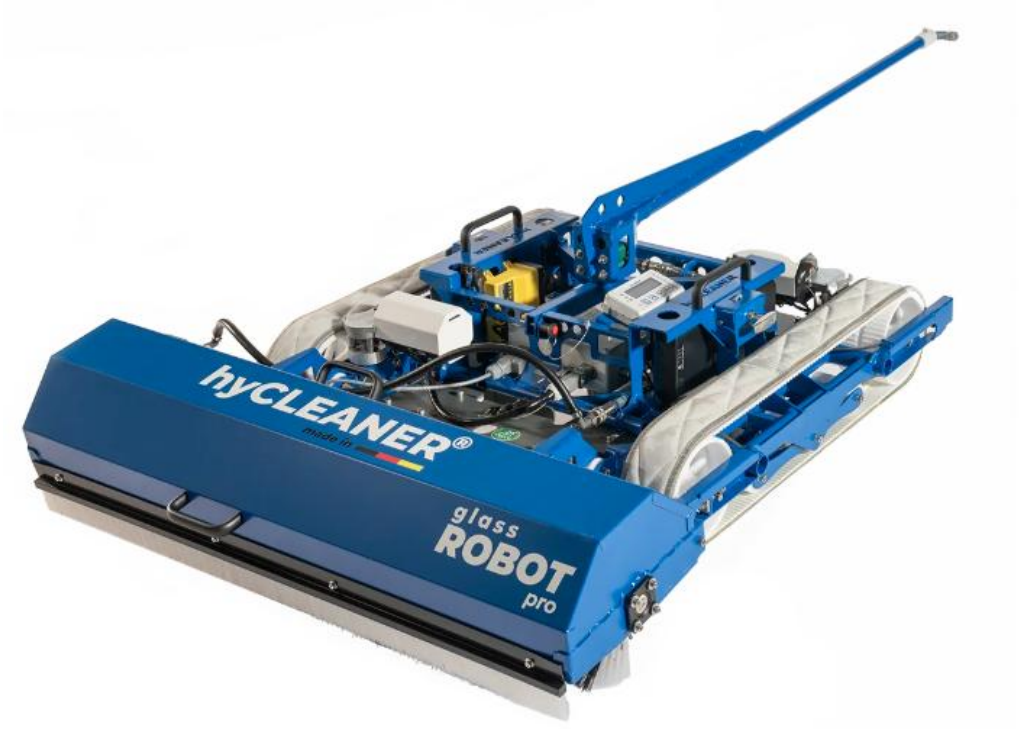
hyCLEANER®
made in

glass ROBOT pro

Operating instructions



Version February 2025

hyCLEANER®
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Table of contents

1. General

1.1 Foreword

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

All illustrations and drawings in these operating instructions are for general illustration of glassROBOT pro 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 glassROBOT pro.
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 a threatening 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 injuries 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.

	**Notice**
	Notice text …

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

1.3 Scope of delivery

a. glassROBOT pro		Article No.:	952.032
Consisting of:			
Control unit	1 pcs.	Article No.:	705.130
Drive unit	2 pcs.	Article No.:	705.199
Hose guide	1 pcs.	Article No.:	705.129
Option 1: Brush system 1,100 mm	2 pcs.	Article No.:	705.147
or			
Option 2: Brush system 1,300 mm	2 pcs.	Article No.:	705.127
Radio remote control	1 pcs.	Article No.:	603.239
Charging station hyCLEANER® 36 V	1 pcs.	Article No.:	705.177
Radio remote control - Battery	2 pcs.	Article No.:	603.238
Battery 36 V/14 Ah	2 pcs.	Article No.:	603.084
b. Electrical plan with bill of materials	1 pcs.		
c. Hydraulic plan with bill of materials	1 pcs.		
d. Operating instructions	1 pcs.		
e. EC Declaration of Conformity	1 pcs.		

1.4 Legal note

1.4.1 Copyright note

1.4.2 Warranty

These operating instructions must be read carefully before commissioning the glassROBOT pro !

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 accident prevention regulations applicable in individual countries and regions at the respective work site and the recognised technical rules for safe and professional work must be observed.

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

1.4.3 Obligation of the owner

The usage of the glassROBOT pro carries the risk of personal injuries 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 glassROBOT pro and customer equipment must be secured by the owner.

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 glassROBOT pro must have read and understood the operating instructions, particularly the "Safety" chapter, as well as the applicable regulations, before starting work!

The glassROBOT pro 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 data and instructions contained in these operating instructions technical as information for the operation of the glassROBOT pro machine correspond to the last state at the date of printing, and shall be carried out diligently taking into account the previous experience and knowledge of the manufacturer.

The manufacturer retains the right to carry out technical changes within the scope of further development of the glassROBOT pro 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 only examples.

The glassROBOT pro should only be used in the countries and regions that require a CE mark, or explicitly renounce to it.
The glassROBOT pro should only be used in countries and regions that require a CE mark or explicitly waive this requirement.
In particular, the glassROBOT pro is not yet approved for the North American and Canadian markets.

1.4.5 Manufacturer address

Manufacturer of the glassROBOT pro is:

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

Tel: +49 2562 99254 0
Fax: +49 2562 99254 10

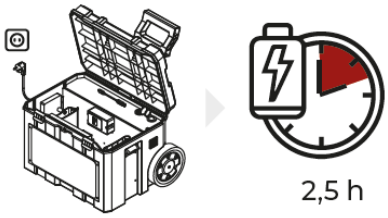
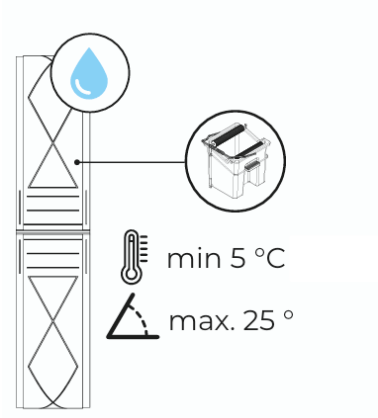
E-Mail: info@hycleaner.de
Web: www.hycleaner.de

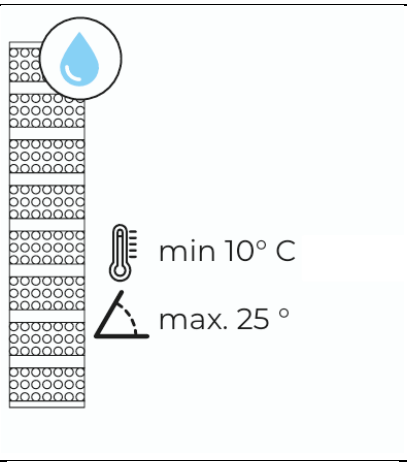
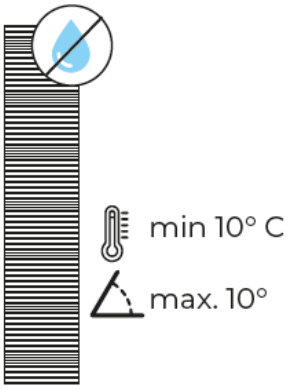
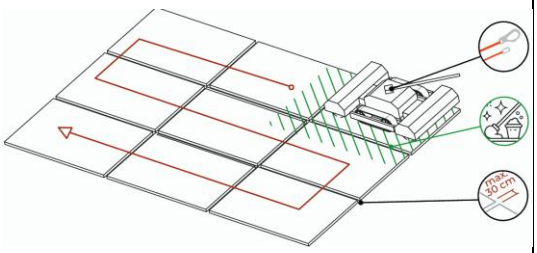
General Managers:
Celina Kneiber, Josha Kneiber

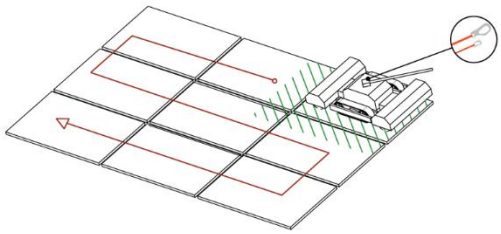
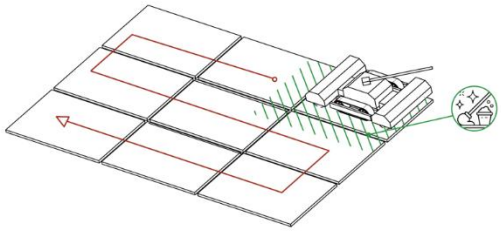
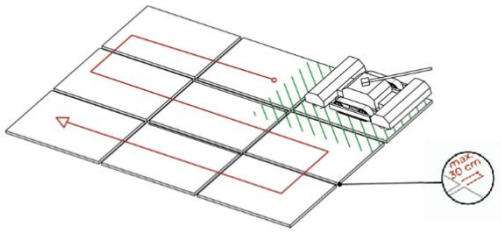
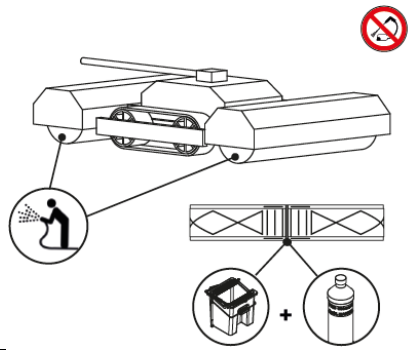
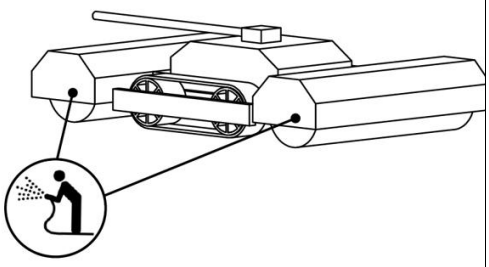
The manufacturer provides a 12-month warranty from the date of delivery from the Gronau site.

