly edge to edge with the charging station base plate, partly to the right of centre. See the picture opposite.

The value for the F-signal should be above 300 and the value for the N-signal should be above 100.

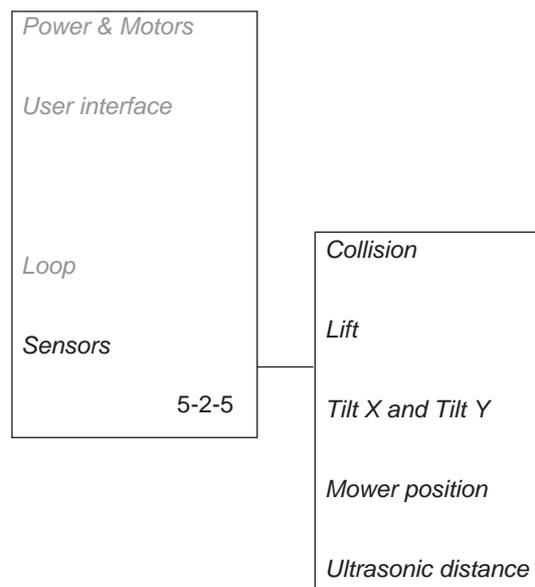
When one of the values is lower than 300 respective 100, there is probably a coil fault in the charging station plate (see page 89 to replace the plate). The loop sensors on the Automower® could also be faulty.



Sensors (5-2-5)

The easiest way to test the sensors is when the Automower® is at a standstill. The following values indicate:

- *Collision* = position of the right and left collision sensors. To test the collision sensors: Hold the handle on the underside of the Automower®. Press on different parts of the body. The display shows *None*, *Both*, *Left* or *Right*. Continue to press on the body until you see that both collision sensors work.
- *Lift* = position for the lift sensor. To test the lift sensor, lift up the front part of the body. When the body is lifted up, the lift sensor is activated and *YES* is shown on the mower's display. When the mower is in the lowered position *NO* is shown.
- *Tilt X* and *Tilt Y* = the movement of the angle sensors where X is the inclination front/rear and Y the inclination left/right-hand side. When Automower® is horizontal the values should be max ± 3 . Inclination up and to the left give a negative values.



2. SPECIAL MENU FUNCTIONS

- Mower position = the part of the angle sensor that states *Mower normal pos.* or *Mower reversed*.

The tilt sensor can be calibrated if necessary via the function *Tools- Special settings - Calibrate tilt sensor* (shortcut 5-6-3).

- *Ultrasonic distance* = indicates the mower's distance to the closest obstacle. A correct value is between 40-300 cm (16"-120") and changes when the mover moves forward or backward in relation to the obstacle. The test is best completed outdoors on the grass.

2.7.3 Live data (5-3)

This function can be used to study an Automower® in operation. Using *Live data* you receive relevant data for respective component groups or function.

Select a group and start the Automower®. A group of values (data) are shown on the display when the mower is working. See 2.7.2 *Test (5-2)*, page 35 for more information about the different values. Press **Arrow back** to exit.

Blade motor (5-3-1)

Current, average current, speed and voltage are shown.

Wheel motors (5-3-2)

Power L, power R, pulse difference and speed are shown.

Battery (5-3-3)

Voltage, charge, current and battery temperature are shown.

Loop (5-3-4)

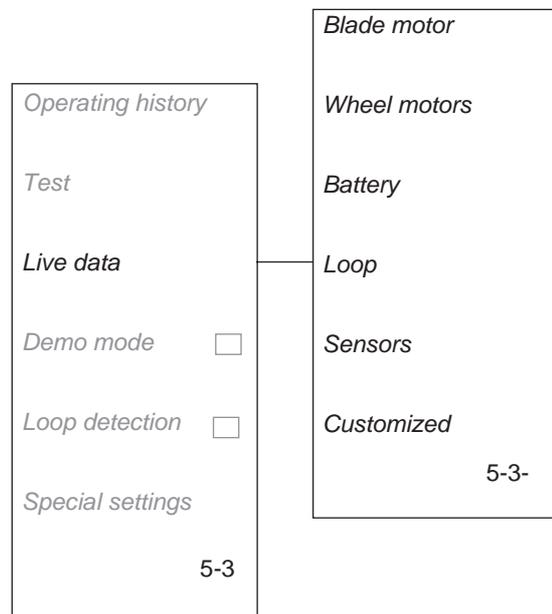
Values for the loop signals, quality and restart are shown.

Sensors (5-3-5)

Positions for the collision sensors, lift sensor and tilt sensor are shown.

Customized (5-3-6)

Customized is a function to determine which four values are to be shown on the display when *real time data* is started. However, the function does not need to be use other than on the direct request of Husqvarna AB.

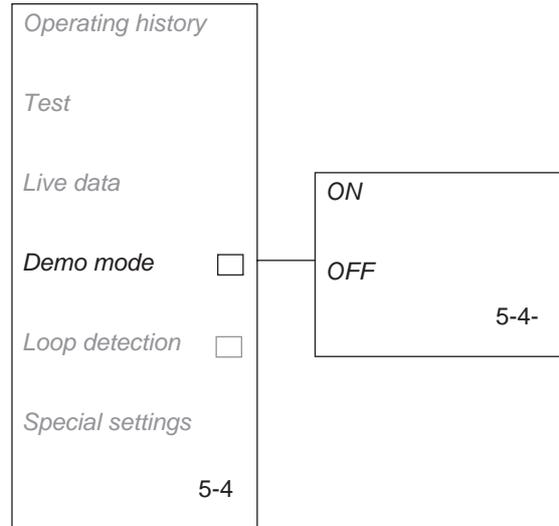


2. SPECIAL MENU FUNCTIONS

2.7.4 Demo mode (5-4)

The function is only available for the 220 AC and 230 ACX, without GSM software. In demo mode the Automower® works without starting the blade disc. The mower varies running with charging at four minute intervals.

The checkbox is checked when ON is selected.

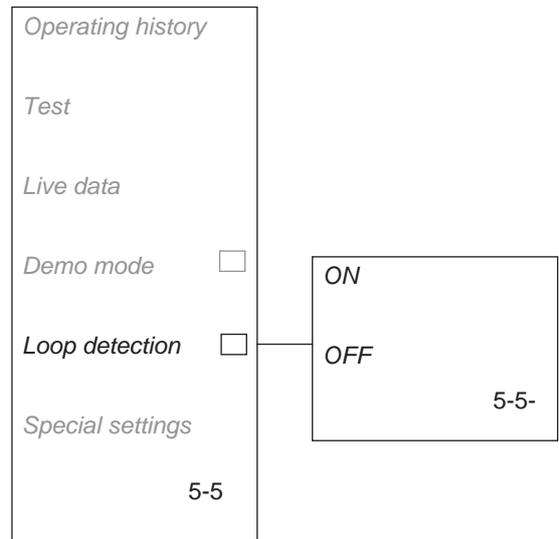


2.7.5 Loop detection (5-5)

This function makes it possible to temporarily switch off a mower's loop detection, i.e. to be able to run it without the charging station and boundary wire being installed. Such times include demonstrating an Automower® at the home of a customer.

The checkbox is checked when ON is selected. ON means the Automower® can only work when there is a loop signal.

The function is switched off automatically when the mower is switched off and on using the main switch. NOTE! Remember to reactive loop detection again.



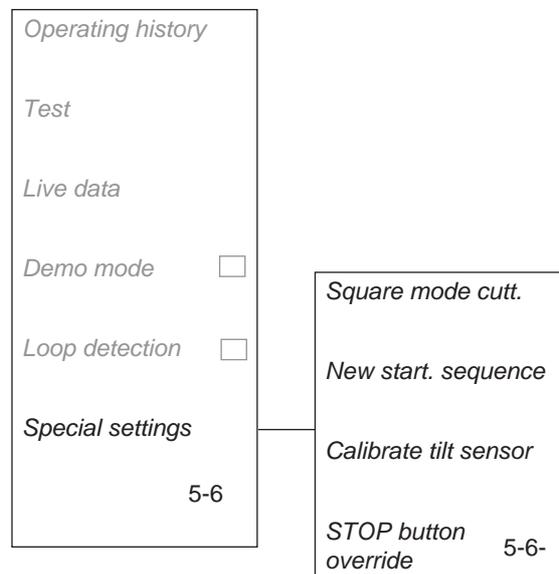
2.7.6 Special settings (5-6)

Square mode cutting (5-6-1)

The function is only available via the mower's menu on the 220 AC, 230 ACX and Solar Hybrid, without GSM software. However, the limit value can be set for all mowers in Autocheck.

The limit values for when the Automower® should start square mode cutting is set at the factory at 70% for 230 ACX and 50% for 220 AC and Solar Hybrid. For the 260 ACX, square mode cutting is not activated at the factory. The value can be changed in exceptional cases, when an Automower® seems to use square mode cutting frequently or infrequently. The higher the value, the more infrequently Automower® will carry out square mode cutting and vice versa. See page 11 for more information about square mode cutting.

To change the entry level: Select *Square cutting* and then place the cursor on *Input value* and press **YES**.



2. SPECIAL MENU FUNCTIONS

It is also possible to switch the square cutting function off completely. However, this should only be done in exceptional cases. To switch off square cutting: Select the function *OFF* and press **YES**. Place the cursor on *OFF* and press **YES** again.

Reset square cutting is used to reset the time counter for square mode cutting. An Automower® must run uninterrupted (mowing + charging) for about 13 – 14 hours before it can start square mode cutting. This function is used, for example, if you wish to prevent square mode cutting when the mower is moved from a well-mown area to an unmown area. Select the function and press **YES** when the cursor is on *Yes* to reset.

New startup sequence (5-6-2)

This function can be used when a second-hand Automower® is sold. The new owner will then be asked the start-up questions about language, date, and time when the main switch is turned *ON* for the first time. In addition, all settings on the Automower® will be restored to their original values, see *Table 3: Factory settings, page 42*.

To select a new start-up sequence: Place the cursor on *New start-up sequence* and press **YES**. Now press **YES** when asked *Select new startup?*.

Calibrate tilt sensor (5-6-3)

To calibrate, i.e. reset the tilt sensor: Place the Automower® on a horizontal surface. Place the cursor on *Calibrate tilt sensor* and press **YES**. Now press **YES** when asked *Calibrate tilt sensor?*.

STOP button override (5-6-4)

When *STOP button override* is actuated the Automower® can be started and stopped with the help of the number **0** instead of the **STOP** button. This function is suitable when the display is difficult to read on a working mower, for example, when charging or running in *Live data* mode.

The function is switched off automatically when the mower is switched off and on using the main switch.

Table 3: Factory settings

Function	220 AC, 230 ACX, Solar Hybrid, 260 ACX
	Value (min – max)
<i>Drive past wire</i>	27cm (15 – 50cm), 11" (6" - 20")
<i>Reversing distance from charging station</i>	60cm, random ± 20cm (15 – 300cm) 24", random ± 8" (6" - 120")
<i>Exit angles</i>	90° – 270° (45° – 315°)
<i>Follow loop out</i>	No area activated

2. SPECIAL MENU FUNCTIONS

Table 3: Factory settings

Function	220 AC, 230 ACX, Solar Hybrid, 260 ACX
	Value (min – max)
<i>Boundary wire delay</i>	11 minutes
<i>Guide delay 1</i>	4 minutes (2 minutes for 260 ACX)
<i>Guide delay 2 (only 230 ACX, Solar Hybrid and 260 ACX)</i>	4 minutes (2 minutes for 260 ACX)
<i>Boundary wire corridor</i>	10 (19 for 260 ACX)
<i>Guide corridor 1</i>	10 (19 for 260 ACX)
<i>Guide corridor 2 (only 230 ACX, Solar Hybrid and 260 ACX)</i>	10 (19 for 260 ACX)
<i>Timer</i>	No limitation
<i>Time lock</i>	30 days
<i>Alarm</i>	Deactivated
<i>Square mode cutting (EXP-position)</i>	230 ACX: 70 %, 220 AC/Solar Hybrid: 50 %, 260 ACX: deactivated
<i>Sounds Keypad</i>	ON
<i>Sounds Operation</i>	OFF
<i>Garden shape</i>	Normal

3. INSTALLATION

3. Installation

3.1 Charging station

The placement of the charging station should be well planned in order to give the best installation and function of the Husqvarna Automower®:

- The charging station should have a central placement in the working area, so that the Automower® can find it as soon as possible. A central placement is of extra importance with complex installations.
- Automower® finds the charging station much easier when there is a large open area in front of it. If you use a guide wire and follow it out from the charging station, it is extremely important with a large open space, likewise if you have set the mower for a wide corridor (see 1.9 *Corridor width*, page 16).
- The charging station must be positioned on relatively level ground. The height difference must not differ more than 5 cm (2") between the front and rear of the charging station.
- The battery is spared if charged in the lowest possible ambient temperature. Consequently, it is beneficial if the charging station can be placed where it is shaded, especially during the warmest parts of the day.
- The transformer must be placed where it is well ventilated and is not exposed to direct sunlight. Under no circumstances may it be enclosed in any form of small box or plastic bag. The transformer should be placed under a roof, preferably indoors.

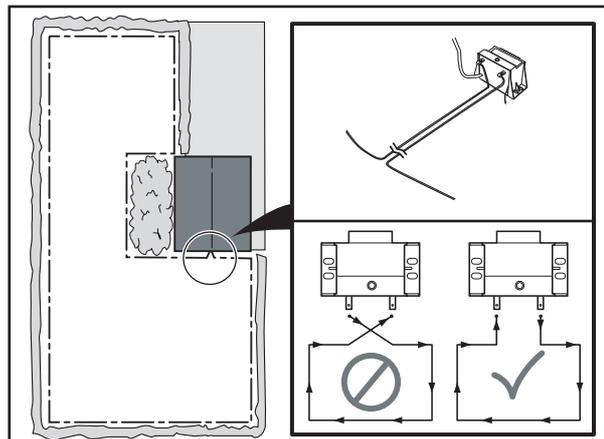
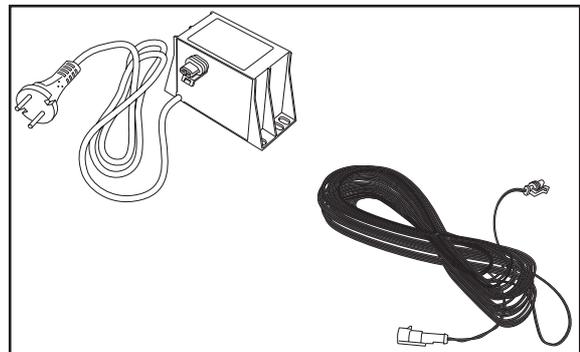
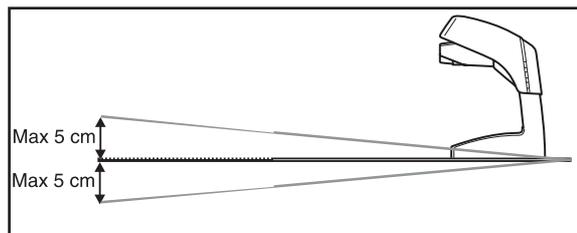
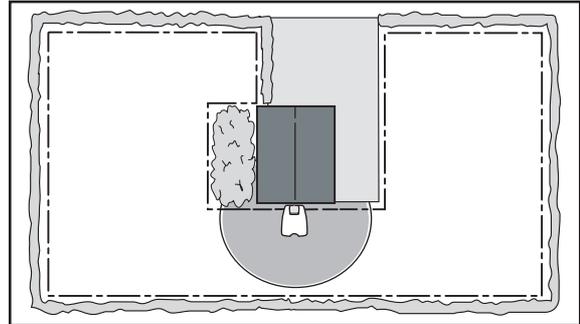
The supplied low voltage cable is 20 metres (65 ft) long. The low voltage cable must not be shortened nor extended.

It is recommended to use an earth fault-breaker when connecting the transformer to the wall socket.

Loop generator/charger (only 210C) should be installed as the transformer above. The ends of the boundary wire are run in parallel and close to each other, in towards the loop generator/charger.

- If you use a guide wire the charging station must be placed so that the overall guide loop is not too long. The guide loop should not be longer than about 300 metres (1000 ft).

Guide loop = the guide wire from the charging station to the T-connection on the boundary wire + the boundary wire from the T-connection (to the left seen in the direction towards the charging station) back to the charging station. For more information about the guide loop, see 1.8.2 *Guide loop*, page 15.



3. INSTALLATION

3.2 Boundary wire

To start an Automower® requires a charging station and boundary wire to be installed. It is not possible to test drive a mower until the installation is complete. The Automower® displays the fault message *No loop signal* when an attempt is made to start before the installation is complete.

However, it is possible, to test the mower before the installation is completed, by connecting a short, temporary loop in a small area around the mower. Alternatively you can temporarily deactivate the mower's loop detection (see 2.7.5 *Loop detection (5-5)*, page 41. Note that this type of special function is not available to consumers).

3.2.1 Laying the boundary wire

Stapling

It is easier to readjust a stapled boundary wire, as it does not lie so deep. The function *Check loop*, (shortcut 3-4-1) can be used to detect the wire, which can then be pried up using a screwdriver. Care must be taken though so as not to damage the wire.

Burying

A buried boundary wire is more protected than a stapled wire, which may be an advantage if you need to dethatch or aerated the lawn.

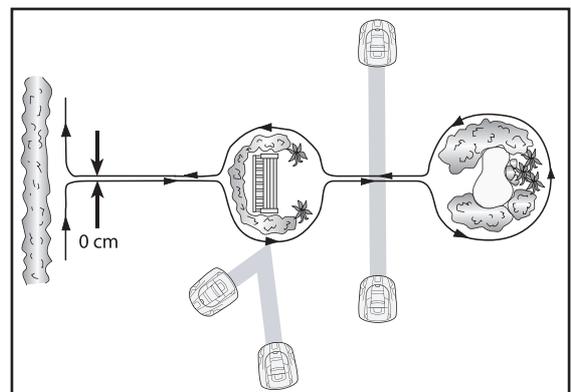
When burying, make a channel using a spade, approximately 1 – 20 cm (0.5" - 8") deep, around the entire garden. Place the wire in the channel and then fill it in.

You can also cut a channel using an edge cutting tool.

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 along the same path under the same staples. The distance between the wires on the return route should be as small as possible.

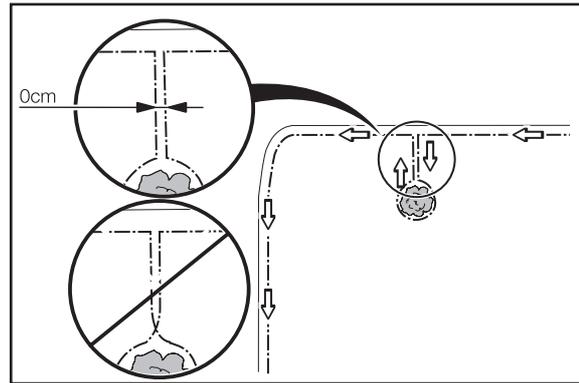
The Automower® interprets an odd number of wires next to each other as an outer edge where it should turn. On the other hand: The mower will run over an even number of wires close to each other.



3. INSTALLATION

Should the cables to and from an obstacle cross, the Automower® can perceive it is outside the working area despite being inside the working area. Besides, if the obstacle is relatively large in relation to the working area this can affect the mower within the entire working area.

Obstacles within the working area that can be run into should still be demarcated by the boundary wire even though the function of the Automower® does not demand this. It will however make operations quieter and significantly reduce wear on the Automower®. Obstacles that can withstand a collision include large trees, large kerbstones, swing frames, sandpits, walls, thick bushes, etc.

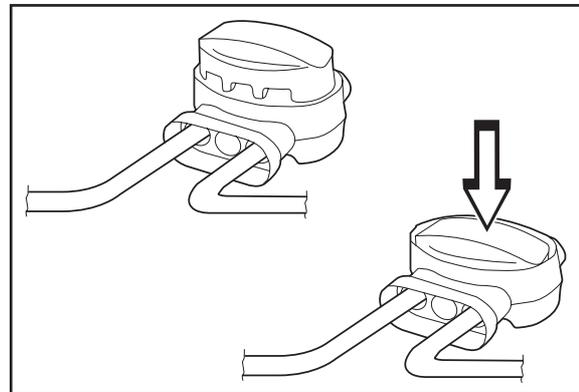


Connector

If the supplied boundary wire is not long enough to run all the way round the working area, an additional wire can be spliced on using an original solderless coupler (part number 501 98 02-01). The total length of the boundary wire should not exceed 500 metres (1600 ft), (250 metres (800 ft) for 210 C). For installations where a longer boundary wire of up to 800 metres (2560 ft) is required, we recommend a Signal amplifier (522 42 58-01), which is available as an accessory.

To join the boundary wire: Insert both ends of the wires into the connector. Then press down the button on top of the connector. The button has been pressed down fully when none of edges of the button can be felt or seen on the connector.

Tip! The connector must be pressed together fully to ensure functionality. A pair of pliers is recommended.



IMPORTANT INFORMATION

Twisted cables, or a screw terminal (chock-block), insulated with insulation tape is not a satisfactory splice. Soil moisture will cause the conductors to oxidise and after a while result in a broken circuit.

3.3 Guide wire

This section does not apply to 210 C.

3.3.1 Need of a guide wire

With the help of a guide wire Automower® can quickly and easily find the charging station by following the guide wire instead of searching irregularly or by following the boundary wire.

On 230 ACX, Solar Hybrid and 260 ACX it is possible to install two guide wires, examples showing installation with two guide wires can be found in chapter 3.10 *Installation examples, page 54*.

3. INSTALLATION

When any of the following can be found in the working area, the installation of a guide wire is recommended.

- Narrow passages.

In passages where the distance between the boundary wires is less than 3 metres (10 ft), it is recommended to install a guide wire through the passage. This is a better solution than allowing Automower® to follow close to the boundary wire by setting a low *Corridor width* value.

- The boundary wire runs along a steep slope (steeper than 35 %).

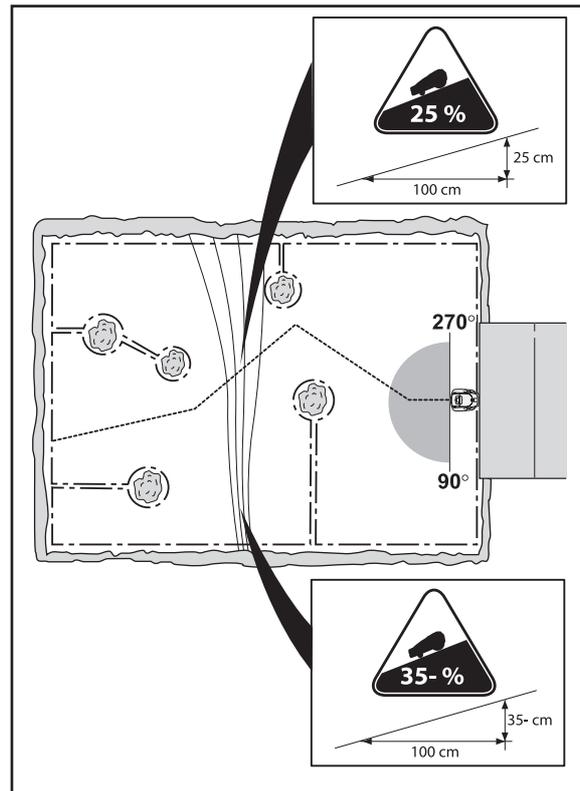
When Automower® follows the boundary wire that runs along a steep slope, the mower will change direction and run away from the boundary wire.

- Numerous or large islands.

If Automower® is permitted to follow the boundary wire it may circle an island roughly twice before it leaves the island and once again searches for the boundary wire.

- The route to a remote area is long or complicated.

When Automower® shall follow the boundary wire to or from a remote area and the route along the boundary wire to the area is long or complicated.

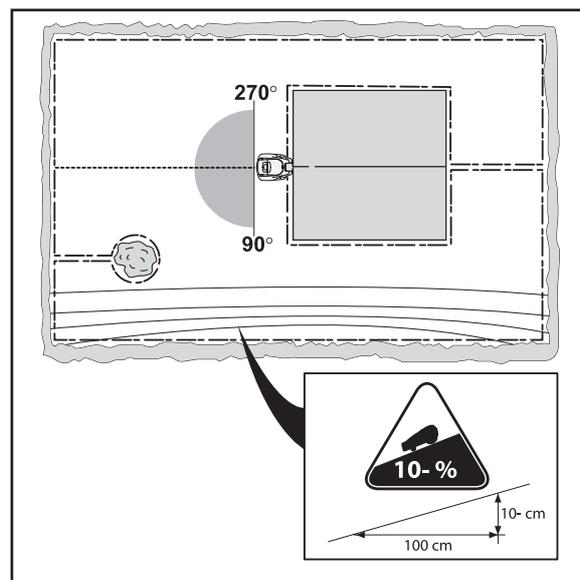


- The boundary wire runs across a long slope (steeper than 10 %).

When Automower® follows the boundary wire across a slope (steeper than 10 %) the mower must compensate for the slope. The mower must stop relatively often to check the strength of the loop signal and then follow the boundary wire at a slower speed. The risk of the mower running outside of the working area due to skidding increases.

- The charging station is positioned on an island.

When there is more than 4 metres between the charging station and the outer edge of the boundary wire, it can take a long time for Automower® to find the charging station when it follows the boundary wire. There is a risk of the mower following the outer edge of the working area 2 – 3 turns before it changes direction and starts to follow the loop at another spot.



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3.3.2 Installation of the guide wire

Check that the charging station has the best placement.

- Placement of the charging station and where on the boundary wire the guide wire is connected affect the length of the guide loop, see the 1.8.2 *Guide loop*, page 15.

The adjoining picture shows what is considered a guide loop.

The picture is also a good example of an ideal position for the charging station to give the shortest possible guide loop.

- Make the guide wire as short as possible. The longer the guide wire, the closer the mower follows the guide wire. If the guide wire exceeds 300 metres (1000 ft), the mower may find it difficult to follow the wire.

