hyCLEANER®
made in

solar ROBOT compact

Operating instructions

Version October 2024

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1. General

1.1 Foreword

These operating instructions are an integral part of the solarROBOT compact machine. Furthermore, it is an essential aid for a successful and safe handling of the solarROBOT compact. It contains important instructions for using the solarROBOT compact safely and correctly. The operating instructions helps to reduce risks, minimize repair costs and downtime, prevent personal injury and property damage, and increase the reliability and lifespan of the solarROBOT compact.

All illustrations and drawings in these operating instructions are for general illustration of solarROBOT compact and are not indicative of its construction details

IMPORTANT NOTE!

The operating instructions must always be available at the machine and be maintained and updated throughout the entire lifespan of the machine. The operating instructions must be read, understood and applied by any person who is assigned to work with the solarROBOT compact.
This implies the following tasks:

a. Operation
b. Troubleshooting in workflow
c. Care
d. Maintenance
e. Service
f. Repair
g. Transport

The respective persons involved must confirm this in writing.

1.2 Warning notes

In these operating instructions, the following warning notes are used:

	**DANGER** **Risk of death!** **Consequences of neglect ...** ⇨ **Prevention 1** ⇨ **...**

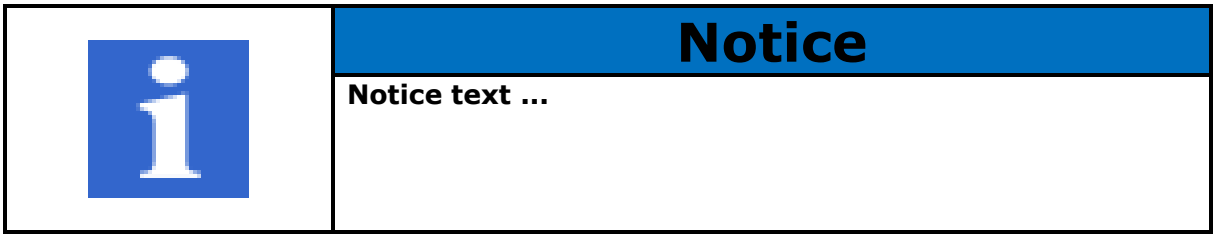
A warning note of this danger level indicates an imminent dangerous situation.
If the dangerous situation is not avoided, it will result in death or serious injury.
The instructions in this warning note must be followed in order to avoid the risk of death or serious injury to persons.

	**WARNING** **Risk of injury!** **Consequences of neglect ...** ⇨ **Prevention 1** ⇨ **...**

A warning note of this danger level indicates a potentially dangerous situation.
If the dangerous situation is not avoided, it may result in death or serious injury.
The instructions in this warning note must be followed in order to avoid the possible risk of death or serious injury to persons.

	**CAUTION** **Personal injury from ...** **Consequences of neglect ...** ⇨ **Prevention 1** ⇨ **...**

A warning note of this danger level indicates a potentially dangerous situation.
If the dangerous situation is not avoided, it may result in minor or moderate injury.
The instructions in this warning note must be followed to prevent damage to property.



A notice signifies additional information that assists in the handling of the solarROBOT.

1.3 Scope of delivery

solarROBOT compact		Article No.:	952.039
In the standard consisting of:			
Control unit incl. radio remote control	1 pcs.	Article No.:	705.188
Drive unit	2 pcs.	Article No.:	705.185
Extension of hose guide	1 pcs.	Article No.:	705.192
Brush system 800 mm	2 pcs.	Article No.:	705.193
Battery 36 V/14 Ah	1 pcs.	Article No.:	962.031
Starter set driving pads Leather 1,450 mm	1 pcs.	Article No.:	962.093
Charging station hyCLEANER® 36V	1 pcs.	Article No.:	705.177
a. Operating instructions - Electrical plan with bill of materials - Hydraulic plan with bill of materials - EC Declaration of Conformity	1 pcs.		

1.4 Legal note

1.4.1 Copyright note

These operating instructions must be treated confidentially. Only authorized persons may use them. The transfer to third parties is only allowed with written consent of the manufacturer.

All documents are protected under the copyright law.

Copying and distribution of these documents - including excerpts - as well as utilization and communication of their contents are not permitted without express permission. Violations are punishable and liable for damages.

The manufacturer reserves all rights to exercise intellectual property rights.

1.4.2 Warranty

These operating instructions must be thoroughly read prior to commissioning the solarROBOT compact.

The manufacturer accepts no liability for any damage or malfunctions resulting from neglect of the operating instructions.

The operating instructions must be supplemented by the owner on its own responsibility with the specific working instructions based on existing national regulations for accident prevention and environmental protection.

In addition to these operating instructions, the binding regulations for accident prevention applicable at the work site in individual countries and regions must be observed, as well as the recognized technical standards for safe and professional work.

The warranty is void in the following cases:

a. Improper use
b. Use of inappropriate equipment
c. Faulty connection
d. Non-use of original spare parts or accessories
e. Conversions, if these have not been coordinated with the manufacturer
f. Non-compliance with prescribed maintenance work
g. Untrained or unsuitable (e.g. underage) personnel,
h. Non-compliance with current health and safety guidelines.

1.4.3 Obligation of the owner

The use of the solarROBOT compact carries the risk of personal injury or property damage if the machine is used improperly or in an improper condition.
The owner is obliged to operate the machine only when it is in perfect condition. Danger zones that arise between the solarROBOT compact and customer equipment must be secured by the owner. This also includes securing the machine against falling.

The owner must designate and instruct responsible persons to:

a. employ only trained and instructed personnel,
b. define the responsibilities of the personnel for operating, maintaining, and repairing.

Furthermore, the owner must:

c. monitor the safety-conscious and hazard-aware work of the personnel as well as their adherence to the operating instructions,
d. store the operating instructions and applicable regulations in such a way that they are always accessible to the operator and maintenance personnel,
e. define responsibilities.

Personnel tasked with carrying out work with the solarROBOT compact must have read and understood the operating instructions, particularly the "Safety" chapter, as well as the applicable regulations, before starting work!

The solarROBOT compact must be kept out of the reach of children. Neglecting this will make the owner fully liable for all damages arising from this!

Notice

In addition to the operating instructions, generally applicable statutory and other binding regulations for accident prevention and environmental protection must be observed, and the operators must be instructed.

1.4.4 Disclaimer

All technical information, data, and instructions for operating the solarROBOT compact contained in these operating instructions correspond to the latest state at the time of printing and are carried out taking into account the experience and knowledge of the manufacturer to the best of their knowledge.

The manufacturer retains the right to carry out technical changes within the scope of further development of the solarROBOT compact machine described in these operating instructions. No claims can be derived from the information, illustrations and descriptions of these operating instructions. The manufacturer is liable for any errors or omissions on the part of the manufacturer, but excludes further claims under the warranty commitments under the contract.
Claims for damages, regardless of the legal ground, are excluded.
Translations are carried out in good faith. The manufacturer cannot assume liability for any translation errors, even if the translation was carried out by the manufacturer or on his behalf. Solely the original text in German remains binding. The textual and graphic representations do not necessarily correspond to the scope of delivery or a possible spare parts order. The drawings and graphics are not to scale and are for illustrative purposes only.

The solarROBOT compact should only be used in the countries and regions that require a CE mark, or explicitly renounce to it.
The solarROBOT compact should only be used in countries and regions that require a CE mark or explicitly waive this requirement.
Prior to exporting to the North American and/or Canadian economic area, written authorisation must be obtained from the manufacturer.

1.4.5 Manufacturer's address

Manufacturer of the solarROBOT compact is:

hyCLEANER GmbH & Co. KG
Maybachstraße 6
D-48599 Gronau

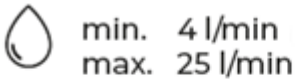
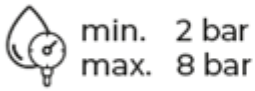
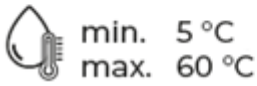
Tel.: +49 2562 99254 0
Facsimile: +49 2562 99254 10

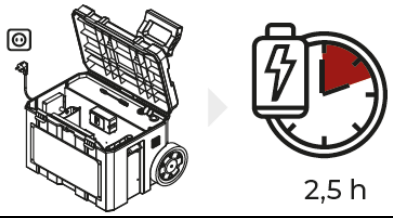
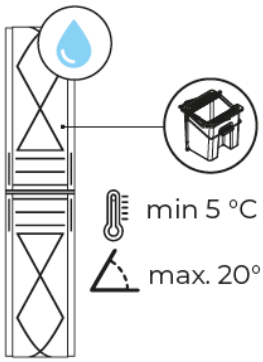
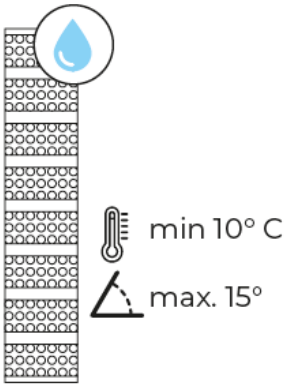
E-Mail: info@hyCLEANER.de
Web: www.hyCLEANER.de

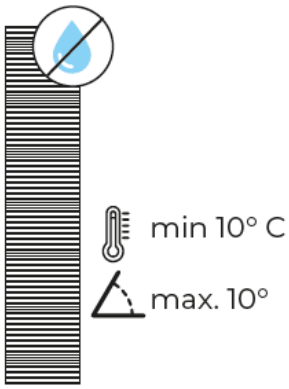
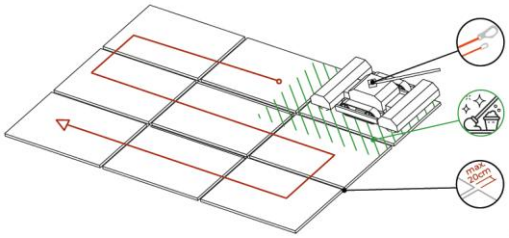
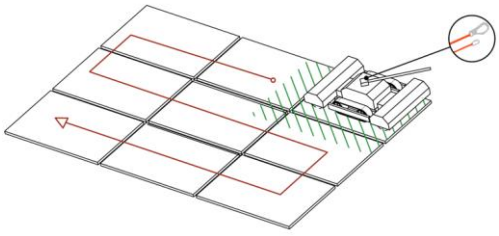
General Managers:
Celina Kneiber, Josha Kneiber

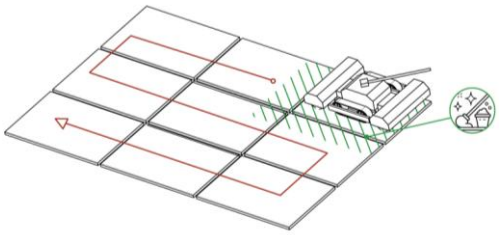
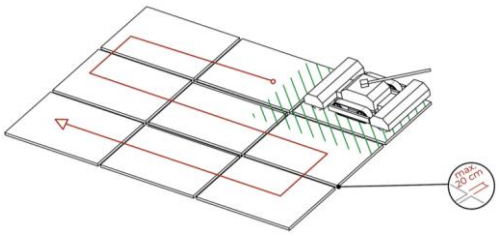
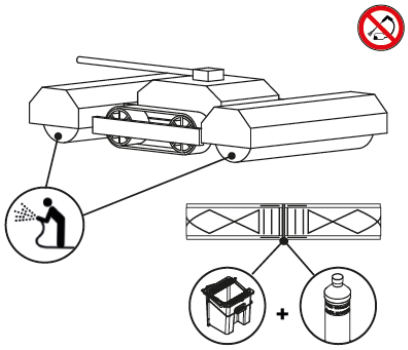
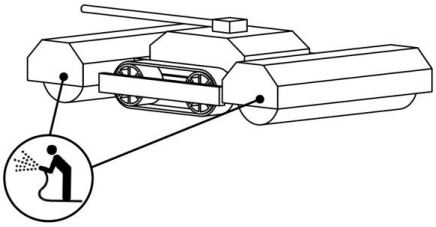
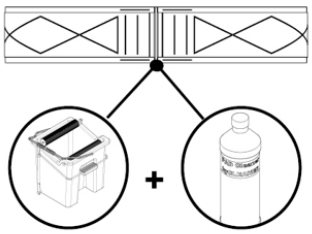
The manufacturer provides a 12-month warranty from the date of delivery from the Gronau site.

1.5 Glossary – Machine labelling

Chapter	Representation	Description
!		Before commissioning, the operator is obliged to read the operating instructions, which contain all the necessary safety instructions for proper use.
		Permissible amount of water
		Permitted water pressure
		Permissible water temperature
		Risk of slipping! Adapt the driving style to the conditions and surface condition. Sudden, rapid changes of direction or speed must be avoided when the surface to be cleaned is wet, slippery, or dirty.
		Workplaces and traffic routes where there is a risk of the machine falling must be equipped with devices that prevent persons from reaching the hazardous areas.
		Personal protective equipment (PPE) for fall protection must be used if, for structural reasons, another type of fall protection (such as side protection) is not possible and safety nets (e.g., catch scaffolding) are impractical.
		Cleaning the machine and all associated parts with a high-pressure cleaner is prohibited!

1		The charging process takes up to 2.5 hours, depending on the state of discharge of the batteries.
		Repair and maintenance work may only be carried out on electrical appliances when they are de-energized. Before carrying out repair and maintenance work, the electrical devices such as the charging station must be disconnected from the mains voltage (via the mains plug).
2		Driving pad - leather 1450 mm In connection with the solarROBOT compact, it is possible to drive inclines up to 20° with this driving pad, depending on the surface condition. The outside temperature must not fall below 5 °C. This driving pad may only be used for wet cleaning. Only use this driving pad when it is wet. With a dry or dirty driving pad made of natural leather, the machine loses traction on the surface! Attention: The grip is always dependent on the surface condition of the area to be cleaned.
		Driving pad - rubber In connection with the solarROBOT compact, it is possible to drive inclines up to 15° with this driving pad, depending on the surface condition. The outside temperature must not fall below 10 °C. This driving pad is suitable for wet cleaning and dry cleaning.