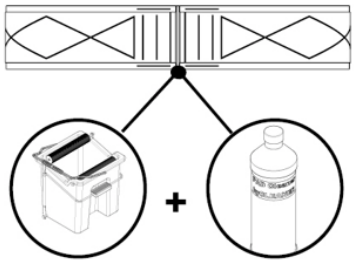
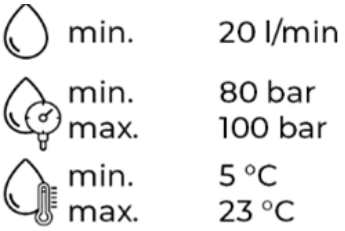
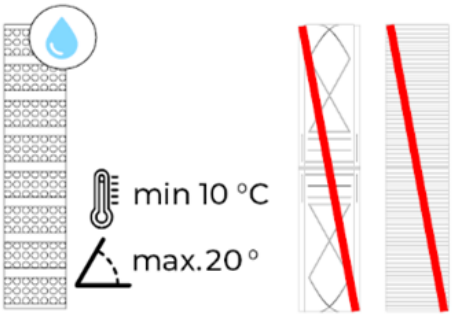
1.5 Glossary – Machine labelling

Chapter	Representation	Description
Quick Reference Guide		
!		Before commissioning, the operator is obliged to read the operating instructions, which contain all the necessary safety instructions for proper use.
	 min. 9 l/min max. 25 l/min	Permissible amount of water
	 min. 2 bar max. 8 bar	Permitted water pressure
	 min. 5 °C max. 60 °C	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 discharge status of the batteries.
		Repair and maintenance work on electrical equipment may only be carried out when it is de-energised. Before carrying out repair and maintenance work, electrical equipment such as the charging station must be disconnected from the mains voltage (via the mains plug).
2		Driving pad - leather 1,980 mm In connection with the glassROBOT pro, it is possible to drive inclines up to 25° 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 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, sections In conjunction with the glassROBOT pro, it is possible to drive on inclines of up to 25° 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 1,980 mm In conjunction with the glassROBOT pro, it is possible to drive on inclines of 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 glassROBOT pro can drive over maintenance aisles up to 30 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 usage. Attention: No high-pressure cleaner!
		Clean the washing brushes with a water hose and remove any dirt residues. Alternatively, the brushes can be raised while idle, e.g., on the transport carriage, and rotated with water on the robot without resistance for rinsing. Attention: No high-pressure cleaner!

		Driving pads made of 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: No high-pressure cleaner! Attention: Do not let the leather driving pads dry on the machine!
Accessories: Lichen remover DIRT FORCE		
		Permissible amount of water Permitted water pressure Permissible water temperature
		Attention: Avoid contact with body parts. The high-pressure water jet can cause severe injuries.
		Driving pad – Rubber, sections In conjunction with the lichen remover DIRT FORCE, cleaning is only permitted with with driving pad made of rubber. With this, it is possible to drive inclines of up to a maximum of 20°, depending on the surface condition. The outside temperature must not fall below 10 °C. 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.

2. Safety

2.1 Safety marking on the product

Since the glassROBOT pro is a non-mains operated machine with small electrical 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 glassROBOT pro. 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 glassROBOT pro must be stopped by pressing the EMERGENCY STOP button!

The EMERGENCY STOP button is clearly visible on the side of the radio remote control.

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 glassROBOT pro.

2.3.2 Observing the operating instructions

In these operating instructions, the successful and non-hazardous usage of the glassROBOT pro 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 glassROBOT pro 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 glassROBOT pro 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 glassROBOT pro must be disposed of in a safe and environmentally friendly manner.

The glassROBOT pro 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 glassROBOT pro, 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 rubbish.**

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 glassROBOT pro can be used in its standard configuration for cleaning solar modules or glass roofs

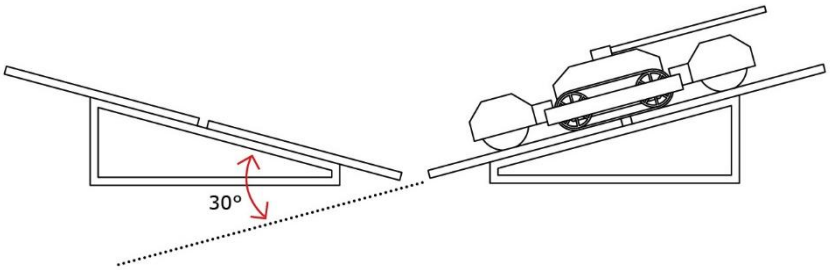
a. in the incline direction up to an inclination angle of 25° (47%),
b. transversely to the incline direction up to an inclination angle of 25° (47%),
c. up to an approach angle of 30 ° (58%),
d. at obstacles up to 20 mm in height,
e. at gaps and maintenance aisles up to 300 mm,
f. for a working load of the roof of at least 560 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 glassROBOT pro. 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 glassROBOT pro, wear close-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 due to crushing hazard!** **There is a risk of injury from being squeezed between the glassROBOT pro and solid objects!** ⇨ **Do not stay on the glassROBOT pro and/or between the glassROBOT pro and other solid objects!** ⇨ **Do not reach into the glassROBOT pro!**

	**CAUTION** **Personal injuries due to tripping!** **There is a risk of injury due to the rolled-out hose!** ⇨ **When handling the glassROBOT pro, 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 glassROBOT pro, pay attention to a secure footing!** ⇨ **Wear workwear with safety footwear!**

	**Notice** **When handling the glassROBOT pro wear eye protection!**

	**Notice** **When handling the glassROBOT pro wear hearing protection!**

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

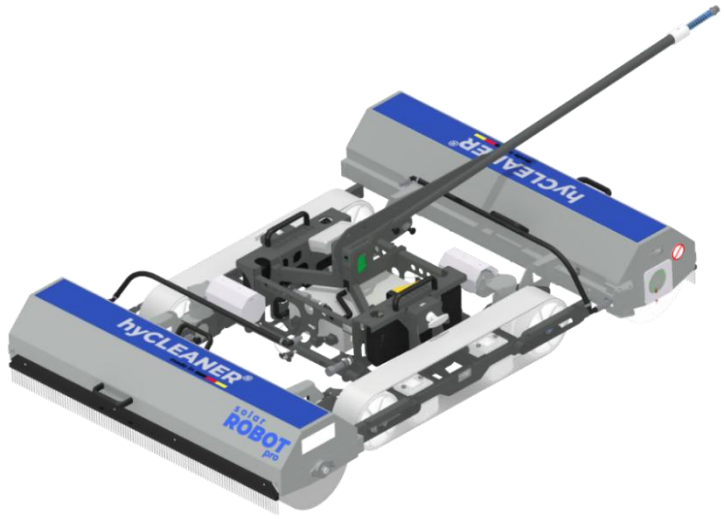
At startup and during operation of the glassROBOT pro, a safety distance of one metre from the machine and the hose must be observed!

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

3. Technical data – basic version

3.1 glassROBOT pro

Article No.: 952.032

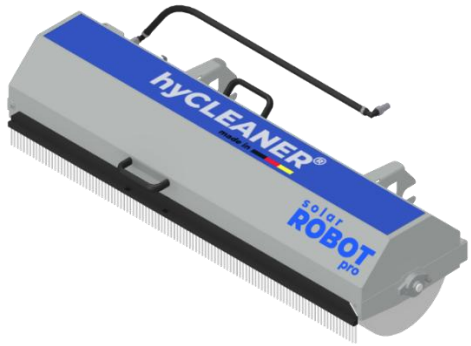


Height without hose guide:	approx. 325 mm
Overall height with hose guide:	approx. 459 mm
Width without brush system:	approx. 1,005 mm
Width of brush system 1100:	approx. 1,190 mm
Width of brush system 1300:	approx. 1,395 mm
Length without brush system:	approx. 1,182 mm
Length with brush system 1100 or 1300:	approx. 1,730 mm
Weight of brush system 1100:	approx. 87 kg
Weight of brush system 1300:	approx. 91 kg
Cleaning width of brush system 1100:	approx. 1,100 mm
Cleaning width of brush system 1300:	approx. 1,300 mm
Brush rotation:	up to max. 400 rpm
Brush diameter:	approx. 280 mm
Resting length of the driving pad:	approx. 693 mm
Width of the driving pad:	approx. 100 mm
Max. working load:	560 Pa
Max. speed:	2.2 km/h
Max. inclination angle*: (*depending on degree of pollution)	Ride in incline direction 25 ° (47%) Ride across the incline direction 25 ° (47%) Approach angle rear 30° (58%) Approach angle front 30° (58%)

Min. permitted water pressure:	2 bar
Max. permitted water pressure:	8 bar
Min. amount of water required:	9 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 glassROBOT pro 1,100 mm

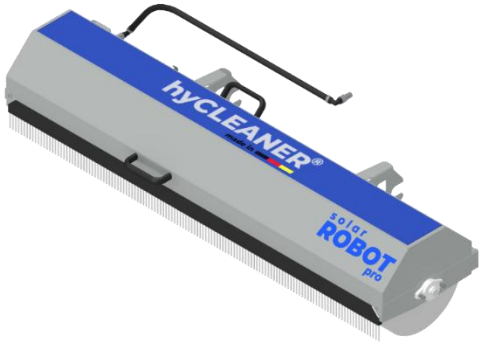
Article No.: 705.147



Height:	approx. 295 mm
Width:	approx. 1,195 mm
Length:	approx. 463 mm
Weight:	approx. 19 kg
Length of the washing brush:	approx. 1,100 mm

3.3 Brush system glassROBOT pro 1,300 mm

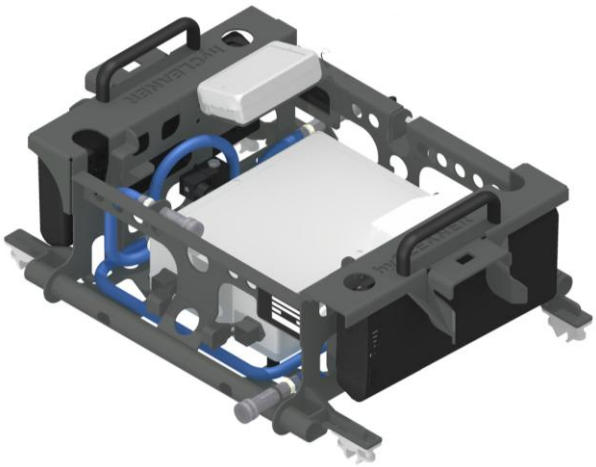
Article No.: 705.147



Height:	approx. 295 mm
Width:	approx. 1,395 mm
Length:	approx. 463 mm
Weight:	approx. 21 kg
Length of the washing brush:	approx. 1,300 mm

3.4 Control unit

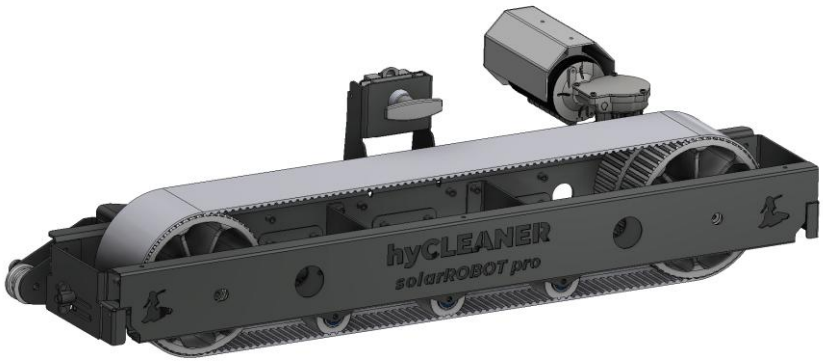
Article No.: 705.130



Height:	approx. 270 mm
Width:	approx. 682 mm
Length:	approx. 573 mm
Weight:	approx. 16 kg