If you shall install the guide wire through a passage:

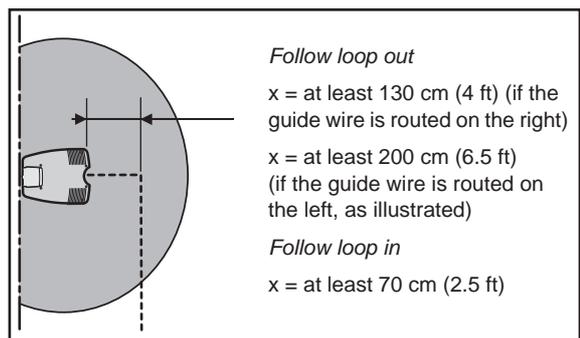
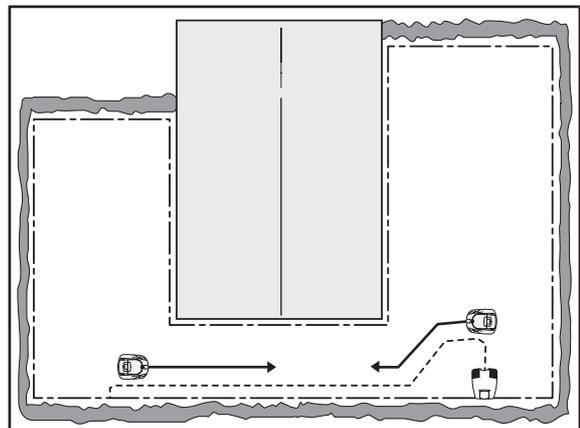
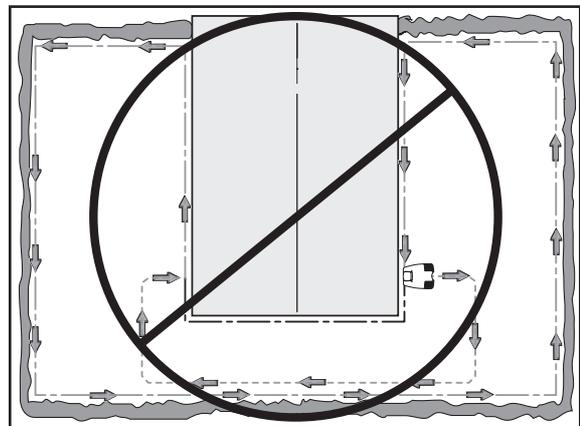
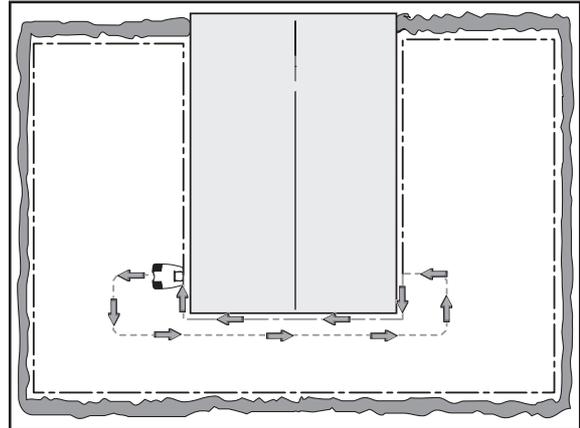
- Automower® follows the guide wire on the same side of the wire both to and from the charging station. This means that in towards the charging station the guide wire is on the right side of the mower and away from the charging station the guide wire is on the left side of the mower.

In the passage, the guide wire must be placed so that the mower has as much space to run as possible. The distance between the boundary wire and the guide wire must however be at least 30 cm (12") (see the picture above).

The same minimum measurement (30 cm, 12") also applies to the distance between the guide wire and the guide wire in the passage, if you intend to lay the guide wire backwards and forwards through the passage.

The guide wire should be connected to the charging station. If it is placed square in the working area then the measurements in the figure opposite must be observed.

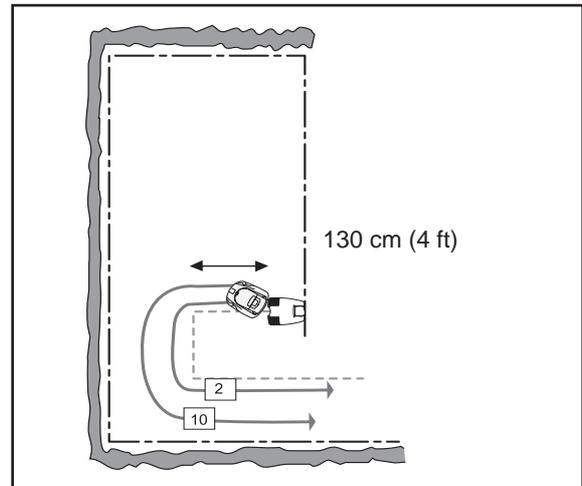
- Depending on whether the guide wire is to be used on both functions *Follow loop in* and *Follow loop out* and whether the guide wire is routed to the left or to the right, the guide wire must be routed at different distances from the front edge of the charging plate. The direction right or left applies from the charging station seen in the mower's direction of entry.



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If the guide wire is to be used for the *Follow loop out* function:

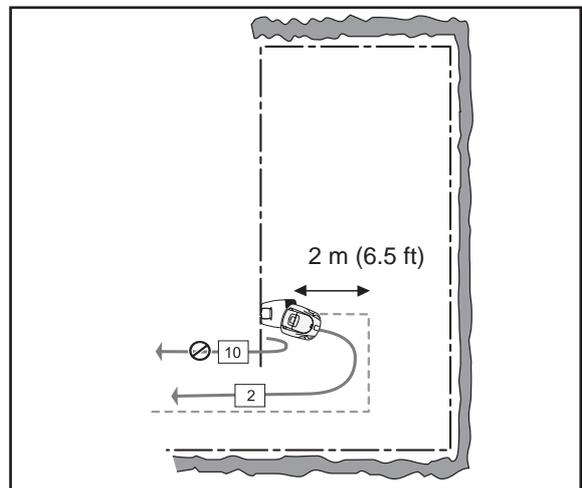
- If the guide wire runs on the right, seen in the mower's direction of entry, the guide wire must be routed at least 130 cm (4 ft) straight out from the front edge of the charging plate. In this instance, Automower® will find the right loop signal strength without problem and follow the guide wire.



- If the guide wire runs on the left, seen in the mower's direction of entry, the guide wire must be routed at least 2 m (6.5 ft) from the front edge of the charging plate. In this instance, Automower® will find it difficult to find the low loop signal strengths, i.e. if a high Corridor width value is used. There is then a risk that the mower will not find the right strength on the loop signal and can not follow the guide wire.

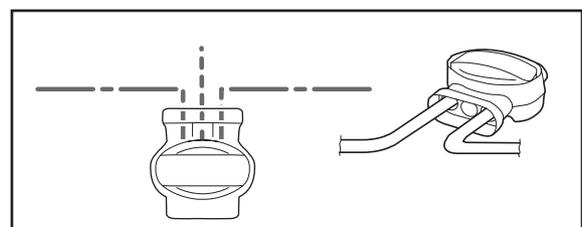
If the guide wire is to be used for the *Follow loop in* function:

- When the guide wire is only used for the *Follow loop in* function it is sufficient for the guide wire to be routed 70 cm (2.5 ft) straight out from the front edge of the plate.
- Should the mower, when it follows the guide wire, collide with an obstacle, it changes direction and leaves the guide wire.



The standard boundary wire should be used for the guide wire. Use a regular boundary wire as a guide wire. There are three varieties, 150 m (480 ft) (501 98 03-01), 250 m (800 ft) (501 98 03-02) or 500 m (1600) (522 91 41-01, extra strong).

The guide wire should be connected to the boundary wire with the help of an original connector, 501 98 02-01. See the picture opposite.



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3.4 Testing the installation

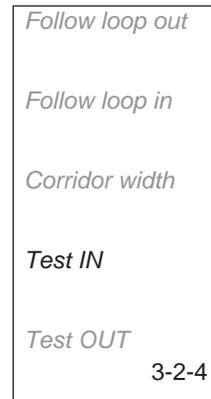
This section does not apply to 210 C.

3.4.1 Test IN (3-2-4)

The *Test IN (3-2-4)* function is used to test how Automower® finds its way into the charging station.

Find the maximum *Corridor width* through trial and error:

1. Position the mower where you want to make the test and direct it towards the wire, if possible at a distance of a few metres.
2. Select *Corridor width* (guide 1, guide 2 and boundary).
3. Select the function *Test IN (3-2-4)*. When the function is selected the mower will immediately follow the boundary wire or the guide wire, depending on which one it finds first, in to the charging station.
4. Check that the mower finds the charging station without problem. If there is a passage and the mower can not run through it, the *Corridor width* value is set too high.
5. Repeat steps 1 to 4 until you find the maximum corridor width.

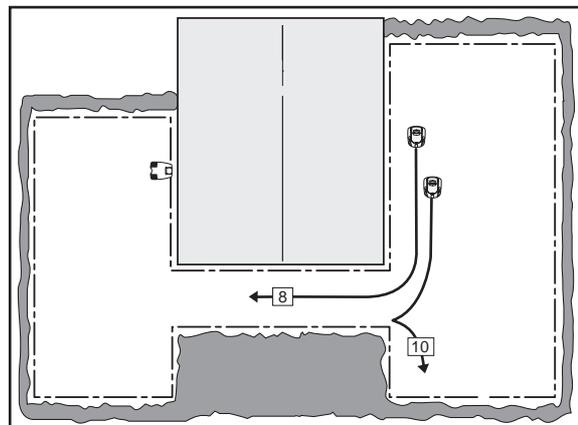


IMPORTANT INFORMATION

When *Test IN (3-2-4)* is used, the house icon on the display will come on and the mower will remain in the charging station. Press the Home button to return to operations.

The adjacent picture shows how an Automower® negotiates a passage when a value of 8 is set for the *Corridor width*, but not when a value of 10 is set.

The *Test IN (3-2-4)* function differs compared to using the **Home** button to send Automower® to the charging station. When the **Home** button is pressed down, the mower starts to search for the charging station according to the defined settings. Depending on the set delay for the boundary wire and the guide wires, it will take a specific time before the mower starts to follow the boundary wire or a guide wire in to the charging station. *Test IN (3-2-4)* is a test function that disregards the delay times. When the function is selected the mower will immediately start to follow the boundary wire or the guide wire in to the charging station.



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3.4.2 Test OUT (3-2-5)

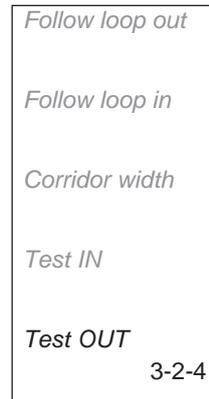
The *Test OUT (3-2-5)* function is used to try different charge exit settings and to find out how far it is from the charging station to a remote area.

To test the settings for *Follow loop out (3-2-1)*:

1. State the value 100 % for *Proportion* for the remote area to be tested.
2. Place Automower® in the charging station and select *Test OUT (3-2-5)*.

The mower will now leave the charging station directly according to the stated direction and start mowing after the stated distance.

3. Reset the *Proportion* value when testing is finished.



To find out the distance from the charging station to a remote area:

1. State a distance that easily exceeds the true distance. The maximum distance that can be stated is 500 metres (1600 ft).
2. State the value 100 % for *Proportion* for the area to which the distance is to be measured.
3. Place Automower® in the charging station and select *Test OUT (3-2-5)*.

The mower will now leave the charging station directly according to the stated direction. The distance will be shown on the display, stated in metres, as the mower runs.

4. Stop the mower after the required distance and read the distance.
5. Reset the *Proportion* value when testing is finished.

To test the settings in *Exit angles*:

1. State the value 100 % for *Proportion first* when sector 1 is to be tested. State the value 0 % for *Proportion first* when sector 2 is to be tested. All areas below *Follow loop out* must be set to 0 % as well.
2. Place Automower® in the charging station and select the *Test OUT (3-2-5)* function.

The mower will now leave the charging station directly according to the settings under *Exit angles*.

3. Reset the *Proportion first* value when testing is finished.

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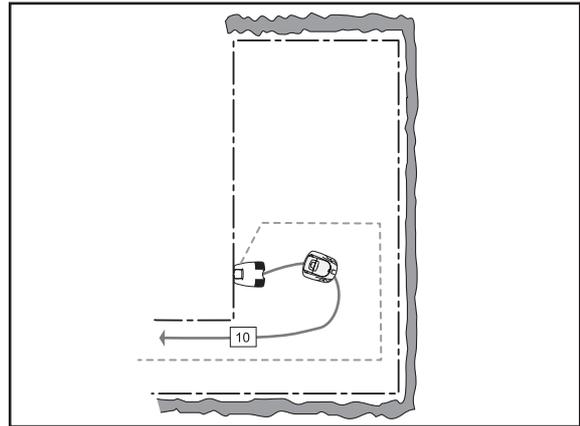
3.5 Problems following OUT

IMPORTANT INFORMATION

If Automower® does not find the right strength on the loop signal when it leaves the charging station, it will start to mow immediately instead.

Tip! If Automower® finds it difficult to follow the guide wire out from the charging station, the guide wire should, if possible, be routed further out from the front edge of the charging plate. Should this not be possible, reduce the reversing length or set a lower Corridor width value.

If the mower has difficulty in finding or starting to follow the boundary loop out from the charging station, the *Corridor width* setting should be increased. The *Reversing distance* setting may need slight adjustment. The *Reverse distance* setting can be found in the *Exit angles* menu.



3.6 One Automower® in several gardens

Automower® can be connected/coded for more than one installation, which allows a mower to be used in several gardens.

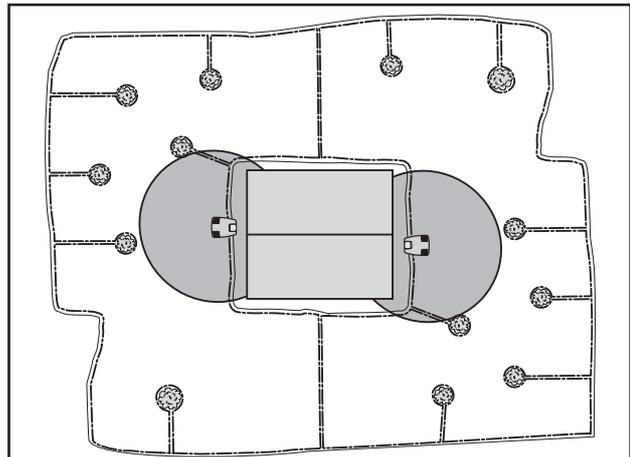
As usual the mower is coded to the first garden and then to the next garden via the *PIN code* function (The function to change the PIN code). Different PIN-codes should be used if the installations are positioned closer than 4 m (13 ft).

3.7 Several Automower® machines in one garden

If the lawn in the garden is larger than that recommended for the chosen Automower®, two or more mowers and charging stations should be installed in the garden.

Set up the installation, each with their own working area, with approximately 10 cm (4") distance from each other. All the grass in the garden will then be cut.

The installations will require different PIN codes.



3. INSTALLATION

3.8 Incline conditions

The incline of a working area can be expressed in different ways. In table 4 the relation between the different ways of expressing an incline in per cent, height-length ratio and in degrees are presented.

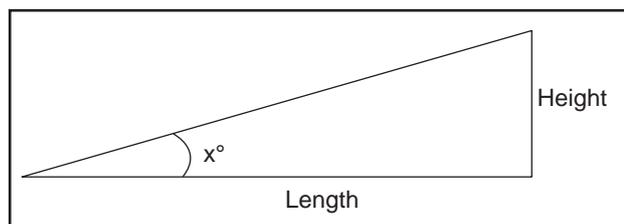


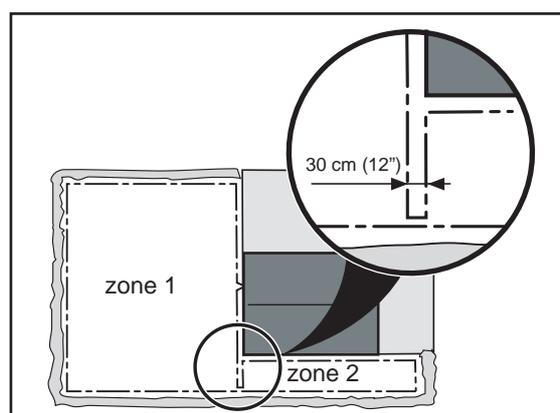
Table 4: Incline conditions

Per cent (%)	Height – length ratio (1:X)	Degrees (°)
10	1:10	6
20	1:5	11
30	1:3.3	17
35	1:2.9	19
40	1:2.5	22

3.9 Even mowing result on complex working areas

Automower® 220 AC, 230 ACX, Solar Hybrid and 260 ACX are equipped with setting options to assure an even mowing result on complex working areas too. The settings are made on the *Exit angles* (3-1) and *Follow loop out* (3-2-1) functions. By not adapting these settings, the area close to the charging station would be mown more than areas situated further away that are accessed via narrow passages. See 3.10 *Installation examples, page 54* for examples of the settings.

The garden can be divided into zones if the mowing result is uneven in an installation for Automower® 210 C. This is done with the help of the boundary wire, see the figure on the right. When the mower is placed in zone 1, it will not mow in zone 2 and vice versa. Move the mower between the zones to maintain an even mowing results.



3. INSTALLATION

3.10 Installation examples

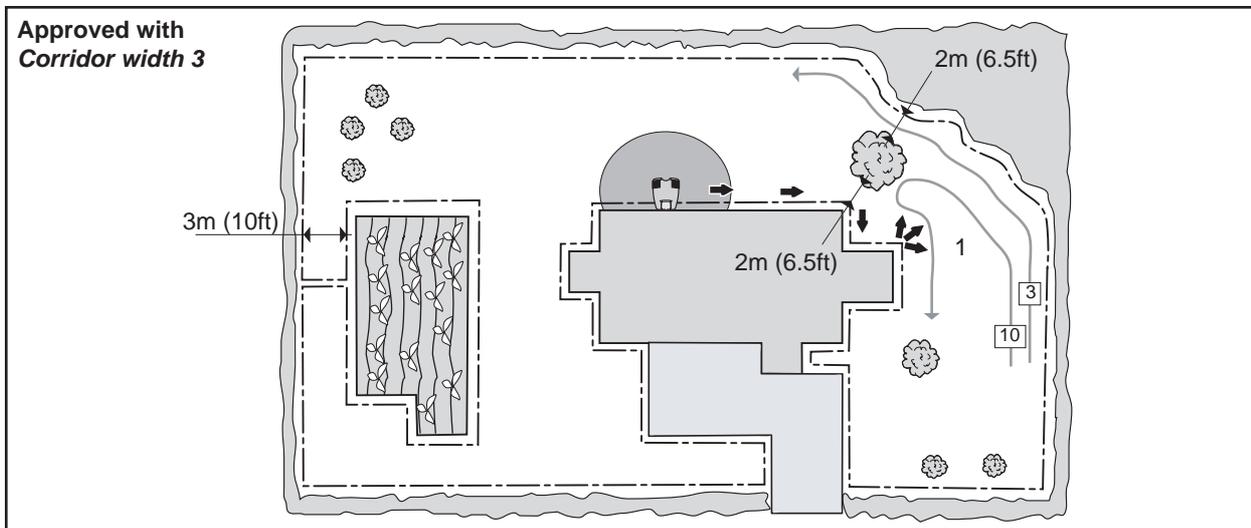
A number of examples of settings are presented on the following pages. Each installation has been assessed according to the scale:

- Non approved installation
- Approved installation
- Fully approved installation.

Example number 1

This installation is not approved if *Corridor width 10* is used. This results in a corridor that is too wide. Automower® would not pass through this passage.

On the other hand, with *Corridor width 3* the installation is approved. Automower® can pass through this passage. However, a narrow corridor can result in tracks forming on the lawn, especially around a large island. A guide wire is recommended through the passage.

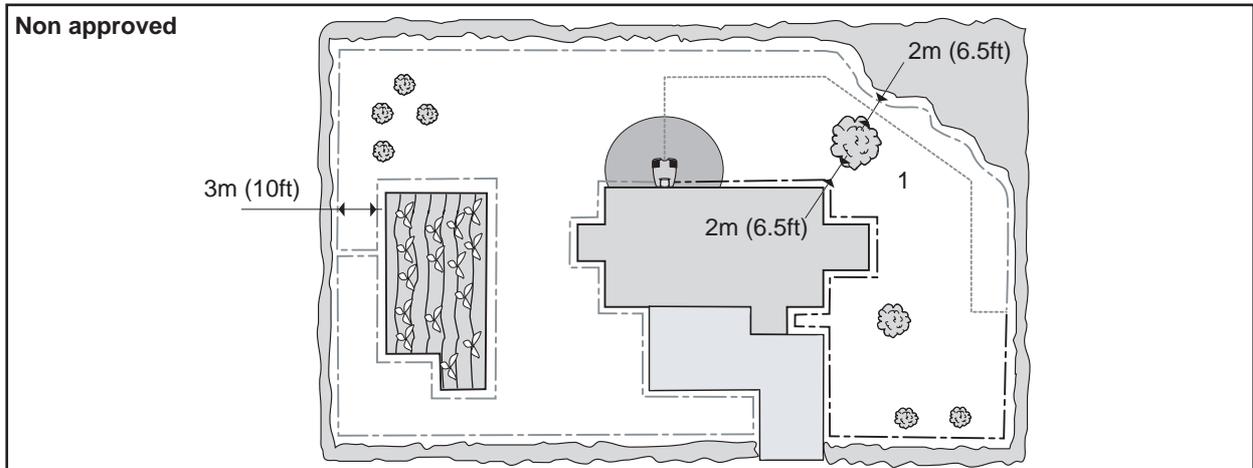


<i>Follow loop</i>	<i>Boundary wire</i>	<i>Guide wire</i>	<i>Follow loop out</i>	<i>Area 1</i>
<i>Delay</i>	11 minutes	7 minutes	<i>Direction</i>	<i>Left</i>
<i>Corridor width</i>	10 / 3	6	<i>Distance</i>	20 metres (65 ft)
			<i>Proportion</i>	30 %

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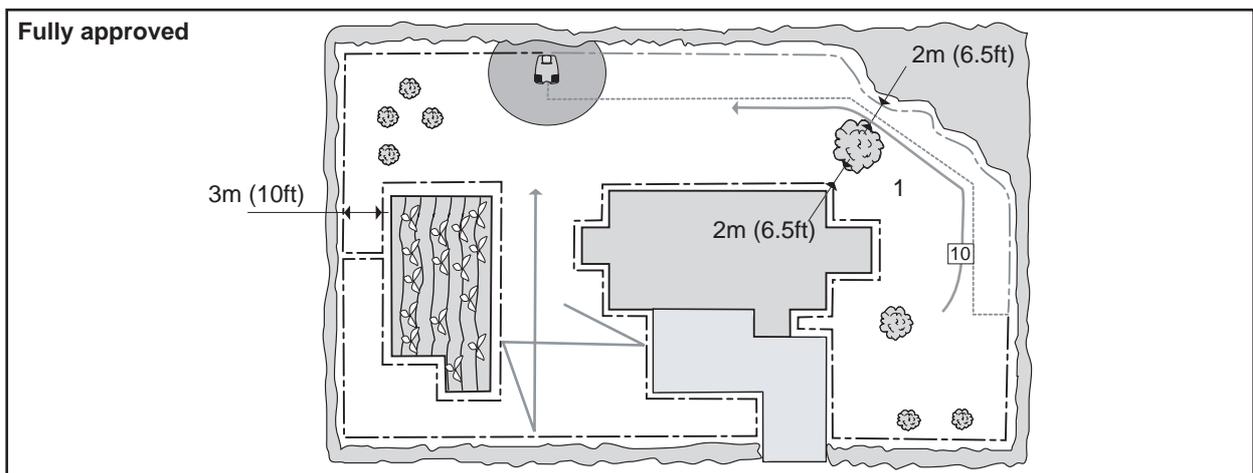
Example number 2

In this example the guide loop is longer than 300 metres (1000 ft). There is a risk that the Automower® stops following the guide wire. The charging station should therefore be moved.



<i>Follow loop</i>	Boundary wire	Guide wire	<i>Follow loop out</i>	Area 1
<i>Delay</i>	11 minutes	7 minutes	<i>Direction</i>	<i>Guide</i>
<i>Corridor width</i>	6	10	<i>Distance</i>	30 metres (100 ft)
			<i>Proportion</i>	30%

In the figure below, the charging station has been moved to the outer edge of the working area. The guide loop is now shorter than 300 metres (1000 ft) and there is a large open area in front of the charging station. The delay time for the boundary wire is set to 99 minutes, that is to say, deactivated, which reduces the risk of tracks forming. Automower® will find the charging station through the Irregular search method or by following the guide wire.