		With a dirty rubber driving pad, the machine loses traction on the surface! Attention: The grip is always dependent on the surface condition of the area to be cleaned.
		Driving pad – neoprene 1450 mm In connection with the solarROBOT compact, it is possible to drive inclines up to 10° with this driving pad, depending on the surface condition. The outside temperature must not fall below 10 °C. This driving pad must be used for dry cleaning and for operating the robot with lateral guidance. With a dirty driving pad made of neoprene, the machine loses traction on the surface! Attention: The grip is always dependent on the surface condition of the area to be cleaned.
3		The red line shows the recommended cleaning route. The solar module to be cleaned must be cleaned from top to bottom so that the dissolved impurities do not run over the already cleaned surfaces. Notice: Ensure a water supply from above! Thus, the weight of the hose does not pull on the machine. Thus, the risk of slipping is reduced.
		The machine must be secured against falling by roping up. Use the attachment points of the machine on the rotating tower for this.

		The starting area must be cleaned before the machine is placed to keep the driving pad clean and maintain sufficient grip. Attention: Failure to comply will result in loss of grip on the driving pads.
		The solarROBOT compact can drive over maintenance aisles up to 20 cm wide. Attention: Parallel to the direction of travel, gap distances up to a maximum of 6 cm are allowed. Attention: Risk of tipping over
4		The machine must be cleaned after use. Attention: Do not use a high-pressure cleaner!
		Clean the washing brushes with a water hose and remove any dirt residues. Alternatively, the brushes can be rotated without resistance with water on the robot, for example on the transport carriage, to rinse. Attention: No high-pressure cleaner!
		Driving pads made of natural leather must be cleaned, if necessary, during the cleaning as well as after the cleaning has been completed. See maintenance instructions in the chapter "Accessories". Attention: Do not use a high-pressure cleaner! Attention: Do not dry the leather driving pads on the machine!

2. Safety

2.1 Safety marking on the product

Since the solarROBOT compact is a non-mains operated machine with low voltage, no safety marking is required.

2.2 Safety marking in these operating instructions

See chapter "Warning notes"

2.3 Basic safety instructions

For the protection of the operating personnel, warning notes and hazard notices are located on the solarROBOT compact. These instructions must be observed.
Damaged and illegible warning notes or hazard notices must be replaced immediately by the owner.

2.3.1 Behaviour in case of emergency

In an emergency, the solarROBOT compact must be stopped by pressing the EMERGENCY STOP switch!

The EMERGENCY STOP switch (SD) is clearly visible on the back of the radio remote control.
Further information: See chapter "Operation".

An emergency occurs when rolling over people and objects, and when objects or body parts get caught in the brush system or drive unit of the solarROBOT compact.

2.3.2 Observing the operating instructions

In these operating instructions, the successful and non-hazardous use of the solarROBOT compact is described. These instructions must be read, understood, and applied by any person who is commissioned with work on or with the machine. If the operating instructions are neglected, the manufacturer's liability for personal injuries and property damage expires.

	**DANGER** **Risk of death from falling parts!** **Neglecting the operating instructions can cause falling parts of the solarROBOT compact to lead to the death of uninvolved persons or other living beings.** ⇨ **Read and understand the operating instructions!** ⇨ **Apply the operating instructions!**

	**WARNING** **Risk of injury from torn-off parts!** **Neglecting the operating instructions can cause parts of the solarROBOT compact to detach and result in serious injuries to the operating personnel!** ⇨ **Read and understand the operating instructions!** ⇨ **Apply the operating instructions!**

2.3.3 Requirements for personnel – duty of care

Only persons who are qualified to independently operate and maintain cleaning robots may be employed, who:

- have reached the age of 18,
- are physically and mentally fit,
- have been instructed in the operation and maintenance of the cleaning robots, have demonstrated their ability to do so to the employer. and can be expected to reliably fulfil the tasks assigned to them.

They must be appointed by the owner to operate and maintain the cleaning robot.

2.3.4 Disposal

No longer needed material of the solarROBOT compact must be disposed of in a safe and environmentally friendly manner.

The solarROBOT compact can be disposed of, for example, at a collection point for scrap metal.

Defective batteries must be handed over to a collection point for batteries.

When disposing of the solarROBOT compact, the national regulations of the country of use must be observed.

Notice

- **Lithium-containing batteries are safe when handled properly.**
- **Batteries containing lithium can cause fires if used and stored incorrectly.**
- **Do not use defective, damaged, deformed or inflated batteries.**
- **Batteries must not be disposed of with household waste.**

DANGER

Risk of death by explosion!

Results in death or serious injuries.

- ⇨ **Read and understand the operating instructions!**
- ⇨ **Proper use of the batteries**

2.4 Intended use

2.4.1 Application area

The solarROBOT compact can be used in its standard configuration for cleaning solar modules or glass roofs.

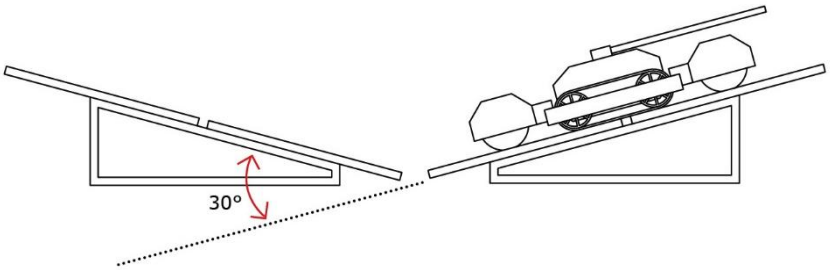
a. in incline direction up to an inclination angle of 20° (36 %),
b. transverse to the incline direction up to an inclination angle of 20° (36 %),
c. up to an approach angle of 30° (57 %).
d. at obstacles up to 20 mm in height,
e. at gaps and maintenance aisles up to 200 mm
f. for a working load of the roof of at least 588.4 Pa,
g. on solar modules with product certification according to IEC 61646 and IEC 61730.

Notice

The specified values depend on the surface condition.

With the term incline, both the upward slope and the downward gradient are meant. In these operating instructions, the term incline is consistently used.

The approach angle refers to the change in incline that can be handled by the machine without the ground being touched by its overhanging components. See the following illustration:



The installation of accessories can result in different operating conditions. See chapter "Accessories".

2.4.2 Operating conditions

Commissioning of the device is possible at:

a. at an ambient temperature of at least 5 °C and maximum 60 °C,
b. a maximum wind speed of up to 6 Beaufort.

2.4.3 Connection conditions

See chapter "Local requirements".

2.5 Improper use

a. DO NOT use in electrical installations, except for photovoltaic systems!
b. DO NOT use in an explosive atmosphere!
c. DO NOT use as a means of transport for people or other living beings!
d. DO NOT use as a traction device!
e. DO NOT use as a means of transport for objects!
f. DO NOT use as a clearing vehicle, e.g. for snow or sand!
g. DO NOT use under water!
h. DO NOT use for the irrigation of green areas!
i. DO NOT operate with other liquids except water.

2.6 Residual risks and precautions

By wearing protective clothing and following these operating instructions, you minimise the risks that can occur when handling the solarROBOT compact. However, you must be aware of the following residual risks:

	**DANGER** **Risk of death by suffocation!** **Loose workwear may be drawn in by the rotating components. This can lead to serious injuries or death!** ⇨ **When handling the solarROBOT compact, wear snug-fitting workwear!** ⇨ **Keep away from rotating components!** ⇨ **Tie back long hair!**

	**CAUTION** **Personal injuries caused by rotating components!** **There is a risk of injury from rotating components!** ⇨ **Keep away from rotating components!** ⇨ **Tie back long hair!**

	**CAUTION** **Personal injuries from crushing!** **There is a risk of injury from being squeezed between the solarROBOT compact and solid objects.** ⇨ **Do not stay on the solarROBOT compact and/or between the solarROBOT compact and other solid objects!** ⇨ **Do not reach into the solarROBOT compact!**

	**CAUTION** **Personal injuries due to tripping!** **There is a risk of injury due to the rolled-out hose!** ⇨ **When handling the solarROBOT compact, pay attention to objects lying around!**

	**CAUTION** **Personal injuries due to slipping!** **There is a risk of injury due to slipping on the wet surface!** ⇨ **When handling the solarROBOT compact, pay attention to a secure footing!** ⇨ **Wear work clothes with safety footwear!**

	**Notice** **When handling the solarROBOT compact wear eye protection!**

	**Notice** **When handling the solarROBOT compact wear hearing protection!**

	**Notice** **Improper driving behaviour and turning of the solarROBOT compact on obstacles, such as module clamps, can lead to the run-out of the driving chains.**

At startup and during operation of the solarROBOT compact, a safety distance of one metre from the machine and the hose must be observed!

If you find yourself in a dangerous situation, immediately activate the EMERGENCY STOP switch!!

3. Technical data – basic version

3.1 solarROBOT compact

Article No.: 952.039

Height:	approx. 420 mm	
Width without washing brushes:	approx. 800 mm	
Length without washing brushes:	approx. 710 mm	
Width with washing brushes:	approx. 900 mm	
Length with washing brushes:	approx. 1.460 mm	
Diameter of the washing brush:	approx. 250 mm	
Length of the washing brush:	approx. 800 mm	
Speed of the washing brush:	up to max. 300 rpm	
Max. surface load:	approx. 412.2 Pa	
Max. speed:	approx. 3.0 km/h	
Resting length of the driving pad:	approx. 410 mm	
Width of the driving pad:	approx. 100 mm	
Weight:	approx. 55 kg	
Max. inclination angle*:	Ride in incline direction	20° (36 %)
(*depending on degree of pollution)	Ride across the incline direction	20° (36 %)
	Approach angle rear	30° (57 %)
	Approach angle front	30° (57 %)
Min. required water pressure:	2 bar	
Max. permitted water pressure:	8 bar	
For wet cleaning:		
Min. amount of water required:	4 l/min	
Max. amount of water required:	25 l/min	
Min. water temperature:	5 °C	
Max. water temperature:	60 °C	

Noise level: Noise Directive 2000/14/EC is observed

3.2 Brush system 800 mm

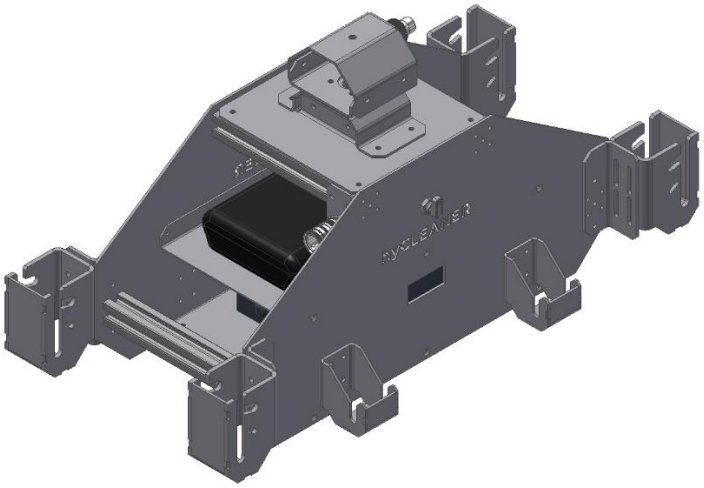
Article No.: 705.193

2 pieces per machine

Height:	approx. 270 mm
Width:	approx. 910 mm
Length:	approx. 415 mm
Weight:	approx. 10 kg
Length of the washing brush:	approx. 800 mm

3.3 Control unit

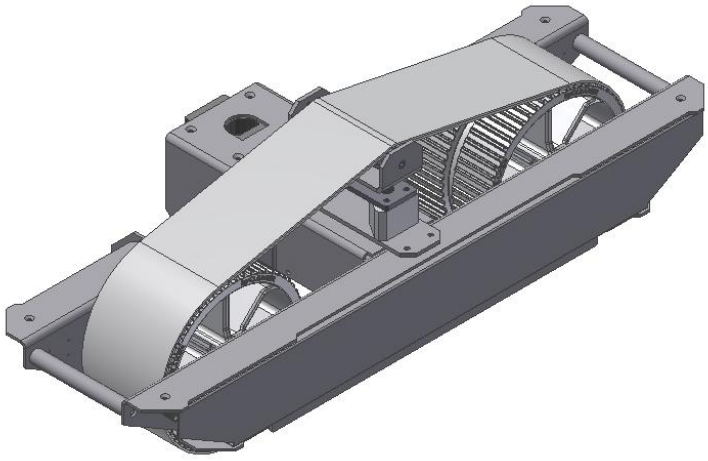
Article No.: 705.188



Height:	approx. 420 mm
Width:	approx. 370 mm
Length:	approx. 710 mm
Weight:	approx. 10 kg

3.4 Drive unit

Article No.: 705.185



2 pieces per machine

Height:	approx. 240 mm
Width:	approx. 300 mm
Length:	approx. 715 mm
Weight:	approx. 10 kg

3.5 Extension of hose guide

Article No.: 705.192

Height:	approx. 45 mm
Width:	approx. 45 mm
Length:	approx. 900 mm
Weight:	approx. 1.4 kg

3.6 Radio remote control

Article No.: 603.326

Height:	approx. 50 mm
Depth:	approx. 130 mm
Width:	approx. 200 mm
Weight:	approx. 0.47 kg