3.5 Drive unit

Article No.: 705.199

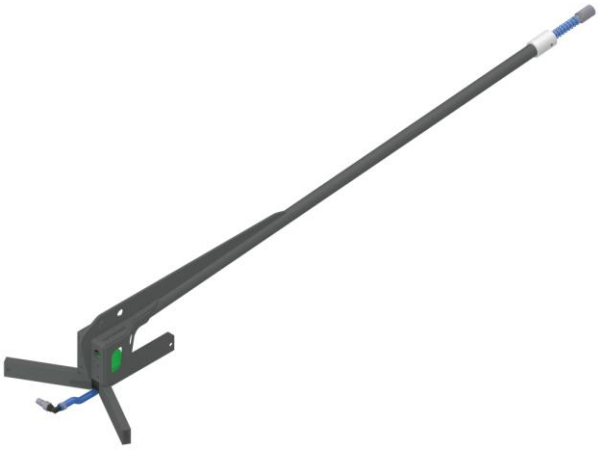


2 pieces per machine

Height:	approx. 285 mm
Width:	approx. 380 mm
Length:	approx. 1,030 mm
Weight:	approx. 15.5 kg

3.6 Hose guide

Article No.: 705.129



Height:	approx. 272 mm
Width:	approx. 392 mm
Length:	approx. 1,660 mm
Weight:	approx. 3 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 (603.084) and radio remote control — approx. 17 kg

3.8 Radio remote control

Article No.: 603.239

Height:	approx. 180 mm
Depth:	approx. 165 mm
Width:	approx. 260 mm
Weight:	approx. 1.60 kg

3.9 Radio remote control - Battery

Article No.: 603.238

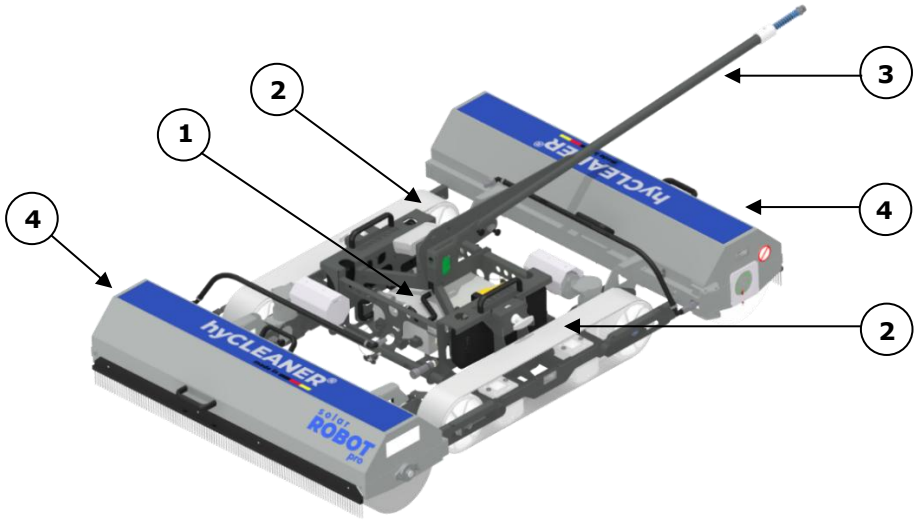
Type:	Ni-MH
Voltage:	approx. 7.2 V
Capacity:	approx. 750 mAh

4. Design and function

4.1 Graphical representation and functional description

4.1.1 Description of the removable components of the glassROBOT pro

Article No.: 952.032



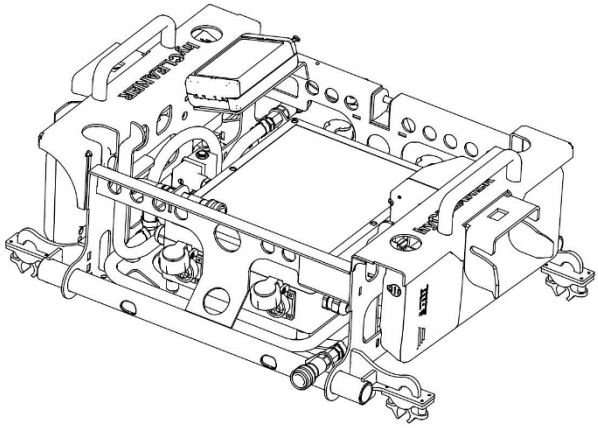
Removable components:

(1) Control unit; article No.: 705.130
(2) Drive unit (2 pieces); article No.: 705.199
(3) Hose guide; Article No.: 705.129
(4) Brush system 1,100 mm; article No.: 705.147
or
Brush system 1,300 mm; article No.: 705.127

For the proper operation of the glassROBOT pro, 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

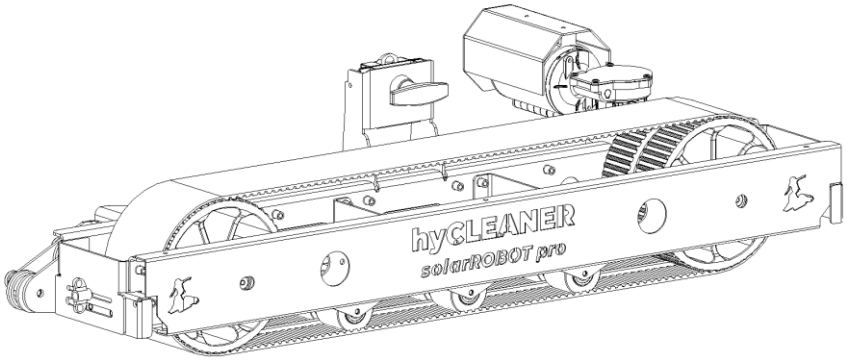
Article No.: 705.130



The control unit is the centre of the glassROBOT pro.
The frame is a welded construction.
The electric control is arranged in the middle of the frame.
On one side of the frame's interior, there is a diagnostic display for function and fault information, and on the opposite side, there is the transmitter for the radio remote control.
In the upper area of the frame, there are handles on both sides intended for carrying the control unit. Furthermore, the handles are used when connecting the control unit to the drive units.
On the side of the frame, there are two battery compartments for housing the batteries.
On both sides of the sheet metal collar above the battery compartments are the threading plates for holding and locking the latch locks of the drive units.
On the lower side of the frame, there are plastic claws with spring jaws at all four corners, which take over the lower connection of the drive units.
On the front and rear side of the frame, one coupling sleeve each is arranged for the water connection of the brush systems. The coupling sleeve for the water connection of the hose guide is located at the top side of the frame's interior.
At the top corner area, there are two holding tabs on one inner side for accommodating two bars of the hose guide. On the opposite side, in the middle of the frame, the ball lock pin is arranged which takes over the locking of the hose guide.
The sockets for the electrical connection of the drive units and brush systems are located at the front and rear of the control unit.
Inside the frame, next to the electrical housing, there is an electric solenoid valve that stops the water flow to the brush system if the "brush system" function is deactivated on the radio remote control.

4.1.1.2 Drive unit

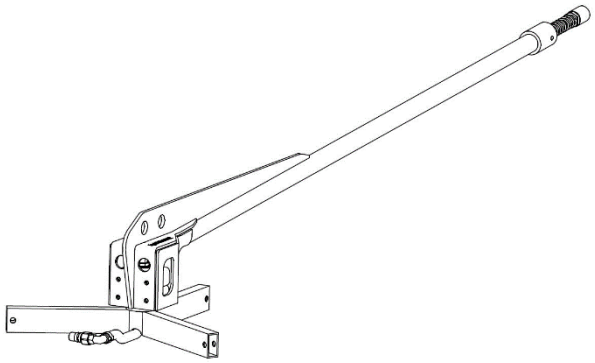
Article No.: 705.199



The glassROBOT pro includes 2 identical drive units.
They are mounted on both sides, mirrored to each other on the control unit. Both drive units can be dismantled.
The frame of both drive units consists of a bolted sheet metal construction.
At the rear of the frame, there is the drive wheel, which is driven by a DC motor via a worm gear.
At the front, there is the driving chain wheel. Using this wheel, the driving chain is tensioned and guided.
The driving chain is tensioned on both sides next to the driving chain wheel using tensioning screws and lock nuts located in the axle area.
The driving chain consists of a toothed belt and is guided over the wheels. On the driving chain, the driving pad is attached circumferentially with a Velcro closure.
Three supporting rollers, which are spring-mounted at the bottom in the middle area of the drive unit, ensure an adequately even application of the driving pads on the s modules.
The two plastic rollers on each side of the drive unit are equipped with adjustable eccentric bolts and take over the reception and guidance of the brush systems.
Thus, a brush system can be mounted at the front and rear of the glassROBOT pro.
The height of the washing brushes can be adjusted by altering the two eccentric bolts. The eccentric bolts are locked at the front and rear with a locking pin.
The lower frame tube (Ø 16 mm) is designed to accommodate the plastic claws with spring jaws of the control unit on both sides.
In the upper middle area, there is an externally operated latch lock with a toggle, which serves to fix and lock the control unit.
Furthermore, there are ultrasonic sensors in the outer area in front of the driving chain at the front and rear, which realize the edge detection of the area to be cleaned.

4.1.1.3 Hose guide

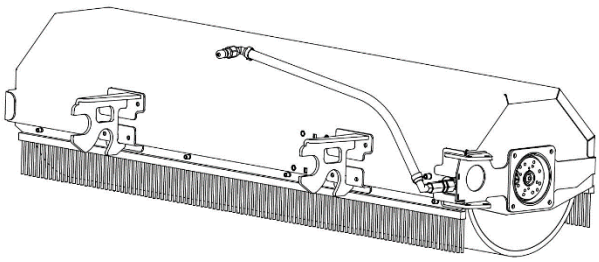
Article No.: 705.129



The base of the hose guide is the lower section consisting of 3 identical rectangular tubes. The rectangular tubes are arranged at an angle of 120° to each other.
The hose guide tube is rotatably mounted above the 3 rectangular tubes. At the lower end of the hose guide, a hose with a coupling plug at the end is positioned between 2 rectangular tubes, which connects the water connection to the control unit.
The hose is connected to the water hose located in the hose guide via a rotary union.
There is a threaded socket with a ½" internal pipe thread at the upper end of the water hose in front of the anti-kink spring. Commercially available fittings, e.g. hose nozzles, can be installed on this sleeve for connection to a water hose. In the bend area of the hose guide tube is a sheet metal collar with 2 adjacent holes. These holes can be used as attachment points if the glassROBOT pro is to be lifted using lifting equipment (e.g. onto solar modules).