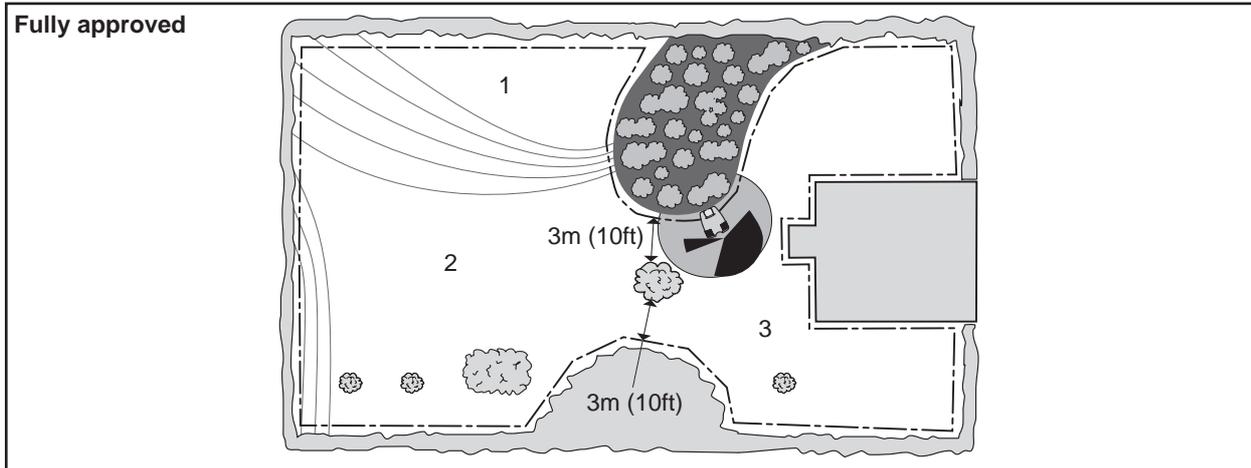
<i>Follow loop</i>	Boundary wire	Guide wire	<i>Follow loop out</i>	Area 1
<i>Delay</i>	99 minutes	7 minutes	<i>Direction</i>	<i>Guide</i>
<i>Corridor width</i>	6	10	<i>Distance</i>	30 metres (100 ft)
			<i>Proportion</i>	30%

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Example number 3

In this example different exit angles have been set. Automower® will easily reach all parts of the working area. The risk of tracks forming is less with these settings compared with allowing the mower to follow the boundary wire out of the charging station.

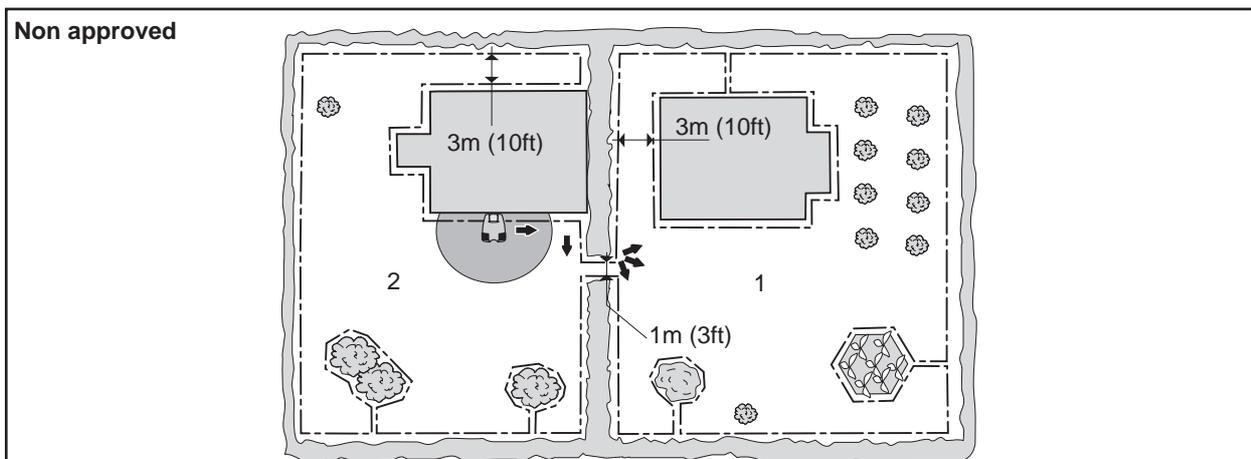
Increasing the delay time for the boundary wire increases the chance of the mower finding the charging station before it starts to follow the boundary wire. When searching it is a disadvantage for the mower to follow the boundary wire across an incline.



Follow loop	Boundary wire	Guide wire	Exit angles	Area 1, 2, 3
Delay	20 minutes	7 minutes	Start angle 1 – End angle 1 (3)	60° and 200°
Corridor width	6	6	Start angle 2 – End angle 2 (1, 2)	240° and 270°
			Proportion first	40 %

Example number 4

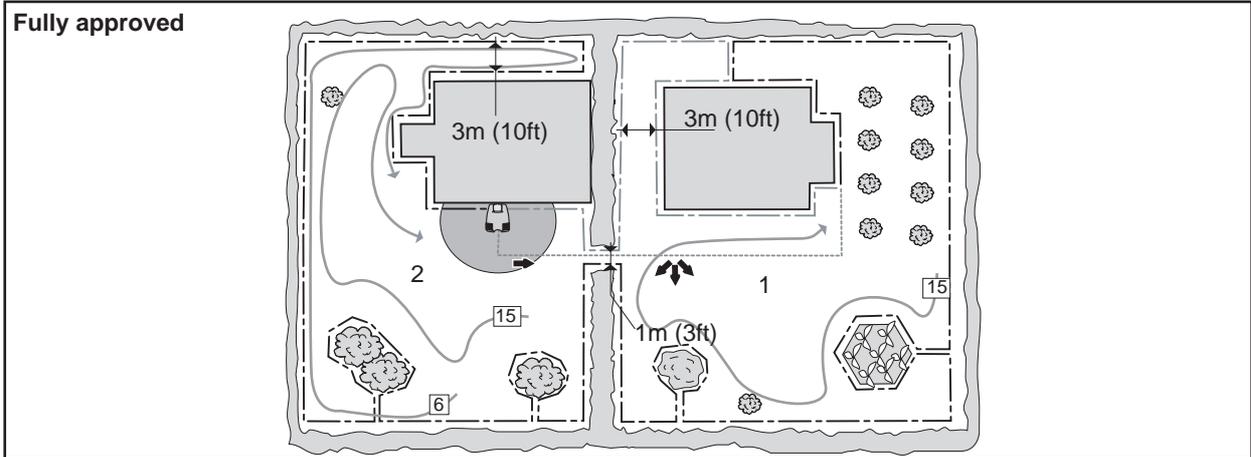
In this example a *Corridor width 0* is required for the mower to pass through the passage. This setting requires the boundary wire to be at least 40cm (16”) inside the working area, which the passage is too narrow for. The working area also contains many islands, which makes it inappropriate to allow the mower to follow the boundary wire. In order for the mower to easily pass through the passage, to avoid tracks forming and to get shorter search times, a guide wire through the passage is recommended.



Follow loop	Boundary wire	Guide wire	Follow loop out	Area 1
Delay	11 minutes	7 minutes	Direction	Right
Corridor width	0	6	Distance	10 metres (30 ft)
			Proportion	50 %

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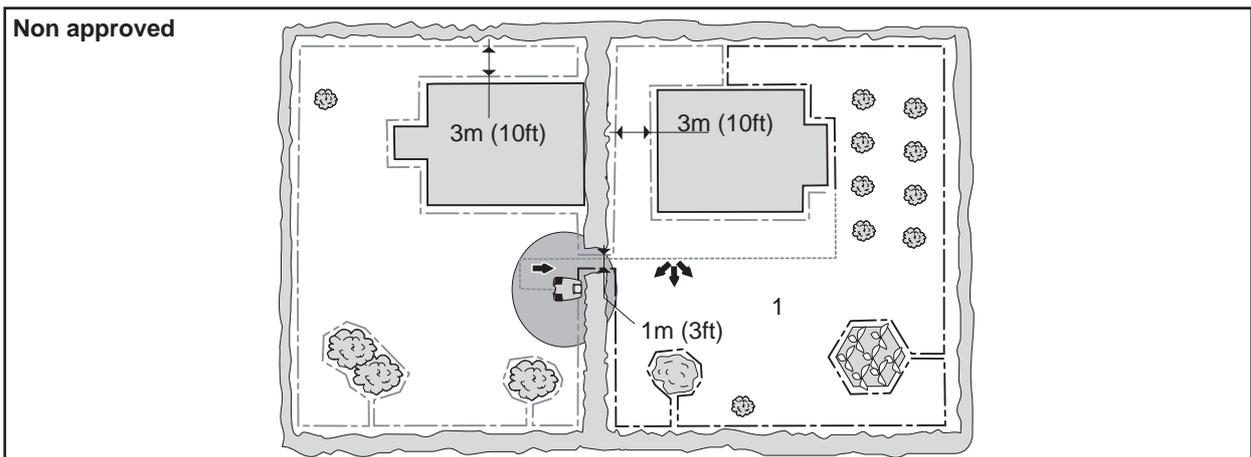
With the help of a guide wire, the Automower® finds the charging station easily from Area 1. On the other hand, there is a risk of the mower not finding its way out of the area if it does not find the guide wire and start to follow it before the delay time for the boundary wire has elapsed. From Area 2 the Automower® will normally find the charging station by using the Irregular search method. With an increased corridor width for the boundary wire the mower, when searching, will run past several passages instead of running through them, which is an advantage in Area 2.



<i>Follow loop</i>	Boundary wire	Guide wire	<i>Follow loop out</i>	Area 1
<i>Delay</i>	18 minutes	3 minutes	<i>Direction</i>	<i>Guide</i>
<i>Corridor width</i>	15	6	<i>Distance</i>	10 metres (30 ft)
			<i>Proportion</i>	50 %

Example number 5

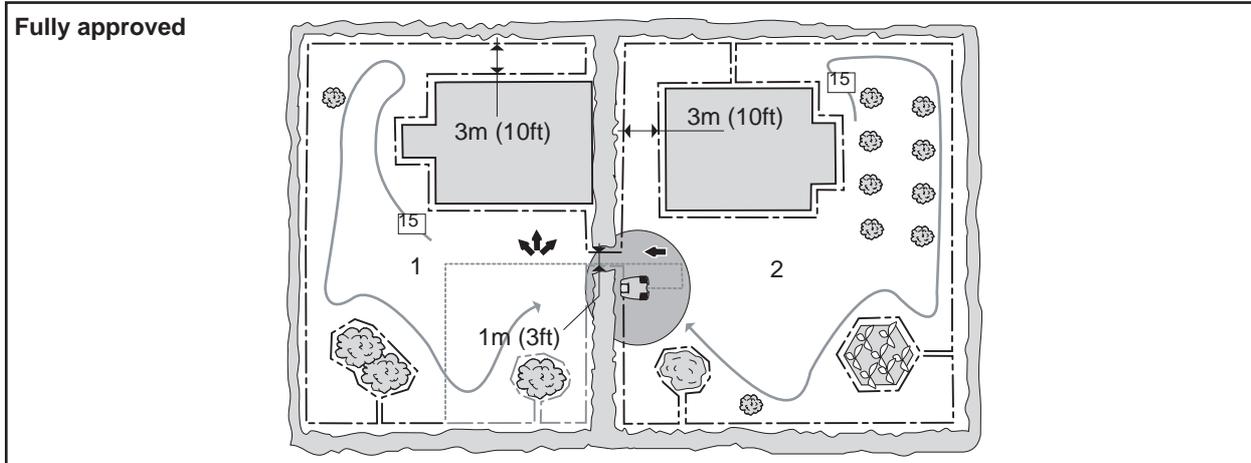
In this example the guide loop is longer than 300 metres (1000 ft). There is a risk that the Automower® stops following the guide wire. The charging station should therefore be moved.



<i>Follow loop</i>	Boundary wire	Guide wire	<i>Follow loop out</i>	Area 1
<i>Delay</i>	11 minutes	7 minutes	<i>Direction</i>	<i>Guide</i>
<i>Corridor width</i>	6	6	<i>Distance</i>	10 metres (30 ft)
			<i>Proportion</i>	50 %

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In the figure below, the charging station is placed in a corresponding position in Area 2. The guide loop will then be shorter than 300 metres (1000 ft). By increasing the corridor width for the boundary wire the mower, when searching, will run past several passages instead of running through them.

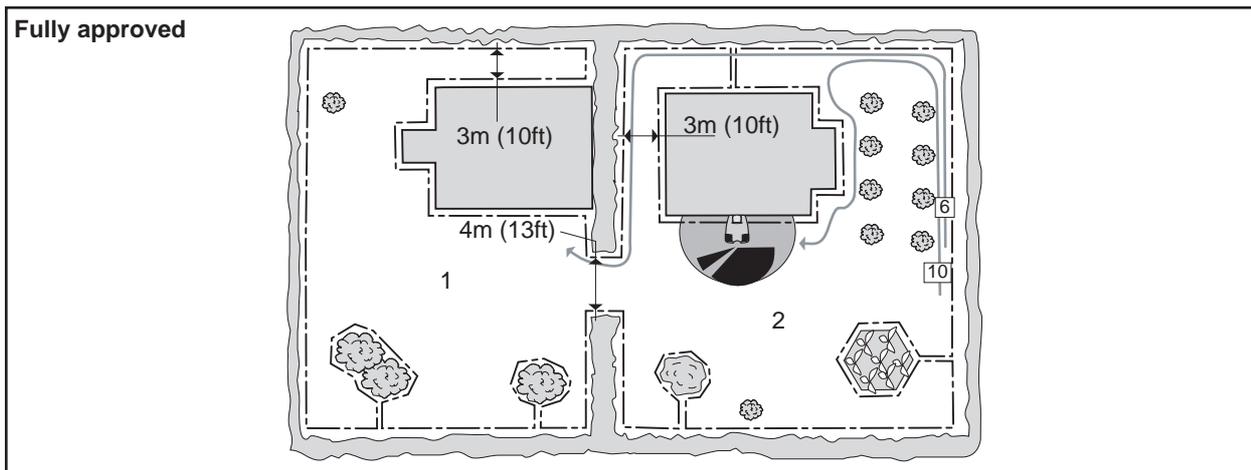


<i>Follow loop</i>	Boundary wire	Guide wire	<i>Follow loop out</i>	Area 1
<i>Delay</i>	11 minutes	7 minutes	<i>Direction</i>	<i>Guide</i>
<i>Corridor width</i>	15	6	<i>Distance</i>	10 metres (30 ft)
			<i>Proportion</i>	50%

Example number 6

In this example the charging station is placed by an island. The easiest way to reach Area 1 is with the help of the *Exit angles* function.

The working area contains many islands, which results in long search times. By increasing the corridor width for the boundary wire, the search times are reduced, as the mower will then run past unnecessary passages. However this does suggest a risk of tracks forming. Consequently, a guide wire is recommended.

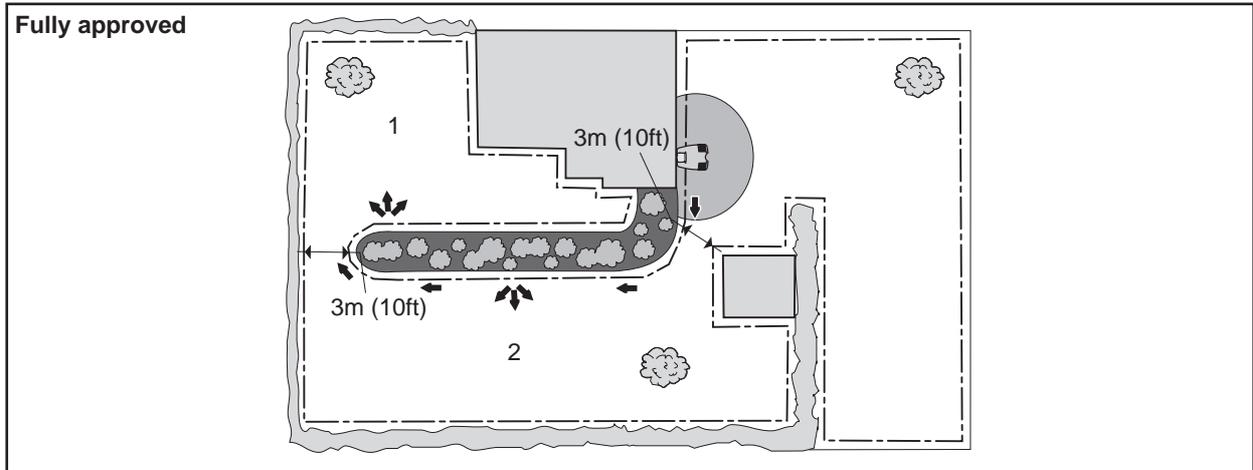


<i>Follow loop</i>	Boundary wire	Guide wire	<i>Exit angles</i>	Area 1, 2
<i>Delay</i>	20 minutes	7 minutes	<i>Start angle 1 – End angle 1 (2)</i>	90° and 200°
<i>Corridor width</i>	10	6	<i>Start angle 2 – End angle 2 (1)</i>	240° and 270°
			<i>Proportion first</i>	40 %

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Example number 7

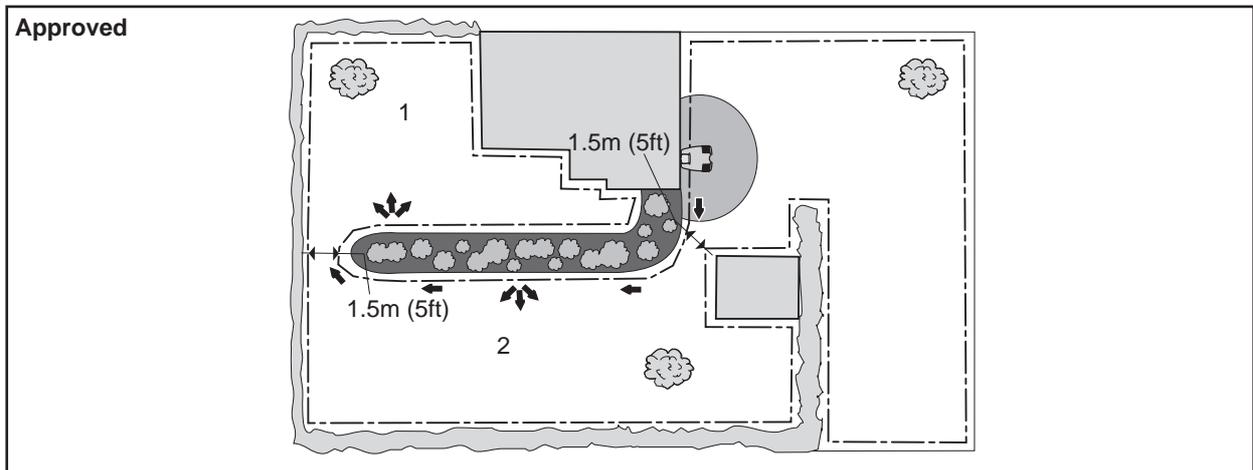
In this example Automower®, with the help of the settings, will reach the entire working area.



<i>Follow loop</i>	<i>Boundary wire</i>	<i>Guide wire</i>	<i>Follow loop out</i>	<i>Area 1</i>	<i>Area 2</i>
<i>Delay</i>	11 minutes	7 minutes	<i>Direction</i>	<i>Left</i>	<i>Left</i>
<i>Corridor width</i>	6	6	<i>Distance</i>	30 metres (100 ft)	15 metres (50 ft)
			<i>Proportion</i>	20%	40%

Example number 8

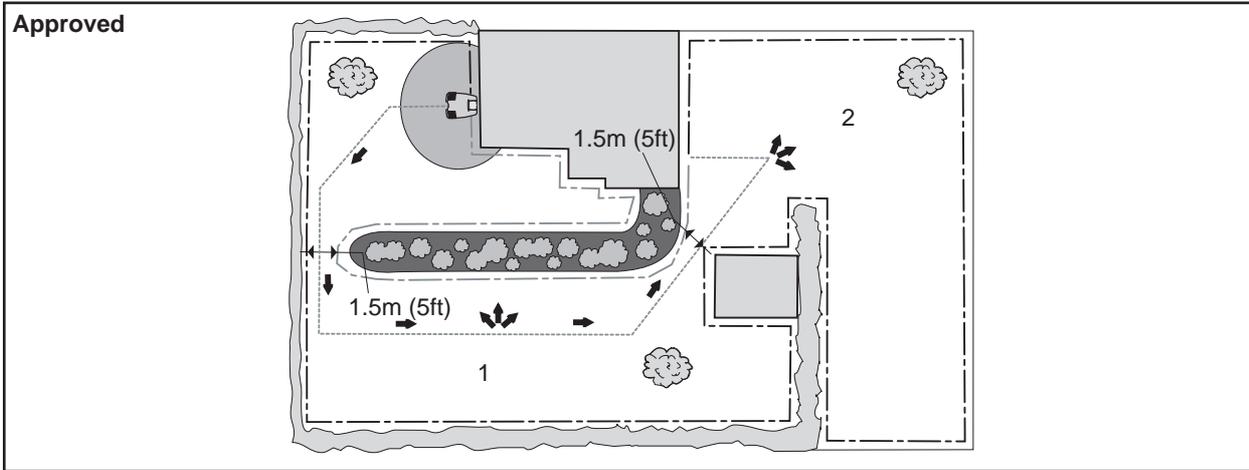
In this example *Corridor width* 1 is required for the mower to pass through the passages. The installation is approved, but can be designed better. Both another charging station placement and a guide wire are recommended.



<i>Follow loop</i>	<i>Boundary wire</i>	<i>Guide wire</i>	<i>Follow loop out</i>	<i>Area 1</i>	<i>Area 2</i>
<i>Delay</i>	11 minutes	7 minutes	<i>Direction</i>	<i>Left</i>	<i>Left</i>
<i>Corridor width</i>	1	6	<i>Distance</i>	30 metres (100 ft)	15 metres (50 ft)
			<i>Proportion</i>	20%	40%

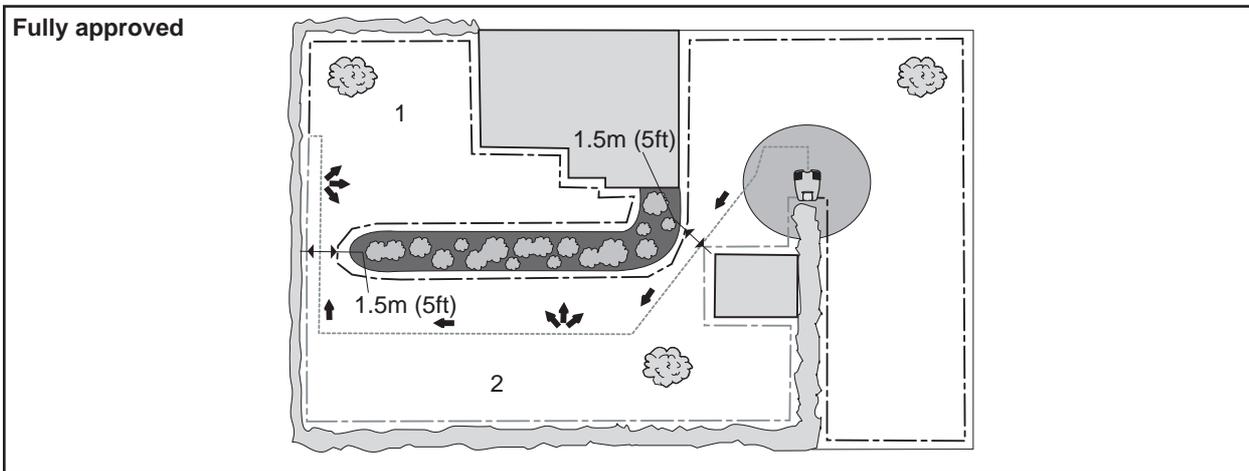
3. INSTALLATION

By adopting another charging station placement it will be easier to install a guide wire and make a guide loop that is shorter than 300 metres (1000 ft). However, there is a risk of tracks forming as the charging station is located far from the largest areas of the working area. The installation will be fully approved if the charging station is moved again.



<i>Follow loop</i>	Boundary wire	Guide wire	<i>Follow loop out</i>	<i>Area 1</i>	<i>Area 2</i>
<i>Delay</i>	11 minutes	7 minutes	<i>Direction</i>	<i>Guide</i>	<i>Guide</i>
<i>Corridor width</i>	1	6	<i>Distance</i>	20 metres (65 ft)	40 metres (130 ft)
			<i>Proportion</i>	40%	40 %

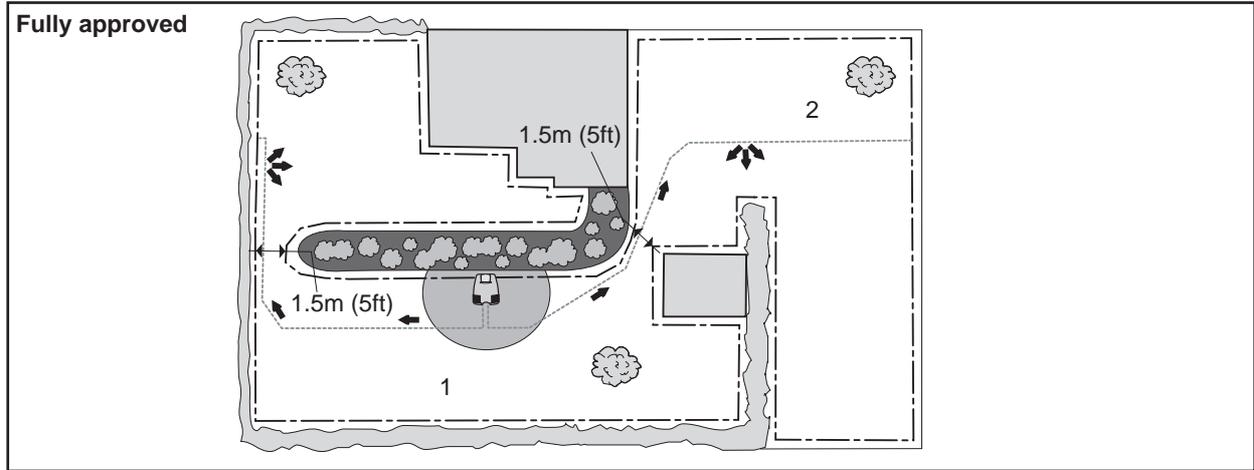
Moving the charging station to a more central position in the working area makes it easier to access from the largest areas.



<i>Follow loop</i>	Boundary wire	Guide wire	<i>Follow loop out</i>	<i>Area 1</i>	<i>Area 2</i>
<i>Delay</i>	11 minutes	7 minutes	<i>Direction</i>	<i>Guide</i>	<i>Guide</i>
<i>Corridor width</i>	1	6	<i>Distance</i>	40 metres (130 ft)	20 metres (65 ft)
			<i>Proportion</i>	20%	40 %

3. INSTALLATION

Two guide wires can be installed for Automower® 230 ACX, Solar Hybrid and 260 ACX. This permits more installation solutions.