3.7 Charging station hyCLEANER® 36 V

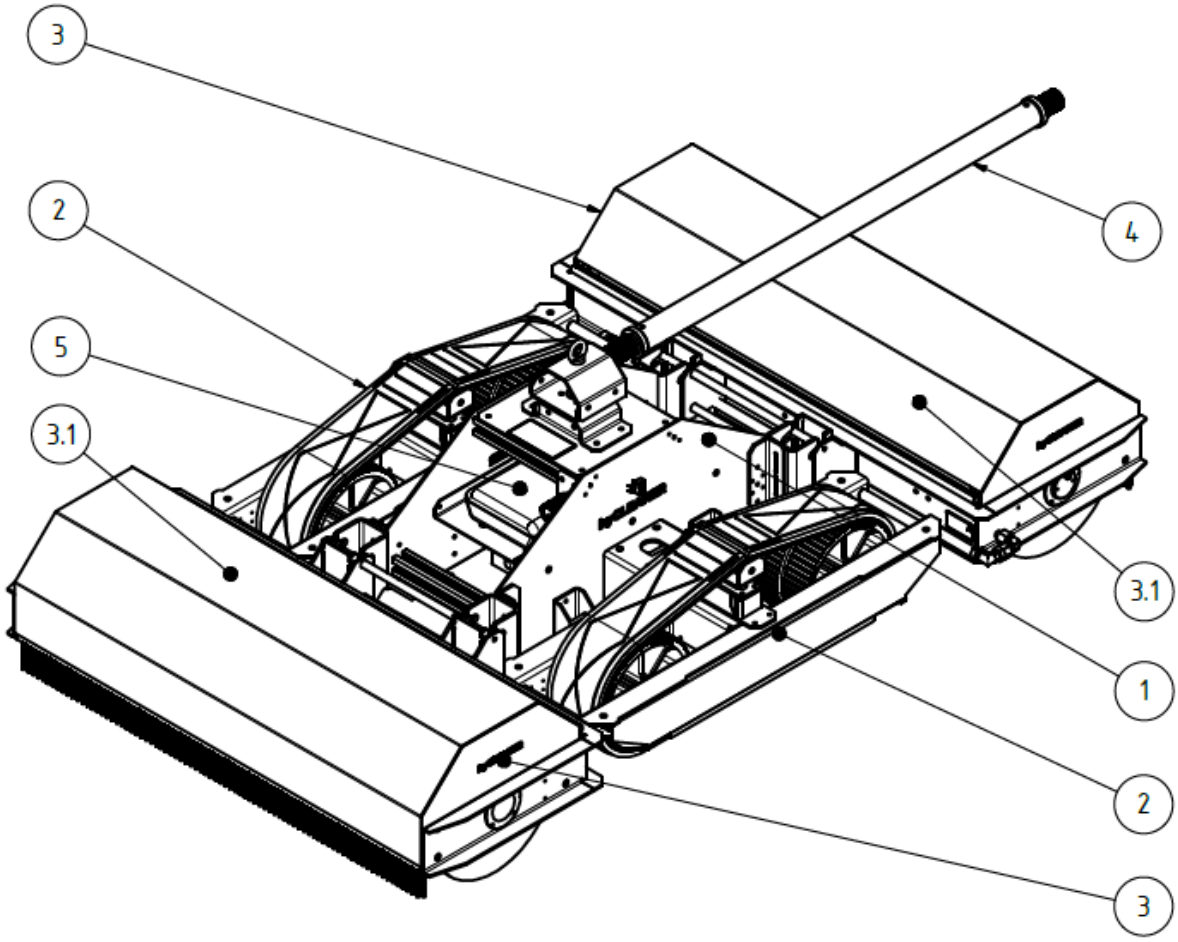
Article No.: 705.177

Height (lid closed):	approx. 640 mm
Width:	approx. 500 mm
Length:	approx. 430 mm
Weight:	
Without batteries and radio remote control.	approx. 10 kg
With two batteries 36 V/14 Ah (962.031) and radio remote control.	approx. 17 kg

4. Design and function

4.1 Graphical representation and functional description

4.1.1 Description of the removable components of the solarROBOT compact



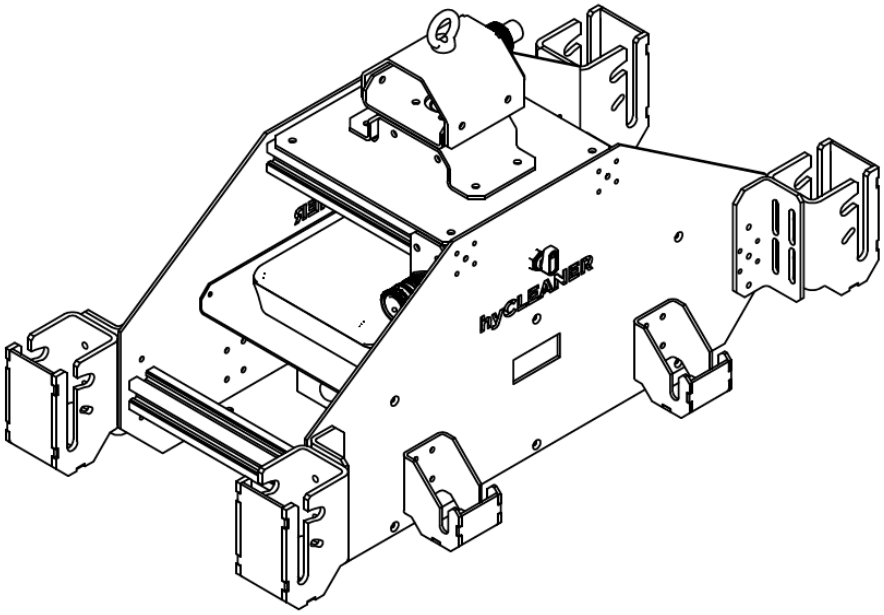
Removable components:

(1)	Control unit solarROBOT compact; Article No.: 705.188
(2)	Drive unit solarROBOT compact (2 pieces); Article No.: 705.185
(3)	Brush system 800 mm solarROBOT compact; Article No.: 705.193
(3.1)	Splash guard tarpaulin 800 solarROBOT compact; Article No.: 704.113
(4)	Extension of hose guide solarROBOT compact; Article No.: 705.192
(5)	Battery 36 V/14 Ah; Article No.: 962.031

For the proper operation of the solarROBOT compact, it is important that the corresponding connections of the electrical and mechanical components, as well as the designated water connections, are properly established.
Furthermore, the transmission path of the radio remote control must be established with the remote receiver in the control unit (1).
The detailed description of the connections is provided in the chapters of the individual components.

4.1.1.1 Control unit

Article No.: 705.188



The control unit is the centre of the solarROBOT compact.
The frame consists of construction profiles, sheet metal, and smaller welded assemblies. At the bottom, in the centre between the 2 upright side plates, is the control box including the radio receiver on the lowest level. For operation, the control unit is connected to the corresponding radio remote control. The longer cables with plugs are intended for the electrical connection of the brush systems.

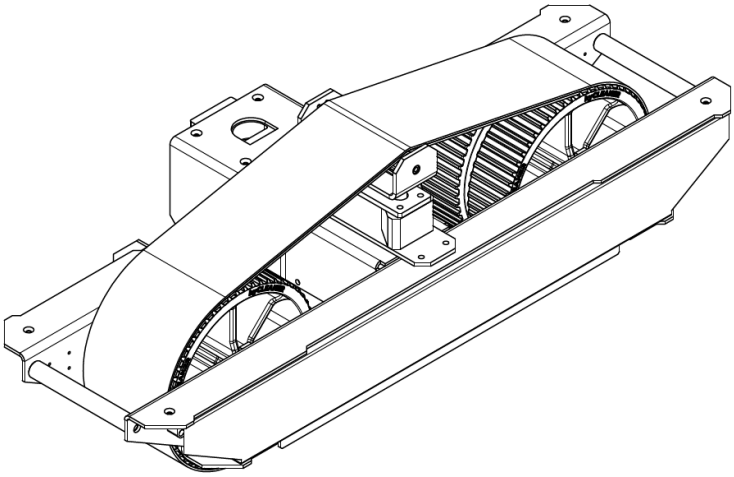
The shorter cables with plugs are intended for the electrical connection of the drive units. The plugs cannot be confused as they are designed differently. The plugs are easy to plug and can be connected without using force.

The battery compartment is connected to the control box at the factory via a socket.
The outer construction profiles are designed to carry the unit.
The battery compartment for housing the battery is located on the next level.

Above this is the water system. On the side plate, there is a water valve that can be used to open or close the water supply.
The water is fed to the two coupling sleeves to which the brush systems are connected. The adjustment of the height of the brush systems is described in detail in the "Installation" chapter.
On the side plates, there are also 2 brackets for the drive units on each side. The drive unit is hooked in at an angle and then tilted upwards until it engages.
Brackets for the brush systems are mounted on the front and rear of the control unit. The brush systems are inserted from above so that both tubes are in the bracket on both sides.
The tower on the control unit can be rotated 360°. The extension of the hose guide is connected to the tower. In addition, a ring nut is mounted on the rotating tower, which can be used as a lifting point for the machine.

4.1.1.2 Drive unit of the solarROBOT compact

Article No.: 705.185



The solarROBOT compact includes 2 identical drive units.
They are mounted on both sides, mirrored to each other on the control unit. Both drive units can be disassembled and interchanged.

The frame of both drive units consists of a sheet metal and tube construction.
In the middle area of the drive unit, the geared motor drives one of the two wheels via a belt.

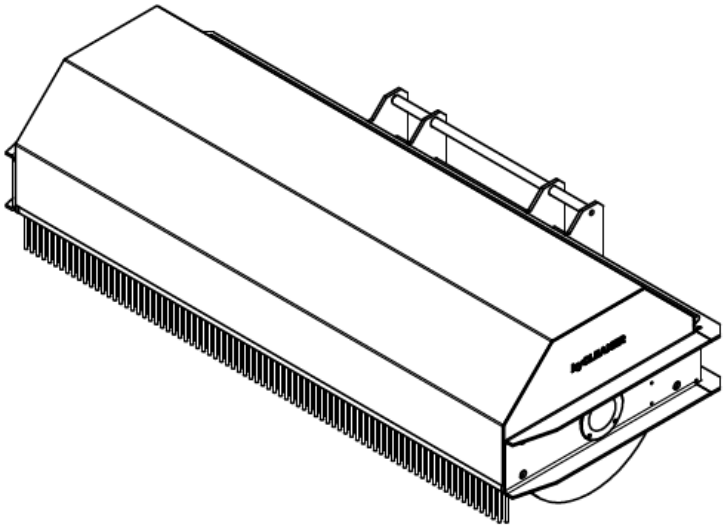
The chain tensioner is located in the area above the geared motor.
The driving chain is tensioned with the centrally located tensioning screw (M12), including a lock nut. The driving chain consists of a toothed belt and is guided by means of the wheels. On the driving chain, the driving pad is attached circumferentially with a Velcro closure. The driving pad made of leather, which is included in the standard scope of delivery, is explained in more detail in the chapter "Accessories", as well as other optional driving pads.

The 2 tubes Ø 12 mm are intended for hooking on both sides into the brackets of the drive units on the control unit.

In the centre of the upper area, there is an external engagement for releasing the lock bolt, which is responsible for fixing and locking with the control unit.
Furthermore, the manufacturer can fit an optional edge detection system (chargeable accessory) upon customer request. This consists of 2 ultrasonic sensors per drive unit, which are mounted on the front and rear. The edge detection ensures the automatic stopping of the machine when it reaches an edge of the solar module. For further information, see the chapter "Accessories".

4.1.1.3 Brush system 800 mm

Article No.: 705.193

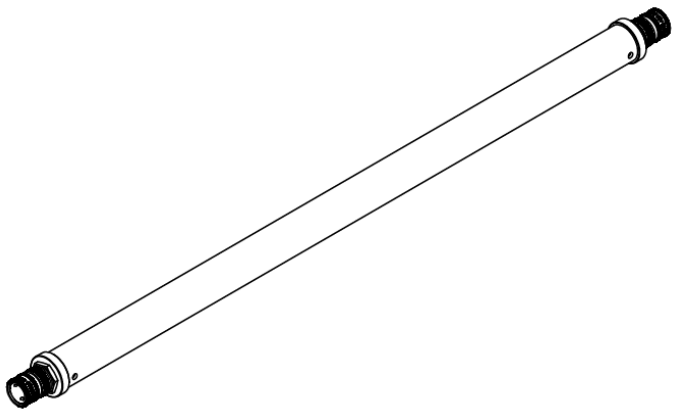


The solarROBOT compact includes 2 identical brush systems with a width of 800 mm. These consist of a sheet metal and tube construction. A removable splash guard tarpaulin and a brush strip at the front of the brush system serve as splash protection. The splash guard tarpaulin ensures that the water is not sprayed upwards, but is brought to the solar modules.

The drive motor of the brush system is integrated into the motor holder on the right-hand side of the brush frame in the direction of travel.
The drive motor of the brush system, with its motor shaft, takes over the drive of the washing brush via a coupling. The brush system is supported by a plain bearing on the motor holders mounted on both sides. At the rear part of the brush system, there are 2 tubes with which the brush system is hooked into the brackets on the control unit.
The washing brush of the brush system is 800 mm long. The brush is equipped with a single type of bristle all around.
Including the bristles, the washing brush diameter is 250 mm.
The water supply to the washing brush is provided by connecting the coupling plug to the coupling sleeve on the control unit.
The water is guided from the coupling plug through the water hose to the sprinkler pipe (located under the splash guard tarpaulin) and evenly distributed to the washing brush.
The electrical supply to the brush motor is provided via an electric cable with a socket. This socket is connected to the plug of the control box of the control unit.
Furthermore, it is possible to use the brush systems with lateral offset. With the additional holes, the brush systems can each be used with a lateral offset of 150 mm or 175 mm. Overall, this results in cleaning widths of 1,100 – 1,150 mm. A description of this can be found in the chapter "Installation".

4.1.1.4 Extension of hose guide

Article No.: 705.192



The hose guide extension consists of a tube in which the hose is guided away from the rotating parts of the machine. At each end of the tube, there is a coupling sleeve. These sleeves are used to create the connection to the control unit on one side and to the water supply on the other side.
The tube can be rotated 360° via the rotary transmission in the tower of the control unit.

DANGER

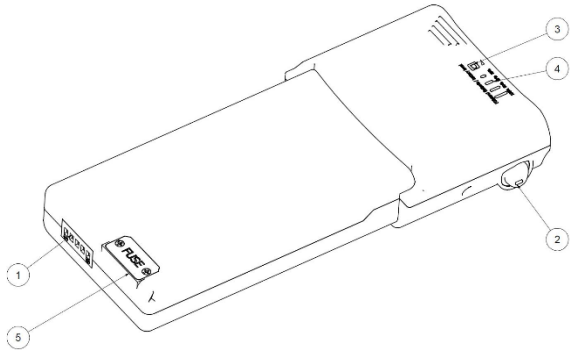
Risk of death from falling parts!

Neglecting the operating instructions can cause falling parts of the solarROBOT compact to lead to the death of uninvolved persons or other living beings.

- ⇨ **Read, understand, and apply the operating instructions!**
- ⇨ **Immediately secure dismantled components against falling!**

4.1.1.5 Battery

Article No.: 962.031



Components:

(1) Connection socket
(2) On/Off switch
(3) Activation button – Fill level display
(4) Fill level display
(5) Flat fuse 30 A

The control unit is supplied with power via the connection socket (1) of the battery.
To do so, the battery must be completely slid horizontally to the stop in the battery compartment of the control unit.
On the back of the battery compartment, there is the corresponding connection socket.