4.1.1.4 Brush system glassROBOT pro 1,100 mm / 1,300 mm

Article No.: 705.147 / 705.127



The brush motor is mounted in a bracket on the right-hand side of the brush bonnet of the brush system 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 bearing of the washing brush on the right side takes place via the surface of the bracket of the brush motor.
The left-side mounting is done via a flange bearing on the left side wall of the brush hood. On the right side wall of the brush hood, there is a mount for the accessory bracket for offset arrangement.

On the rear longitudinal side of the brush hood, there are 2 mounting claws, which connect to the respective drive unit via the two plastic rollers on the drive unit.
The right-hand mounting claw can be screwed on in 2 screw positions. The outer screw position is intended for mounting the accessory bracket for offset arrangement.
The inner screw position is intended for normal brush operation.
Both types of washing brushes (1,100 / 1,300 mm) are equipped with a uniformly distributed type of bristle around the brush core.
The splash guard hood and associated splash guard strip ensure that the water is not swirled upwards but is directed onto the solar modules. The rear rubber lip, especially in combination with the changed brush rotation, ensures that larger amounts of water are held back to not restrict the function of edge detection.
The water supply to the washing brush is provided by connecting the coupling plug to the coupling sleeve on the control unit.
From the coupling plug, water is directed through the water hose to the sprinkler pipe (under the splash guard hood) and from there evenly distributed onto the washing brush.
The electrical supply of the brush motor takes place via an electric cable with plug. This plug is connected to the socket on the control unit. Splash guard brushes on the lower longitudinal side of the splash guard hood ensure that the water is brought onto the solar modules.

DANGER

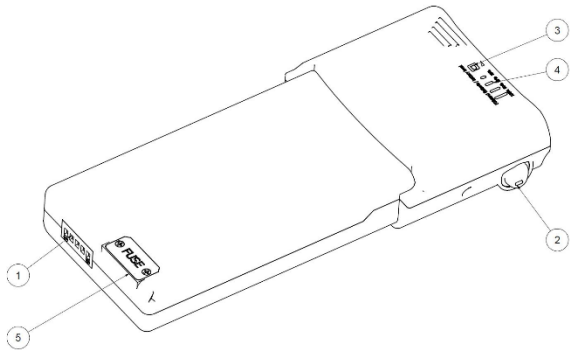
Risk of death from falling parts!

If the operating instructions are neglected, falling components of the glassROBOT pro can 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.: 603.084



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.
The corresponding connection socket (1) is located on the inside of the back of the battery compartment.

2 rechargeable batteries (36 V/14 Ah) are required to operate the glassROBOT pro .

The connection sockets are used to electrically connect the batteries to the charging station during the charging process.

The two charging dishes of the charging station are identical in design to the battery compartments of the control unit.
The On/Off switches (2) of both batteries must be switched to "On" before commissioning the glassROBOT pro .
To do this, the On/Off switch on each battery must be pressed down.
When the battery is turned on, a green LED in the lower area of the On/Off switch lights up.

To switch off the battery and , press the On/Off switch upwards.
The corresponding green LED on the On/Off switch goes out.
The batteries and the glassROBOT pro are then de-energised.

The activation button for the fill level display (3) is located in the front, centre area at the top of each 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% indicator lights up in red.
The flat fuse (30 A) is located in the rear, upper area under a screwed cover (5).

Information about the battery 36 V/14 Ah (603.084):

a) Charge (see chapter "Charging the batteries".):
   - 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 glassROBOT pro:
   Extreme temperatures must be avoided.
   Strong heat may damage the battery.
   Cold can lead to a temporary loss of capacity.
   If the glassROBOT pro 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 glassROBOT pro 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, the batteries 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 glassROBOT pro, 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 glassROBOT pro.

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 glassROBOT pro:
  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.: 603.239

With the supplied radio remote control, all functions of the glassROBOT pro are controlled.

The radio remote control establishes a secure communication link with the receiver unit in the glassROBOT pro when the transmitter is registered. The radio remote control also has an EMERGENCY STOP button, which can be used to stop the movement of the machine in a dangerous situation.
The radio remote control is powered by a battery. The charger for the radio remote control battery is in the charging station.

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 glassROBOT pro works in the following frequency ranges:

Region	**Frequency range**
EU and EFTA	863 – 870 MHz 25 mW ERP
USA, Canada, Australia	915 – 928 MHz according to FCC and IC requirements

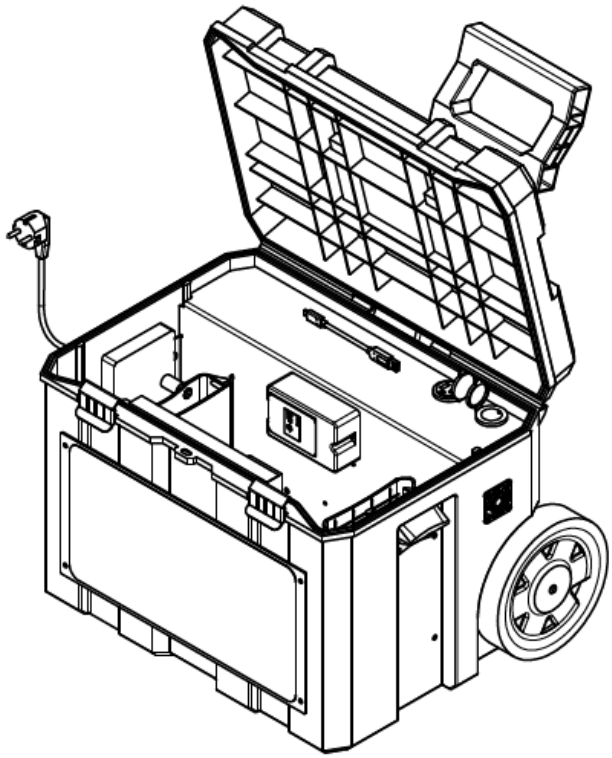
The glassROBOT pro is steered using the integrated joystick to control the driving pads on the left and right.

Modifications by the owner 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 glassROBOT pro and compact. 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. In the lower area of the mounting plate, you can see the indicator lights of the chargers for the batteries.

Above the 2 battery compartments is the charger for the battery of the radio remote control. The fill level display shows the charging state.

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

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

The 230 V connection cable is used to connect the charging station to the mains voltage (230 V). 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.

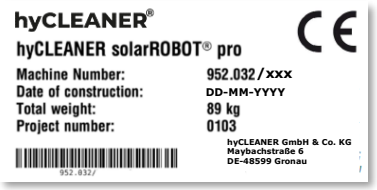
Charging time

-	Battery 36 V/14 Ah	approx. 2.5 hours, depending on the discharge status
-	Battery for radio remote control (603.238)	approx. 2.4 hours, depending on the discharge status

Temperature
Operating the charging station is only possible with functioning fans and at ambient temperatures of 5 – 30 °C.

Required supply voltage
230 V, 50 Hz

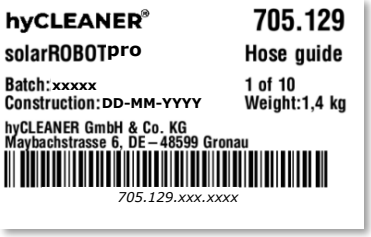
4.2 Nameplates and module plates

Designation:	Article No.:	Position:	Nameplate:
glassROBOT pro	952.032	on the frame of the control unit	

Designation:	Article No.:	Position:	Module plate:
Drive unit (2 pieces)	705.199	Drive unit centred, outside	

Control unit	705.130	on the frame of the control unit	

Brush system 1,100 mm / 1,300 mm (2 pieces)	705.147 705.127	Brush frame left, sided	

Hose guide	705.129	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 80 kg.
For safe transport with a car trailer, in the trunk of a car, with a van or with a truck, the loading surface must also be clean, flat and non-slippery.
For road traffic or for long distances within the company, load securing must be carried out using lashing belts. The 2 brackets on the control unit serve this purpose.
Due to the very low own weight of the glassROBOT pro, the lashing belts may only be used with a maximum tractive force of 185 daN.

Load securing is always the responsibility of the driver.

Notice

The glassROBOT pro 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.

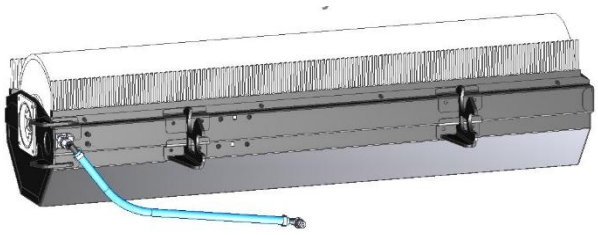
Notice

For transport, it is recommended not to connect the brush systems with the drive units.

5.2 Storage conditions

The glassROBOT pro 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 splash guard hood. See illustration. To avoid scratching the paint or the label, the splash guard hood must be placed on a protective film.
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

a. Fast charger 42 V, 8 A:
   Supply voltage: 230V AC, 50/60Hz
   Charging current: 8 A

b. Radio remote control – charging station (603.043):
   Supply voltage: 230 V/AC, 50 Hz
   Current consumption: 35 mA
   Charging current: 650 mA

6.1.2 Water connection

Water hose with at least ½ "nominal diameter.

Water pressure:	minimum	2 bar
	maximum	8 bar
Water throughput:	minimum	9 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 glassROBOT pro above the solar module so that the weight of the hose does not pull on the glassROBOT pro.

6.1.4 Construction specifications

A securing point with a minimum tensile strength of 5,000 N must be provided on site above the solar modules to ensure fall protection for the glassROBOT pro.