<i>Follow loop</i>	<i>Boundary wire</i>	<i>Guide 1</i>	<i>Guide 1</i>	<i>Follow loop out</i>	<i>Area 1</i>	<i>Area 2</i>
<i>Delay</i>	15 minutes	4 minutes	4 minutes	<i>Direction</i>	<i>Guide 1</i>	<i>Guide 2</i>
<i>Corridor width</i>	20	6	6	<i>Distance</i>	20 m (65 ft)	20 m (65 ft)
				<i>Proportion</i>	20%	40 %

4. AUTOCHECK, SERVICE PROGRAM

4. Autocheck, Service program

The service program Autocheck is a tool to help trouble shoot as well as send and retrieve information to/from an Husqvarna Automower®. You can also, via Autocheck, update the mower program in an Automower®.

Autocheck is intended for Automower® models from 2003. The program does not work on earlier models.

This technical manual deals with Autocheck version 8.0.

The mower is connected to the computer via a service cable. There are two cables available, one for the COM port (part number 535 13 24-01) and one for the USB port (part number 535 13 23-02). It is also possible to connect 535 13 24-01 to a USB port through a virtual COM port. The virtual COM port can also be used for the service cable to Automower® generation 1. Virtual COM-port, also known as a USB-adapter, can be ordered and has the part number 544 08 50-01 Installation of Autocheck.

4.1 Installation of Autocheck

Autocheck can only be installed on PC-computers.

Installing Autocheck

1. Exit all open programs on your computer.
2. Insert the CD with the service program into the computer's reader.

The disc normally starts automatically, if this does not happen you will need to open it manually via *My computer* or *Explorer*.

3. Follow the onscreen instructions.

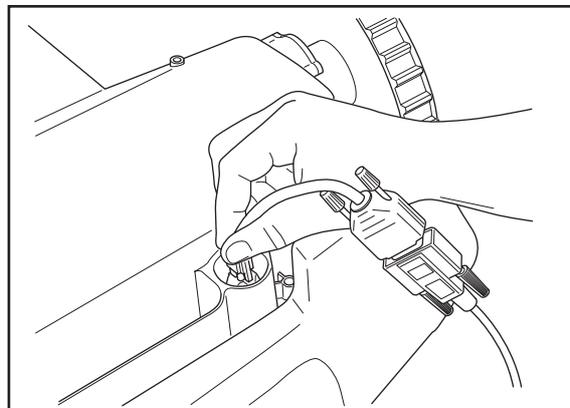
When the installation has finished an *Autocheck* menu will be created in the *Start* menu on your computer. A shortcut is also automatically created on the computer's desktop.

4. AUTOCHECK, SERVICE PROGRAM

4.2 Using Autocheck

1. Connect the service cable between your computer and Automower®.
 - Remove the protective cover on the service outlet on the underside of the mower, to the left of the handle.
 - Insert the service cable into the service outlet.
2. Turn *ON* the main switch on the mower.
3. Start Autocheck.

The service cable can only be connected in one way. Look closely at the service outlet on the mower and make sure you turn the connector the right way.



Autocheck is shutdown by clicking on the **Exit** button in the lower left corner of the window or by clicking on the cross in the upper right corner of the window.

IMPORTANT INFORMATION

Remember to refit the protective cover on the service outlet on the mower once work has been completed.

4.3 Autocheck Assistant

Autocheck Assistant is a utility that checks and manages important functions in Autocheck.

The *Autocheck Assistant* opens automatically when Autocheck starts. *Autocheck Assistant* checks that Automower® has the correct version of the mower program, that the serial number is correct and that the right version of Autocheck is used. It also gives a reminder to save the mower in the log file and to carry out an *Auto test*.

If the *Status* is green the mower is approved. However, if Status is shown in red or yellow it is something that should be rectified. Press the Go to button to rectify the problem.

Click on the arrow in the left-hand corner to activate or deactivate *Autocheck Assistant*.



4. AUTOCHECK, SERVICE PROGRAM

4.4 The Properties menu

The *Properties* menu on the top menu bar contains a number of functions where you can make settings for Autocheck. Click **OK** to save any settings you have made.

4.4.1 Language

The *Language* function allows you to choose which language Autocheck should use.

4.4.2 Communication

The *Communication* function informs Autocheck which COM-port you will use when connecting an Automower®. Many computers have more than one COM port and the right one must be defined so that the Autocheck can make contact with the connected mower. You can test whether the connection works by clicking **Test connection**.

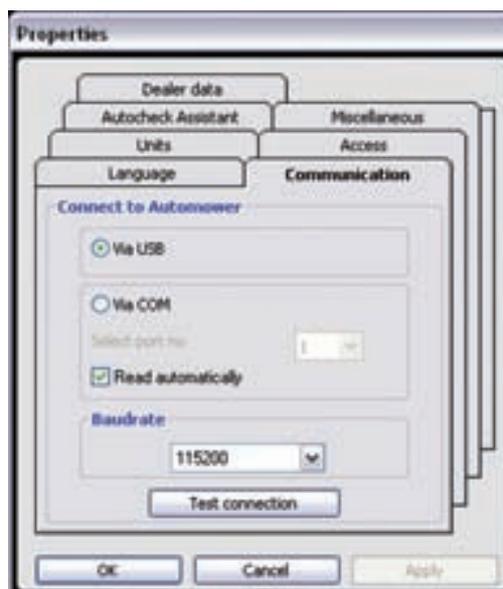


4.4.3 Units

In the *Units* function you can choose whether Autocheck should use the imperial system (inches) as the length unit, or whether it should use the metric system (metres). You can also choose Fahrenheit or Celsius as the temperature unit.

4.4.4 Access

Not an available function.

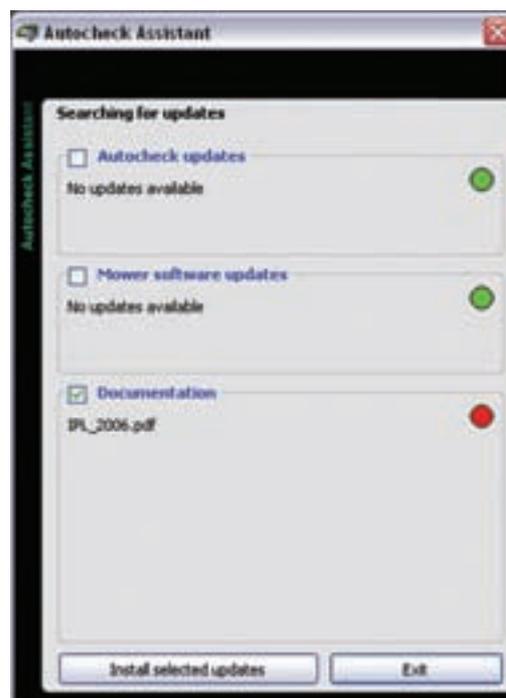


4. AUTOCHECK, SERVICE PROGRAM

4.4.5 Autocheck Assistant

In the *Autocheck Assistant* function you choose whether you want the function activated and whether you want *Autocheck Assistant* to be displayed as soon as a new mower is connected.

You also choose how often you want *Autocheck Assistant* to check for updates of Autocheck, the mower program and documentation. Automatic checks for updates require access to an internet connection. The check is made when Autocheck starts. If no updates are available *Autocheck Assistant* shows green. Whereas if there are updates available *Autocheck Assistant* shows red and you are invited to download the updates or new documentation.



4.4.6 Miscellaneous

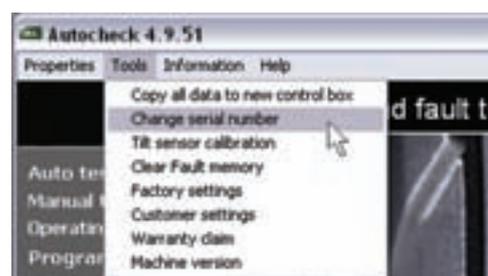
In the *Miscellaneous* function you choose whether Autocheck should display extended information while you perform an Auto test. The extended information provides a good guide through the test and is particularly useful for inexperienced users.

4.4.7 Dealer data

In the *Dealer data* function those of you who are dealers enter your contact details. The details are then included on all printouts from Autocheck.

4.5 The Tools menu

In the *Tools* menu you will find shortcuts to the functions in Autocheck. All functions, except *Machine version*, are also available in other places in Autocheck. *The Machine version* function allows you to reset the mower program, for example, after replacing the collision pillar. You are automatically requested to make this reset or this selection in the *Programming* function however by doing this via the *Tools* menu you do not need to reprogram the mower.



4.6 Information menu

4.6.1 Mower program

In the *Mower program* function you can view information related to the mower program on a connected Automower®. When you select this function the *Mower program* window opens. This contains, among others, data about the mower program in the connected mower, hardware and the type of mower.



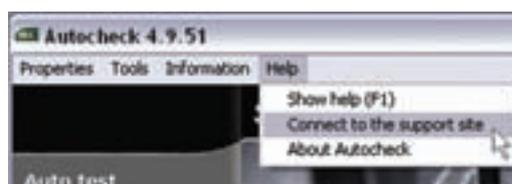
4. AUTOCHECK, SERVICE PROGRAM

4.7 Help menu

The *Help* function provides information about the functions available in Autocheck. When a function is open you can display information either by selecting *Show help* from the *Help* menu or by right clicking when the cursor is in the window.

4.7.1 About

You can find out the version number of Autocheck by using the *About Autocheck* function. When you select *About Autocheck* a box is displayed where, among others, the version number of the program is shown.



4.8 Menus and functions in Autocheck

Many of the functions available in the service program, can also be found on the Tool menu on the mower, (see 2. *Special menu functions*, page 25). These functions work in the same way in both programs. The difference is that it may be easier to access, view and state information via the computer.

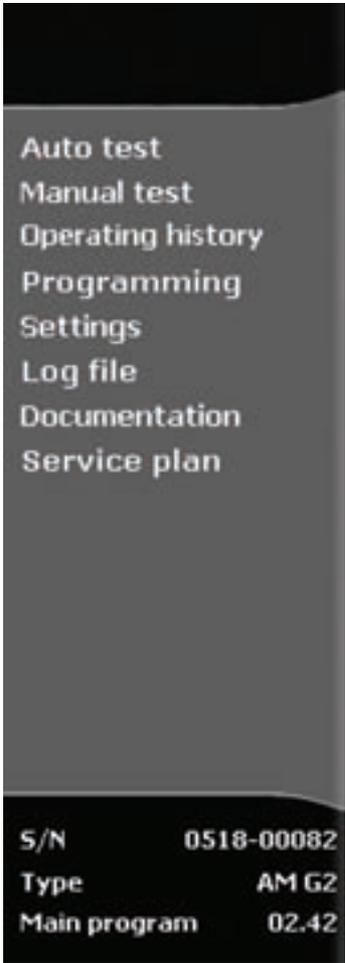
All instructions and all information in this chapter presuppose that you have an Automower® connected via the service cable to your computer and Autocheck is running.

The menus and functions provided by the service program are listed in the table below.

Further information concerning the functions can be accessed directly in Autocheck by clicking *Help* on the menu bar. Then select *Show help*. You can also display help by right clicking when a function is open and the cursor is in the window.

4. AUTOCHECK, SERVICE PROGRAM

Table 5: Menus and functions in Autocheck

	Menu	Function
	4.8.1 Auto test	Performs automatic tests on a mower's components. One, several or all components can be selected for testing. Ideal function to use to gain a total trace of components, for example, when you do not know what is wrong with a mower. The Auto test function is also suitable when performing, e.g. a winter service on a mower.
	4.8.2 Manual test	Performs manual tests on a mower's components. Suitable function when you want to test a specific component on a mower.
	4.8.3 Operating history	Displays saved error messages and operating data, e.g. running time and charging time.
	4.8.4 Programming	Function to load a new mower program on an Automower®.
	4.8.5 Settings	Function to read all the mower's settings. These can be changed without using the mower's keypad.
	4.8.6 Log file	Function that allows information about a mower to be saved, for example, operating history, settings and replaced parts.
	4.8.7 Documentation	Includes links to the User manual, Spare part list, Technical handbook and Service bulletins for Automower®.
	4.8.8 Service plan	Checklist that is printed out when a service is to be carried out on the mower.

4.8.1 Auto test

Auto test allows you to test all components on an Automower®. The test is semi-automatic, which means each component is started and stopped by the service program. *Auto test* is the ideal function to use to gain a total trace of components, for example, when you do not know what may be wrong on an Automower®.

1. Select the components you would like to test.
2. Click on the **Start test** button.

The selected components are tested in the order they are listed on screen. The component currently being tested is shown in the window on screen. If/When a fault is found, this is denoted in the Test result box.

4. AUTOCHECK, SERVICE PROGRAM

Instructions are shown continuously during the test in the box at the bottom of the screen.

If/When a question is asked or a request is made in the box: Follow the instructions on screen.

You can cancel the test at any time by clicking on **Interrupt test**.

When the test is completed and if a fault has been found the following is asked: *Test defect components again?* You can either choose to make the test again or skip this.

After the test is completed, a summary of the faults found is listed in the *Test result* box to the right of the screen. Highlighting a defective component produces an extract from the fault tracing guide, see page 104.

After *Auto test* is completed, the test is automatically saved in the log file.

4.8.2 Manual test

Manual test allows you to test all components on an Automower®. The function consists of four parts: *Power/Motors*, *User interface*, *Sensors*, and *Loop*.

When using *Manual test*, unlike *Auto test*, you need to start and stop the components you wish to test. When you have started a test, for example, of the wheel motors, these will run until you click on **Stop**. This means you have greater control over the test, which makes the function suitable to use when testing a specific component and when you want it to run for a long period. Values are shown on screen throughout the entire test.

Power/Motors

The values for battery voltage, battery current and battery temperature are always shown irrespective of the component being tested. If a Solar Hybrid is connected, the current from the solar cell panel is also shown.

The same values are presented as a horizontal bar to the right of respective value boxes. A green bar colour indicates an approved value. A red colour indicates the value is too high or too low. A black colour indicates that there is no limit value.

When a component is started, all buttons except **Stop** are dimmed. Consequently, it is not possible to change to another component for testing until the ongoing test is complete.

Test the wheel motors and blade motor forwards and backwards by clicking on the corresponding button with an arrow to the left respective arrow to the right.

4. AUTOCHECK, SERVICE PROGRAM

Manual test: Test of wheel motors

1. Click on the **Wheel motors >** button.
Click on **the right arrow** or **left arrow** to increase respective reduce the force. One click represents a 5% increase/reduction. 100% wheel force gives maximum speed.
2. Read the values in respective boxes and bars.
3. Click on **Wheel motors <** to reverse the direction of the wheel motors.
4. Click on **Stop** to end the test.

IMPORTANT INFORMATION

Lift up the rear wheels on the mower before starting the wheel motors. Otherwise the mower will drive off and may damage the service cable.

Manual test: Testing the blade motor



WARNING

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

1. Click on the **Blade motor >** button.
2. Read the value in the box and on the bar.
The value/blade motor speed should be about 2,500 rpm (1750 rpm for 260 ACX).
3. Click on the Blade motor button> to start the mower in the opposite direction.

Manuellt test: Battery test

In cases where a battery test cannot be performed on an installation, the test can be performed directly on the work bench via Autocheck. Since resistance to the wheel drive and blade disc during the test is quite small, discharging the battery/batteries may take several hours.

To start the test:

1. Click on the button **Battery test**.
2. Follow the instructions in Autocheck.
3. After completing the test, read the measured battery capacity under *Operating history, Battery history*.

When testing the wheel motors:

- Increase the force to 80% and block respective drive wheels in at least ten different positions over the wheel revolution. Check that the motor starts again once blocking is released.
- Increase the power to 100% and check that the speed in each wheel is at least 45 cm/second (18"/second) for the 220 AC and Solar Hybrid, and 60 cm/second (24"/second) for the 230 ACX and 260 ACX.
- Check to make sure that the motors' gearboxes do not slip by blocking respective wheels. When blocked the speed should be 0 cm/second.

NOTE! If you need to help the wheel by hand in order for the wheel motor to start and the wheel motor stops as soon as the wheel is blocked, the fault is in the control box.

NOTE! When a motor does not start and is extremely difficult to turn by hand, except from the wheel motor, the control box may be faulty.

- Inspect the cabling and electrical connectors on the wheel motors and to the mower's control box.

4. AUTOCHECK, SERVICE PROGRAM

If the battery capacity displayed is approximately 1500 mAh or lower, it is possible that the battery is dead and needs to be replaced. Note that the values are approximate and vary between different mowers and assume that the measuring is done as described. Note that the most reliable test results can be achieved when the mower is run on an installation.

Manual test: Testing the charge

If charging works well, the horizontal bar with *Battery current* is green. When the mower is maintenance charged, the charging current can be negative and the battery bar red. Press the *Charging on* button (1 min) to switch on charging at full current.

The solar panel on Solar Hybrid can supply 600-700 mA in the most favourable operating conditions. This means outdoors, during the summer, in the middle of the day, with a clear sky and at right angles to the sun. In order to create a repeatable test it is recommended to use a 500 W halogen construction lamp mounted at right angles to, and at a 50cm (20") distance from, the panel. A normal current is 100 mA. Readings should be taken at the latest 10 seconds after the lamp has been switched on, otherwise the heat from the lamp will reduce the current. Only measuring the idle current on a disconnected solar panel, which should be above 25 V, does not provide sufficient information about the function of the panel. This only indicates that there is an open-circuit in the panel.

Manual test: User interface

1. Press and hold down all buttons on the keypad, one at a time, on the connected mower.
The button you are pressing is shown in the *Latest pressed button* box.
2. Click on **Test display** to check the pixels. Clicking once lights all the pixels on the display. The button then changes to **Reset display**. Click on the button to switch off the pixels again. On 210 C all indicator lamps come on and go off.
3. Close the control panel cover on the mower to check the function of the stop button.
When the cover is closed, *RUNNING POSITION* should then be displayed in the *Stop button* box. When the cover is opened, *STOP POSITION* should then be displayed in the box.
4. Turn the main switch *ON* and *OFF* to check the function of the switch.
ON is displayed in the *Main switch* box when the main switch is *ON*. *OFF* is displayed in the box when the main switch is *OFF*.
5. Click on **Test Alarm** to test the mower's alarm (not 210 C).
6. Click on **Test internal** buzzer to test the mower's internal buzzer (not 220 AC).

4. AUTOCHECK, SERVICE PROGRAM

Manual test: Sensors

This function deals with the mower's collision sensors, tilt sensor, lift sensor and ultrasonic sensors (only 260 ACX). For a more detailed description of the sensors, see 1.13 *Sensors* on page 21.

The image on the upper left of the screen shows which collision sensor is active: *None*, *Left*, *Right* or *Both*. The image on the upper right of the screen indicates whether the lift sensor is active. The middle image displays the angle, X or Y respectively, and the direction, which is indicated with plus or minus. The lower image displays the distance in centimetres from the front of the mower to the nearest obstacle (only 260 ACX).

The same values are presented as a horizontal bar to the right of respective value boxes. A green bar colour indicates an approved value. A red colour indicates the value is too high or too low. A black colour indicates that there is no limit value.

The collision sensors are the sensors that detect when the mower has run into a fixed object. To test the two collision sensors:

1. Hold the handle on the underside of the Automower®.
2. Press on different parts of the body.
In the *Active collision sensors* box you should now see *None*, *Left*, *Right* or *Both*. This is also shown in the picture to the right of the screen.
3. Continue to press on the body until you see that both sensors work. Make sure the mower does not indicate a collision when it is untouched.

The lift sensor is the sensor that detects whether the mower has been lifted from the ground. To test the lift sensor:

1. Lift up the front part of the body.
2. When the body is lifted up, *YES* is shown. When the mower is in the lowered position *NO* is shown.

The tilt sensor is the sensor that detects the mower's inclination in relation to the horizontal plane. The X-angle indicates a front – rear inclination and the Y-angle a left – right inclination.

When Automower® stands on a perfectly flat surface, the values should be about +/-3. Otherwise the tilt sensor needs to be calibrated. When the mower is tilted up and to the left the values will be negative.

To calibrate, i.e. reset the tilt sensor:

1. Place the Automower® on a flat surface.
2. Click on **Tilt sensor calibration**.
3. Click **OK** when prompted to place the mower horizontal.

The message *Calibration OK* is shown once calibration is complete.



4. AUTOCHECK, SERVICE PROGRAM

The purpose of the ultrasonic sensors is to reduce the mower's speed before a collision with obstacles that are not protected by a boundary wire.

To check the ultrasonic sensors in Autocheck:

1. Place the Automower® on a flat surface pointing towards a wall, for example.
2. Check that the given distance varies between 40 and 300 cm (16" and 120").

Another recommendation is to finish the test by also carefully placing a finger against one sensor at a time. A functioning sensor vibrates, which you should be able to feel with your finger. Make sure that the main switch is in the ON position.

For additional testing of the ultrasonic function:

1. Place the mower on an open grass surface with only one "test object" closer than 3 m (9.5 ft).
2. Go to the *Quick check* function (press and hold the 0 button). Press **YES** until you see the value for *Ultrasonic distance*.
3. Point the mower toward the test object (perhaps an object with structure, e.g. a tree) at a distance of one metre.
4. Check that the distance displayed on the mower matches with reality +/- 20 cm (8"). Perform this test on one sensor at a time, by covering the other sensor.

The distance is measured from the mower body and varies between a minimum value of 40 cm (16") and a maximum value of 300 cm (120").

Note! If possible, ultrasonic tests should not be performed indoors and/or directly on hard, smooth surfaces, since the ultrasound risks being incorrectly reflected. Even when there are no objects in the area of the mower, in these cases the measuring value can incorrectly display 40 cm (16").

Manual test: Loop

In order to test the loop signals and to receive useful values the test must be performed where there is a boundary wire and a charging station installed. It must be a test surface of at least a few square metres around the charging station. It also requires the mower to be connected to the installation.

The values for the different loop signals are shown in the *Loop signals* box. These values are an indication of how well the loop system is functioning. The loop signals can be measured through the front or the rear loop sensor. Select which sensor is to be tested by checking either *Front loop sensor* or *Rear loop sensor*. Point to a value or a heading and the relative field and loop are shown in the picture at the bottom of the screen.

4. AUTOCHECK, SERVICE PROGRAM

The following values are stated for the A-signal and Guide signals:

- **A_f** = The strength of the A-signal measured via the front loop sensor on the mower. The value should lie between approximately 70 and 320 to ensure good functionality. The closer to the loop the mower is, the higher the value. When the Automower® is directly over the loop the value is 0 and when the mower is outside of the loop the value is negative.
- **A_r** = The strength of the A-signal measured via the rear loop sensor on the mower. The guideline values of approximately 70 – 320 also apply for A_r.
- **Guide 1 and Guide 2** = The strength of each guide signal measured via the front loop sensor and close to the guide wire. To the left of the guide wire, in the direction towards the charging station, the value is negative and to the right of the wire the value is positive. To ensure the functionality of the guide wire, the Guide signal value should be (-) 250 – 320 next to the guide wire.

In order to obtain usable values from the F- and N-signals the Automower® must be in the test position. This means the nose of the mower is partly edge to edge with the charging station base plate, partly to the right of centre. See the picture opposite. Tick the *Mower is standing in test position* checkbox when you have positioned the mower correctly.

The value of the F-signal should be more than 300 and for the N-signal the value should be over 100.

The value stated for Quality, is a measurement of the loop system's total function. When a value other than 100 % is stated, this indicates that the system is malfunctioning and the values shown for loop signals are not correct.

On 210 C only Quality and the A-signal are available.

4.8.3 Operating history

Operating history is an ideal function to use when you wish to see how well an Automower® has worked. The function is divided into three parts: *Operating data*, *Operating data*, *Trip* and *Fault memory*.

Operating history: Operating data

Operating data displays information about the mower's function divided into *Key data*, *Search times* and *Battery history*. This is also where the *Reset charging cycle counter* and *Copy all data to new control card* functions are located.

Loop system reminder:

A-signal: Signal that the charging station transmits to the loop and which the loop sensors then interpret. Normal value for the A-signal: about 70 – 320.

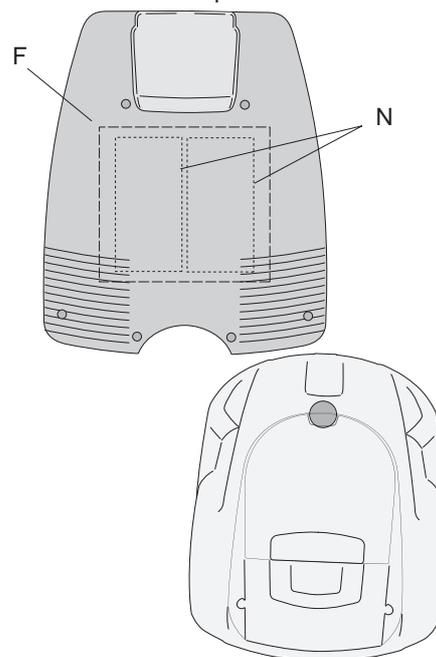
Guide signal: Signal that delimits the guide area. Default value for the Guide signal next to the guide wire: about (-) 250 – 320.

F-signal: Remote signal that helps the Automower® to find the charging station. Normal value for F with Automower® in the test position: Over 300.

N-signal: Near signal that guides the Automower® into the charging station. Normal value for N with Automower® in the test position: Over 100.

The loop signals can only be interpreted if the Quality value is 100 %. When the value is 99 % or lower, the loop system does not function correctly and with that, the displayed values for the signals will not be correct.

Automower® in the test position



4. AUTOCHECK, SERVICE PROGRAM

Operating history: Key data

Operating data displays information about the mower's function divided into *Key data*, *Search times* and *Battery history*. This is also where the *Reset charging cycle counter* and *Copy all data to new control card* functions are located.