To operate the solarROBOT compact, a battery (36 V/14 Ah) is required.

The connection socket is used for the electrical connection of the battery with the charging station during the charging process.

The two charging dishes of the charging station are identical to the battery compartment of the control unit.
The On/Off switch of the battery must be switched to "On" prior to operating the solarROBOT compact.
The On/Off switch must be pushed down for this.
When the battery is turned on, a green LED in the lower area of the On/Off switch lights up.

To turn off the battery and the solarROBOT compact, the On/Off switch must be pushed up.
The corresponding green LED of the On/Off switch (2) goes out.
Both the battery and the solarROBOT compact are then de-energised.

The activation button for the fill level display (3) is located in the front, centre area at the top of the battery.
When this activation button is pressed, the charging state is displayed by the fill level display (4), which is located to the left of the activation button.

The fill level display indicates charging states of 100 %, 80 %, 50 %, and 20 %.
The display for 100 % to 50 % light up with a green LED.
If the charging state is only 20 %, the 20 % the display lights up in red.

In the back upper area, you will find the flat fuse (30 A) under a screwed-down cover (5).

Information about the battery 36 V/14 Ah (962.031):

a) Charge (see chapter "Charging the battery"):
- Only the charging station (705.177) approved by hyCLEANER GmbH & Co. KG may be used.
- The batteries may only be charged in dry conditions and at temperatures of 5 – 30 °C.
- In particular, the batteries must not be exposed to direct sunlight while charging.
- After the charging process, the batteries can remain connected to the charger for a few hours or, under supervision, even several days.
  All cells are balanced through this.
- The batteries must not be charged near flammable materials!

b) Behaviour during operation of the solarROBOT compact:
Extreme temperatures must be avoided.
Strong heat may damage the battery.
Cold can lead to a temporary loss of capacity.
If the solarROBOT compact is not being used, for example, during the winter months, the batteries must always be stored separately from the machine. See point d "Storage".
If the solarROBOT compact is parked for a longer period of time on the solar modules with direct sunlight, for example, during lunch break, the batteries must be stored separately from the machine in a shaded area.

c) Transport:
Since the batteries are defined as hazardous goods, they may not be transported in passenger airplanes and must be labelled separately when shipping with forwarding agents.

d) Storage:
If the batteries will not be used for a longer period of time, for example, during the winter months, the batteries must be stored at about 60 % of their capacity at approximately 10 – 15 °C in a cool and dry place. At least once a month, the charging states of the batteries must be checked and, if necessary, the batteries recharged.

e) Defective batteries:
- Mechanically damaged batteries must not be used further.
- The batteries must never be opened.
- Damaged batteries must be returned to the vendor of the solarROBOT compact, along with details about the incident.
- Defective batteries may not be sent by mail.

f) Disposal:
- The batteries must be disposed of separately and can be dropped off at the vendor or the manufacturer of the solarROBOT compact. Observe the legal regulations applicable in the country of use!

Decisive factors influencing battery life:

- Driving style:
  A large number of cornering or large inclines lower the battery life compared to long, straight trips with few inclines.
- Influence of accessories:
  The battery life is significantly reduced with an increasing number and weight of accessories.
- Influence of incorrect settings on the solarROBOT compact:
  Driving chains that are too tight or washing brushes that are set too low lead to significant reductions in battery life.

4.1.2 Description of the radio remote control

Article No.: 603.326

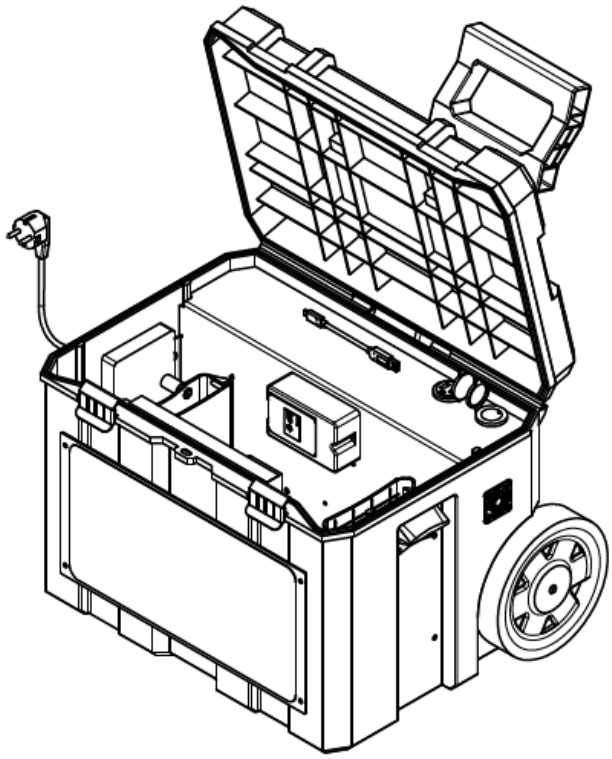
With the supplied radio remote control, all functions of the solarROBOT compact are controlled.

The radio remote control establishes a secure communication link with the receiver unit in the solarROBOT compact when the transmitter is registered. In addition, the control system has an EMERGENCY STOP switch, which can be used to stop the movement of the machine in a dangerous situation.
The solarROBOT compact works with the following transmission system:
The TWIN X Lite is a powerful radio remote control that simultaneously uses two transmitters with 2.4 GHz frequencies on the same receiver in TW mode. The TW active-active protocol differs from the general active-standby redundancy solutions. With this protocol, two 2.4 GHz frequency bands are active simultaneously on the RF module and the receiver of the TWIN series. The radio remote control has 2 internal 2.4 GHz RF antennas that provide multidirectional and wider coverage for signal transmission compared to a single antenna design. Thanks to these features, the twin system can guarantee lower latency and higher reliability at a faster data rate.

It is not considered a defect if the connection between the transmitter and receiver is lost due to external signals or no connection can be established.
The solarROBOT compact is steered using the integrated joystick to control the driving pads on the left and right.
Modifications by the operator are not permitted, otherwise the operation permit will be invalidated.
The detailed description of the radio remote control is in the chapter "Operation".

4.1.3 Description of the charging station

Article No.: 705.177



The charging station is used to charge both the batteries and the radio remote control of the solarROBOT compact and pro. The elements are integrated into a storage box.
The charging station already includes integrated supply elements as well as the scope of delivery listed above. The handle of the storage box can be extended for better movement or rolling (telescopic guide).

The 2 battery compartments in the storage box are equipped with integrated chargers for charging the batteries. The battery compartments and the chargers are connected to each other side by side.
The USB socket is used to charge the radio remote control.

The cooling of the charging station is ensured by 2 fans, which are mounted opposite each other on the side of the storage box.

In the lower area of the mounting plate, you can see the indicator lights of the chargers for the batteries.

By using the USB socket and the 12 V car socket, various devices such as smartphones can be charged.

The charging station is connected to the mains voltage (230 V) with the 230 V connection cable. Using extension cables can lead to a drop in voltage, which can impair the charging function.

The bottle opener can be used to open bottles with crown caps.
The lashing belt is intended for lashing the charging station hyCLEANER ® 36 V.

Charging time

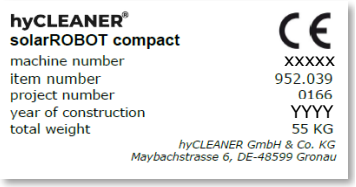
- Battery 36 V/14 Ah (962.031): approx. 2.5 hours, depending on discharge status

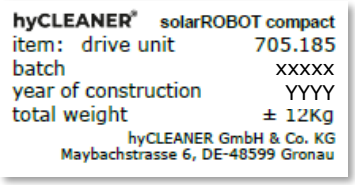
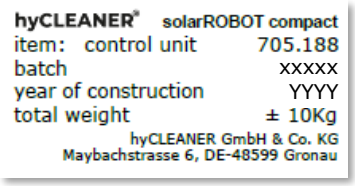
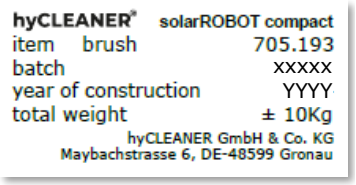
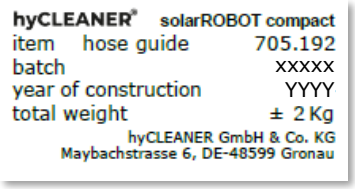
- Radio remote control (603.326): approx. 2 hours, depending on discharge status

Temperature
The charging station can only be operated with functioning fans and at outside temperatures of 5 - 30 °C.

Required supply voltage
230 V, 50 Hz

4.2 Name plates and module signs

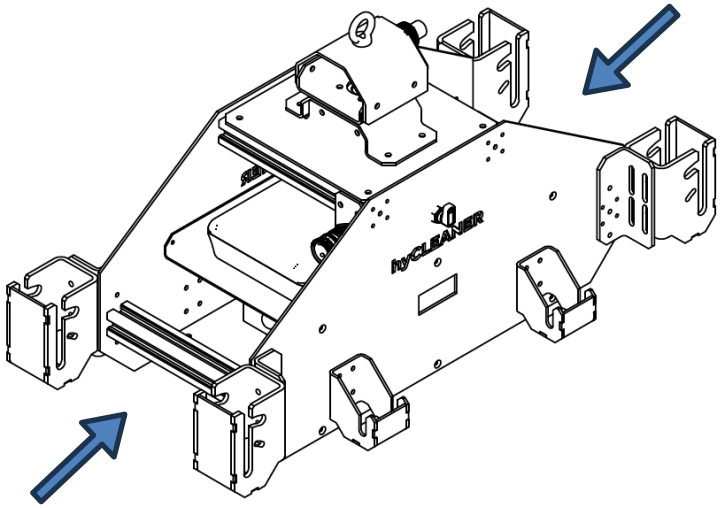
Designation:	Article No.:	Position:	Nameplate:
solarROBOT compact	952.039	Control unit	

Designation:	Article No.:	Position:	Module plate:
Drive unit (2 pieces)	705.185	Drive unit centred, outside	
Control unit	705.188	On the frame of the control unit	
Brush system 800	705.193	Brush frame sided	
Extension of hose guide	705.192	Hose guide	

5. Transport and storage conditions

5.1 Safe transportation

For transport on a trolley, for example, within the company premises, the driving pads must rest with their entire contact surface on the supporting surface of the trolley.
The supporting surface must be clean, flat and non-slippery.
The trolley must be designed to support a load of at least 55 kg.
For safe transport with a car trailer, in the boot of a car, with a van or with a truck, the loading surface must also be clean, flat and non-slippery.
For transportation on public roads or for long distances within the company, load securing must be carried out using lashing belts.
Due to the very low own weight of the solarROBOT compact, the lashing belts may only be used with a maximum tractive force of 185 daN. For lashing, profiles are provided at the front and rear of the control unit. See arrows.



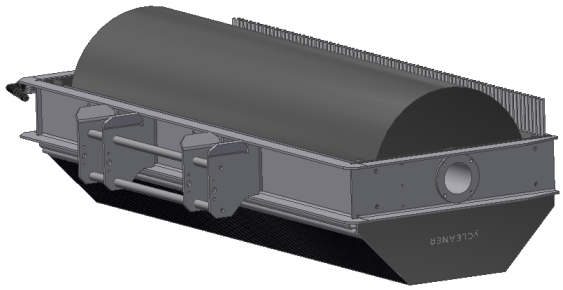
For transport, it is recommended to connect the brush system to the control unit.
An additional lashing of the brush system must not be made.
Load securing is always the responsibility of the driver.

	Notice
	The solarROBOT compact is not designed for lashing with a ratchet. Only use lashing belts with a clamp lock. The machine can be damaged if too much force is applied.

5.2 Storage conditions

The solarROBOT compact must be stored in a dry and frost-free place.
It is irrelevant if the machine is assembled or the brush system, the control with motor controller and the hose guide are stored separately from the drive unit.
During storage, no conservation work is required.

Attention:
The washing brush must not be lying on the bristles during storage, as the bristles can deform!
If the brush system is stored separately from the drive unit, it must be placed on the wide side of the upper side. To avoid scratches on the splash guard tarpaulin, the brush with splash guard tarpaulin must be placed on a protective film or the splash guard tarpaulin must be removed.
This also applies to the other individual components that are stored separately from the drive unit



The battery must be removed from the control unit.
Batteries must be charged monthly in the entrained charging station.

	Notice
	If the batteries are stored improperly, they can be damaged. A defective battery should be disposed of as described in the "Disposal" chapter.

6. Local requirements

6.1 Connections

6.1.1 Electrical connection of the charging station

Article No.: 705.177

Supply voltage:	230 V/AC, 50/60 Hz
Charging current:	16 A

6.1.2 Water connection

Water hose with at least ½" nominal diameter.

Water pressure:	minimum	2 bar
	maximum	8 bar
Water throughput:	minimum	4 l/min
	maximum	25 l/min

Operating media:

a. Use only service water according to DIN 4046 (analysis according to EU Directive 76/160/EEC).
b. Only use additives approved by the manufacturer.

6.1.3 Hose guide

The water hose must be supplied to the solarROBOT compact above the solar module so that the weight of the hose does not pull on the solarROBOT compact.

6.1.4 Construction specifications

A securing point with a minimum breaking strength of 5,000 N must be provided on site above the solar modules to ensure fall protection for the solarROBOT compact. The corresponding laws, regulations and technical rules in the respective countries and regions must be observed.