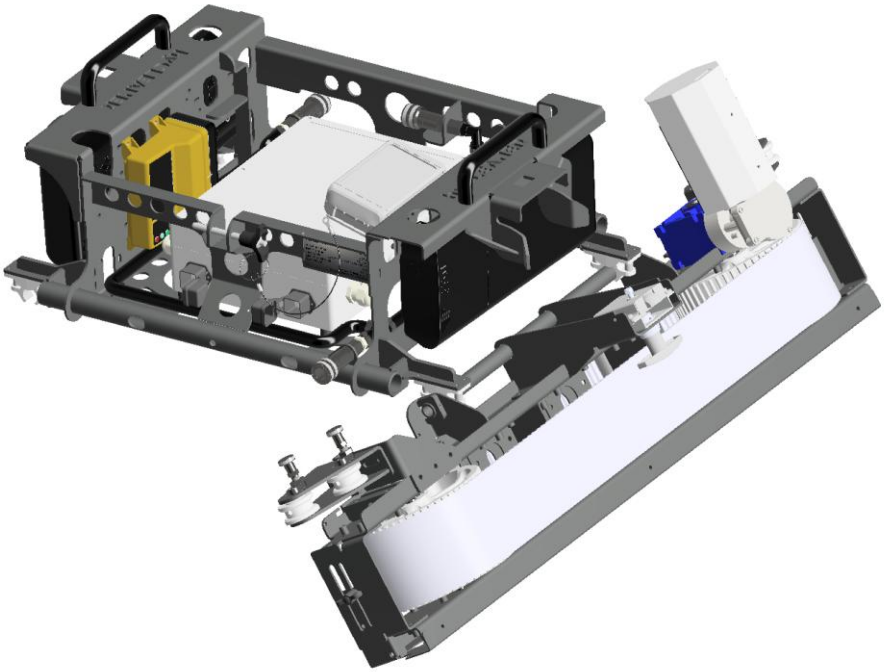
7. Installation

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

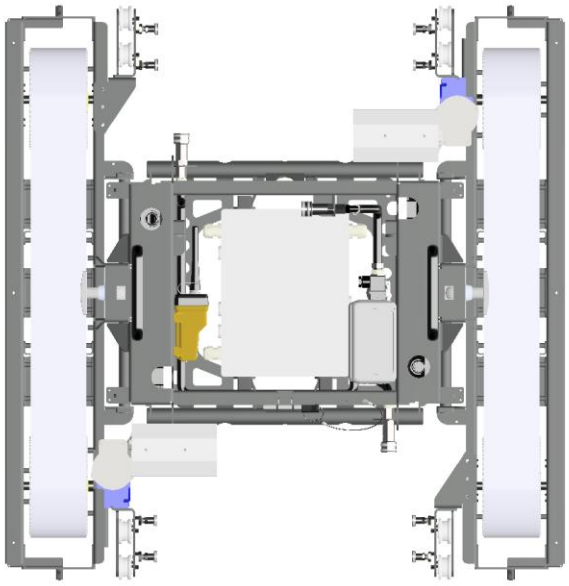
The following installation order is recommended:

(1) Connection of the two drive units to the control unit: see below
(2) Connection of the hose guide to the control unit: see below
(3) Connection of the brush systems with the two drive units: see below

7.1 Connection of the two drive units with the control unit

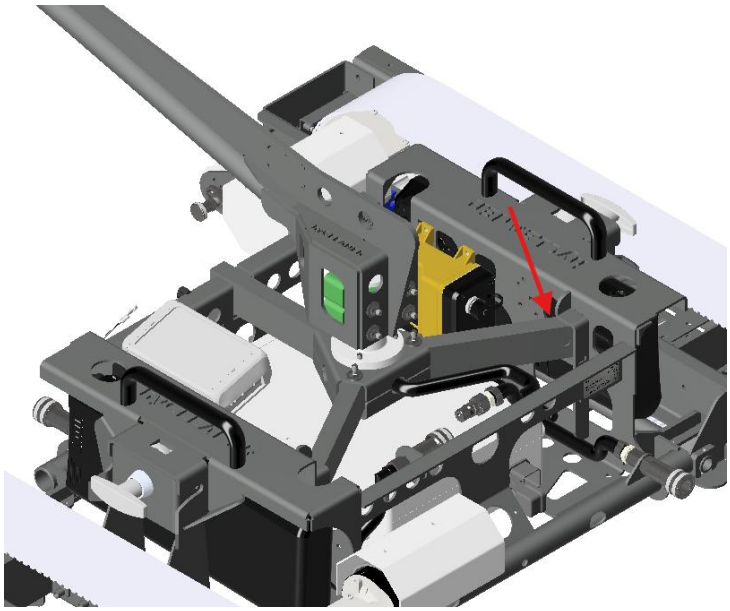


The precondition for the connection of the two drive units with the control unit is a clean subsurface, so that the installed driving pads are not soiled.
A drive unit is aligned laterally in front of the control unit so that the two lower claws with clamping jaws on the control unit fit between the two cross pipes of the drive unit.
The drive unit is tilted slightly forward and the control unit is lifted by the upper handle.
Then the two plastic claw fasteners with spring jaws are evenly clamped on the lower frame pipe Ø 16 mm.
Now the drive unit is tilted towards the control unit until the locking padlock snaps into the designated opening on the control unit.

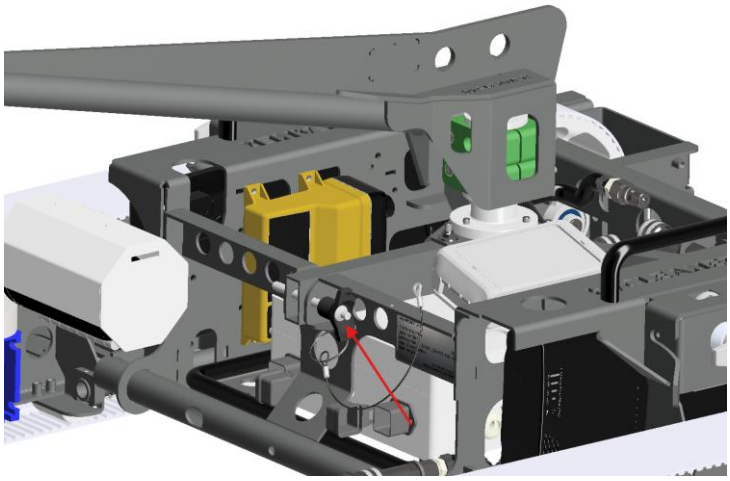


The installation of the second drive unit on the other side of the control unit takes place in the same order.
The plug for the electrical supply to the drive motors is then connected to the corresponding socket on the control unit.

7.2 Connecting the hose guide to the control unit

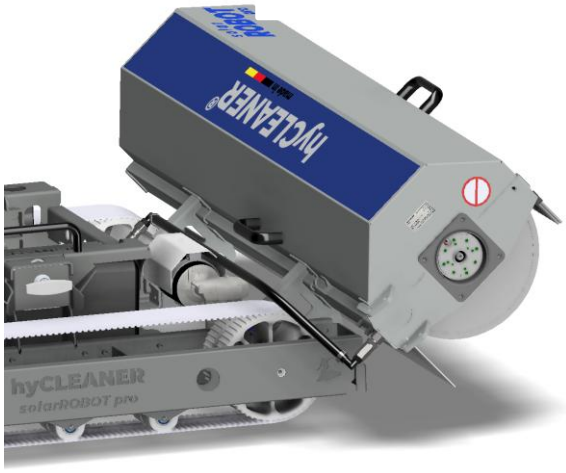


First, the two bars of the hose guide are inserted into the corresponding bracket (on both sides inside the control unit).
In the middle of the hose guide, the hose is equipped with the coupling plug for the water connection.



Then, the front bar of the hose guide is connected to the control unit using the ball lock pin.
Afterwards, the coupling plug is connected to the corresponding coupling sleeve of the control unit.

7.3 Connecting the brush system to the two drive units



First, the two rear openings of the claws of the brush system are evenly guided over the respective upper rollers of the drive units. To do so, the brush system is angled.

Then, the brush system is evenly lowered by tilting until the respective radius at the lower openings of the claws of the brush system rests on the outer rollers of the two drive units. With the locking pins on the eccentric bolts of the rear rollers of the drive units, the height of the brush system can be adjusted in 5 positions.
The plug of the water hose is connected to the coupling sleeve of the control unit.
Subsequently, the plug for the electrical supply of the brush motor is inserted into the corresponding socket of the control unit.

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.

DANGER

Risk of death from falling parts!

Neglecting the operating instructions can cause falling parts of the glassROBOT pro to lead to the death of uninvolved persons or other living beings!

- ⇨ **Read and understand the operating instructions!**
- ⇨ **Apply the operating instructions!**
- ⇨ **Perform mounting only on flat, horizontal surfaces!**
- ⇨ **Secure the glassROBOT pro 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 injuries or death!** ⇨ **When handling the glassROBOT pro, wear close-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!**

8.2 Operating elements, operation of the radio remote control

Article No.: 603.239

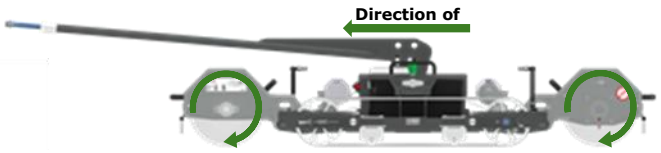
8.2.1 Key assignment

1.	Push button S1 brush	–	Change of the direction of rotation of the trailing
2.	Push button S2	–	Not assigned
3.	Push button S3	–	Direction of travel (I/II drive dir)
4.	Push button S4	–	Cleaning mode (wet/dry cleaning)
5.	Push button S5	–	Bridging of edge detection
6.	Rotary switch	–	Fine adjustment of driving straight ahead
7.	Rotary switch	–	Speed controller (speed)
8.	Joystick	–	Steering & acceleration
9.	Push button	–	Autodrive
10.	Push button	–	Start
11.	Key	–	Radio remote control On/Off
12.	Push button	–	Brush On/Off
13.	Push button stepwise	–	EMERGENCY STOP button (General safe stop)
14.	Push button	–	Display illumination
15.	Push button	–	Not assigned
16.	Push button	–	Not assigned
17.	Push button	–	Not assigned
18.	Push button	–	Not assigned

Operation:

1. **Push button S1 - Change of direction of rotation of the trailing brush**

   This push button allows the direction of rotation of the trailing brush to be changed. Both brushes now rotate in the same direction of rotation in the direction of travel.



2. **Push button S2**

   Not assigned

3. Push button S3 - Direction of travel (I/II drive dir)

Reverse direction of travel:
Using this push button, the direction of travel can be reversed. The glassROBOT pro drives in the direction of travel 1.
By operating the push button, the mode changes to the direction of travel 2.
This bypasses reversing with the joystick pushed backwards.
The direction of travel is displayed on the display of the radio remote control.

Attention:
Before driving off, it is mandatory to check the change of the direction of travel on the display. Risk of falling!

Naming of the direction of travel	Designation in the display of the radio remote control (603.239)
Direction of travel 1	I drive dir.
Direction of travel 2	II drive dir.

4. Push button S4 - cleaning mode (wet/dry cleaning)

Cleaning mode:
Using this push button, you can switch between the cleaning modes.
Mode 1, wet cleaning
Mode 2, dry cleaning
Mode 1 is for wet cleaning. This mode is displayed on the display of the radio remote control (603.239) as "wet cleaning".
By pressing the push button, it switches to mode 2 for dry cleaning.
This is displayed as "dry cleaning" on the display of the radio remote control (603.239).

5. Push button S5 - Edge detection override

Bridging of edge detection:
The glassROBOT pro is equipped with sensors that stop the machine as soon as it reaches the edge of an area.