To the right of each value box the same value is shown in the form of a horizontal column. A green coloured column signifies an approved value. A yellow colour signifies an acceptable value. A red colour signifies an not approved value. Note that threshold values are approximate and they can vary from mower to mower and depending on the installation.

Key data displays the most important information about mower function, such as the number of hours run, how much of the total run time that the Automower searched for the charging station, number of complete chargings, i.e. the age of the battery, etc.

The display mode for mower's key data shows:

- *Running (h)* = the accumulated time that the Automower® has been in operation. This time is the same as the run time and is displayed in the main menu.
- *Production date* = the date that the mower was manufactured.
- *Efficiency* = A measure how much of the total operating time the Automower® was mowing grass.
- *Faults, number* = the accumulated number of faults that occurred.
- *Charging cycles (chargings OK)* = the accumulated number of chargings when the battery was fully charged.

Chargings OK is a measure of how old the battery is. A battery can normally take approximately 1000-2000 charges.

IMPORTANT INFORMATION

***Chargings OK* is reset on both the main counter and the trip counter when you perform a reset of *Trip op. counters*. If *Trip op. counter* is reset when the batteries are replaced *Chargings OK* displays the current age of the battery in the mower.**

NOTE! If the mower is run for long periods of time in demo mode or if the *Test OUT (3-2-5)* function is used frequently, *Chargings OK* can display a value that is too high

- *Battery capacity (mAh)* = indicates the current battery capacity of the mower per battery.

4. AUTOCHECK, SERVICE PROGRAM

- *Docking efficiency (%)* = a measurement of on how many occasions the Automower® has reached the N-field which resulted in a successful docking.
- *Searching (h)* = the accumulated time that the Automower® was searching for the charging station.

Operating history: Search times

Search times indicates partly an average value of how long each search for the charging station has taken, partly a maximum value that indicates how long the longest search took.

The last 20 search times are shown in the list.

Operating history: Battery history

The *Battery history* is shown in the box at the bottom. The four most recent battery tests are saved in the battery history. For more information about the battery capacity and how a battery check is performed see 1.12.1 *Battery check* on page 20.

Operating history: Resetting charging cycle counter (Chargings OK)

To clear the charging cycle counter *Chargings OK* when replacing the battery: Click on the *Clear charging cycle counter* button.

Operating history: Copy all data to new control box

The *Copy all data to new control box* function is used when the control box on an Automower® needs to be replaced. All settings and complete operating history in the mower can, by using this function, be saved to a file in the Autocheck folder to then be reloaded to the mower again when the control box has been replaced.

To copy data to the new control box:

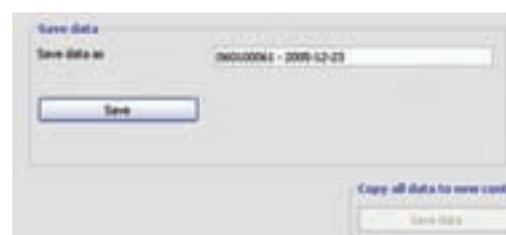
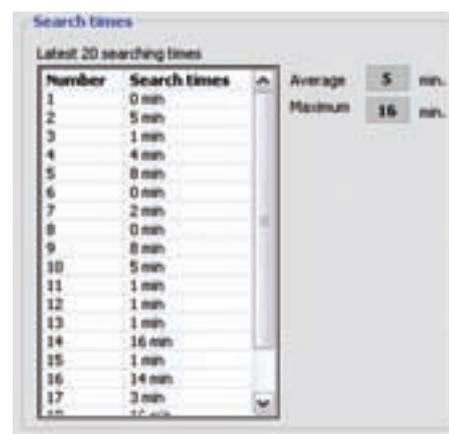
Before replacing the control box:

1. Ensure that the mower is connected correctly and that the main switch is turned *ON*.
2. Click on **Save data**.

This button then becomes dimmed and a new box, *Save data*, is displayed. The connected mower's serial number and the current date are stated as the filename in the *Save data as* box. You can change the filename by selecting the name, delete it and then enter a new name.

3. Click on **Save**.
4. Click **OK** when the message *Settings saved* is displayed.

When a file has been saved, the function of the box *Save data* changes to *Transmit data*.



4. AUTOCHECK, SERVICE PROGRAM

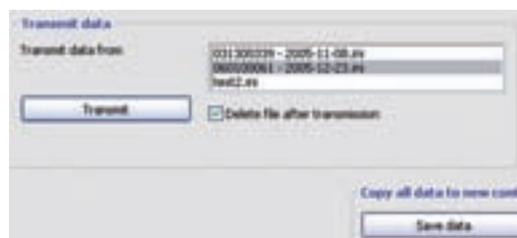
The *Transmit data* function can also be accessed by clicking on the **Transmit data** button in the *Copy all data to new control box*.

After replacing the control box:

5. Ensure that the mower is connected correctly and that the main switch is turned *ON*.
6. Select the file you wish to transmit from the list in the *Transmit data from* box.

If you would like to keep the file after it has been transmitted to the mower you will need to deselect the *Delete file after transmission* checkbox.

7. Click on **Transmit**.
8. Click **OK** when the message *Settings changed* is displayed.



Operating history: Operating data, trip

This function largely includes the same information as *Key data*. The difference is that the values under *Operating data, trip* can be reset, just as a mileage counter on a car can be reset. This function is ideal to use when you wish to see how a mower works during a specific period.

To reset: Click on the **Reset** button. The values are reset and the current date is entered on the *Reset* row.

Operating history: Fault memory

This list displays the last 50 faults to occur (100 for 220 AC without GSM). The fault is displayed with the date and time and where the last fault to occur is shown at the top of the list.

You can change the displayed order as required:

- Click on *Date* to change between the between first and last faults.
- Click on *Fault* to show the faults in alphabetical order.

Selecting a row with a specific fault from the fault list, displays an extract from the fault tracing guide (see page 104) in the *Fault tracing* box. To the left of the box the possible cause of the fault is listed, and to the right fault tracing tips and actions are stated.

Clicking on the **Table, frequency** button allows you to display a summary of the faults that have occurred on the connected mower and how many times each fault has occurred.

All occurring faults saved in the fault memory can be deleted:

1. Click on **Clear Fault memory**.
2. Click **Yes** when asked *Clear fault memory list?*

4. AUTOCHECK, SERVICE PROGRAM

4.8.4 Programming

Programming is a function to update the mower program in an Automower®.

Autocheck, which contains the most recent mowing programs, can always be downloaded from the Automower® support site. This requires Internet access.

Different control boxes in the mower and optional equipment determine which program is to be used, see *Table 2: Version of the mower program, page 8*.

IMPORTANT INFORMATION

Always use *Automatic programming*. Autocheck then automatically selects the correct version of the mower program and there is no risk of Automower® being programmed with the wrong version.

IMPORTANT INFORMATION

Always let Autocheck complete a started programming process! An interrupted programming process can block the mower's control box

For automatic programming:

1. Click on the **Start** button.
Autocheck retrieves the main program and the language file from the Program folder. These files are shown in the box to the right of the window.
Autocheck automatically selects the latest program versions installed on your computer.
2. Autocheck asks a number of questions about the mower design before downloading the mower program. The default answers are most often the most likely ones for your mower, and you should only need to change your selection if the component in question has been replaced, for example.
3. Autocheck also allows you to select which of the two language files you want to download. Check which languages you would like to install in the mower and then select language file A or B.
4. Click **OK**.
The message *Programming finished* is shown when the main program and language file have been transmitted to the mower.

Program a spare part control box

All new spare part boxes must be programmed as they are not programmed at the factory. If the mower is not programmed a warning image is shown on the mower's display (On 210 C all the indicator lamps flash simultaneously). *Autocheck Assistant* also warns that the mower must be programmed.

4. AUTOCHECK, SERVICE PROGRAM

Solving problems when programming

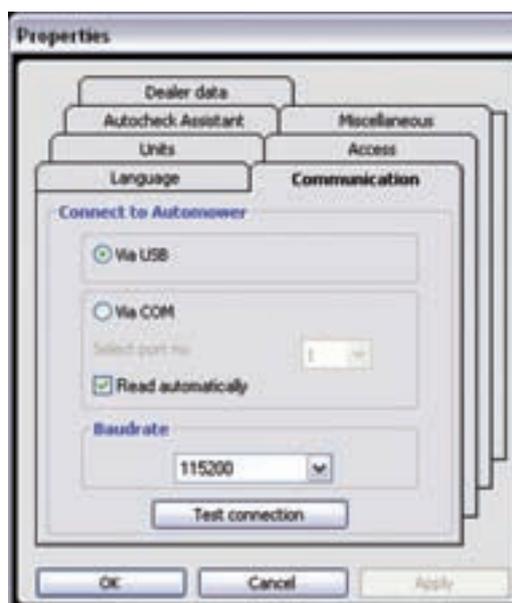
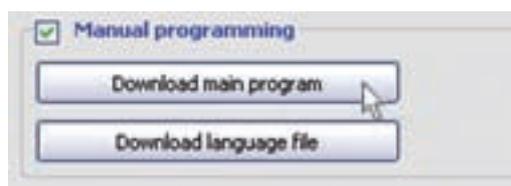
If the message *No contact* is shown during programming, Autocheck has lost contact with the mower. Programming must then be repeated. Do not leave the mower in the charging station for more than 15 minutes, if the mower is blocked as this can damage the battery.

When you do not have contact with the mower, you must use *Manual programming*:

1. Select the *Manual programming* checkbox.
2. Click on **Download main program**.
3. Select the program to be downloaded to the mower, see *Table 2: Version of the mower program, page 8* and click **Open**.

If you still receive the message *No contact*: Perform the following actions, one at a time. If you do not receive any contact with the mower, continue with the next action.

1. Put the mower in a connected charging station. Make sure that the main switch is in the *ON* position. Use *Manual programming*. Repeat if necessary several times. In the event of repeated problems you can try to change the *Baudrate* under *Communication* in the *Properties Menu*.
2. Perform a battery reset on the mower:
 1. Dismantle the body.
 2. Unscrew the display cover so that you can see the connection between the battery and the control box.
 3. Turn the main switch to the *OFF* position.
 4. Disconnect the connectors between all the batteries and the control box.
 5. Prepare manual programming in Autocheck by clicking on **Download main program**, and select program. NOTE! Wait to click **Open**.
 6. Connect all the batteries to the control box at the same time as you click on **Open** (with the chosen program file selected).
 7. Repeat if necessary several times.

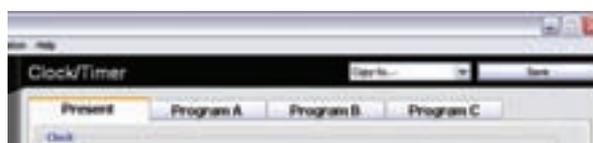


4.8.5 Settings

This function can be used to collect all information concerning the settings in the Automower® connected to the computer. You can also change these settings and then transmit the changes to the mower.

When you select the *Settings* function the present settings are automatically displayed.

Press the tab for Program A, B or C to show the settings that are saved under the relevant program (these program types are only available on the 220 AC and 230 ACX, without GSM).



4. AUTOCHECK, SERVICE PROGRAM

To save changed settings: Press the **Save** button at the top right. Note that the settings are only saved for the program that is displayed at that time. It is also possible to copy settings from one program to another. To copy settings: Select the program from where the settings are to be copied by clicking on the tab for the relevant program. Then select the program to which the settings are to be copied in the menu bar *Copy to.....*

Settings: Miscellaneous

On the *Settings, Miscellaneous* menu there are a number of special functions, these are described below.

Settings: Special

In certain cases, you may need to temporarily modify the mower's *Special settings* including *Loop detection*, *Demo mode*, *STOP button override*, *Square mode cutt.* and *Wheel motor speed*.

A mower's *Loop detection* sometimes may need to be temporarily turned off. This may be when an Automower® needs to be demonstrated when a charging station and boundary wire have not been installed, i.e. at a customer's home.

NOTE! Remember to reactive loop detection again.

To deactivate loop detection:

1. Deselect the *Loop detection* checkbox.
2. Click on **Save**.

To activate loop detection again:

1. Select the *Loop detection* checkbox.
2. Click on **Save**.

Settings: Demo mode (only 220 AC and 230 ACX , without GSM software)

In order to make it easier to demonstrate an Automower® it is equipped with a demo mode. You can use different settings in the different programs for Demo mode.

To activate demo mode:

1. Select the Demo mode checkbox.
2. Click on **Save**.

When the function is activated the Automower® works without starting the blade disc. The mower varies running with charging at four minute intervals.

Settings: STOP button override

When *STOP button override* is activated, the Automower® can be started and stopped with the help of the number **0** instead of the **STOP** button.

To activate *STOP button override*:

1. Check the *STOP button override* box.
2. Click **Save**.

4. AUTOCHECK, SERVICE PROGRAM

Settings: Square mode cutting

Square mode cutting is when the mower cuts the grass in a square pattern, see *1.6 Square mode cutting* on page 11.

To change the frequency for *Square mode cutting*:

1. Use the controller to increase or decrease the percentage. A high percentage means that the mower runs in square mode cutting more seldom and vice versa.
2. Click **Save**.

To deactivate *Square mode cutting*:

1. Check the *Square mode cutting* box. A checked box means that this function is turned off. The mower will never run in square cutting mode.
2. Click **Save**.

Settings: Wheel motor speed (only 230 ACX)

The wheel motor speed can be adjusted on the Automower® 230 ACX. Two speeds are available, *Normal* and *Reduced*. Unless the installation requires full speed for the mower to be able to mow the entire surface, the speed should be reduced. This protects the machine from hard collisions and therefore unnecessary wear and tear.

To change *Wheel motor speed*:

1. Use the controller to adjust between *Normal* and *Reduced* speed.

Click **Save**.

Settings: Reset

Click on **Factory settings** to restore all settings on the mower to the original values. To view these settings, see *Table 3: Factory settings, page 42*. All settings except the selected language and PIN code are reset.



4. AUTOCHECK, SERVICE PROGRAM

Settings: CustomMer settings

You can save and transmit all settings that the customer has made on the mower before and after fault tracing on the mower by using the function *Customer settings*.

Click on **Save**. A *Save as* dialog box is shown where you need to select a file name and then click on **Save** to save the settings.

Connect the mower you wish to transmit the settings to. Click on **Transmit**. An *Open* dialog box is shown where you need to select the file with settings to be transmitted to the mower. Click on **Open**.



4.8.6 Log file

Log file is a function that allows information about a large number of mowers to be saved in a database on the computer. The information can then be searched and used even when the mowers are not connected to Autocheck.

If the Log file is used regularly, when sales are made, for the winter service and when repairs are made you gain a good general view of the mowers you have sold or serviced. You can quickly see how much a mower has run since its last service, how well it has worked, which parts you should replace at each service, if the customer has changed the settings, etcetera. When carrying out an installation it is both sensible and appropriate to save all the settings in the log file on site in the garden for future reference with any modifications or problems.

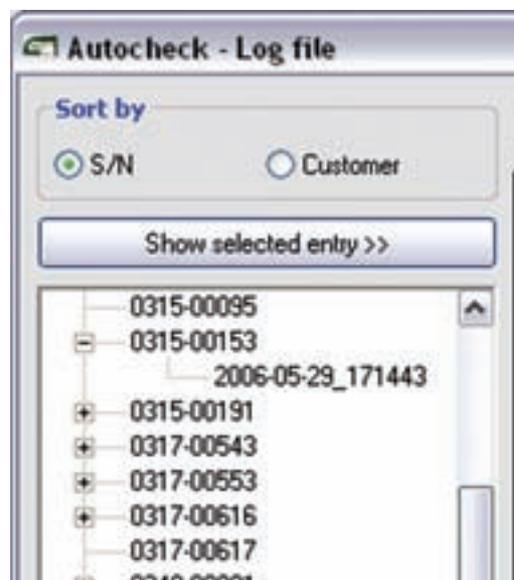
The log file has two main functions: *Edit* and *Compare*.

In the *Edit* function you can save new mowers, edit any mowers already saved, read information, import and export files and print documents.

In the *Compare* function you can compare two entries to see the differences. For example, whether the same mower has been saved on two different occasions.

Edit log file: Sort by

You can search for saved mowers by sorting them according to serial number or customer. You can find the mower you are interested in from the list and then click on **Show selected entry**. The selected mower is marked in the list in bold.



4. AUTOCHECK, SERVICE PROGRAM

Edit log file: Entry

In the *Entry* box you can:

- Save a new mower in the log file by clicking on **Create new**. The mower must be connected in order to save new data.
- Add information and save the changes to an previously saved entry by clicking on **Save changes**. A previously saved mower does not need to be connected to save changes.
- Delete an entry by clicking on **Delete**. The entry is then sent to the Recycle Bin on your computer.

The information in the log file is divided on the tabs.
The following information can be found on the tabs:

A. *General data and entered details*

In the *Mower saved in log file* box you can read the production date, mower program version, serial number and when the last entry was saved. In the *Registered Mower data* box you can read or enter details concerning the customer's name, sales date, possible fault descriptions provided by the customer, any faults found as well as additional information. Click on **Create new** to save a new mower in the log file. Click on **Save changes** to add information to a previously saved entry.

B. *Replaced components*

In the *Replaced components* box you can enter how many and which components (part number) that have been replaced on the mower. Click on **Save changes** to add information to a previously saved entry.

C. *Operating history*

D. *Operating history, trip*

E. *Fault memory*

F. *Search times*

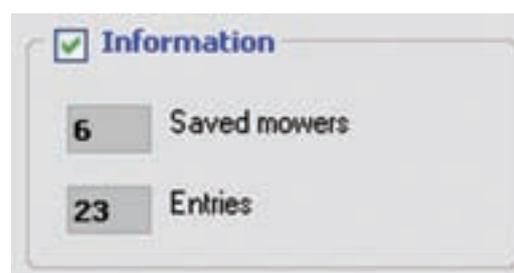
G. *Settings: Clock/Timer and Garden*

H. *Settings: Security, Sound Levels, Startup settings and Miscellaneous.*

I. *Auto test*

Edit log file: Information

Click in the *Information* box to read statistics concerning how many mowers and how many entries there are saved in your log file.



4. AUTOCHECK, SERVICE PROGRAM

Edit log file: Print

Click in the Print box to print a *Status report*, *Warranty claim*, *Auto test* and *Service plan*.

Click on **Status report** to print a status report concerning the selected mower.

Click on **Warranty claim** to print an attachment to the warranty claim for the selected mower. This attachment contains the data you have saved concerning the mower, for example, serial number and replaced components. You need this data, if you enclose the attachment to the sales company, thus do not complete the warranty claim.

Click on **Autotest** to print the selected *Autotest*.

Click on **Service plan** to print a service plan for the selected mower.



Edit log file: Import/export

Import and Export log file is used when working with different computers, for example, to transfer information from a notebook to a desktop computer.

Click in the *Import/Export* box to import or export a log file and to open the log file in Excel.

Click on **Import log file** to upload a log file that has been saved on your computer.

Click on **Export log file** to save a log file on your computer.

Clicking on **Open with Excel** displays the log file in Excel, where all data concerning the saved mowers is available in a single file. This file can also be printed.

It is not possible to transfer information from a log file created with Autocheck 3.4 and earlier.

To access the information from an older log file click on **Open older log file**. The file where details from an earlier mower have been saved is then opened in Excel. This file can also be printed.

When you click on **Open with Excel**, you will be prompted whether to accept macros: Check the box *Always accept macros from Husqvarna* and then click **Yes**.



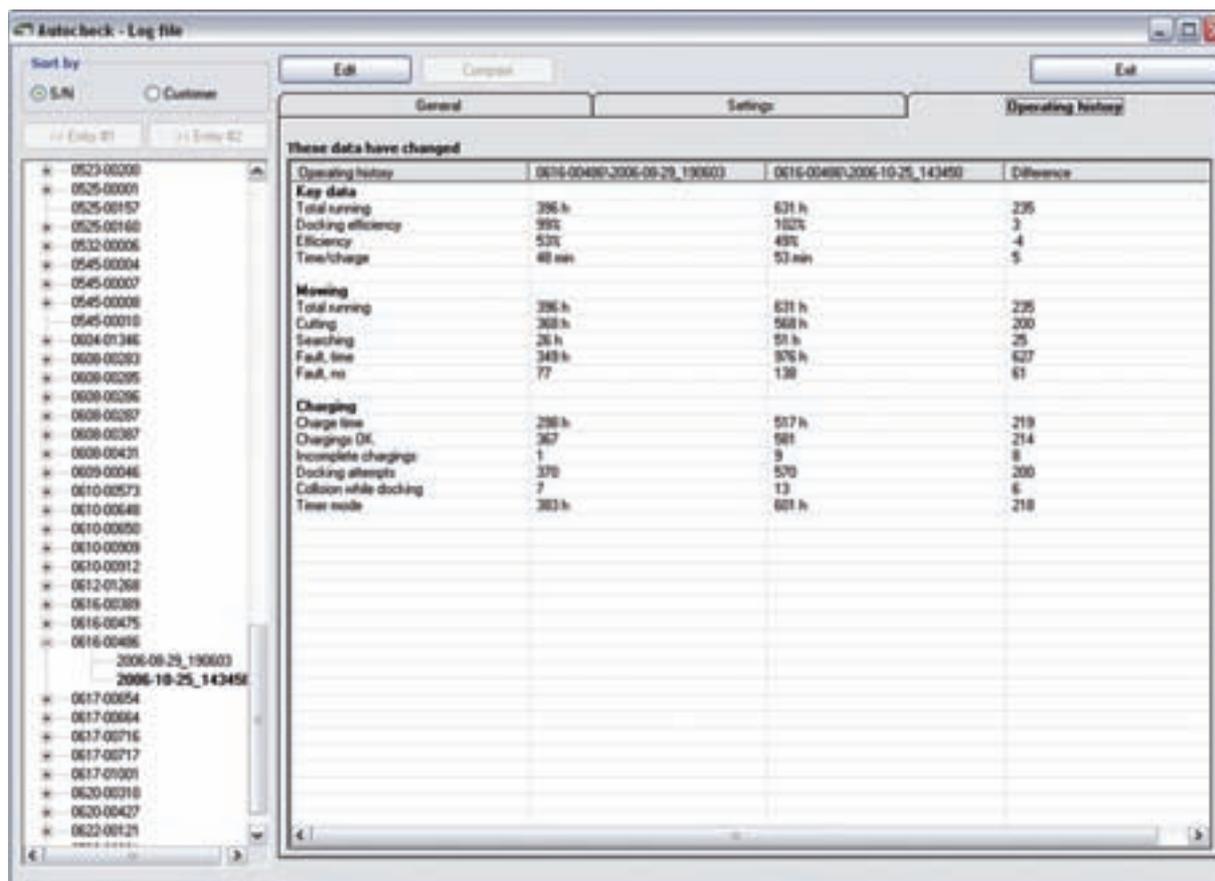
4. AUTOCHECK, SERVICE PROGRAM

Compare log file

In the *Compare* function you can compare two entries to see the differences.

Select from the list of saved mowers and select the entries you wish to compare. Now click on **>Entry #1**. Now select the entry you wish to compare and click on **>Entry #2**.

You select the information you wish to compare by clicking on the tabs *General*, *Settings* or *Operating history*.



The screenshot shows the 'Autocheck - Log file' application window. On the left is a list of mower entries with expandable arrows. The main area is divided into three tabs: 'General', 'Settings', and 'Operating history'. The 'Operating history' tab is active, displaying a table titled 'These data have changed' comparing two entries: '0616-00480/2006-09-29_190603' and '0616-00480/2006-10-25_143450'. The table lists various metrics and their differences.

	0616-00480/2006-09-29_190603	0616-00480/2006-10-25_143450	Difference
Operating history			
Key data			
Total running	396 h	631 h	235
Docking efficiency	99%	100%	1
Efficiency	53%	49%	-4
Time/charge	48 min	53 min	5
Mowing			
Total running	396 h	631 h	235
Cutting	368 h	568 h	200
Searching	26 h	51 h	25
Fault, time	349 h	376 h	27
Fault, no	77	138	61
Charging			
Charge time	298 h	517 h	219
Charging OK	367	581	214
Incomplete charging	1	9	8
Docking attempts	370	570	200
Collision while docking	7	13	6
Timer mode	383 h	601 h	218

4.8.7 Documentation

This page includes links to pdf documents with Spare Parts List, Operator's Manual, Technical Handbook, Service Bulletins and Installation Instructions.

You require Acrobat Reader 5.0 or higher to view these documents.

Select the document by clicking on the small arrow next to respective boxes, then choose which edition you wish to open. Documents from 2003 are available.

The page also includes a link to the Automower® support site and the consumer site. On the support site you can download the latest versions of Autocheck, the mower program and documentation. Select the site you wish to access and click on **Connect**. Check the *Open in web browser* option to open the support site or consumer site in its own window.

4. AUTOCHECK, SERVICE PROGRAM

4.8.8 Service plan

Service plan is a function to print a checklist of actions when servicing an Automower®.

Data about the connected mower's production date, program version, running time and serial number are shown when you open this function. Click on **Print service plan** to print out a service plan with pre-printed data about the connected mower.

Select a service plan from *Show service plan as PDF* and then click on **Open** to open. Now print out a service plan without preprinted details.

5. REPAIR INSTRUCTIONS

5. Repair instructions

All repairs to the Husqvarna Automower® should be made indoors on a clean work bench to protect sensitive components from moisture and dirt.

IMPORTANT INFORMATION

Oil, grease and dirt on electrical contactors can cause intermittent faults on the Automower®. These faults only occur at times, which makes them difficult to find. Never touch sensitive electronic components with your fingers, for example, connector pins or components on a circuit card.

Ground yourself, for example against a radiator or on the mower's chassis, before you start to work on electrical components.

When you disconnect a cable from a component: Always pull the connector and NOT the cable.

Never use any form of silicone or the like when repairing an Automower®.

If possible check that replaced components work before completing the assembly of Automower®.