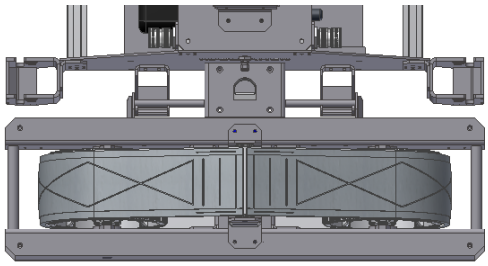
7. Installation

	Notice **Let the commissioning be carried out only by trained and authorised personnel.**

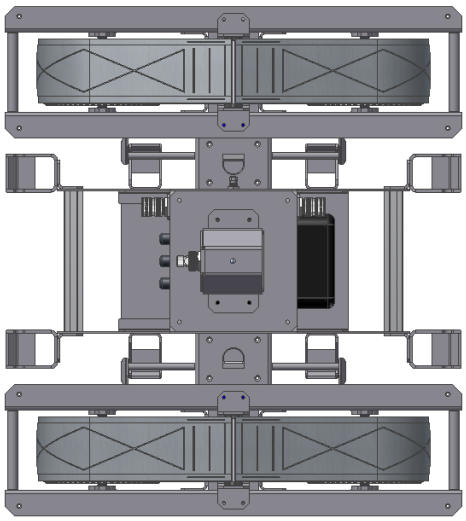
The following installation order is recommended:

(1) Connection of the two drive units with the control unit
(2) Connection of the hose guide with the control unit
(3) Connection of the brush systems with the control unit
(4) [Optional] Brush holder with lateral offset

7.1 Connection of the two drive units with the control unit

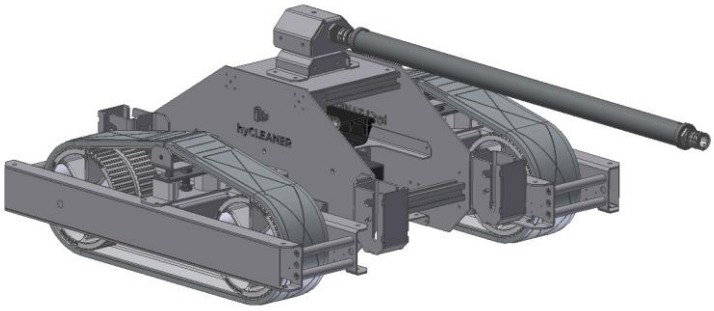


The precondition for the connection of the two drive units with the control unit is a clean subsurface, so that the installed driving pads are not soiled.
The first drive unit is aligned laterally in front of the control unit so that the two lower brackets on the control unit fit between the two cross pipes of the drive unit.
The drive unit is tilted slightly downwards and hooked into the bracket of the drive unit.
The drive unit is tilted towards the control unit until the locking padlock audibly locks into the designated opening on the control unit.

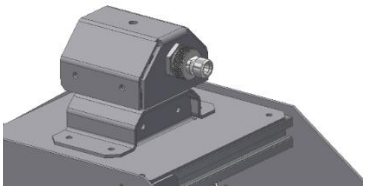


The installation of the second drive unit on the other side of the control unit takes place in the same order.
The plug for the electrical supply of the drive motors is connected to the corresponding socket on the drive unit.

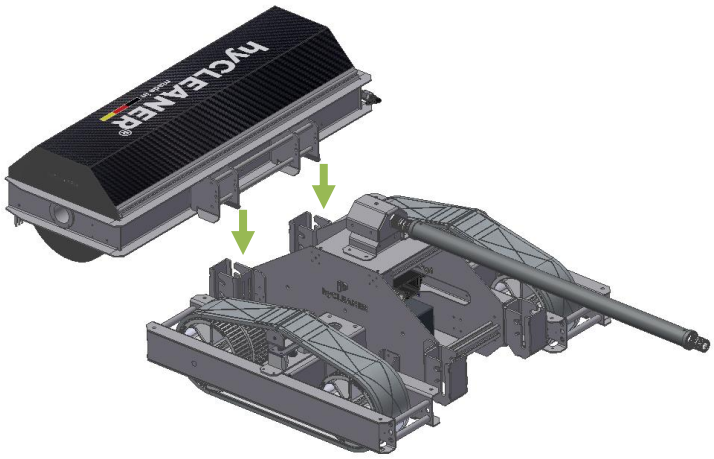
7.2 Connection of the extension of the hose guide to the control unit



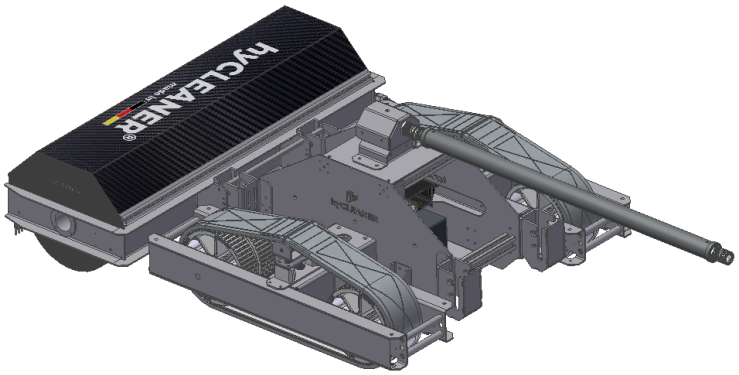
There are coupling sleeves on both sides of the hose guide extension. To connect to the control unit, pull the front ring of the sleeves backwards and insert the plug. The ring is released and snaps into place if the plug is inserted.
A water hose is connected on the opposite side using the same principle.



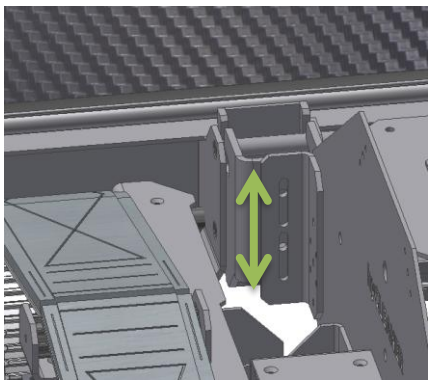
7.3 Connection of the brush systems to the control unit



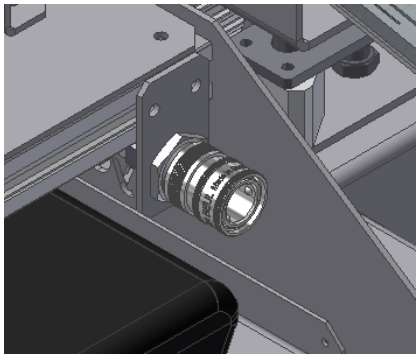
The mounting bracket for attaching the brush system to the control unit is located at the rear of the brush system. The brush system is inserted into the recesses on the control unit. Both tubes must be in the bracket and fully inserted downwards.



The optimum brush height must be set depending on the surface, incline and the driving pad used. The height is adjusted using the elongated holes on the back of the brackets on the control unit. An Allen key and an open-end spanner are required for this. After loosening the cylinder head screws (M6), it is possible to adjust the height of the bracket. The screws must be tightened to the prescribed torque of 10 Nm for the thread in order to prevent damage or unintentional loosening of the screw connections.



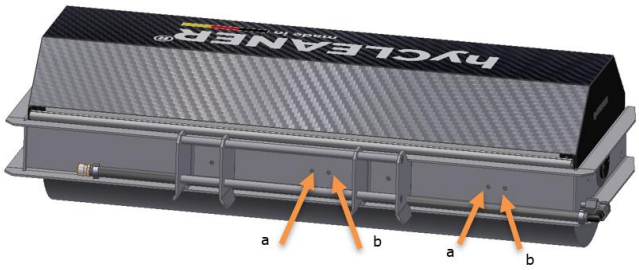
The plug of the water hose is connected to the coupling sleeve of the control unit. The coupling sleeve does not have a water stop, which is why cleaning with a brush is not possible.



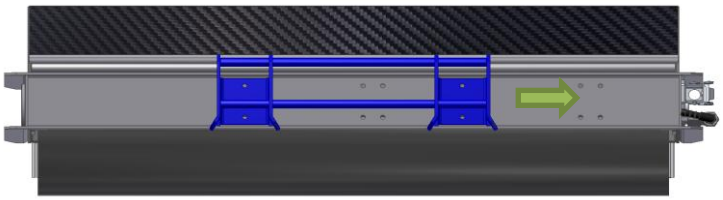
The plug for the electrical supply of the brush motor is inserted into the corresponding socket on the brush system.

	Notice
	The optimum immersion depth of the washing brush is 20 mm (2 cm). Brushes that are set too low can have a negative impact on cleaning performance and battery life! Brushes that are not optimally adjusted can lead to cleaning shadows.

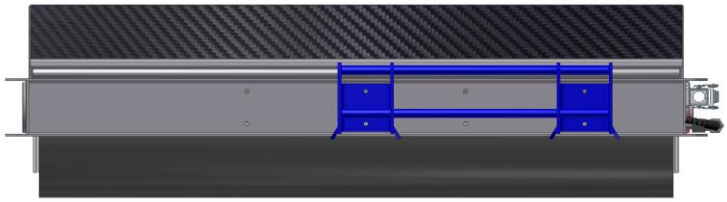
7.4 Offset arrangement of the brush system 800 mm



The brush system of the solarROBOT compact can be extended by 150 mm (a) or 175 mm (b) to a total cleaning width of 1,100 mm or 1,150 mm by moving the brush holder sideways if 2 brush systems are used.



To do this, the 2 screws with which the bracket is mounted to the frame must be loosened. The entire bracket is moved to the right until the holes in the bracket are visible.



The bracket must be reattached in this position using the previously loosened screws.

	**Notice** **If both brushes are arranged offset, during cleaning, a drive unit drives over the dirty surface. This can lead to premature soiling of the driving pads. We recommend cleaning in offset with a rubber driving pad. See chapter "Accessories".** **Attention: Adapt the driving behaviour to the condition of the surface.**

	**DANGER** **Risk of death from falling parts!** **Neglecting the operating instructions can cause falling parts of the solarROBOT compact to lead to the death of persons or other living beings.** ⇨ **Read and understand the operating instructions!** ⇨ **Apply the operating instructions!** ⇨ **Perform mounting only on flat, horizontal surfaces!** ⇨ **Secure the solarROBOT compact against falling down!**

8. Operation

8.1 Special safety instructions

	**DANGER** **Risk of death by suffocation!** **Loose workwear may be drawn in by the rotating components. This can lead to serious injury or death!** ⇨ **When handling the solarROBOT compact, wear wear close-fitting workwear!** ⇨ **Keep away from rotating components!** ⇨ **Tie back long hair!**

	**CAUTION** **Personal injury caused by rotating components!** **There is a risk of injury from rotating components!** ⇨ **Keep away from rotating components!** ⇨ **Tie back long hair!**

8.2 Operating elements, operation of the radio remote control

8.2.1 Key assignment

1. On/Off button – Radio remote control On/Off
2. Joystick – Control
3. Joystick – Speed controller
4. Switch (SA) – On/Off/On [Brush system 1]
5. Switch (SB) – On/Off/On [Brush system 2]
6. Controller (L1) – Rotation speed 0 – 100 % [Brush system 1]
7. Controller (L2) – Rotation speed 0 – 100 % [Brush system 2]
8. Push button (SE) – Reset [Cleaning robot]
9. Push button (SF) – Bridging the edge detection [Cleaning robot]
10. Switch (SC) - On/Off [Drive unit 1 & 2]
11. Switch (SD) - EMERGENCY STOP switch
12. USB socket (Type C) – connection for charging cable
13. Touch display
14. Loudspeaker
15. Push button Top (MDL) 'Model' [Menu control]
16. Push button Right (DISP) 'Display' [Menu control]
17. Push button Down (RTN) 'Return' [Menu control]
18. Push button Left (SYS) 'System' [Menu control]
19. Push button Middle Next page [Menu control]
20. Push button Middle select [Menu control]
21. Scroll wheel scroll [Menu control]
22. Push button 1 (LED) – Drive mode 1: Forward, fast
23. Push button 2 (LED) – Drive mode 2: Forward, normal
24. Push button 3 (LED) – Drive mode 3: Backward, normal
25. Push button 4 (LED) – Drive mode 4: Backward, fast
26. Button cross (T1) – *not assigned*
27. Button cross (T2) – *not assigned*
28. Button cross (T3) – *not assigned*
29. Button cross (T4) - *not assigned*
30. Trimmer (T5) – *not assigned*
31. Trimmer (T6) – *not assigned*

Operation:

1. **On/Off button**
   To press the On/Off button, the display (30) must first be pushed up. By pressing the push button (approximately 5 seconds), the radio remote control and the control are started or shut down.

2. **Joystick – control**
   The solarROBOT compact is controlled using this joystick. The stronger you push the joystick in one direction, the faster the machine moves. Lateral movements of the joystick result in rotary movements of the machine.

Direction of the joystick	Movement of the machine
	Straight on
	Backward
	Straight on with a curve to the left
	Straight on with a curve to the right
	Backward with a curve to the left
	Backward with a curve to the right

3. **Joystick – Speed controller**
   This joystick is used to control the speed. In the lower position, the drive motors are controlled at 0 % and in the upper position at 100 %. This applies to the respective drive mode. Lateral movements of the joystick have no function.

   The input is done in real time. The operator is responsible for ensuring that speed adjustments are carried out carefully and in a safe environment. There is a risk of slipping at high speeds

DANGER

Risk of death from falling parts!

By neglecting, you endanger your own life or the lives of others.

⇨ **The speed must be adapted to the conditions on site. (Weather conditions, degree of soiling, type of soiling, etc.)**

4. **Switch (SA) – On/Off/On** **[Brush system 1]**
   This switch can engage in 3 different positions.
   Upper position – Brush system ON
   Middle position – Brush system OFF
   Lower position – Brush system ON

5. **Switch (SB) – On/Off/On** **[Brush system 2]**
   This switch can engage in 3 different positions.
   Upper position – Brush system ON
   Middle position – Brush system OFF
   Lower position – Brush system ON

6. **Controller (L1) – Rotation speed 0 – 100 %** **[Brush system 1]**
   The rotation speed of the brush is infinitely variable using the controller.
   0 % = 0 % Motor speed
   100 % = 100 % Motor speed

7. **Controller (L2) – Rotation speed 0 – 100 %** **[Brush system 2]**
   The rotation speed of the brush is infinitely variable using the controller.
   0 % = 0 % Motor speed
   100 % = 100 % Motor speed

8. **Push button (SE) – Reset** **[Cleaning robot]**
   If the cleaning robot is in protective mode, the drives can be reactivated by briefly pressing the button after the time-out (approx. 7 sec) has elapsed. The robot switches to protective mode to protect against possible damage due to overloading, e.g., if the motors overheat.