Notice

When the edge detection is triggered, the radio remote control vibrates pulsatingly.

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 300 mm.

Notice

When bypassing the edge detection, the radio remote control vibrates pulsatingly.

As soon as an obstacle has been passed over, the push button for overriding the edge detection must be released immediately. Otherwise, the edge detection remains deactivated until the push button S5 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.**
- ⇨ **Release the override push button after overcoming the obstacle.**

6. Rotary switch – fine adjustment for straight travel

This rotary switch can be used to fine-tune straight-ahead travel.
When travelling parallel to the incline of the surface to be cleaned, the machine may be pulled slightly downwards by the downhill force.
If the machine should drift sideways from the direction of travel, the rotary switch for fine adjustment can be used in the opposite direction to maintaina straight direction of travel.
This can also be used while using the Autodrive function (point 9.2.9).

7. Rotary switch - speed controller (Speed)

Using this rotary switch, the speed can be adjusted continuously.
In the process, "Max" indicates the maximum speed and "Min" indicates the minimum speed.

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.)**

8. Joystick - Steering & Acceleration

The glassROBOT pro 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

Attention:
The direction of travel can be reversed by the push button S3!

9. Push button – Autodrive

This function can only be used when driving the machine with the joystick straight on or straight on backward.
When the joystick and push button for the Autodrive function are pressed simultaneously, a short tone sounds.
Now the joystick as well as the push button can be released and the machine continues to move in the direction previously travelled (forward/backward).
The Autodrive stops as soon as an edge of the surface is reached and one of the edge detection sensors is triggered or the joystick is pulled forwards or backwards.
While the autodrive function is active, the 2 LEDs to the left of the display on the radio remote control light up.
Strong steering inputs (right/left) terminate the autodrive.
Light steering inputs are still possible.

Notice

The machine must be permanently monitored by the operator during Autodrive to prevent potentially dangerous situations!

10. Push button – Start

The push button for starting the unit is used to log in and connect the control unit to the radio remote control.
For a more detailed description see Chapter "Commissioning".

11. Key – radio remote control On/Off

The radio remote control only works with the key.
To switch on the radio remote control, the key must be inserted. For a more detailed description, see the chapter "Commissioning".

12. Push button – Brush On/off

Using this push button, the rotation of the brush system can be switched On and Off.
When rotation is on, the 2 LEDs to the right of the display on the radio remote control light up. (PICTURE with ARROW)

13. Push button latching – EMERGENCY STOP button

Pressing the EMERGENCY STOP button immediately disconnects the power supply to the motors.
As it is a stepwise switch, it must be turned clockwise to return it to its original position and be able to use the machine.

14. Push button - Display illumination

This push button turns on the display lighting on the radio remote control for 20 seconds.

15.Push button

Not assigned

16.Push button

Not assigned

17.Push button

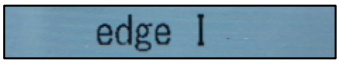
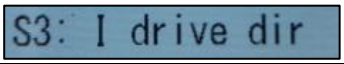
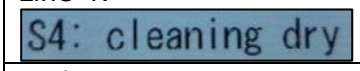
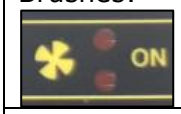
Not assigned

18.Push button

Not assigned

8.3 Display and warning device

8.3.1 Radio remote control display

Line 1: 	Status message hyCLEANER®
Line 2: 	Edge detection sensor triggered in the direction of travel I/II
Line 3: 	Direction of travel (I/II)
Line 4: 	Drive mode (wet/dry)
Radio connection: 	Radio connection quality
Battery: 	Battery charge level (radio remote control)
AutoDrive: 	both LED's light up = AutoDrive active both LED's do not light up = AutoDrive deactived
Brushes: 	both LED's light up = Brush rotation switched On both LED's do not light up = Brush rotation switched Off
Edge detection: 	four LEDs flash = Edge detection sensor triggered four LEDs do **not** flash = edge detection sensor **not** triggered
Display lighting: 	There is a button on the front to illuminate the display.

8.3.2 Display machine

At each start (see below) of the machine, the start screen is displayed.

Display	**Meaning**
Start screen – radio remote control not connected: EMERGENCY STOP dry cleaning	Emergency stop active / radio remote control not connected Cleaning mode (wet/dry)
Start screen – radio remote control connected: 75-100% 38950mV dry cleaning	Charging state of the battery in % and mV Cleaning mode (wet/dry)
Menu 1: hyCLEANER V1.65 LCD V1.04 _	Version hyCLEANER® Version display
Menu 2: 30.06.2022 10:40 _	Date Time
Menu 3: Tilt angle 1 Grad	Current incline
Menu 4: NOK Sensors NOK NOK NOK	Switching state ultrasonic sensors
Menu 5: Temperatur 100% 22C 25C 24C	Value reflects the performance Values of the 3 temperature sensors
Menu 6: Brush rear 100% 0.00A (NP:7) _	Value reflects the performance of the brush View of the current
Menu 7: Brush front 100% 0.00A (NP:10)	Value reflects the performance of the brush View of the current
Menu 9: Drive motor 0.00A 0.00A	View of the current strength of the drive units

Further menu items can be seen in the display.
To do this, press and hold the "OK" button until menu 1 appears on the display and you hear a signal tone.
The individual screen pages can be accessed using the arrow keys.
Press the C button to exit the menu at any time and return to the start screen.
Indication of source: innotronic Elektronische Systeme GmbH, hyCLEANER GmbH & Co. KG LC-Display 20210322-1, April 2021

8.4 Commissioning

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

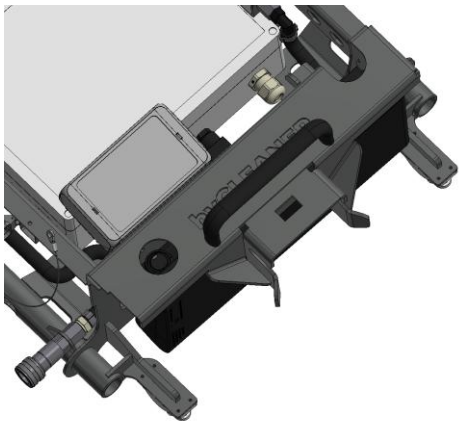
Prior to each commissioning of the glassROBOT pro, all screws must be securely tightened. Furthermore, it must be ensured that the mechanical locking of the control unit and the hose guide are secured with ball lock pins.
The connection and locking of the drive units with the control unit must be secured by the respective locking padlocks. All plug connections for the water hydraulics and electrics must be made.
Prior to each commissioning of the glassROBOT pro, the edge detection has to be checked for proper functioning.
The switched-on glassROBOT pro is either elevated or on the transport carriage. Firstly, press and hold the "OK" button for 2 seconds. The display changes and a signal tone is heard. Then, use the arrow keys on the display to navigate to the "Sensors" screen page. This display shows the status of all 4 edge detection sensors. If the glassROBOT pro is e.g. on the transport carriage, the status of the sensors is displayed with "NOK".
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 "NOK" to "OK", this sensor is functional.
The use of the glassROBOT pro is prohibited if a status permanently indicates "NOK" or one or more sensors are defective.

8.4.1 Start of the glassROBOT pro

When the radio remote control is switched off, a charged battery must be inserted into the radio remote control.
It must be checked whether the red EMERGENCY STOP button is engaged.
If the EMERGENCY STOP button is engaged, it must be unlocked by turning the button.

Starting the control unit of the glassROBOT pro:

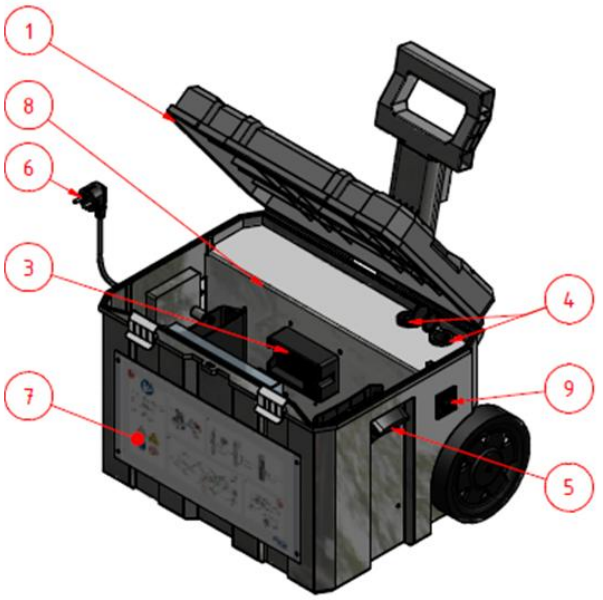
1. By switching on the batteries, the glassROBOT pro is started and the display boots up.

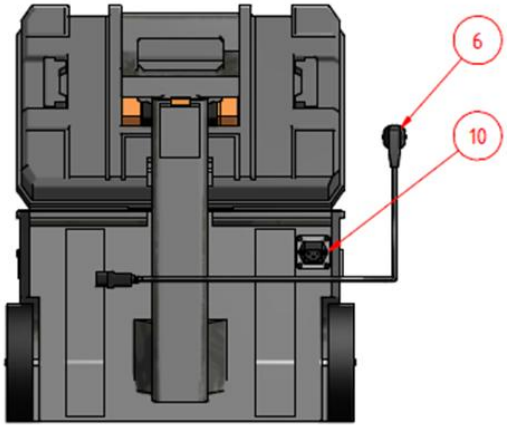


Starting and logging into the radio remote control:

1. The key (11) of the radio remote control is inserted.
2. Press the start push button (10) for one second - display starts.
3. Briefly press the start push button (10) – The connection to the control unit is established.
4. Connection established. The individual functions of the glassROBOT pro are controlled via the radio remote control.

8.4.2 Start of the charging station hyCLEANER 36V





(1) Storage box (703.445)

(2) Battery compartment (603.086)

(3) Charger for radio remote control (603,254)

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

(5) Bottle opener (703.448)

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

(7) Quick Reference Guide (704.065)

(8) Mounting plate (301.265)

(9) Fan (603.265)

(10) Cold-device socket (603.260)

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

(a) Indicator light (Charger 36V 6A battery (603.256))

Before each start

1. Check to see that the sides of the charging station where the fans (9) 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.

It is 230 volts alternating voltage. The device is not suitable for children.

Safety instructions

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 electric shock!

Results in death or serious injuries.

- ⇨ **Disconnect the mains plug from the power supply before opening the charging station.**
- ⇨ **Repair and maintenance work is only permitted by trained personnel.**

	**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**

9.5 Charging the batteries 36 V/14 Ah

Put the charging station into operation by connecting the cold-device socket (10) to the required supply voltage using the supplied connection cable (6).