All components on the Automower® must be fitted according to the values in *Table 6: Tightening Torques*, page 102.

5. REPAIR INSTRUCTIONS

5.1 Dismantling and assembling the Automower®

IMPORTANT INFORMATION

Clean any grass and dirt from the Automower® before you begin dismantling.

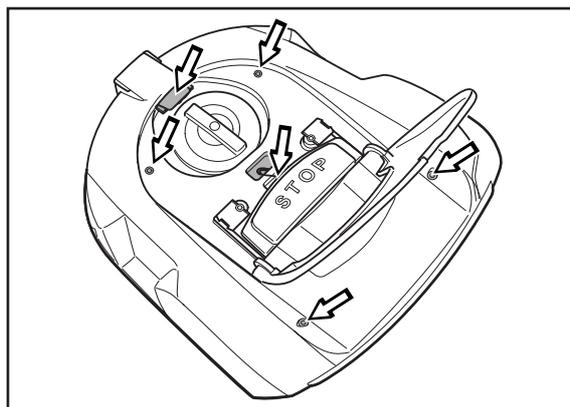
5.1.1 Dismantling the body

The body is screwed to the chassis with four screws, hex 4.

Tip! Only loosen the rear screws two turns, so that the rear part of the body is not loosened. On the newer models, m/2007 and beyond, the screws can be removed completely.

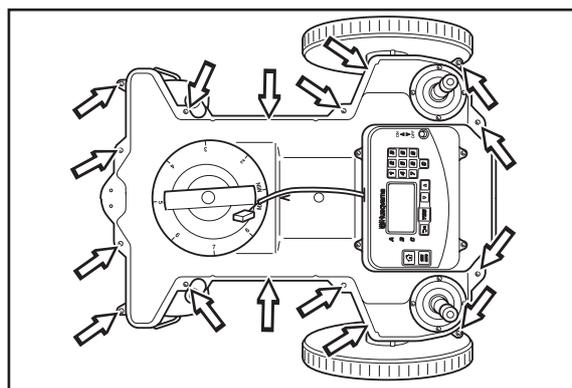
First clean the area around the grommet.

2. Pull out the rubber grommet on the charging cable located at the front under the mower and carefully loosen the connector (210 C has no charger cable).
3. In order to completely lift off the body, the microswitch for the stop button must also be removed.



5.1.2 Dismantling the chassis

The chassis consists of upper and lower sections. These are screwed together using 16 screws, torx 20. The top part of the cabling must be removed from the control box to completely separate the parts.



5. REPAIR INSTRUCTIONS

5.1.3 Assembling the chassis and body

IMPORTANT INFORMATION

Before assembling the upper and lower parts of the chassis: Make sure parts are clean and that no cables will be pinched. Dirt or the like can prevent the chassis from being sealed correctly. An unsealed chassis lets in moisture, which can result in faults on the mower. Always apply new grease (m/2003-2009) or new packing (m/2010-) before joining the chassis halves together.

The chassis halves must be assembled correctly in order to prevent water leakage: The edges on the upper section must sit correctly in the groove on the lower section. Also check that there is rubber packing (m/2010-) in the groove. Grass and dirt squeezed between the two halves mean the mower will not be sealed.

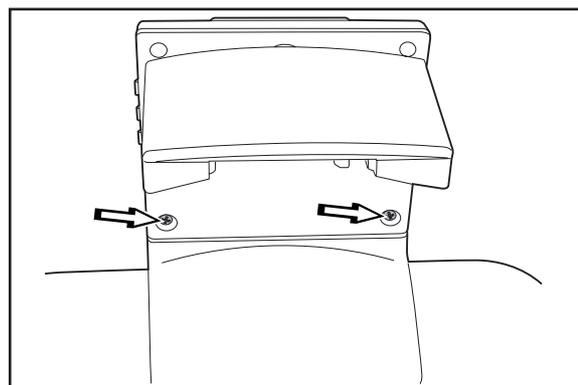
1. Assemble the upper and lower chassis parts.

When it is necessary to wipe off the edges due to dirt new grease, part number 535 14 12-01, must be applied before the halves are assembled. In products made after 2010, the grease has been replaced with rubber packing. This should also be replaced when the chassis is opened.

2. Screw together the upper and lower parts of the chassis using 16 screws. The screws should be tightened crosswise.
3. Fit the microswitch on the stop button and replace the brass clip holding the microswitch.
4. Screw the body to the chassis using the four screws.
5. Fit the connector on the charging cable and refit the rubber grommet on the charging cable properly.

5.2 Dismantling the charging station

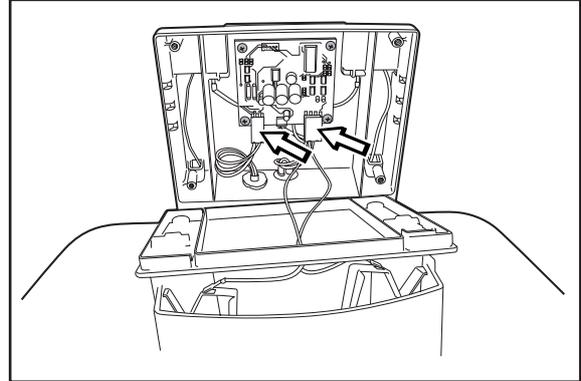
1. Remove the cable to the transformer from the wall socket.
2. Remove the connector for the contact strip, the connector for the charging plate and the connector for the guide wire if fitted, from the circuit card.
3. Unscrew the two screws, torx 20, holding the front on the tower.
4. Lift off the front.



5. REPAIR INSTRUCTIONS

5.3 Replacing the circuit card, charging station

1. Dismantle the charging station.
2. Remove the connector to the contact strips and the connector to the charge plate from the circuit card.
3. Unscrew the four screws, torx 20, holding the circuit card.
4. Remove the old card and replace with the new card.
5. Refit the screws and connect the connectors again.
6. Assembling the charging station.
7. Program the new circuit card with the mower's PIN code:
 - Place mower in the charging station and select *Settings - Security - PIN code* (shortcut 4-1-1).
 - State and confirm the PIN-code. You can use the same code as earlier.



5.4 Replacing the plate, charging station

Replacing the plate is simplified if you first remove the transformer and boundary wire connections from the charging station.

1. Dismantle the charging station.
2. Remove the connections to the plate from the circuit card.
3. Turn the charging station.
4. Unscrew the four screws, torx 20, holding the tower against the plate.
5. Remove the plate's cable through the hole in the tower.
6. Fit the tower on the new plate.

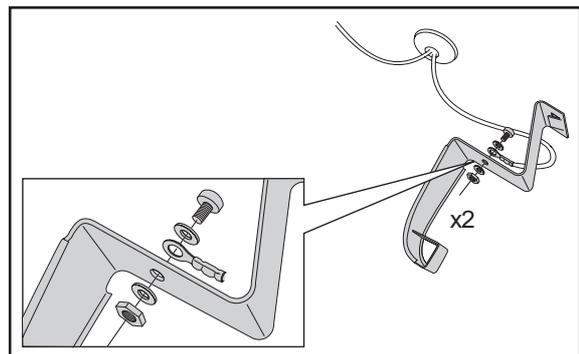
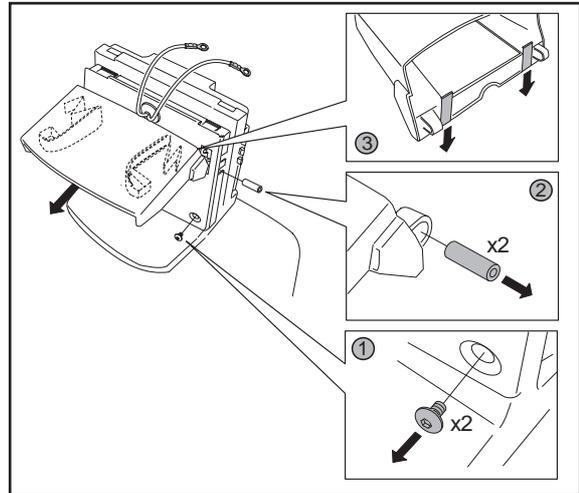
When connecting the plates cable to the circuit card: Ensure the cable's rubber grommet is seated correctly in the hole in the tower.
7. Assembling the charging station.

5. REPAIR INSTRUCTIONS

5.5 Replacing the contact strips, charging station

When the mower's battery does not recharge this may be due to worn contact strips in the charging station. Inspect the contact strips and charging strips on the Automower®. The contact strips should be replaced when blackened. Also clean the charging strips on the Automower®.

1. Remove the cable to the transformer from the wall socket.
2. Lift off the cover on the tower.
3. Remove the connections from the contact strips.
4. Unscrew the two screws, torx 20, that hold the front on the tower.
5. Lift off the front.
6. Remove the cotter pins that are holding the charging plate holder (incl. charging plate) in place. Also remove the two springs on the rear edge of the charging plate holder.
7. Replace the old charging plate holder (including charging plate) and replace with a new one (510 05 97-02).
8. Install the two springs on the new charging plate holder.
9. Install the connections from the contact strip.
10. Attach the charging plate holder on the front using the cotter pins. Put the front back in place.
11. Assemble the cover on the tower and connect the transformer.

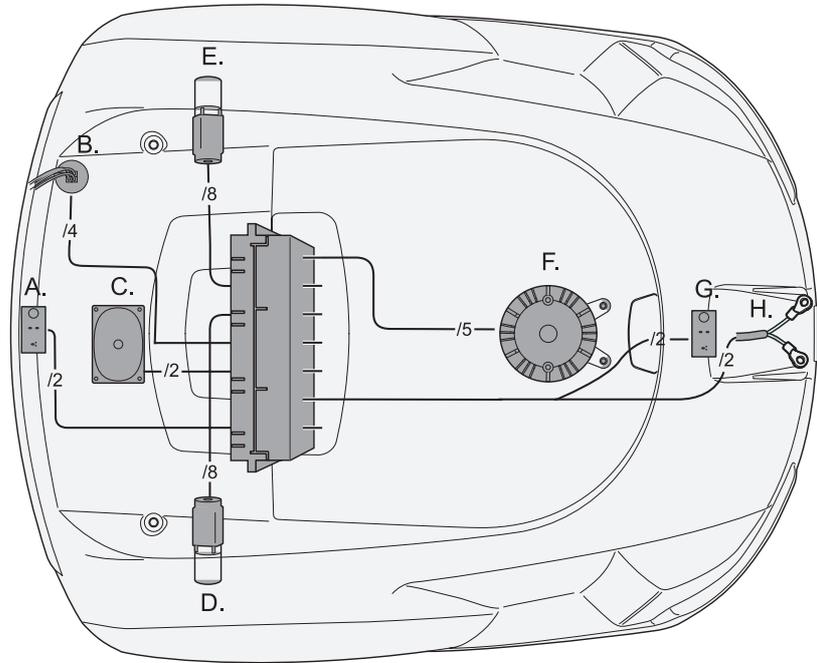


5. REPAIR INSTRUCTIONS

5.6 Replacing the lower section cable harness

The lower section cable harness on the Automower® runs from the control box connection to the components:

- A. Rear loop sensor. (white)
- B. Service connector. (white)
- C. Speaker (220 AC m/2003-2009). (white)
- D. Right wheel motor.(yellow)
- E. Left wheel motor.(green)
- F. Blade motor. (blue)
- G. Front loop sensor. (black)
- H. Connector for charging strip (not 210 C). (black)
- I. Connector to the charger contact (only 210 C). (black)
- J. Buzzer (not 210 and 220 AC m/2003-2009). (white)

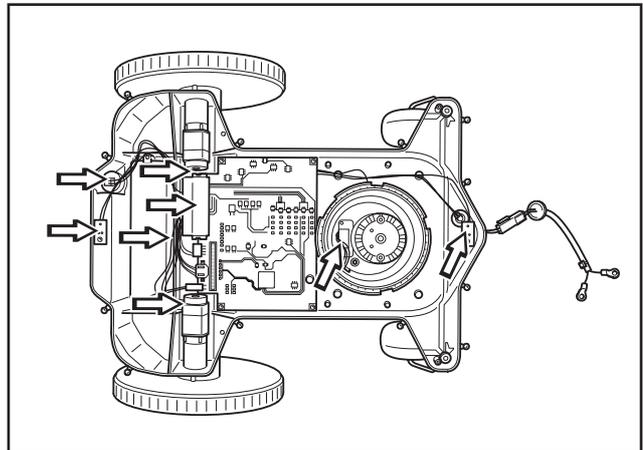


To change the cabling:

1. Dismantle the body and chassis.
2. Remove all cables from their connections: control box, speaker, rear loop sensor, service connector (press together, from below the chassis, the catches using e.g. a screwdriver), wheel motors (may be necessary to remove the wheel motors), blade motor and front loop sensor.

NOTE! Remove the cables by loosening respective catches and pull the connector.

3. Dismantle the control box.
4. Remove the old cabling and replace with new cabling. Ensure that all connections are made properly.
5. Assemble the control box.
6. Check that the mower works.
7. Fit the chassis and body.



5. REPAIR INSTRUCTIONS

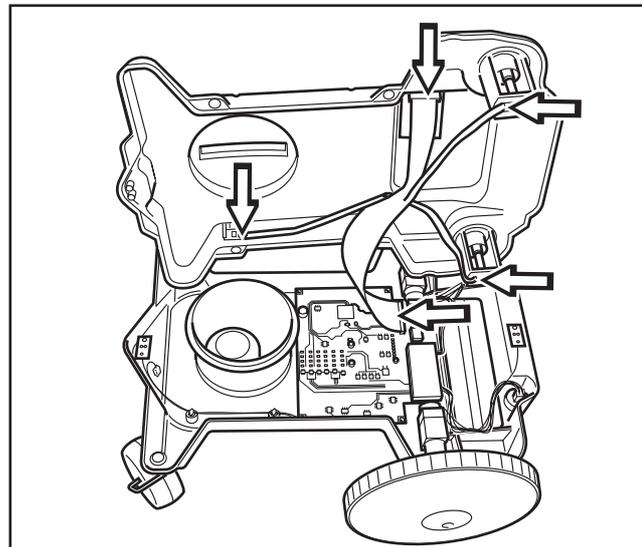
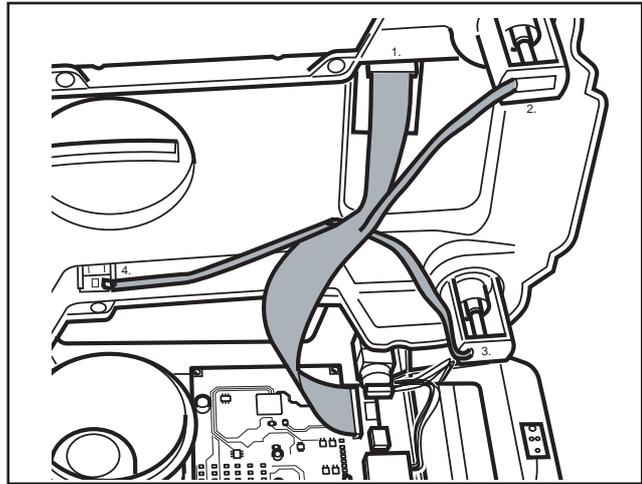
5.7 Replacing the upper section cable harness

Upper section cable harness in the Automower® connects the control box with:

1. Display circuit board.
2. Left collision sensor.
3. Right collision sensor.
4. Lift sensor.

To change the cabling:

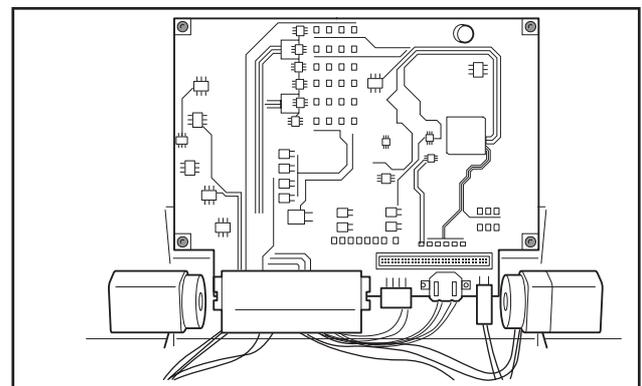
1. Dismantle the body and chassis.
2. Remove the cabling from the control box, display circuit card, the collision sensors and the lift sensor.
3. Replace with a new upper section harness and connect.
4. Check that the mower works.
5. Fit the chassis and body.



5.8 Replacing the control box

A mower's operating information is stored in the control box. This information, with the help of the service program Autocheck, can be saved in a file on a computer and then transferred back to the mower once the control box has been replaced, see *Operating history: Copy all data to new control box, page 75*.

1. Dismantle the body and chassis.
2. Remove the cabling, battery cable and any GSM module.
3. Unscrew the four screws, torx 20, holding the control box.



IMPORTANT INFORMATION

Only hold a circuit board by its edges. Never touch the card's components and pin terminals.

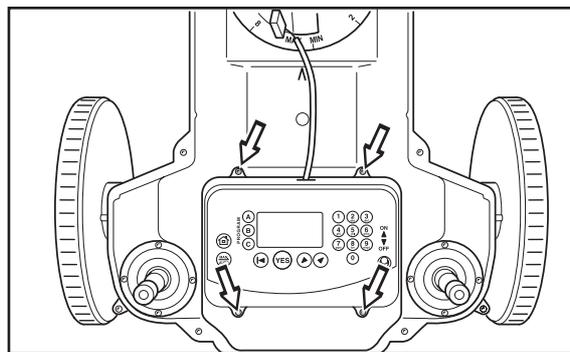
5. REPAIR INSTRUCTIONS

4. Remove the old card and replace with the new card.
5. Screw the screws back in place and connect the cable and the GSM module.
6. Program the mower with the latest control program. A spare part box does not include a mower program.
7. Check that the mower works.
8. Fit the chassis and body.

A new start-up sequence starts when the main switch is turned to the *ON* position after replacing the control box, provided that the data on the old control box has not been transferred to the new via Autocheck first.

5.9 Replacing the display

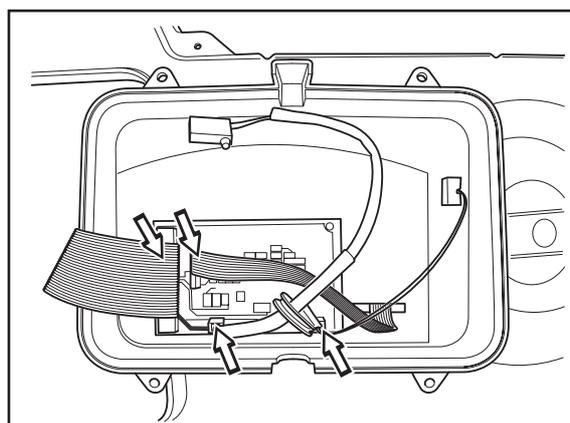
1. Dismantle the body.
2. Unscrew the four screws, torx 20, holding the display cover.



3. Disconnect all the cable connected to the display circuit card; top part of the cabling, stop button, main switch, keypad and background lighting (not 210 C, 220 AC).

NOTE! Remove the cables by pulling respective connectors.

4. Loosen the screw retainer and remove the display.
5. Replace with a new display and reconnect all the cables again. Ensure that the cable to the display circuit card is connected the right way and that the rubber grommet on the cable to the stop button is fitted correctly. If the cable is connected incorrectly, the buttons will not correspond with the menu functions.
6. Test that the display and keypad work. The mower program needs to be reconfigured for the new display if the text on the display is inverted or dark. This is done using the function *Machine version* in Autocheck (see Tools page 29)
7. Replace any packing for the display cover with new packing (m/2010). Screw on the display cover.
8. Assemble the body.



5. REPAIR INSTRUCTIONS

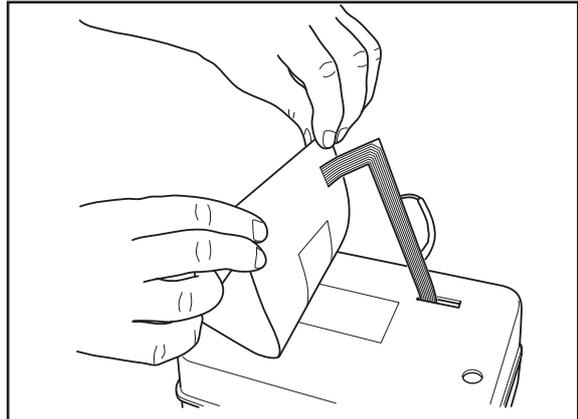
5.10 Replacing the keypad

1. Dismantle the body.
2. Unscrew the four screws, torx 20, holding the display cover.
3. Remove the cable to the keypad from the display circuit card.
4. Unscrew the rubber cap on the main switch and pass the main switch out through the hole.
5. Pull off the keypad and pass the cable out through the hole.
6. Remove the protective film, press on a new keypad and connect the cable to the display-circuit card.

Make sure you press the keypad carefully and firmly into position. There must be no loose corners or air bubbles, as dirt and moisture can enter under the keypad.

Ensure that the cable to the display circuit card is connected the right way. If the cable is connected incorrectly, the buttons will not correspond with the menu functions.

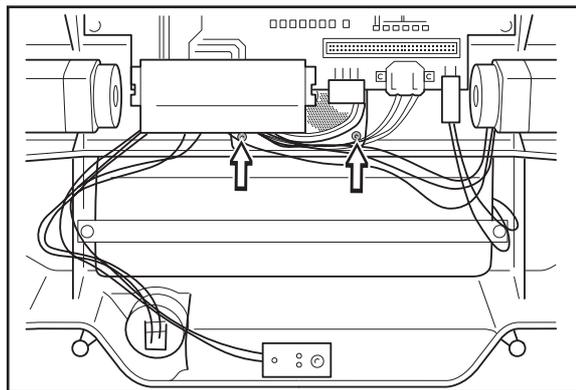
7. Refit the main switch and screw on the rubber cap.
8. Check that the keypad works.
9. Assemble the body.



5.11 Replacing the Speaker/buzzer

1. Dismantle the body and chassis.
2. Press down the catch on the connector to the speaker/buzzer and disconnect the cable.
3. Unscrew the two screws holding the speaker/buzzer.
4. Lift out the old speaker/buzzer and replace with a new one.
5. Refit the screws and connect the cable.
6. Test that the speaker/buzzer works.
7. Fit the chassis and body.

The internal buzzer (not 220 AC) is fitted on the control box. The whole control box must be replaced if this is defective.



5.12 Replacing the main switch

1. Dismantle the body.
2. Unscrew the four screws, torx 20, holding the display cover.
3. Unscrew the rubber cap on the main switch.
4. Turn the display cover and remove the main switch connection from the display circuit card.

5. REPAIR INSTRUCTIONS

5. Pull the main switch out of the hole.
6. Insert the new main switch in the hole and connect its cable to the display circuit card.
7. Screw the rubber cap onto the main switch.
8. Screw on the display cover.
9. Check that the main switch works
10. Assemble the body.

5.13 Replacing the micro switch, stop button (210 C, 220 AC, 230 ACX and 260 ACX)

1. Dismantle the body.
2. Remove the microswitch on the stop button.
3. Unscrew the four screws, torx 20, holding the display cover.
4. Remove the micro switch connection from the display circuit card.
5. Connect the new micro switch to the display circuit card.
6. Make sure the switch's rubber seal is fitted correctly on the display cover.
7. Screw on the display cover.
8. Check that the microswitch and stop button work.
9. Assemble the body.

5.14 Replacing the micro switch, stop button (Solar Hybrid)

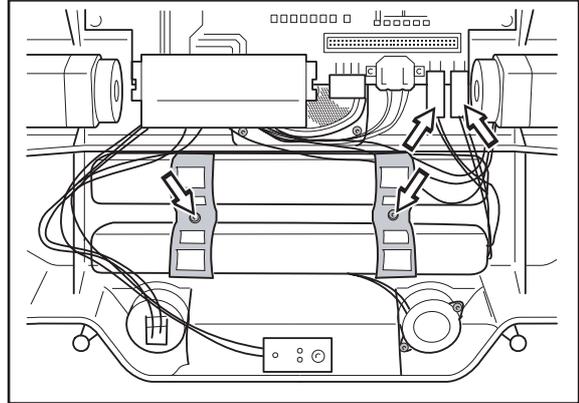
1. Remove the solar panel, follow the instructions for replacing the solar panel, see page100.
2. When the panel has been removed, place it upside down on a soft surface.
NOTE! The solar cells are extremely sensitive to pressure and knocks.
3. Unscrew the eight screws holding the inner cover.
4. Cut off the wires that run to the cover switch, cut the wires approximately 16 cm (6") from the switch.
5. Place the new switch into position and lay the new wires into the grooves. This is most easily done if the stop button is in the stop position.
6. Splice the wires together with the supplied splice connectors.
7. Install the cover with the eight screws.
8. Install the solar panel.

5. REPAIR INSTRUCTIONS

5.15 Replacing the battery

1. Dismantle the body and chassis.
2. Press down the catch on the battery cable's connector and pull the cable off of the control box.
3. Loosen the two screws, Torx 20, and the holder over the battery. To access the batteries on the 260 ACX model, the ultrasonic circuit first has to be uninstalled.
4. Lift out the battery.
5. Fit the new battery. The battery on the 210 C, 220 AC and Solar Hybrid should be installed in the front compartment. Be sure to insert the battery with the text "THIS SIDE DOWN" facing downwards. If the battery is inserted incorrectly, this can result in interference in the mower's rear loop sensor.
6. Check that the battery works
7. Fit the chassis and body.

NOTE! After replacing the battery you should reset *Charges OK*, which a measurement of the battery age. This is done from Autocheck via *Operating history*, *Clear Charges OK*.