	**Notice** **If the robot repeatedly goes into protective mode, operation must be stopped and the machine must be serviced by qualified personnel.**

9. **Push button (SF) – Bridging of edge detection**
   Optional accessory: The solarROBOT compact is optionally equipped with sensors that stop the machine as soon as it reaches the edge of a surface. The machine can be driven back towards the surface. Beyond the edge of the surface, however, the direction of travel is blocked by the software. This push button can be used to bypass the sensors in order to drive over gaps and maintenance aisles of up to 200 mm.

   As soon as an obstacle has been passed over, the push button for overriding the edge detection must be released immediately. Edge detection remains deactivated until the push button SF is released.

DANGER

Risk of death from falling parts!

By neglecting, you endanger your own life or the lives of others.

- ⇨ **The operator must carefully manoeuvre the machine away from the edge.**
- ⇨ **The push button for bypassing the edge detection must be released immediately after overcoming the obstacle.**

10. **Switch (SC) – On/Off** **[Drive unit 1 & 2]**
    This switch can engage in 2 different positions.
    Upper position = ON
    Lower position = OFF

11. **Switch (SD) – EMERGENCY STOP switch**
    By operating the EMERGENCY-STOP switch, the power supply to the motors is immediately disconnected.
    As it is a latching switch, it must be pushed upward to return it to its original position to be able to use the machine.
    Top = ON
    Bottom = OFF

12. **USB socket (Type C) – connection for charging cable**
    For connecting the charging cable. See charging station hyCLEANER 36 V (705.177).

13. **Touch display**
    Touch display: 480 × 320 pixels, for the display of information.

14. **Loudspeaker**
    Loudspeaker for acoustic warnings and information.

15. **Push button top (MDL) – "Model"** **[Menu control]**
    Press this button to switch to the "Model" menu. This area is locked for the operator. Settings must not be adjusted!

16. **Push button on the right (DISP) – "Display"** **[Menu control]**
    Press this button to switch to the "Display" menu. This area is locked for the operator. Settings must not be adjusted!

17. **Push button Down (RTN) – "Return"** **[Menu control]**
    Press this button to return to the previous menu.

18. **Push button left (SYS) – "System"** **[Menu control]**
    Press this button to switch to the "System" menu. This area is locked for the operator. Settings may only be adjusted by authorised trained personnel!

19. **Push button Middle – next page** **[Menu control]**
    Press this button to change the page in the display.

20. **Push button Middle – select** **[Menu control]**
    This button is used to select an item in the menu.

21. **Scroll wheel – scroll** **[Menu control]**
    The scroll wheel is used to scroll through the individual items in the menu.

22. **Push button 1 (LED) – Drive mode 1: Forward, normal**
    The machine drives forward at normal speed. The speed must be adjusted to the conditions on site using the speed controller (3).

23. **Push button 2 (LED) – Drive mode 2: Backward, normal**
    The machine drives backwards (control inverted) at normal speed. The speed must be adjusted to the conditions on site using the speed controller (3).

24. **Push button 3 (LED) – Drive mode 3: Forward, fast**
    The machine drives forward at a high speed. The speed must be adjusted to the conditions on site using the speed controller (3).

25. **Push button 4 (LED) – Drive mode 4: Backward, fast**
    The machine drives backwards (control inverted) at a high speed. The speed must be adjusted to the conditions on site using the speed controller (3).

26. **Button cross (T1) – *not assigned***

27. **Button cross (T2) – *not assigned***

28. **Button cross (T3) – *not assigned***

29. **Button cross (T4) – *not assigned***

30. **Trimmer (T5) – *not assigned***

31. **Trimmer (T6) – *not assigned***

8.3 Display and warning device

8.3.1 Touch display

The display on the radio remote control is a touch display. Entries can be made by touching the display. By swiping across the display, you can switch between multiple screen pages. The menus for setting the radio remote control are locked for the operator!
ATTENTION: Any adjustments made by the operator will invalidate the warranty.

8.3.2 Display of the status bar

LED – buttons 22 – 25	Drive modes **Mode 1: Forward, fast** **Mode 2: Forward, normal** **Mode 3: Backward, normal** **Mode 4: Backward, fast**
	Emergency stop active (red dot) Emergency stop inactive (grey dot)
	Connection status (the more bars, the better the connection)
	Volume of the radio remote control
	Battery charge status of the radio remote control

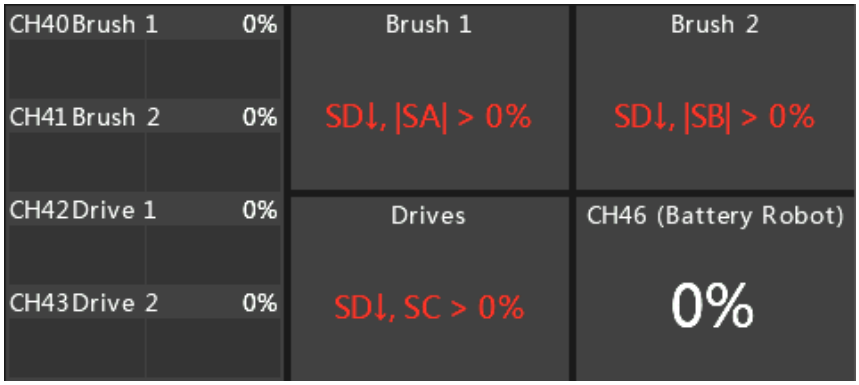
8.3.3 Screen page 1

Widget 1:
This widget displays the version numbers of the radio remote control and the control.
To read out the hardware version, the robot's battery must be switched on.

Widget 2:
This widget shows the status of the robot.

Red	Error Messages	Follow the instructions on the display.
Yellow	System Waiting	No connection between radio remote control and robot.
Green	System Ready	Ready for work.

8.3.4 Screen page 2



Widget 1:

Brush 1:	Display of the rotation speed of brush 1	from 0 – 100 %
Brush 2:	Display of the rotation speed of brush 2	from 0 – 100 %
Drive 1:	Display control of the drive unit motor 1	from 0 – 100 %
Drive 2:	Display control of the drive unit motor 2	from 0 – 100 %

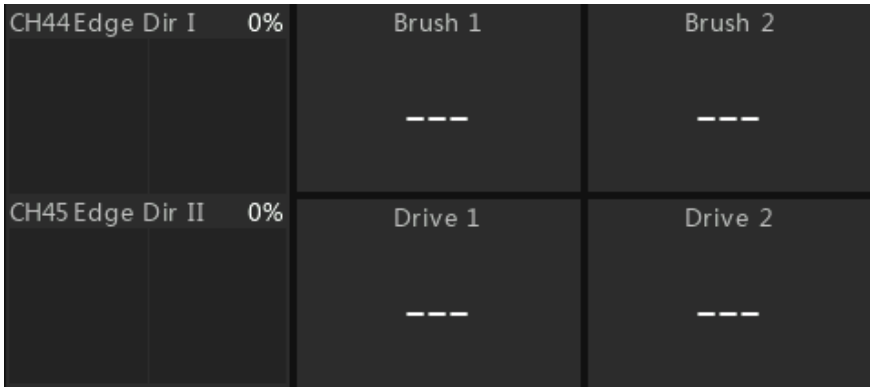
Widget 2:

Brush 1:	0 %	= Drive of brush 1 switched off
	100 %	= Drive of brush 1 switched on
Brush 2:	0 %	= Drive of brush 2 switched off
	100 %	= Drive of brush 2 switched on
Drives:	0 %	= Drives of the drive units switched off
	100 %	= Drives of the drive units switched on

Battery Robot: The battery charge level of the solarROBOT compact is displayed in a bar chart.

4 bars	=	81 - 100 %
3 bars	=	51 – 80 %
2 bars	=	21 – 50 %
1 bar	=	0 – 20 %

8.3.5 Screen page 3



The edge detection of the solarROBOT compact is an optional accessory. See chapter "Accessories".

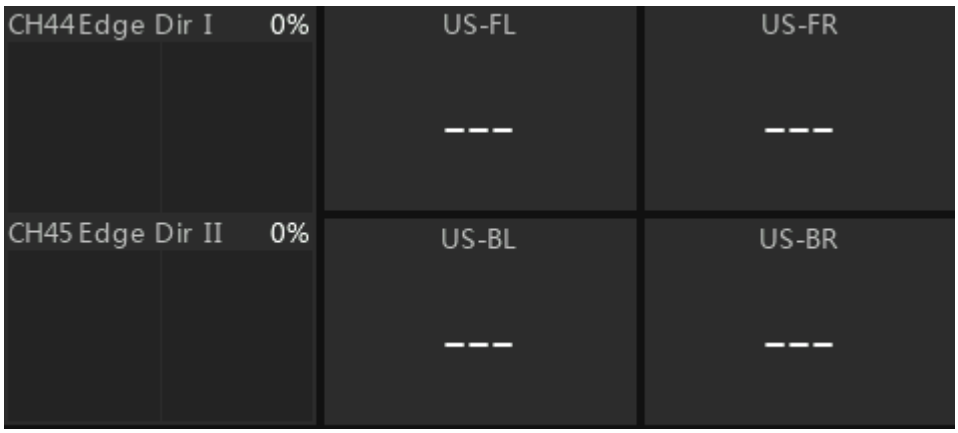
Widget 1:
Status display of the edge detection sensors
This shows whether or not the sensors detect the surface in direction of travel 1 or direction of travel 2.

Edge Dir I:	---	= No connection to the drive.
	0 %	= No surface detected in direction of travel 1.
	100 %	= Surface detected in direction of travel 1
Edge Dir II:	0 %	= No surface detected in direction of travel 2.
	100%	= Surface detected in direction of travel 2

Widget 2:
Telemetry data of the drives
Here, the current intensities of the individual motors are displayed in mA.

Brush 1:	Telemetry of brush 1 (current strength in mA)
Brush 2:	Telemetry of brush 2 (current strength in mA)
Drive 1:	Telemetry of drive unit motor 1 (current strength in mA)
Drive 2:	Telemetry of drive unit motor 2 (current strength in mA)

8.3.6 Screen page 4



The edge detection of the solarROBOT compact is an optional accessory. See chapter "Accessories".

Widget 1:
Status display of the edge detection sensors
This shows whether or not the sensors detect the surface in direction of travel 1 or direction of travel 2.

Edge Dir I:	0 %	= No surface detected in direction of travel 1.
	100 %	= Surface detected in direction of travel 1
Edge Dir II:	0 %	= No surface detected in direction of travel 2.
	100 %	= Surface detected in direction of travel 2

Widget 2:
Display of sensor values
The directions refer to the selected drive mode. (Direction of travel 1 or 2).

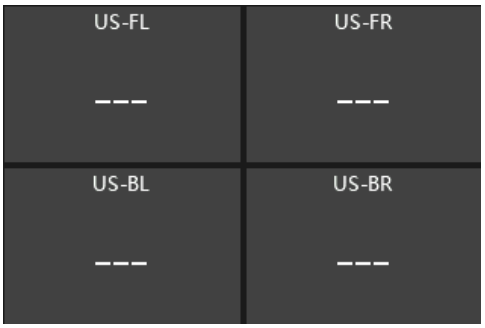
US-FL:	---	=	No connection to the machine
	0	=	front left: Surface not detected
	1	=	front left: Surface detected
US-FR:	---	=	No connection to the machine
	0	=	front right: Surface not detected
	1	=	front right: Surface detected
US-BL:	---	=	No connection to the machine
	0	=	rear left: Surface not detected
	1	=	rear left: Surface detected
US-BR:	---	=	No connection to the machine
	0	=	rear right: Surface not detected
	1	=	rear right: Surface detected

Warning messages from the radio remote control
Sensors - no surface detected: Single pulsating signal tone
Bridging button pushed: Intense pulsating signal tone

8.4 Commissioning

	Notice **Let the commissioning be carried out only by trained and authorised personnel.**

Prior to each commissioning of the solarROBOT compact, all screws must be securely tightened.
The connections and lockings of the drive units with the control unit must be secured by the respective locking padlocks. All plug connections for the water hydraulics and electrics must be made.
Prior to each commissioning of the solarROBOT compact, the edge detection (optional accessory) must be checked for proper functioning.
The switched-on solarROBOT compact is either elevated or on the transport carriage. First, switch to screen page 3 via the display on the radio remote control. This display shows the status of all 4 edge detection sensors. If the solarROBOT compact is on the transport carriage, for example, the status of the sensors is displayed as "0".
To test the proper functioning of the individual sensors, an object is held under each sensor, for example, a piece of paper, to simulate a surface. If the display of the tested sensor changes from "0" to "1", this sensor is functional.
The use of the solarROBOT compact is prohibited if a status permanently indicates "0", one or more sensors are defective, or have no connection (---).



8.4.1 Start of the solarROBOT compact

It has to be checked if the red EMERGENCY STOP switch is in the lower position. If yes, the switch must be unlocked by flipping it to the upper position.

Starting the control unit of the solarROBOT compact:

1. Switching on the battery starts the solarROBOT compact and boots the control unit.

Starting and logging on the radio remote control (603.326):

1. Press the On/Off button (1) for 3 seconds – display & software start.

2. The connection is established automatically.
With the radio remote control, the individual functions of the solarROBOT compact can be controlled. The connection quality is displayed in the status bar.

Optional accessory for edge detection:

The radio remote control is equipped with a non-latching bridging button to be able to bridge the edge detection sensors. The button is located on the front of the radio remote control. This button must be operated with extreme caution, as it can be used to perform driving movements that increase the risk of tipping over.
As soon as an obstacle has been passed over, the push button for overriding the edge detection must be released.
If the push button is not released, edge detection is deactivated!

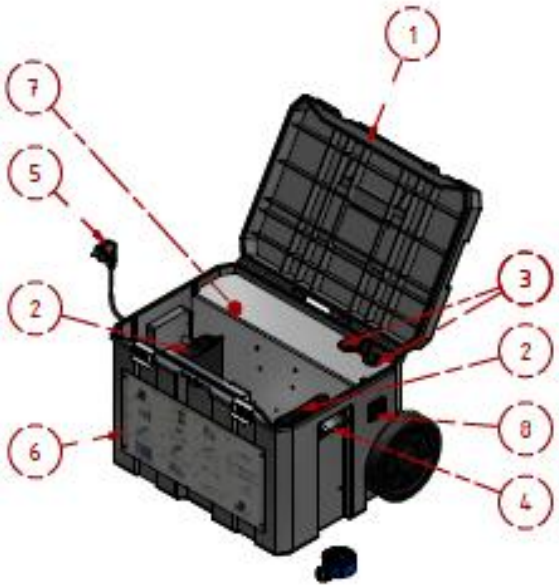
DANGER

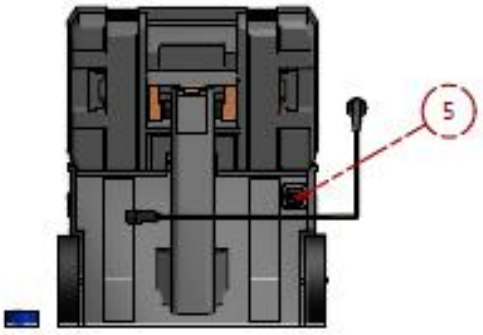
Risk of death from falling parts!