- The indicator light (a) lights up green. The charger (11) 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 (11) is ready for operation.

	**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 (603.238)

Put the charging station into operation by connecting the cold-device socket (10) to the required supply voltage using the supplied connection cable (6).

- The power LED lights up green, the charging state indicator does not light up:
  The charger for the radio remote control (3) is ready for operation. See *picture 1.*

Insert the battery into the charger for the radio remote control (3).

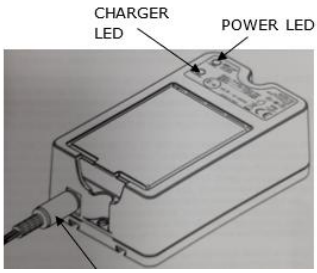
- The power LED lights up green, the charging state indicator (Charger-LED) lights up yellow:
  Battery is charging. See *picture 1.*

The battery is fully charged and can be removed.

- The power LED lights up green, the charging state indicator does not light up. See *picture 1.*

After removing the battery, the power LED lights up green, the charging state indicator does not light up. See image 1:

- The charger for the radio remote control (3) is ready for operation.



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 splashing 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.

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.

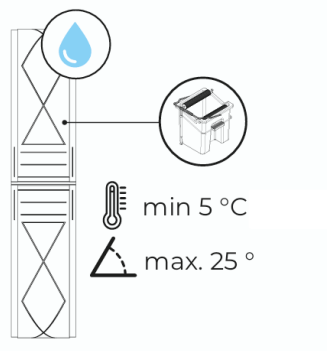
9. Accessories

The following accessories are listed and described. Combining these items with the glassROBOT pro 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 1,980 mm

Article No.: 703.406



The 1,980 mm leather driving pad enables the glassROBOT pro to work on wet and smooth surfaces with an incline of up to 25° thanks to its physical properties. 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 – 25 °
Outside 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:

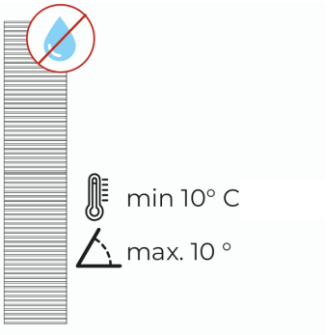
Driving pads made of leather are very temperature-sensitive.
Therefore, the following care and cleaning instructions must be observed:
The driving pads may only be cleaned with surfactant-free detergent.
Wrong treatment using detergent containing surfactants leads to the destruction of the cell structure 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. The application and hazard notices are listed in the "PAD-Cleaner" chapter.

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 1,980 mm

Article No.: 703.408



This driving pad can be used wherever the glassROBOT pro 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.

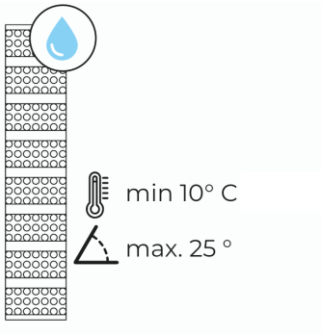
Place of usage:

Incline (on dry surfaces)	0 – 10 °
Outside 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



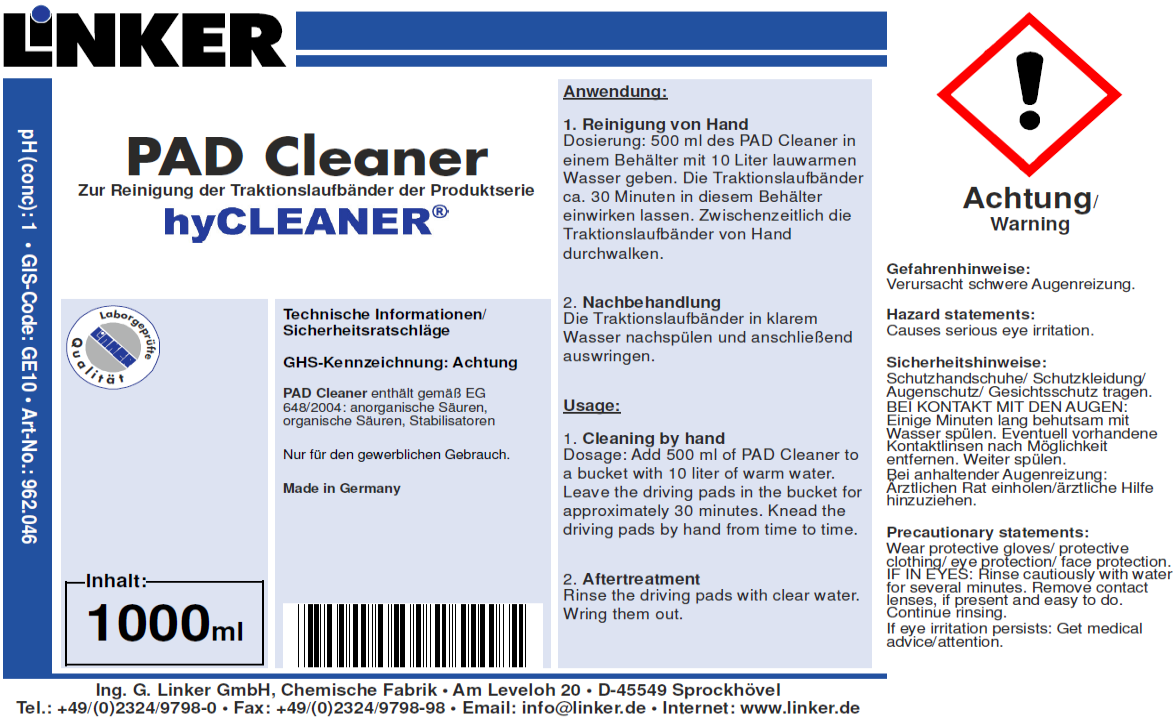
This driving pad enables the glassROBOT pro to work on wet and smooth surfaces with a maximum incline of 25°. The driving pad can be used from an ambient temperature of 10 °C.
Place of usage:

Incline	0 – 25 °
Outside 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
   Add 500 ml of the PAD-Cleaner to 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.

9.5 Cleaning bucket

Article No.: 962.040

The cleaning bucket allows for site-appropriate cleaning of the driving pads.
The cleaning bucket for driving pads has a filling quantity of 15 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 left side of the bucket, a ledge is arranged at the bottom, by means of which the bucket can be fixed.
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.

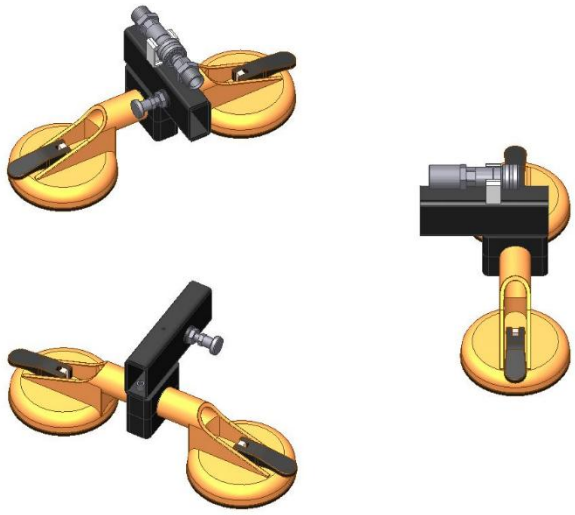
9.6 Hose reel 25 m

Article No.: 705.134

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. Like the hose guide (705.129), these 3 uprights have the same structural arrangement and dimensions.
The assembly is carried out in the same way as the assembly of the hose guide. See chapter "Connecting the hose guide to the control unit".

9.7 Additional parts for stationary use hose guide or hose reel

Article No.: 705.135



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 attached and locked onto the 3 bars of the hose guide or the 3 bars of the 25 m hose reel.
That way, either the hose guide or the hose reel 25 m can be clamped onto 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 glassROBOT pro.

9.8 Brush system in combination with offset arrangement Brush system

Article No.: 705.124 and 705.144

For the two brush systems 1,100 mm and 1,300 mm, there is the option of using an offset arrangement as an accessory. This increases the cleaning width to 2,000 mm with the 1,100 mm brushes or to 2,400 mm with the 1,300 mm brushes. The *offset arrangement* accessory is fitted to the drive unit at the front and rear in an offset arrangement.
To do so, one holm each for offset arrangement is screwed on the intended motor-side articulation to the brush system. The connection of the brush system with the claws on the plastic rollers at the front of the drive units is done as with the standard equipment. The claw on the holm for offset arrangement can be adjusted in height through the screw connection.

9.9 Battery 36 V/14 Ah as replacement battery

Article No.: 603.084

By using additional replacement batteries, the effectiveness of the glassROBOT pro is significantly increased.
While one pair of batteries is being charged, the glassROBOT pro can continue to operate with the replacement batteries.

9.10 Crane hook

Article No.: 203.009

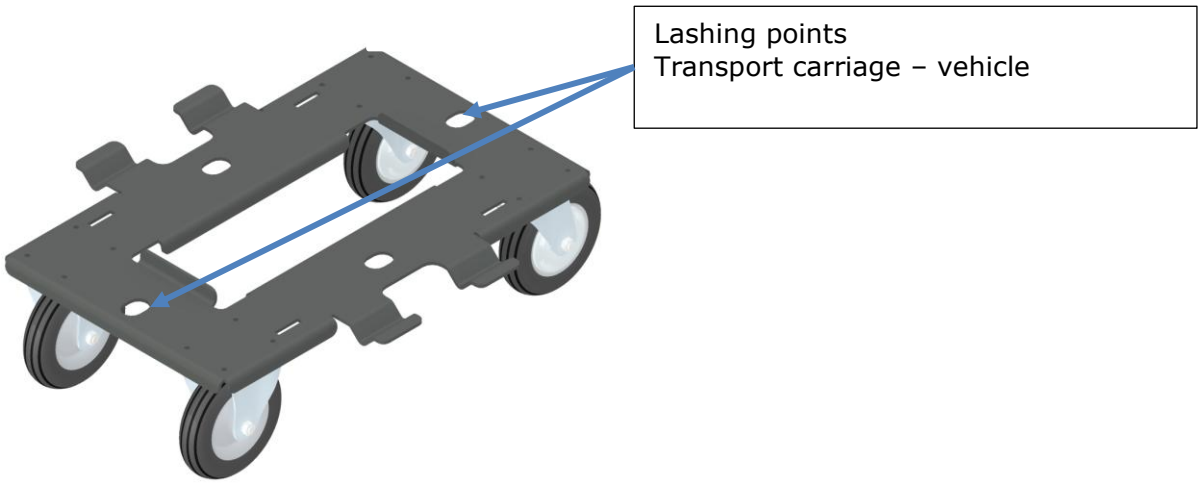
The crane hook is used to lift the glassROBOT pro onto the solar module using lifting equipment.
For this purpose, a rope is attached to the upper eye of the crane hook, which is then connected to the lifting equipment.
The operator easily threads the lower cranked end of the crane hook into the bore of the upper attachment point of the hose guide (705.067 or another optional hose guide).
Then the glassROBOT pro 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.