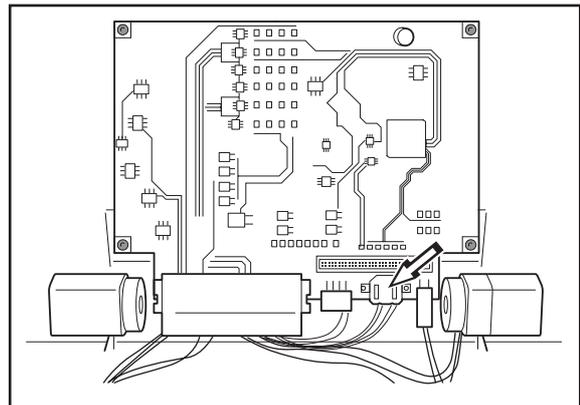
5.16 Replacing the battery, control box

(not applicable to 210 C)

There is a lithium battery on the control box that provides power to the mower's clock when the main battery is replaced or is fully discharged after, e.g. winter storage. The lithium battery must be replaced when the mower's clock starts to show strange times or when the voltage drops below 2.5V. The normal life span is several years.

Battery type: CR 2025 3V.

1. Dismantle the body and chassis.
2. Remove the old battery from its holder on the control box.
3. Insert the new battery, with + side facing upwards.
4. Fit the chassis and body.



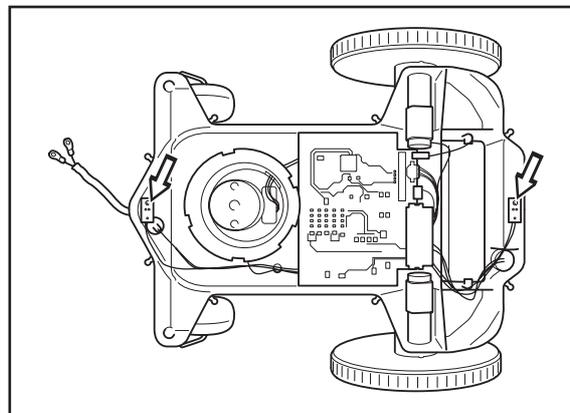
5. REPAIR INSTRUCTIONS

5.17 Replacing the sensors

Dismantle the body and chassis.

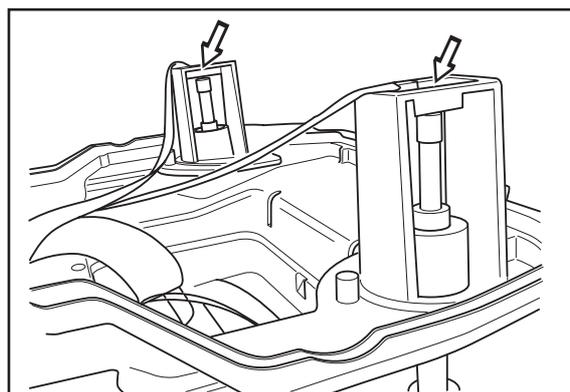
5.17.1 Front and rear loop sensors

1. Remove the cable from the sensor to be replaced.
2. Unscrew the screw, torx 20, and lift out the sensor.
3. Fit the new sensor. Do not tighten the screws too tight.
4. Check that the loop sensors work.
5. Fit the chassis and body.



5.17.2 Collision sensors

1. Remove the cable from the sensor to be replaced.
2. Remove the sensor to be replaced by pressing one of the catches, holding the sensor, backwards and at the same time hold the upright to the side. Exercise care so that the catch holding the collision sensor is not broken off.
3. Fit the new sensor.
4. Check that the collision sensor works.
5. Fit the chassis and body.



If the collision sensor still does not work after replacement, this may be due to the magnet in the upright not being located correctly. Try to turn the magnet. Also check that the upright is straight. The collision sensor is deactivated when the upright is straight.

If a collision sensor is permanently *activated* due to a fault, the fault message *Left collision sensor defect* or *Right collision sensor defect* is displayed.

6. Check that the mower has the correct setting for the component version. If a mower that is fitted with white collision sensors (mowers produced from 2003 or 2004) changes to black collision sensors (mowers produced from 2005 and onwards) the settings must be changed. This is done in Autocheck under the menu *Tools-Machine version*.

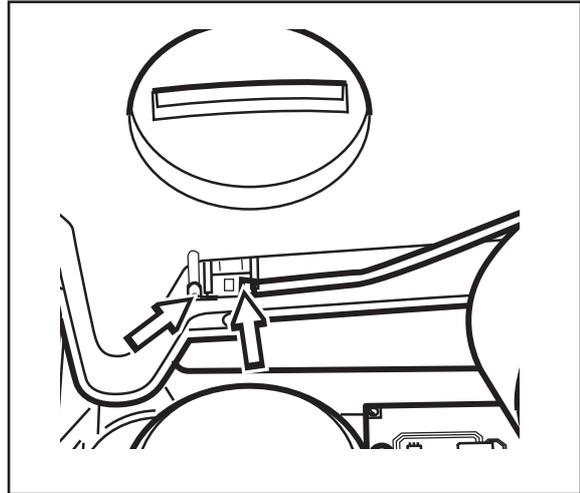
5. REPAIR INSTRUCTIONS

5.17.3 Lift sensor

1. Remove the cable from the lift sensor.
2. Unscrew the screw, torx 20, and lift the sensor from its holder.
3. Fit the new sensor.
4. Check that the lift sensor works.

Check that the sensors work via *Tools - Test - Sensors* (shortcut 5-2-5). When the mower has been lifted, i.e. when the lift sensor is activated, the mower should indicate *YES* on the display.

If the lift sensor still does not work after replacement, check that the pillar and magnet have been fitted correctly. The magnet must be fitted on the right-hand pillar and it must be square to the chassis. Two dashes on the chassis mark where the magnet should be seated.



5.17.4 Ultrasonic sensor

1. Open the cover for the cutting height adjustment.
2. Remove the cable from the ultrasonic sensor using a bayonet socket. Also undo the "Christmas tree" that holds the cable in place.
3. Turn the mower over and unscrew the two screws of the plastic holder that keep the ultrasonic sensor in place.
4. Remove the ultrasonic sensor from its holder.
5. Carefully install the new ultrasonic sensor and be sure to place it in the middle of the chassis component.
6. Test the ultrasonic sensor to be sure that it works.

5.18 Replacing the blade motor

1. Turn the Automower® upside down.
2. Unscrew the skid plate (4 screws torx 20), blade disc (3 screws torx 20) and the hub (stop screw hex 2).
3. Unscrew the four screws, torx 20, holding the blade motor.
4. Turn the Automower® and open the cover for the cutting height adjustment.
5. Place your fingers under the edge of the wheel for the cutting height adjustment and lift off the wheel.
6. Remove the connector to the blade motor.
7. Replace the blade motor with a new motor and connect the connector.
8. Place the Automower® on its side.
9. Hold the blade motor and screw in position.
10. Check that the mower motor works.
11. Replace the wheel for the cutting height adjustment and close the cover.
12. Fit the hub, blade disc and skid plate.

5. REPAIR INSTRUCTIONS

5.19 Replacing the wheel motor

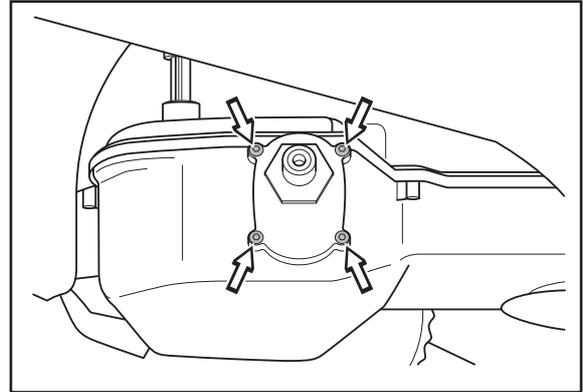
The wheel motors can be replaced without dismantling the chassis.

1. Unscrew the wheel hub (one screw hex 5) on the wheel where the wheel motor is to be replaced.
2. Lift off the wheels.
3. Unscrew the four screws holding the wheel motor, torx 20.
4. Lift out the motor.
5. Carefully remove the cable from the motor.
6. Secure the cable on the new motor.
7. Fit the new motor.

NOTE! The motor must be fitted so that the axle runs through the top part of the hole.

IMPORTANT INFORMATION

Ensure that there is no dirt between the motor and the chassis. Also make sure that the seal is seated correctly.



8. Replace the wheel. Make sure they are fitted to the right axle.
9. Replace the hub.
It is not necessary to apply new thread locking fluid. The screws can be reused about 5 – 10 times.
10. Check that the wheel motor works.

5.20 Replacing the hub

Instructions for replacing the wheel motor's hexagonal hub:

1. Undo the ESD plug as well as the screw in the centre of the drive wheel (5 mm hexagonal wrench).
2. Remove the wheel and the hub cap.
3. Undo the four screws at end of the wheel motor (T20).
4. Carefully pull the motor out and disconnect the connector.
5. Screw an M8 screw of at least 30 mm (1.2") into the centre of the hub as an extractor. The hardness of the screw should be 8.8 or greater, to prevent damage to the threads.
6. Turn the screw until the hexagonal hub is completely pulled out from the wheel motor shaft.
7. Heat the new hexagonal hub using a hot air gun or similar to enlarge the diameter of the hole. The temperature of the hexagonal hub should be 150-200 °C (300-400 °F).
8. Carefully install the heated hub on the wheel motor shaft. Press the hub all the way down until it rests against the threads, this is to maintain complete functionality of the labyrinth seal.

5. REPAIR INSTRUCTIONS

9. Allow the hexagonal hub to cool.
10. Install wheel motor, wheel, hub cap and ESD plug.
The wheel torque should be 10-12 Nm.
11. In some cases the ESD plug may be hard to remove without damaging it. Damaged plugs must be replaced.

5.21 Replacing the solar panel (Solar Hybrid)

1. Fold the solar panel up
2. Switch off the machine using the main switch
3. Disconnect the cable which runs from the keypad cover
4. Undo the two screws, which hold the large connector, from the solar panel, two turns is sufficient
5. Disconnect the connector
6. Remove the clip that holds the gas spring in the solar panel
7. Unscrew the four screws holding the panel to the hinge.
8. When reinstalling, ensure that the connector's catch engages properly, and remember that the new solar panel is extremely sensitive to knocks

5.22 Installing GSM module

1. Disassemble the body.
2. Undo the display cover (4 screws).
3. Remove the connections for the battery/batteries.
4. Install the SIM card and antenna on the GSM module.
5. Carefully install the GSM module directly on the control card through the opening in the display cover. Ensure that the module's connector is attached to the middle of the pin on the control card. Then assemble the module using the accompanying screws.
6. Connect the battery/batteries to the control card.
7. Connect the service cable and Autocheck to the mower. Download a new program to the mower to support the GSM.
8. Set the necessary settings for the SMS feature under *Settings > Safety > SMS* from the mower's menu. See also *1.14 SMS function* page 23.
9. Test the SMS feature by selecting *SMS test* from the SMS menu.
10. Assemble the display cover and body.

5. REPAIR INSTRUCTIONS

5.23 Checking the loop

To check the loop signal, always start by checking the green LED in the charging station, see *1.8 Loop signal strength* on page 13. This normally indicates whether the loop is functioning or not. In the event of a fault, follow the instructions below:

The LED in the charging station flashes once per second (single flash):

1. Probably a break in the loop. Measure the resistance in the loop wire using a multimeter. Disconnect all cables from the charging station during measuring. The correct resistance for the loop should be between 0-20 Ohm.
 - Value >20 Ohm: Indicates a break in the loop. Locate and repair the break. Use the appropriate break detector or cut the area in half using the guide wire to find the break more quickly.
 - Value <20 Ohm: Indicates that the loop is intact. Check the connections to the charging station. If the fault cannot be corrected, replace the circuit card in the charging station, see *5.3 Replacing the circuit card, charging station* on page 89.

The LED in the charging station flashes twice per second (double flash):

1. The loop is probably too long. If the loop is longer than 500 meters, the strength can start to drop even if it is still sufficient. For installations where a longer boundary wire of up to 800 metres (2560 ft) is required, we recommend a Signal amplifier (522 42 58-01), which is available as an accessory.

The LED in the charging station is solid green, but there seems to be no function in the loop.

1. Change the PIN code in the mower. During the change, the PIN code is transmitted to the charging station and the connection between the charging station and mower is renewed. Test run the mower and continue with step 2 if the mower still cannot find the loop signal for the loop.
2. Replace the circuit card in the charging station, see *5.3 Replacing the circuit card, charging station* on page 89.

5. REPAIR INSTRUCTIONS

5.24 Tightening torques

Table 6: Tightening Torques

Joint	Part no.	Mounting elements (Tool)	Notes	Part no.	Assembly torque (Nm)	Remarks
Chassis, lower						
Holder, battery	535 90 78-01	Screw (Torx-20)	2	535 13 03-14	1.3	
Wheel motor, complete	535 13 72-02	Screw (Torx-20)	8	535 13 03-16	1.0	
Drive wheel, complete	535 13 60-02	Screw (Hex-5)	2	535 13 94-01	10-12	Torque wrench
Locking spring	535 12 24-01	Screw (Torx-20)	1	535 13 03-14	1.0	
Speaker, complete	535 12 57-01	Screw (Torx-20)	2	535 13 03-10	1.0	
Control box, complete	544 23 06-01	Screw (Torx-20)	4	535 13 03-10	1.0	
Sensor card, Loop	535 12 31-01	Screw (Torx-20)	1	535 13 03-10	1.0	
Chassis, upper						
Display cover, complete	535 13 84-01	Screw (Torx-20)	4	535 13 03-10	1.0	
Pillar, front	544 14 15-01	Screw (Hex-4)	2	535 07 60-01	3.2	
Sensor card Lift	535 12 31-01	Screw (Torx-20)	1	535 13 03-10	1.0	
Securing ring, Collision tower	535 12 16-01	Screw (Torx-20)	8	535 13 03-10	1.0	Tightened crosswise
Chassis, Upper section	535 12 11-01	Screw (Torx-20)	12	535 13 03-14	1.0	Tightened crosswise. IMPORTANT INFORMATION Check that upper and lower sections are assembled correctly, that there is no dirt in between and that no cables are pinched.

5. REPAIR INSTRUCTIONS

Table 6: Tightening Torques

Joint	Part no.	Mounting elements (Tool)	Notes	Part no.	Assembly torque (Nm)	Remarks
Body, complete	535 14 35-01					
Locking strap	535 12 68-01	Screw (Torx-20)	2	535 13 03-10	1.0	
Axle, Hinge	535 12 78-01	Screw (Torx-20)	4	535 13 03-10	1.0	
Body, Rear securing hole	535 12 45-01	Screw (Hex-4)	2	535 12 93-02	3.0	Torque only applies during assembly on the chassis
Body, complete Front securing hole	544 01 26-01	Screw (Hex-4)	2	535 07 60-01	3.0	
Mowing system						
Blade motor	535 12 36-01	Screw (Torx-20)	4	535 13 07-10	3,5	Only applies to motors made in 2007 and later. For others 2.0 Nm applies.
Hub	535 07 55-01	Stop screw Stop screw (260 ACX)	1 1	728 82 85-01 728 83 60-01	1.0 4.0	Set on the flat surface on the axle
Blade	535 13 87-01	Screw, Blade	3	535 09 53-01	1.0	
Blade disc	535 12 63-01	Screw (Torx-20)	3	535 13 05-01	1.0	Readjusted to the stated torque
Bearing box	535 12 64-01	Screw (Hex-4)	1	535 07 60-01	5.0	Torque wrench
Skid plate	535 07 59-01	Screw (Torx-20)	4	535 13 03-10	1.0	
Charging station, Complete	535 25 33-01					
Body, Charging station	535 12 43-02	Screw (Torx-20)	4	535 13 03-14	1.0	
Circuit card, Complete	544 00 13-01	Screw (Torx-20)	4	535 13 03-10	1.0	
Cover	535 12 44-01	Screw (Torx-20)	2	535 13 03-14	1.0	

6. TROUBLE SHOOTING

6. Trouble shooting

The fault detection section consists of two main areas, Fault messages and Fault symptoms. Each fault message and fault symptom is explained using one or more possible causes of the problem, followed by one or more solutions.

When an Husqvarna Automower® does not work correctly, first take the following actions before continuing with trouble shooting:

1. Update the mower program in Automower® to the latest edition. Many problems are solved directly by the new mower program, see *Table 2: Version of the mower program* on page 8.

The latest version of the mower program can be downloaded from the support site:

<http://support.automower.com>.

2. Reset the factory settings on the mower by selecting *Commands - Make factory sett.* (shortcut 1-3), enter the PIN code and press **YES** or from Autocheck: *Tools, Make factory settings*.

6.1 Fault messages

All fault messages that can be displayed are listed below. Autocheck can also be used for the menu functions mentioned. This primarily applies to 210 C without a display.

Table 7: Fault messages

Fault message	Cause	Action
<i>Outside</i>	The boundary wire's connections to the charging station/loop generator have crossed. When a problem appears while the mower is inside the installation.	Try swapping the connections
	The boundary wire is too close to the edge of the working area. When a problem appears while the mower is outside the installation.	Check that the boundary wire has been routed correctly.
	The downward slope by the boundary wire is too large. The mower has probably skidded and rolled outside the installation.	Move the boundary wire. Equip the mower with wheel brushes for better grip.
	When there are several adjacent installations and the mower is in the vicinity of a neighbouring installation, the message may be due to its own loop signal being lost and the mower believing it is outside of the neighbouring installation.	Switch to another PIN code via <i>Settings - Safety - PIN code</i> (Shortcut 4-1-1).
	If this occurs in isolated areas it may be due to interference from metallic objects (perimeter fence, reinforcement bar) or buried cables in the vicinity. When a problem appears while the mower is inside the installation.	Try moving the boundary wire.
	The boundary wire has been routed the wrong way around an island. When a problem appears while the mower is inside the installation.	Check that the boundary wire has been routed in accordance with the installation instructions.

6. TROUBLE SHOOTING

Table 7: Fault messages

Fault message	Cause	Action
<i>No loop signal</i>	Break in the boundary wire or no voltage to the charging station.	First check that the LED on the charging station is solid or flashing. This indicates that there is power to the charging station. If it is flashing once per second, the loop is damaged. Repair the break on the cable using the original water-tight connector. See 5.23 Checking the loop on page 101 for more information.
	The transformer is not connected to the mains supply or its miniature circuit-breaker has tripped.	Check the wall socket connection and whether the miniature circuit-breaker has tripped. Reset the miniature circuit-breaker by removing the transformer's power cord from the wall socket, wait 10 seconds and then reconnect the power cord in the wall socket again.
	Communication between the Automower® and the charging station has broken down.	Place the Automower® in the charging station and state the PIN-code again via <i>Settings- Security - PIN code</i> (shortcut 4-1-1). You can use the same PIN code as earlier.
	The boundary wire has been routed the wrong way around an island.	Check that the boundary wire has been routed in accordance with the installation instructions.
	The circuit card in the charging station is defective.	Check the levels for Af and Ar via Quick check (Press and hold the number 0 down for 2 seconds). Switch between Af and Ar with the YES button. When both Af and Ar are 0 or when <i>Quality</i> is lower than 100%, the circuit card in the charging station is defective and must be replaced.
	The front loop sensor card is defective.	Check the levels for Af and Ar via Quick check (Press and hold the number 0 down for 2 seconds). Switch between Af and Ar with the YES button. When Af is 0 and Ar is higher than 70 (the mower is outside the charging plate, but inside the loop) or when <i>Quality</i> is lower than 100%, the front loop sensor card is defective and must be replaced.
	The control box in the mower is defective.	Check the levels for Af and Ar via Quick check (Press and hold the number 0 down for 2 seconds). Switch between Af and Ar with the YES button. When both Af and Ar are 0 or when <i>Quality</i> is lower than 100% and the circuit card in the charging station is in working order, the control box is defective and must be replaced.
	If this occurs in isolated areas it may be due to interference from metallic objects (perimeter fence, reinforcement bar) or buried cables in the vicinity.	Try moving the boundary wire.
<i>Front loop sensor defect</i>	The cabling to the front loop sensor is defective or has come loose.	Check the levels for Af and Ar via Quick check (Press and hold the number 0 down for 2 seconds). Switch between Af and Ar with the YES button. When Af is 0 and Ar is higher than 70 (the mower is outside the charging plate, but inside the loop) or when <i>Quality</i> is lower than 100%, the cabling to the front loop sensor is defective or has come loose.
	The front loop sensor card is defective.	Check the levels for Af and Ar via Quick check (Press and hold the number 0 down for 2 seconds). Switch between Af and Ar with the YES button. When Af is 0 and Ar is higher than 70 (the mower is outside the charging plate, but inside the loop) or when <i>Quality</i> is lower than 100% and the cabling to the front loop sensor is undamaged, it is the front loop sensor card that is defective and must be replaced.
<i>Rear loop sensor defect</i>	The cabling to the rear loop sensor is defective or has come loose.	Check the levels for Af and Ar via Quick check (Press and hold the number 0 down for 2 seconds). Switch between Af and Ar with the YES button. Switch between Af and Ar with the help of Arrow up . When Ar is 0 and Af is higher than 70 (the mower is outside the charging plate, but inside the loop) or when <i>Quality</i> is lower than 100%, the cabling to the rear loop sensor is defective or has come loose.

6. TROUBLE SHOOTING

Table 7: Fault messages

Fault message	Cause	Action
<i>Rear loop sensor defect</i>	The rear loop sensor card is defective.	Check the levels for Af and Ar via Quick check (Press and hold the number 0 down for 2 seconds). Switch between Af and Ar with the YES button. When Ar is 0 and Af is higher than 70 (the mower is outside the charging plate, but inside the loop) or when <i>Quality</i> is lower than 100% and the cabling to the rear loop sensor is undamaged, it is the rear loop sensor card that is defective and must be replaced.
	Improperly installed battery	Check that the battery is installed correctly in its holder. The battery should be placed with the text "THIS SIDE DOWN" facing downwards. An incorrectly installed battery can cause interference on the rear sensor.
<i>Trapped</i>	Automower® has got caught or become trapped someplace.	Free the Automower® and rectify the reason for it becoming trapped.
	Both, or one of, the rear screws on the body has not been tightened correctly.	Lift the body from the rear section and feel whether it is secured correctly. If not, tighten the screws.
	The magnet in the collision sensor pillar is loose, twisted or missing.	Check the collision sensors via <i>Tools - Test - Sensors</i> (shortcut 5-2-5). Check whether the magnets on the mower, without contact, indicate a collision.
	The collision sensor card or the cabling is defective.	Check the collision sensors via <i>Tools - Test - Sensors</i> (shortcut 5-2-5). Check the collision sensors and the cabling to see whether the magnet is seated correctly and that the mower, without contact, indicates a collision.
<i>Upside down</i>	The Automower® has been lifted or has turned over and the tilt sensor has tripped.	Correct the mower.
	The tilt sensor is defective.	Check the values for Tilt X and Tilt Y via <i>Tools - Test - Sensors</i> shortcut 5-2-5). When any value is higher than 20 or when the mower indicates <i>Upside down</i> : Calibrate the tilt sensor (shortcut 5-6-3). When no changes are made the control box is defective and must be replaced. When the fault recurs within a month after calibration, the control box is defective and must be replaced.
<i>Low battery voltage</i>	Automower® cannot find the charging station.	Check all passages in the working area by positioning the mower beyond the passage, seen in the direction from the charging station, and press Home . If the mower does not go through the passage, select a smaller corridor width via <i>Installation - Follow loop - Corridor width</i> (Shortcut 3-2-3)
	The position of the charging station is unsuitable.	Check that the charging station has been placed as set out in the installation instructions.
	The charging plate is defective.	Check the F and N signal from the charging station: Set the Automower® in the test position and then check the value via the function Quick check (Press and hold the number 0 down for 2 seconds). The charging plate is defective if the value for F is lower than 300 and the value for N is lower than 100. The charging plate must be replaced.
	The battery is spent or defective.	See section 1.12 Battery on page 19 to ensure the battery capacity. For replacing the battery, see 5.15 Replacing the battery on page 96
<i>Wrong PIN code</i>	Wrong PIN code has been entered. Three attempts are permitted, the keypad is then blocked for five minutes. However, the function Discover PIN code works, this is accessed by pressing and holding down the 9 key for 5 seconds.	When the mower is locked: Wait 5 minutes until you can enter the code again. Now enter the correct PIN code.
<i>No drive</i>	The Automower® has become caught in something.	Free the mower and rectify the reason for the lack of drive. To keep the drive wheels clean and thus increase traction, use wheel brushes (505 13 27-01).
	The mower has run too long without an event.	Check the wheel motors via <i>Tools - Test - Motors</i> (Shortcut 5-2-5) and keep the drive wheels clean using wheel brushes.