By neglecting, you endanger your own life or the lives of others.

- ⇨ **The operator must carefully manoeuvre the machine away from the edge.**
- ⇨ **Release the override push button after overcoming the obstacle.**

8.4.2 Start of the charging station hyCLEANER 36V





(1) Storage box (703.445)

(2) Battery compartment (603.086)

(3) USB socket 12-24 V (603.321)

(4) Bottle opener storage box (703.448)

(5) Connection cable 230 V 2 m (603.261)

(6) Quick Reference Guide (704.119)

(7) Mounting plate (301.265)

(8) Fan (603.265)

(9) Cold-device socket (603.260)

(10) Charger 36 V/6 A (603.256)

a) Indicator light (charger 36 V/6 A (603.256))

Before each start

1. Check to see that the sides of the charging station where the fans (8) are attached have an air gap of at least 10 cm from the nearest obstacle.
   - A distance of less than 10 cm can lead to overheating of the charging station, as the warm air cannot be removed sufficiently by the fans.

2. Make sure that the battery compartments (2) as well as the USB socket with vehicle socket (3) are free of foreign objects.
   - Foreign objects can cause the batteries not to charge.
   - Foreign objects can cause damage to the charging station or its individual elements.

Commissioning

General:
Check the function of the fans at each commissioning through a visual inspection.
If the fans are not working, the battery must not be charged.

The operation is carried out with 230 Volt alternating current. The device is not suitable for children.

Safety guidelines

Ensure that the charging station stands firmly so that it cannot tip over.
- Can cause damage to the charging station or individual components.

Make sure that no splashing water gets into the fans.
- Can cause damage to the charging station or individual components.

Avoid operating the charging station in direct sunlight.
- Can lead to overheating of the charging station.
- Can cause damage to the charging station or individual components.

Protect the charging station from rain and moisture during operation and storage.
- Can cause damage to the charging station or individual components.

Do not use the charging station near flammable gases, solvents, or vapours – Risk of explosion!

	**DANGER** **Risk of death by explosion!** **Results in death or serious injuries.** ⇨ **Read and understand the operating instructions!** ⇨ **Proper use of the batteries and the charging station.**

Attention:
Risk of overheating!

8.5 Charging the battery 36 V/14 Ah (962.031)

Put the charging station into operation by connecting the cold-device socket (9) to the required supply voltage using the supplied connection cable (5). The indicator light (a) lights up green.
The charger (10) is ready for operation.
Switch on the discharged battery and insert it into the battery compartment (2) as far as it will go. The indicator light (a) lights up red after a short time. Battery is charging.
The battery is fully charged and can be removed. The indicator light lights up green.
After removing the battery, the indicator light lights up green. The charger is ready for use.

Notice: If the batteries are not used for a longer period of time, e.g. during the winter break, the batteries must be recharged at least once a month.

Charging the battery of the radio remote control (603.326)
Put the charging station into operation by connecting the cold-device socket to the required supply voltage using the supplied connection cable.
Plug the USB cable into the USB socket and connect the other end of the cable to the radio remote control. When the display is pushed up, the green LED in the On/Off button indicates that the radio remote control is charging. The radio remote control only charges when it is switched off.

USB socket 12 V:

Put the charging station into operation by connecting the cold-device socket to the supply voltage using the supplied connection cable.

- As soon as the supply voltage is connected, the sockets can be used. A blue LED ring lights up on the USB socket as soon as it is supplied with power. The vehicle socket remains colourless.

	Notice **Both charging options and the USB socket can be used simultaneously.** **The lid of the charging station must be closed during operation or charging processes. The fans ensure adequate cooling.** - **The penetration of splash water is reduced.**

	Notice **The charging station "hyCLEANER® 36 V" is exclusively intended for charging the radio remote control and the 36 V/14 Ah batteries.**

DANGER

Risk of death by explosion!

Do not use the charging station near flammable gases, solvents or vapours – Risk of explosion!

Notice

Use the charging station only in dry rooms. Protect it from dust, heat (> 30 °C), direct sunlight, and high air humidity (> 80% relative).

Notice

Only use trained and instructed personnel to operate the charging station.
See chapter "Obligation of the owner".

Notice

Do not cover the ventilation openings during operation!

Notice

Clean the charging station with a dry cloth only.
Liquids must not enter the charging station!

Notice

The charger must be checked for damage before each use!
In the case of damage or malfunction, the device must be put out of operation immediately!
Protect against restarting!

Notice

Repairs may only be carried out by authorised companies or trained personnel.

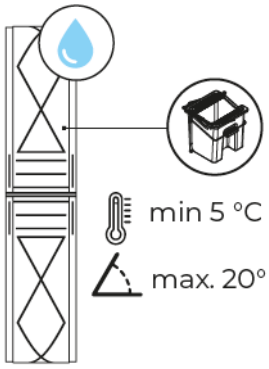
9. Accessories

The following accessories are listed and described. Combining these items with the solarROBOT compact changes the overall weight and weight distribution of the unit. This can change the machine handling and driving behaviour.

	**WARNING** **Risk of falling / falling objects!** **May cause death or serious injuries.** ⇨ **Fall protection / fall safety** ⇨ **Secure the work area.** ⇨ **Personal protective equipment** ⇨ **Read operating instructions.**

9.1 Driving pad – Leather 1450 mm

Article No.: 703.467



This driving pad enables the solarROBOT compact to work on wet and smooth surfaces with an incline of up to 20°. The driving pad can be used from an ambient temperature of 5 °C.

In particular, when cleaning large or heavily soiled solar modules, it is recommended to change the driving pads in a timely manner. Due to excessive dirt, there is a risk of slipping.

Place of usage:

Incline	0 – 20°
Ambient temperature	From 5 °C

Attention: The grip depends on the surface condition and the incline of the surface.

Maintenance and cleaning instructions for leather driving pads:

Driving pads made of leather are very temperature-sensitive.
Therefore, the following care and cleaning instructions must be observed:

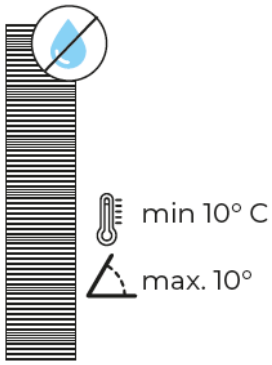
The driving pads may only be cleaned with surfactant-free detergent.
Wrong treatment using detergent containing surfactants leads to the destruction of the cell structure of the leather (saponification).
As a result, the grip of the driving pads is lost and the lifespan decreases significantly!

Attention:
Never wash the driving pads while over 30 °C or never dry them using heat!
We recommend using the PAD cleaner (962.046; 962.069) for hand cleaning. In the accessory chapter, "PAD cleaner", the usage and the hazard notices are listed.

After cleaning, the driving pads must be rinsed with clear water and wrung out. We recommend using the cleaning bucket for driving pads for this purpose.

9.2 Driving pad – Neoprene 1450 mm

Article No.: 703.474



This driving pad can be used wherever the solarROBOT compact is operated without water up to a maximum incline of 10°. Due to the neoprene material, the cleaning effort is very minimal, as dry dirt (e.g. sand) does not diffuse into the driving pads.

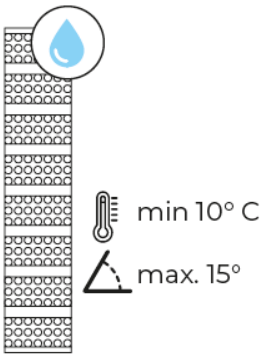
Place of usage:

Incline (on dry surfaces)	0 – 10°
Ambient temperature	From 10 °C

Attention: This driving pad loses its grip immediately in a wet or moist state. This causes a risk of slipping!
The grip depends on the surface condition and the incline of the surface.

9.3 Driving pad – Rubber, sections

Article No.: 705.171



This driving pad enables the solarROBOT compact to work on wet and smooth surfaces with a maximum incline of 15°. The driving pad can be used from an ambient temperature of 10 °C.
Place of usage:

Incline	0 – 15°
Ambient temperature	From 10 °C

Attention: The grip depends on the surface condition and the incline of the surface.
Notice: Several sections are required.

9.4 PAD cleaner 1L / 10L

Article No.: 962.046 *(PAD-CLEANER 1L)*
Article No.: 962.069 *(PAD-CLEANER 10L)*

The PAD CLEANER 1L and the PAD CLEANER 10L are specially designed for cleaning the driving pads made of leather.

Application:

1. Cleaning by hand

   Pour 500 ml of the PAD cleaner into a container with 10 litres of lukewarm water (below 30°C). Allow the driving pads to soak for about 30 minutes in this container. During the exposure time, wring the driving pads by hand several times.

2. Subsequent treatment

   Rinse the driving pads in clear water and wring them out.

This detergent is recommended for effective cleaning of the leather driving pads (703.467).

9.5 Hose reel 25 m with double suction plates

Article No.: 705.134
Article No.: 705.135

The hose reel consists of a hose drum with 25 m hose. The hose drum is freely rotatable mounted on a frame with 3 bars. The additional parts essentially consist of 3 double suction plates, in the middle of which a rectangular shoe with locking bolt is fastened.
These 3 shoes can be placed on the 3 bars of the hose reel 25 m and locked in place.

That way, the hose reel 25 m can be attached to a solar module.
The respective hand levers on the suction plates serve to clamp the double suction plates.
The accessory article No.: 705.135 includes push-in fittings which enable the hose connection of the hose reel 25 m with the hose guide on the solarROBOT compact.

9.6 Cleaning bucket for driving pads

Article No.: 962.040

With the help of the cleaning bucket (included in the standard scope of delivery of the "driving pad leather 1450 mm" starter set), the cleaning of the driving pads can be done in a construction site-appropriate manner.
The cleaning bucket for driving pads has a filling quantity of 10 l.

Attention:
Never wash with a water temperature greater than 30 °C, because the leather might be damaged!
Furthermore, surfactant-containing detergents must not be used, as this would damage the cell structure of the leather!

Two rollers are arranged in the upper area of the cleaning bucket.
On the front side of the bucket, there is a foot pedal that can be used to bring the two rollers together.
The roller mechanism is used to wring out the driving pads.

Wring-out process:
One end of the driving pad is guided between the two rollers and held approx. 10 cm above the rollers.
The pedal is pressed with the right foot, causing the rollers to be guided firmly onto the driving pad.
The driving pad is pulled upward between the rollers and wrung out in the process.
This wring-out process should be repeated several times.
When wringing out multiple times, the dirt water must be replaced with clean water.

9.7 Battery 36 V/14 Ah as replacement battery

Article No.: 603.084

By using additional replacement batteries, the effectiveness of the solarROBOT compact is significantly increased.
While a battery is being charged, the solarROBOT compact can be operated with the replacement battery.

9.8 Crane hook

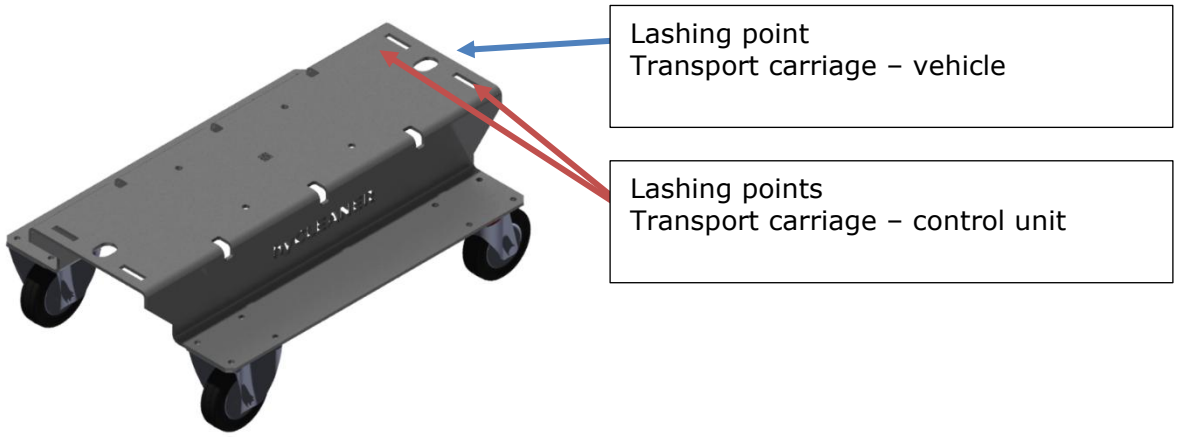
Article No.: 203.009

The crane hook is used to lift the solarROBOT compact onto the solar module using lifting equipment.
For this purpose, a rope is attached to the upper eye of the crane hook, which is then connected to the lifting equipment.
The operator easily threads the lower cranked end of the crane hook into the bore of the upper attachment point of the hose guide (705.067 or another optional hose guide).
Then the solarROBOT compact is lifted by raising the lifting equipment and placed on the solar module to be cleaned.

Furthermore, the crane hook can be used as a steering rod for the optional transport carriage.

9.9 Transport carriage solarROBOT compact

Article No.: 705.194



With the transport carriage solarROBOT compact, a convenient transport of the solarROBOT compact is possible. In particular, a transport without contact of the driving pads with the ground is possible.

The solarROBOT compact can be positioned positively on the aluminium sheet base. First, the control unit is positioned on the centre part. The control unit is attached to the trolley and secured for transportation with 2 locking pins. The two crawler chassis are attached to the control unit as usual, one after the other. Finally, the brushes are hooked in.

To secure the transport carriage with the solarROBOT compact inside a vehicle during transportation, the transport carriage must be lashed with lashing belts to the designated eyelets - see arrows.

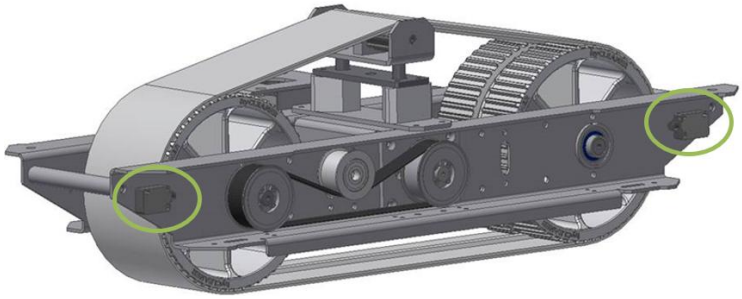
In the rear area of the transport carriage, 2 fixed rollers (per wheel Ø 100 mm) are mounted. At the front of the transport carriage, 2 castors (per wheel Ø 100 mm) with locking devices are mounted.

	Notice
	The solarROBOT compact is not designed for lashing with a ratchet. Only use lashing belt with a clamp lock. The machine can be damaged if too much force is applied.

9.10 Edge detection solarROBOT compact

Article No.: 705.195

The edge detection system consists of 4 individual ultrasonic sensors positioned on the outer sides of the drive units (front and rear) of the solarROBOT compact.



The sensor system helps the operator to recognise the end of the surface at an early stage and stops automatically when the edge is reached. The radio remote control emits a signal tone and displays the triggering sensor and the direction of travel on the display. In addition, the direction of travel towards the triggered edge is blocked. Continuing the journey, e.g. for driving over maintenance aisles, is only possible with the help of the bridging button on the radio remote control (SF) or in the opposite direction. For more information on operation, see the "Operation" chapter.

The sensor system must be checked for functionality before each commissioning. For this purpose, the solarROBOT compact must be slightly elevated, for example, with the transport carriage. This means that all sensors are triggered simultaneously. The sensors can be checked by placing one hand under each sensor on the crawler chassis, one after the other.

	Notice **The use of the accessory for edge detection does not relieve the operator of his duty to always be attentive and vigilant. The safety of man and machine depends to a large extent on actively monitoring and reacting to the environment. In addition, the edge detection accessory does not exempt the operator from the obligation to secure the machine against falling.**

	WARNING **Risk of falling / falling objects!** **May cause death or serious injuries.** ⇨ **Fall protection / fall safety** ⇨ **Secure the work area.** ⇨ **Wear personal protective equipment.** ⇨ **Read operating instructions.**

9.11 Splash guard tarpaulin 800 – solarROBOT compact

Article No.: 704.113

The splash guard tarpaulin is pulled through a rail in the brush system and tensioned on the other side with a Velcro connection.
The splash guard tarpaulin is used to shield off splashing water and to prevent anyone from reaching into the rotating brush.
Use of the solarROBOT compact is **only permitted with a fitted** splash guard tarpaulin.

	CAUTION **Personal injuries caused by rotating brushes** **May result in light or moderate injury.** ⇨ **Machine or brush system must be turned off before removing the splash guard tarpaulin.** ⇨ **Turn off the machine or brush system if a person approaches the machine.**

10. Maintenance and inspection instructions

The maintenance of the solarROBOT compact is limited to a minimum.

The plain bearings are maintenance-free. Corrosion-resistant materials such as aluminium alloys, stainless steel and various plastics are used.

Nevertheless, a minimum of maintenance and inspection is required for safe operation and a long lifespan of the machine.

Attention:
Since the significant electrical components and the electrical control have a protection rating of IP54, cleaning the solarROBOT compact with a high-pressure cleaner is forbidden!

List of maintenance and inspection work and their intervals:

Maintenance and inspection work	Interval	Action in case of defects	Operator	Vendor
Dirtying of wash brush	After and before each use	Clean with water!	X	
Pollution of driving pads on the driving chains	After and before each use	Clean with max. 30° warm water! Detergent: Some leather detergent (no fabric softener)	X X	
Check tightness of all screws and the function of ball lock pins of the brush system	Before each start	Tighten any loose fittings and secure the locks.	X	
Check for deformations and cracks on the machine components.	Before each start	If damaged, further operation is not allowed! Let the repair be made only by the vendor.		X
Check the water hoses for porosity	Yearly	Renew if necessary		X
	All water hoses must be renewed every 6 years.			X
Checking the driving chain tension	Before each start	Tighten the driving chain.	X	X
Control of the edge detection (optional accessory)	Before each start	If damaged or malfunctioning, further operation is not allowed! Let the repair be made only by the vendor.	X	

10.1 Setting of the driving chain tension

To ensure an ideal grip of the driving pads and to avoid the run-out of the driving chains, especially when driving up to 20° transversely to the incline, the driving chain tension must be checked before each start-up.

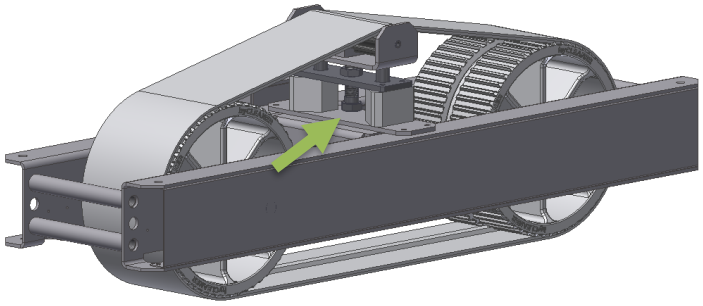
Attention:
This adjustment may only be carried out by appropriately trained personnel! Otherwise contact your vendor.

(1) Precondition:
The outside temperature should be between 10 – 20 °C.

(2) The chassis of the solarROBOT compact must be lifted so far that the driving chains do not touch the ground. (for example with the transport carriage 705.160)

(3) Remove the driving pads from the driving chains.

(4) Loosen the lock nuts in the centre under the tensioning rollers.
(e.g. using an open-end spanner with wrench size 19 mm)



(5) By turning the hexagon screw head, the tension can be increased or decreased. For this, an open-end spanner with wrench size 19 mm can be used, for example. The upper edge of the sheet metal bracket of the tensioning rollers must have a distance of 10 cm from the base plate after tensioning. Attention: Higher or lower tension can cause run-out of the driving chains.

(6) When the required tension has been reached, the setting must be secured using the lock nut. To do so, they are turned onto the screw until they are against the threaded plate and tightened.

11. Troubleshooting

11.1 Troubleshooting solarROBOT compact

Error	Component	Measure	Operator	Vendor
Horn / buzzer signals: Edge detection	Radio remote control 603.326	Drive back on flat ground (solar module) Press the button on the joystick on the radio remote control.	X	
Radio remote control - cannot log in	Radio remote control 603.326	Switch on the battery switch of the batteries. Charge the batteries if they are discharged.	X	
Radio remote control – does not react	Radio remote control 603.326	Change the battery. Charge the battery.	X	
Radio remote control – status indicator is red. (Error Messages)	Radio remote control 603.326	Acknowledge error. Follow the instructions on the display. If the error occurs repeatedly, contact the vendor.	X	X
Radio remote control – status indicator is yellow. (System Waiting)	Radio remote control 603.326	Switch the battery on the machine off and on again.	X	
The machine does not start	solarROBOT compact	Switch on or charge the battery if discharged. Unlock the EMERGENCY STOP switch on the drive unit and on the radio remote control.	X	
The machine does not respond	solarROBOT compact	Ensure that the radio remote control is within range of the machine	X	
Drive unit does not respond; is shown on the display: MOTOR ERROR	solarROBOT compact	Machine is in protective mode. Release the drives by pressing the SE push button (approx. 5 seconds timeout) Wait for time-out). If the event is repeated, contact the vendor or service centre.	X	

Too little water	solarROBOT compact	The hose must be operated with sufficient pressure and have a nominal diameter of at least ½" (25 mm).	X	

11.2 Troubleshooting Charging station hyCLEANER® 36 V

Error	Component	Measure	Operator	Vendor
The indicator light does not light up.	Charging station hyCLEANER® 36 V (705.177)	Charging station is not correctly supplied with voltage. Check that the mains plug is properly seated at both connection ends. Check whether the mains cable is defective. Check the microfuse (603.273) in the cold-device socket.	X	
The indicator light is blinking green.	Charging station hyCLEANER® 36 V (705.177)	Battery defective.		X
The battery charging time is significantly longer than specified.	Charging station hyCLEANER® 36 V (705.177)	Battery is not switched on. Check whether the battery is switched on. See chapter "Charging the battery".	X	

12. Annually recurring inspection by the vendor

We recommend a yearly inspection of the solarROBOT compact machine, to be done by the vendor. This way a safe, functional operation of the solarROBOT compact machine is ensured.

13. EC Declaration of Conformity

Original document

CE

according to EC Machinery Directive 2006/42/EC Annex II A

The manufacturer:	hyCLEANER GmbH & Co. KG Maybachstraße 6 48599 Gronau Tel: +49 2562 99254 0

hereby declares that the following product:

General designation:	solarROBOT compact
Function:	Cleaning solar modules or glass roofs.
Project number:	0166
Year of construction:	2025

complies with the relevant provisions of the Machinery Directive 2006/42/EC. The machine continues to comply with all provisions of the EMC Directive 2014/30/EU and the Radio Equipment Directive 2014/53/EU.

The following harmonised standards were applied:

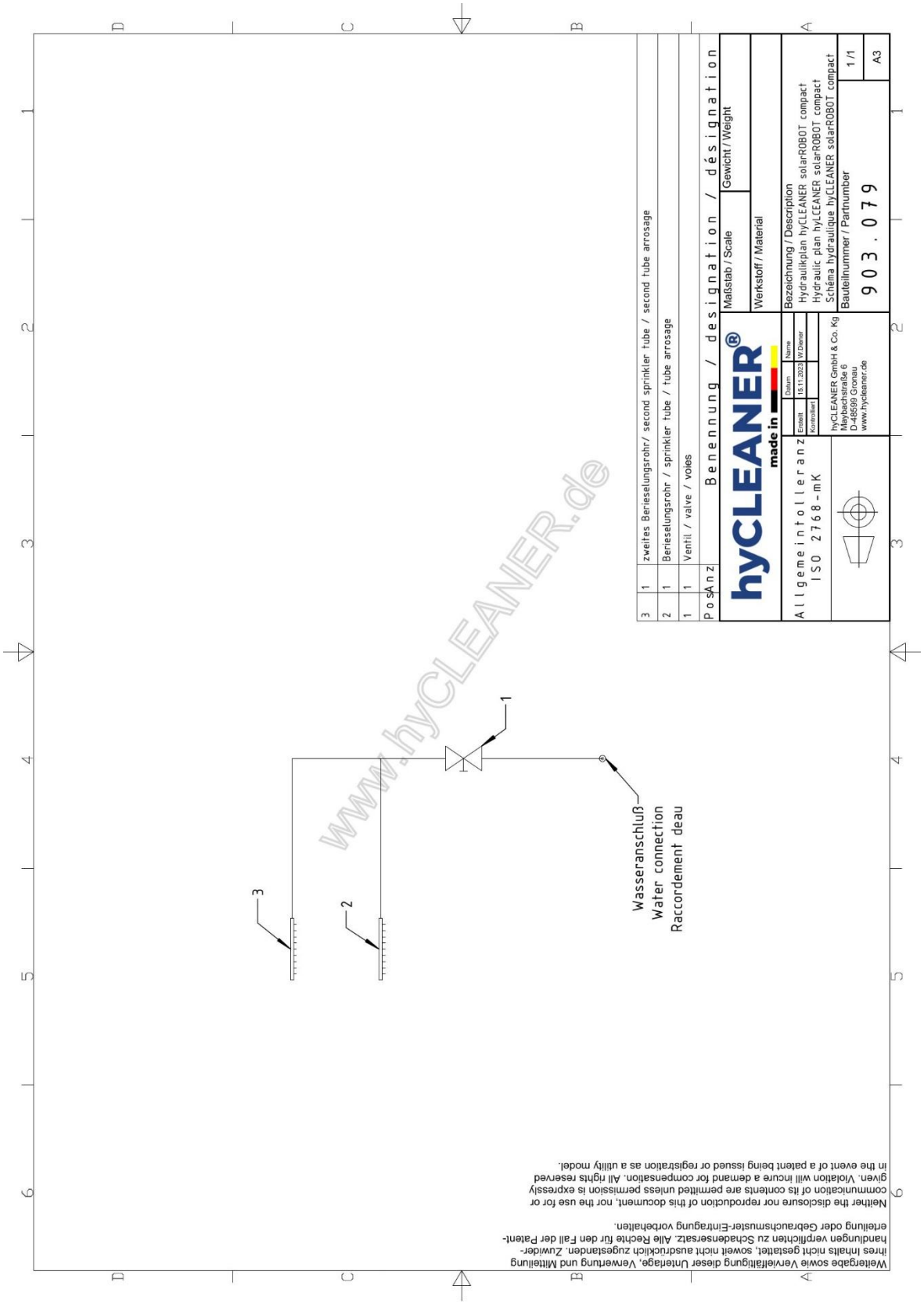
EN 614-1:2006	Safety of machinery - Ergonomic design principles - Part 1: Terms and general principles +A1:2009
EN 614-2:2000	Safety of machinery - Ergonomic design principles - Part 2: Interactions between the design of machinery and the work tasks +A1:2008
EN ISO 4413:2010	Fluid power - General rules and safety requirements for hydraulic systems and their components (ISO 4413:2010)
EN ISO 12100:2010	Safety of machinery - General principles for design - Risk assessment and risk reduction (ISO 12100:2010)
EN ISO 13849-1:2015	Safety of machinery - Safety-related parts of control systems - Part 1: General principles for design (ISO 13849-1:2015)
EN ISO 13850:2015	Safety of machinery - Emergency stop - Design principles (ISO 13850:2015)
EN 60204-1:2018	Safety of machinery - Electrical equipment of machines - Part 1: General requirements

Authorised representative for the compilation of the technical documentation: hyCLEANER GmbH & Co. KG, Maybachstraße 6, 48599 Gronau, Germany, Tel.: +49 2562 99254 0

Gronau, 17 February 2025
Place, Date

Project Engineer / Signature

14. Hydraulic plan of the solarROBOT compact



15. Electrical plan with bill of materials