6. TROUBLE SHOOTING

Table 7: Fault messages

Fault message	Cause	Action
<i>Mower lift</i>	The lift sensor has been activated as the mower has become trapped.	Free the Automower® and rectify the reason for it getting trapped.
	Pillar or magnet fitted incorrectly	Check that the pillar and magnet have been fitted correctly. The magnet must be fitted on the right-hand pillar. Two dashes on the chassis mark where the magnet should be seated. Check that the magnet is facing in towards the chassis. Also check that the mower body can move freely up and down in relation to the chassis.
	The lift sensor card is defective.	Check the lift sensor via <i>Tools - Test - Sensors</i> (shortcut 5-2-5). When the mower has been lifted, i.e. when the lift sensor is activated, the mower should indicate YES on the display.
<i>Stuck in charging station</i>	An object prevents the Automower® from rolling out of the charging station.	Remove the object.
	The contact strips jams.	Check that the contact strips on the charging station are not jammed. Remove any dirt covering the charging plate for the charging station and mower. Use an emery cloth and lubricate with a copper paste.
	The mower skids on the charging plate.	Clean the charging plate and check for any wear on the drive wheels.
<i>Charging station blocked</i>	Automower® has collided with an obstacle in the N-field.	Remove any obstacles from the charging plate or from the plate's N-field. The charging station may need to be moved.
	The charging plate (N-coil) is defective.	Check the N-signal from the charging station: Place the Automower® in the test position and then check the value via the Quick check function (Press and hold the 0 key down for 2 seconds). The N-coil is defective if the value for N is lower than 100. The charging plate must be replaced.
<i>No contact in charging station</i>		Let the Automower® dock itself in the charging station by pressing Home . Check that the charging strips and contact strips make good contact. Also test the charging current with the help of the Quick check function (press and hold the 0 key down for 2 seconds). The current (I) varies between models, see section <i>1.12 Battery</i> on page 19.
	The charging station leans.	Check that the charging station does not lean to the side and that the charging plate is not bent.
	Contact between the charging cable's cable lugs and the charging strips on the Automower® is poor.	Check the cable lugs. File off any corrosion. Replace the entire charging cable assembly if necessary.
	Contact between the flat-pin connectors (2) and the contact strips on the charging station is poor.	Lift off the cover on the charging station and check the connection. Change flat-pin connectors.
	Contact between the charging strips on the Automower® and the contact strips in the charging station is poor.	Check that the contact strips on the charging station are not jammed. Remove any dirt covering the charging plate for the charging station and mower. Use an emery cloth and lubricate with a copper paste.
	The charging cable connector on the chassis is defective.	Check that the charging cable connectors and the charging cables on the mower are undamaged.
	The control box on the Automower® is defective.	Replace the control box. See page 92 to replace.
<i>Left collision sensor defective</i> <i>Right collision sensor defective</i>	The Automower® has jammed.	Remove the object.
	Both, or one of, the rear screws on the body has not been tightened correctly.	Lift the body from the rear section and feel whether it is secured correctly. If not, tighten the screws.
	The magnet in the collision sensor pillar is loose, twisted or missing.	Check the collision sensors via <i>Tools - Test - Sensors</i> (shortcut 5-2-5). Check whether the magnets on the mower, without contact, indicate a collision.
	The collision sensor card or the cabling is defective.	Check the collision sensors via <i>Tools - Test - Sensors</i> (shortcut 5-2-5). Check the collision sensors and the cabling to see whether the magnet is seated correctly and that the mower, without contact, indicates a collision.

6. TROUBLE SHOOTING

Table 7: Fault messages

Fault message	Cause	Action
<i>Left wheel motor blocked</i> <i>Right wheel motor blocked</i>	The Automower® has jammed.	Remove the object.
	Grass or other object may have become wrapped around the drive wheel.	Check the drive wheel and remove the grass or other object.
	The wheel motor is defective.	Check the function of the wheel motors when free wheeling via <i>Tools - Test - Power & Motors – Wheel motors</i> (shortcut 5-2-1-1) or with Autocheck. Check that both wheel motors start with a force of 50 %. Now increase the force using Arrow up to 100 %. At 100% the speed in each wheel should be least 45 cm/second for the 220 AC and Solar Hybrid, and 70 cm/second for the 230 ACX and 260 ACX. (The mower should be fully charged before starting the test. Empty batteries can produce incorrect values.) Check to make sure that the motors' gearboxes do not slip by blocking respective wheels. When blocked the speed should be 0 cm/second. NOTE! When a motor does not start and is extremely difficult to turn by hand, except from the wheel motor, the control box may be faulty. See the cause below. Replace the motor if defective.
The control box is defective.	Some control box faults can be discovered with the help of the wheel motor. Rotate the wheel by hand and note the resistance. Now remove the cabling from the motor and rotate the wheel again. If it is easier to rotate now, the control box is defective and must be replaced.	
<i>Left wheel drive system defect</i> <i>Right wheel drive system defect</i>	The wheel motor is defective.	Check the function of the wheel motors when free wheeling via <i>Tools - Test - Power and Motors – Wheel motors</i> (shortcut 5-2-1-1) or with Autocheck. Check that both wheel motors start with a force of 50 %. Now increase the force using Arrow up to 100 %. At 100% the speed in each wheel should be least 45 cm/second for the 220 AC and Solar Hybrid, and 70 cm/second for the 230 ACX and 260 ACX. (The mower should be fully charged before starting the test. Empty batteries can produce incorrect values.) Check to make sure that the motors' gearboxes do not slip by blocking respective wheels. When blocked the speed should be 0 cm/second. NOTE! When a motor does not start and is extremely difficult to turn by hand, except from the wheel motor, the control box may be faulty. See the cause above. Replace the motor if defective.
	The control box is defective.	Replace the control box.
	The main cable is damaged or defective.	Check the cable harness and connector and check whether there is a repairable defect. If not; replace the cable harness.
<i>Blade disc blocked</i> <i>Blade motor drive defect</i>	Grass or another object may have become wrapped around the blade disc.	Check the blade disc and remove the grass or other object.
	The blade motor is defective.	Check that the blade motor runs at the right speed via <i>Tools - Test - Power & Motors – Blade motor</i> (shortcut 5-2-1-2). The speed should be about 2,500 rpm. For 260 ACX approximately 1750 rpm applies.
	The control box is defective.	Replace the control box.
	The main cable is damaged or defective.	Check the cable harness and connector and check to see whether there is a repairable defect. If not; replace the cable harness.
<i>Check ultrasonic</i>	The mower has collided with an obstacle at full speed several times. The mower continues to mow, but at a reduced speed (30 cm/second) (12"/second).	Clean the ultrasonic sensors with a dry cloth or similar. Protect objects that were not detected by the ultrasound with the boundary wire. For more information about the ultrasound, see 1.13.4 Ultrasonic sensor (260 ACX) on page 22.
<i>The battery is cooling</i>	The temperature of the batteries is too high when the mower reaches the charging station.	Turn the main switch off and on. Close the display cover.

6. TROUBLE SHOOTING

6.2 Fault symptoms

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

- Mowing
- Searching
- Following loop
- Docking
- Charging
- Other

6.2.1 Fault symptom during Mowing

Symptom (mowing)	Cause	Action
Uneven mowing results	The Automower® 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.
	Dull blades.	Replace all the blade units so that the rotating parts are balanced.
	Long grass in relation to the set cutting height.	Increase the cutting height and then successively lower.
	The mower's various starting areas are not being used correctly.	Run the mower in the installation using the starting areas that are available under <i>Installation - Follow loop - Follow loop</i> out.
	Accumulation of grass by the blade disc or around the motor shaft.	Check that the skid plate and the blade disc rotate freely and easily in relation to each other. If not, the skid plate and perhaps the blade disc must be removed and the grass and foreign objects removed.
The Automower® works at the wrong time.	The clock on the Automower® needs to be set.	Set the clock.
	The start and stop times for mowing are incorrect.	Adjust the start and stop time setting for mowing. The battery in the control box may need to be replaced, see page 96.
The Automower® vibrates	Unbalanced blade disc or damaged blades.	Inspect the blade and screws and replace them if necessary.
The mower mows for shorter periods than usual between charges	Grass or a foreign object is blocking the blade disc or skid plate. The cause may also be low battery capacity.	Dismantle and clean the skid plate and blade disc. Perform a battery test to determine the battery's capacity.
Both the mowing and charging times are shorter than usual	This behaviour is normal in high temperatures (gradually increasing above 25 °C). The cause may also be low battery capacity.	Perform a battery test to determine the battery's capacity.
Automower® runs at an angle or in an arc.	The tilt sensor is calibrated incorrectly. The mower believes it is climbing a slope and tries to compensate for this.	Calibrate the tilt sensor by selecting Tools - Special settings - Calibrate tilt sensor (shortcut 5-6-3)
	The tilt sensor is defective.	Replace the control box, see page 92 about replacement.
	Grass has accumulated on one of the drive wheels.	To keep the drive wheels clean and thus increase traction, use wheel brushes (505 13 27-01).

6. TROUBLE SHOOTING

Symptom (mowing)	Cause	Action
Automower® runs in a small circle or one of the wheels locks when turning instead of rotating backwards.	The wheel motor's gearbox is slipping.	Check the function of the wheel motors when free wheeling via <i>Tools - Test - Power & Motors – Wheel motors</i> (shortcut 5-2-1-1) or with Autocheck. Check that both wheel motors start with a force of 50 %. Now increase the force using Arrow up to 100 %. At 100% the speed in each wheel should be least 45 cm/second (18"/second) for the 220 AC and Solar Hybrid, and 70 cm/second (28"/second) for the 230 ACX and 260 ACX. (The mower should be fully charged before starting the test. Empty batteries can produce incorrect values.) Check to make sure that the motors' gearboxes do not slip by blocking respective wheels. When blocked the speed should be 0 cm/second. Replace the wheel motor when faulty, see page 99 about replacement.
The mower does not react when pressing the STOP button	Defective microswitch.	Check and replace the STOP button's microswitch, located under the cutting height adjustment cover.
The mower overturns and rolls upside down on steep hills	Uneven weight distribution.	Program the mower with the latest software. Increase the weight over the front of the mower as needed by installing heavy front wheels (510 20 99-01).
Automower® mows for long periods in areas above hills (plateaus)	Incorrect setting.	Select open installation shape from <i>Installation - Installation shape</i> .
The mower (260 ACX) maintains a lower speed than normal	The mower has collided with an obstacle at full speed several times. The mower continues to mow, but at a reduced speed (30 cm/second) (12"/second).	Clean the ultrasonic sensors with a dry cloth or similar. Protect objects that were not detected by the ultrasound with the boundary wire. For more information about the ultrasound, see <i>1.13.4 Ultrasonic sensor (260 ACX)</i> on page 22.

6.2.2 Fault symptoms during Searching

Symptom (searching)	Cause	Action
Automower® runs, but the blade disc does not rotate.	Automower® is searching for the charging station.	No action The blade disc does not rotate when the mower is searching for the charging station.
Automower® does not run along the boundary wire when it searches for the charging station.	The set delay time does not permit Automower® to start following the boundary wire when it searches for the charging station.	Check that the set delay time to permit Automower® to start following the boundary wire has elapsed. To easily check that Automower® starts to follow the boundary wire, the delay time can be set to 0 minutes.
	Automower® does not find the strength on the loop signal that the set corridor width corresponds to. Automower® will continue to search randomly until it detects the boundary wire again.	When the working area is large/open and when the distance between the boundary wire is large, choose a wider corridor. When the working area is small/narrow and the distance between the boundary wire is small, choose a narrower corridor. Use the function <i>Test IN</i> , see <i>3.4 Testing the installation</i> on page 50.
Automower® does not run along the guide wire when it searches for the charging station. Automower® is set to follow the guide wire on the left-hand side in the direction towards the charging station.	The set delay time does not permit Automower® to start following the guide wire when it searches for the charging station.	Check that the set delay time to permit Automower® to start following the guide wire has elapsed. To easily check that Automower® starts to follow the guide wire, the delay time can be set to 0 minutes.

6. TROUBLE SHOOTING

Symptom (searching)	Cause	Action
Automower® does not run along the guide wire when it searches for the charging station. Automower® is set to follow the guide wire on the left-hand side in the direction towards the charging station.	Automower® does not find the strength on the loop signal that the set corridor width corresponds to.	If the boundary wire to the left of the guide wire, seen in the direction towards the charging station, and the guide wire are routed close together; reduce the corridor width until the Automower® manages to follow the guide wire. Use the function <i>Test IN</i> , see 3.4 Testing the installation on page 50.
		Increase the distance between the boundary wire to the left of the guide wire, seen in the direction towards the charging station, and the guide wire. The distance between the boundary wire and the guide wire should be at least 30 cm (12").

6.2.3 Fault symptoms with“Follow loop”

Symptom (follow loop)	Cause	Action
Automower® follows the boundary wire in a saw tooth pattern	Automower® does not find the strength on the loop signal that the set corridor width corresponds to. Automower® now searches for the strength by running in a saw tooth pattern along the boundary wire.	Increase the corridor width until the behaviour stops.
Automower® can not pass through a narrow opening or passage when following the boundary wire.	The corridor width is too high for Automower® to pass through the passage.	Reduce the corridor width successively until Automower® can pass through the passage. In order to prevent Automower® from running on a small corridor width, install a guide wire through the passage. Use the function <i>Test IN</i> , see 3.4 Testing the installation on page 50.
Automower® does not follow the boundary wire out from the charging station to a remote area when it should, but starts mowing directly.	Automower® does not find the strength on the loop signal that the set corridor width corresponds to. When Automower® does not detect the strength after reversing out of the charging station it starts to mow instead.	Try a different corridor width, a greater corridor width usually improves the function. Check the loop signal strength and compare with Table 8 and Table 9. Also try to adjust the mower's reversing distance.
Automower® does not follow the guide wire out from the charging station to a remote area when it should, but starts mowing directly.	Automower® does not find the strength on the loop signal that the set corridor width corresponds to. When the mower reverses out from the charging station it turns a full circle to find the strength. When Automower® does not find the strength it starts to mow instead.	Check that the guide wire has been routed correctly. It should be routed at least 130 cm (52") straight back, out from the edge of the charging station. The adjustable reversing length must be adapted according. Try a different corridor width, a greater corridor width usually improves the function. Check the loop signal strength and compare with Table 8 and Table 9.

6.2.4 Fault symptoms during Docking

Symptom (docking)	Cause	Action
Automower® detects the signals from the charging station but is not able to dock successfully	The charging plate (N-coil) is defective.	Check the N-signal from the charging station: Place the Automower® in the test position and then check the value via the Quick check function (Press and hold the 0 key down for 2 seconds). The N-coil is defective if the value for N is lower than 100. The charging plate must be replaced.

6. TROUBLE SHOOTING

6.2.5 Fault symptoms during Charging

Symptom (charging)	Cause	Action
Both the mowing and charging times are shorter than usual.	This behaviour is normal in high temperatures (gradually increasing above 25 °C). The cause may also be impaired battery capacity.	Perform a battery test to determine the battery's capacity.
The mower never leaves the charging station	HOME button is activated.	Press the HOME button. Check that the HOUSE symbol disappears from the display.
	<i>TIMER</i> settings prevent the mower from leaving the charging station.	Check the <i>TIMER</i> settings.
	The mower never becomes fully charged.	Check that the mower is receiving the charging power. Let the mower remain in the charging station and bring up Quick check (Press and hold the number 0 down for 2 seconds). Switch the display with the YES button until Power is displayed. Check that the measured value matches the guideline values in section <i>1.12 Battery</i> on page 19. If there is no charge or the charge is too low, remove any coating from the charging plate of the charging station and the mower. Use an emery cloth and lubricate with a copper paste Also check the other cables and connections on the charging station and around the mower's charging strip.

6.2.6 Other fault symptoms

Symptom (other)	Cause	Action
The clock in the Automower® shows strange times.	The battery in the control box is defective.	Replace the battery, see page 96 about replacement.
	The control box is defective.	Replace the control box, see page 92 about replacement.
The background lighting on the display is on, but the keypad and main switch do not react.	The control box is blocked.	<ol style="list-style-type: none"> 1. Reprogram the control box with the help of Autocheck. Use the <i>Advanced</i> function and download the program manually. Ignore the Autocheck message <i>No contact</i>. 2. Should the program not start or it is cancelled before it is finished, the battery may need to be charged for a few minutes. However, do not charge it for more than 10 minutes as the charging/battery's temperature can not be monitored when the control box is blocked. 3. Also refer to page 78.
The display's background lighting is on, the main switch is OK, but pressing the buttons does not produce a reaction	Defective microswitch (for STOP button) and/or defective keypad.	Check the functioning of the microswitch and the keypad. Replace defective parts.
The mower has a GSM module but cannot send an SMS	The SIM card has not been installed in the GSM module. Or the module is incorrectly installed.	Install the SIM card in the GSM module, see <i>5.22 Installing GSM module</i> on page 100. Ensure that the settings are correct, see <i>01.14 SMS function</i> on page 23.

6. TROUBLE SHOOTING

6.3 Loop signal strength

Below are the loop signal strength levels for the respective *Corridor width*. The strength that the Automower® follows varies from search to search. For example, with *Corridor width 6* set on the 02.71 260ACX (2010) mower program, the signal strengths for the boundary loop varies between 255-286

The low strength is the one that the mower searches for when it follows the boundary wire at maximum distance. The higher strength is the one that the mower searches for when it follows the loop at the minimum distance.

When Automower® is set to follow the boundary wire or the guide wire with the help of the *Test IN* function (3-2-4), it follows the loop according to the low strength on the loop signal, that is to say, at maximum distance from the loop. Consequently, you should always use the *Test IN* (3-2-4) function when testing whether the set corridor width is appropriate.

Table 8: Strength on the loop signal at respective corridor widths.

Corridor width	Version 02.71 260 ACX (2010) Version 02.70 220 AC, 230 ACX (2006-2010) Version 02.62 Solar Hybrid, GSM (2008-2010) Version 02.61 Solar Hybrid (2008-2010)	
	Boundary loop (min – max)	Guide wire (min – max)
1	289 – 300	(-) 250 – 265
2	282 – 296	(-) 239 – 265
3	274 – 293	(-) 228 – 263
4	269 – 292	(-) 220 – 258
5	260 – 288	(-) 212 – 253
6	255 – 286	(-) 204 – 247
7	250 – 280	(-) 189 – 231
8	240 – 266	(-) 178 – 224
9	234 – 257	(-) 168 – 211
10	228 – 253	(-) 160 – 207
11	222 – 249	(-) 153 – 201
12	217 – 247	(-) 147 – 194
13	212 – 243	(-) 141 – 184
14	209 – 242	(-) 136 – 177
15	205 – 237	(-) 131 – 174
16	201 – 232	(-) 126 – 171
17	199 – 228	(-) 121 – 164
18	196 – 223	(-) 116 – 158
19	193 – 220	(-) 111 – 156
20	191 – 218 191 - 230 (only 260 ACX)	(-) 108 – 155 (-) 104 - 200 (only 260 ACX)

6. TROUBLE SHOOTING

Table 9: Strength on the loop signal at respective corridor widths.

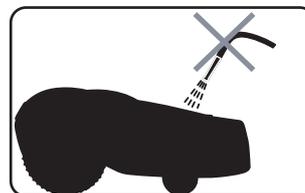
Corridor width	Version 02.33 G2 (2003)		Version 02.50 G2 (2004-2005)	
	Boundary loop (min – max)	Guide wire (min – max)	Boundary loop (min – max)	Guide wire (min – max)
1	320 – 322	(-) 320 – 322	281– 295	(-) 280 – 295
2	319 – 321	(-) 314 – 320	273 – 293	(-) 269 – 295
3	316 – 321	(-) 206 – 316	264 – 287	(-) 258 – 293
4	313 – 318	(-) 298 – 314	260 – 284	(-) 250 – 288
5	308 – 318	(-) 290– 312	255 – 281	(-) 242 – 283
6	203 – 315	(-) 278 – 310	247 – 272	(-) 234 – 277
7	296 – 313	(-) 266 – 304	240 – 267	(-) 219 – 261
8	289 – 311	(-) 254 – 300	233 – 260	(-) 208 – 254
9	282 – 304	(-) 242 – 293	227 –254	(-) 198 – 241
10	276 – 300	(-) 230 – 288	220 – 247	(-) 190 – 237
11	270 – 294	(-) 223 – 283	215 – 242	(-) 183 – 231
12	265 – 289	(-) 216 – 278	211 – 238	(-) 177 – 224
13	260 – 287	(-) 209 – 275	209 – 237	(-) 171 – 214
14	255 – 286	(-) 202 – 272	205 – 234	(-) 166 – 207
15	250 – 284	(-) 195 – 264	202 – 230	(-) 161 – 204
16	246 – 283	(-) 191 – 260	199 – 226	(-) 156 – 201
17	242 – 279	(-) 187 – 242	195 – 220	(-) 151 – 194
18	238 – 276	(-) 183 – 223	193 – 218	(-) 146 – 188
19	234 – 275	(-) 179 – 216	191 – 216	(-) 141 – 186
20	230 – 274	(-) 175 – 209	190 – 215	(-) 138 – 185

7. MAINTENANCE AND SERVICE

7. Maintenance and service

7.1 Cleaning

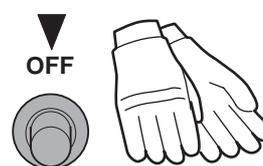
Clean the body and chassis on the Husqvarna Automower® regularly. The best way to clean the body is with a damp sponge or cloth. The underside of the body, wheels, skid plate and blade disc are best cleaned with a brush (for example, a dish-brush). A spray bottle with water and a small amount of washing-up liquid can help to remove dried dirt and grass. Dismantle the body to clean the body and chassis more meticulously.



NOTE! Never use a high pressure washer or even running water.

The main switch should be in the *OFF* position. Wear gloves when cleaning the underside of the body.

It is important to clean off any grass and dirt between the skid plate and the blade disc as well as between the blade disc and the rubber bellows. Dismantle the skid plate and blade disc to be able to clean more meticulously. Run the blade motor using the test function (shortcut 5-2-1). Listen for unusual noises when the blade motor is running. Also test at different cutting heights.



Check when cleaning the mowing system:

- That the bearings are okay. Replace the bearings if necessary.
- That the bearing cage and hub are not worn. Check for play on the skid plate. There should be no play on the plate so that it touches the blades' screw heads.

7.2 Winter storage

Before the Automower® is put away for the winter the following should be done:

- Clean the entire mower thoroughly.
- Dismantle the blade disc and clean all areas around blades, bearings and bearing shell.
- Dismantle the drive wheel and remove grass and other objects from the motor axles. Clean the tread on the wheels. Fit the wheels again.
- Check that the rubber bellows on the mowing system are not damaged.
- Set the main switch to the *OFF* position.
- Charge the mower fully, leave the mower in the charging station for a week if possible. The mower must not be left in the charging station during the whole winter storage. For maximum battery life, the mower should also be charged at some time during winter storage. You can then place the mower in the charging station with the main switch in the *OFF* position for a week.

7. MAINTENANCE AND SERVICE

The Automower® should be stored, preferably in the original packaging, in a dry area, standing on all wheels. There is also a wall mount suitable for all models, which is excellent for winter storage (part no. 504 82 13-01).

The charging station, transformer and low voltage cable should be kept indoors during the winter if possible. It is then important to remember to protect the ends of the boundary wire from moisture by placing them, for example, in a tin with anhydrous grease. If the charging station housing accessory (504 82 14-01) is used, the charging station can be left outdoors for the winter. However, the mower must always be stored indoors.

7.3 Sealing the chassis halves

The chassis halves of the mower must be regreased, where necessary, each time the chassis is opened. In addition, regrease at least once every other year or at 700 hours of operation. When regreasing, all old grease, grass and dirt must be removed from the entire partition line between the chassis halves. Always use a silicone-free grease, for example original grease 535 14 12-01 or 535 14 12-02.

In products made after 2010 (m/2010), the grease has been replaced with rubber packing. This should always be replaced when the chassis is opened.

7.4 Service schedule

The table below contains a checklist of points and actions to be taken when servicing the Automower®.

When faults or a need of cleaning are discovered, this must be rectified before the mower is used again.

Table 10: Service diagram 220 AC, 230 ACX, Solar Hybrid and 260 ACX

No.	Check/Action	For information, see:	✓	Replaced parts
1.	Carefully clean the lead-throughs in the body, primarily the charging cable to ensure that the rubber seals fit correctly.			
2.	Check the bearings, bearing cage and hub in the skid plate. Clean between the skid plate and blade disc as well as between the blade disc and the rubber bellows.	page 115		

7. MAINTENANCE AND SERVICE

Table 10: Service diagram 220 AC, 230 ACX, Solar Hybrid and 260 ACX

No.	Check/Action	For information, see:	✓	Replaced parts
3.	Clean under the body: Inside and outside of the drive wheels, around the front wheel axles and the chassis. Solar Hybrid: also clean the solar panel by wiping it using a damp cloth. 260ACX: Clean the ultrasonic sensors with a dry cloth or similar.	page 115		
4.	Check the blades and screws.	Operator's manual for Automower®		
5.	Check the two lower front wheel bearings.	page 115		
6.	Check the rubber bellows on the cutting height adjustment. The rubber bellows must not be damaged.	page 115		
7.	Check the movability and function of the collision sensors, liftsensor and the front body suspension.	page 39		
8.	Check the rubber cap on the main switch. The rubber cap must not be damaged.	page 94		
9.	Check that the mower has the latest edition and correct version of the mower program.	Quick check page 26 and page 77		
10.	Check that the two halves of the chassis have been sealed together properly. Remove the body and split the chassis halves. As needed, lubricate the two halves of the chassis (m/2003-2009) or replace with rubber packing (m/2010-). Also check the contents of the chassis; wipe off any condensation and dirt.	<i>7.3 Sealing the chassis halves, page 116</i>		
11.	Make an Auto test of all components.	page 67		
12.	Check on site that docking and charging work correct.	page 19		
13.	Perform a battery check	page 19		

7. MAINTENANCE AND SERVICE

Table 11: Service schedule 210 C

No.	Check/Action	For information, see:	✓	Replaced parts
1.	Carefully clean the cable entries in the body to ensure the rubber seals sit correctly.			
2.	Check the bearings, bearing cage and hub in the skid plate. Clean between the skid plate and blade disc as well as between the blade disc and the rubber bellows.	page 115		
3.	Clean under the body: Inside and outside of the drive wheels, around the front wheel axles and the chassis.	page 115		
4.	Check the blades and screws.	Operator's manual for Automower®		
5.	Check the front wheel bearings.	page 115		
6.	Check the rubber bellows on the cutting height adjustment. The rubber bellows must not be damaged.	page 115		
7.	Check the charging strips and contact strips.	page 90		
8.	Check the movability and function of the collision sensors, liftsensor and the front body suspension.	page 39		
9.	Check the rubber cap on the main switch. The rubber cap must not be damaged.	<i>7.3 Sealing the chassis halves</i> page 116		
10.	Check that the two halves of the chassis have been sealed together properly. Remove the body and split the chassis halves. As needed, lubricate the two halves of the chassis (m/2003-2009) or replace with rubber packing (m/2010-). Check that the mower has the latest edition and correct version of the mower program.	Quick check page 26 and page 77		
11.	Make an Auto test of all components.	page 67		
12.	Check on site that Charging works correctly.	page 19		
13.	Perform a battery check	page 19		



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