9.11 Transport carriage glassROBOT pro

Article No.: 705.160

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



The aluminium plate floor has 4 narrow elongated holes and 2 upward bends. These ensure that the control unit is centred on the transport carriage and prevent the control unit from shifting horizontally during transport.

In the rear area of the transport carriage are 2 fixed rollers (each wheel Ø 200 mm).
In the front area of the transport carriage are 2 castors (each wheel Ø 200 mm) with brakes.

To secure the transport carriage with the glassROBOT pro in a vehicle during transport, the transport carriage must be lashed at the designated lashing points using lashing belts. See lashing points in the graphic.

	Notice
	The glassROBOT pro 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.

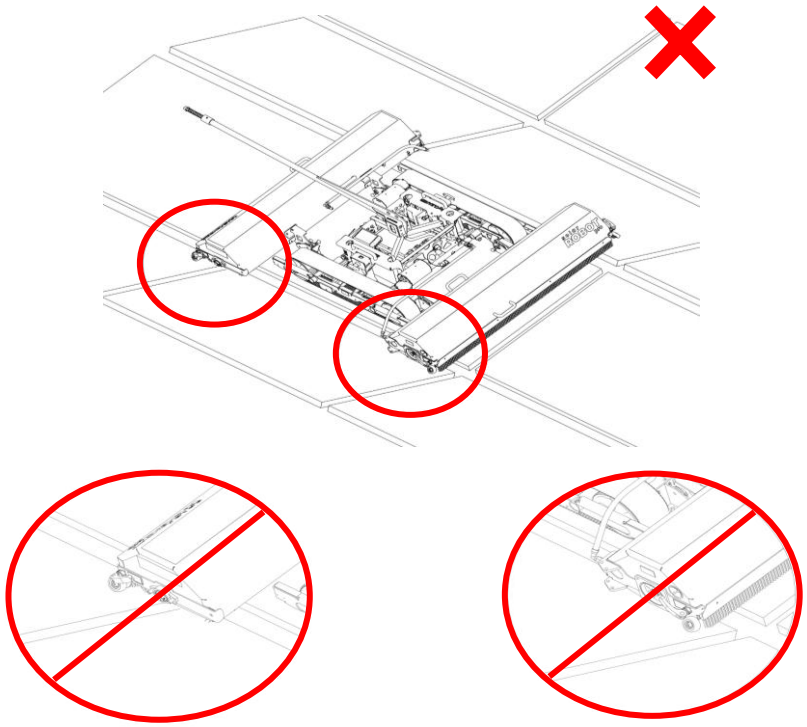
9.12 East-West protection set glassROBOT pro

Article No.: 705.180

For cleaning a glass system in an east-west configuration, the east-west protection set is optionally available to protect the opposing glass modules.

The set consists of 2 East-West protection guards per brush, which are mounted on the left and right of the brushes with eccentric tension levers. The East-West protection lifts the brush before the washing brush cover can come into contact with the opposite panel surface. This prevents contact and avoids damage.

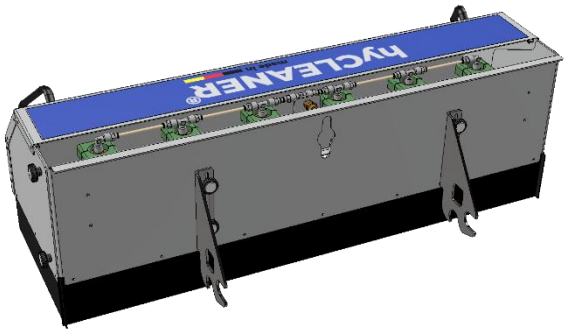
Attention: The East-West protection must not be used as an additional guide for permanent travel with the support roller on the adjacent panel. Otherwise, the cleaning performance may be impaired during the lifting period, as the brush is lifted for protection.



9.13 Lichen remover

Article No.: 705.205

The lichen remover "Dirt Force" is designed for the technical cleaning of glass with stubborn dirt such as lichen infestation. The lichen remover is to be hung in the glassROBOT pro instead of the front brush. The second brush remains hung as a counterweight. If necessary, the brush can be used for re-brushing the area or alternatively brought to the highest brush setting so that there is no bristle contact with the area.



Length:	approx. 1180 mm
Width:	approx. 520 mm
Height:	approx. 375 mm
Weight:	approx. 18 kg
Max. permitted water pressure:	110 bar on the manometer of the lichen remover
Min. amount of water required:	20 l/min
Min. water temperature:	5 °C
Max. water temperature:	21 °C
Max. inclination angle*:	Ride in incline direction 20 ° (47%)
(*depending on degree of pollution)	Ride across the incline direction 20 ° (47%)
	Approach angle rear 30° (58%)
	Approach angle front 30° (58%)

Notice

The use of any type of water additives is generally not recommended.

Notice

The lichen remover is only permitted in combination with the rubber driving pad according to the accessory chapter.

WARNING

Risk of injury!

The rotating high-pressure jet of the rotor nozzle can cause serious injuries.

- ⇨ **Never direct the high-pressure jet at people or animals**
- ⇨ **Observe safety precautions when handling high-pressure cleaners**

9.13.1 High-pressure cleaner and high-pressure hose

The lichen remover is not operated via the water supply of the glassROBOT pro but requires a high-pressure cleaner and an associated high-pressure hose for operation.
When selecting a high-pressure cleaner, the pressure losses of the high-pressure hose must be considered. The pressure losses depend on the inner diameter and length of the high-pressure hose, see the pressure loss table.
Pressure loss table

Pressure loss [bar] / metre

Flow rate		Inner diameter (nominal size)									
l/min	l/h	3/16" 4,8 mm	6,0 mm	1/4" 6,4 mm	5/16" 8,0 mm	3/8" 9,5 mm	12,0 mm	1/2" 12,7 mm	15,0 mm	5/8" 15,9 mm	18,0 mm
18	1.080	5,59	1,83	1,33	0,44	0,18	0,06	0,04	0,02	0,01	
19	1.140	6,23	2,04	1,48	0,48	0,21	0,06	0,05	0,02	0,02	
20	1.200	6,91	2,26	1,64	0,54	0,23	0,07	0,05	0,02	0,02	
21	1.260	7,62	2,50	1,81	0,59	0,25	0,08	0,06	0,03	0,02	
22	1.320		2,74	1,98	0,65	0,28	0,09	0,06	0,03	0,02	
23	1.380		2,99	2,17	0,71	0,30	0,09	0,07	0,03	0,02	
24	1.440		3,26	2,36	0,77	0,33	0,10	0,08	0,03	0,02	0,01
25	1.500		3,54	2,56	0,84	0,36	0,11	0,08	0,04	0,03	0,01
26	1.560		3,83	2,77	0,91	0,38	0,12	0,09	0,04	0,03	0,02
27	1.620		4,13	2,99	0,98	0,41	0,13	0,10	0,04	0,03	0,02

Pressure loss table (Source: www.hochdruckreiniger.de)

High-pressure cleaner
For optimal use of the lichen remover, the following parameters of a high-pressure cleaner should be considered:

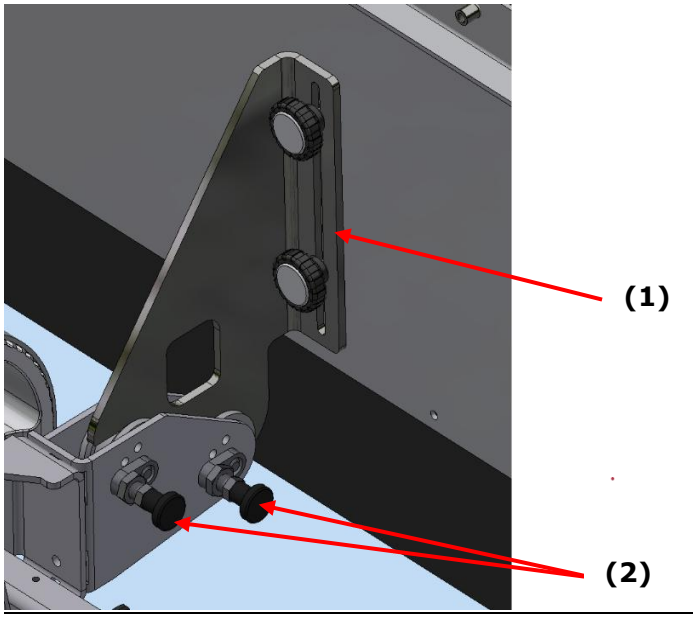
- Optimal range of water flow rate 20 - 25 l/min
- Optimal range of max. working pressure 160 - 220 bar (here the hose length must be calculated according to the pressure loss table)

High-pressure hose
For the high-pressure hose, ensure that the water pressure of the lichen remover does not fall below the water pressure of the high-pressure cleaner. It is recommended to use a high-pressure hose with a minimum inner diameter of 8 mm.

9.13.2 Commissioning of the lichen remover

Positioning of the lichen remover
The lichen remover is to be hooked into the glassROBOT pro in place of the front brush system and then connected to the drive units (see chapter connection of the brush system with the two drive units). In this process, the lichen remover can be used as the sole system for cleaning in the direction of travel. The rear brush system remains mounted on the robot and serves as a counterweight and can optionally be used for post-brushing the area.

If necessary, align the lichen remover parallel to the surface by adjusting the locking pins **(1)** on the drive units. Align yourself with the splash guard.
With the help of the adjustable claws **(2)** of the lichen remover, the lichen remover can be adjusted in height. The splash guard of the lichen remover should hover approximately 1 cm above the surface.



Use of the standard hose guide:
The use of the standard hose guide is only possible to a limited extent and must be observed by the operator at all times during application. Secure the high-pressure hose along the hose guide, e.g. with cable ties. Use the entire length of the hose guide to secure it. Ensure that the connection to the lichen remover is not under tension.
It should be noted that the hose guide is no longer 360° rotatable with this adaptation. This results in restricted manoeuvrability of the machine and must be considered during cleaning.

Alternatively, the lichen remover can be used as usual with the accessory hose guide high-pressure (HD).

Notice

If you also wish to operate the trailing brush with water, you will need a second water source. In this case, one of the hoses must be routed separately (e.g., as described above using cable ties). Attention: Restricted manoeuvrability of the machine.

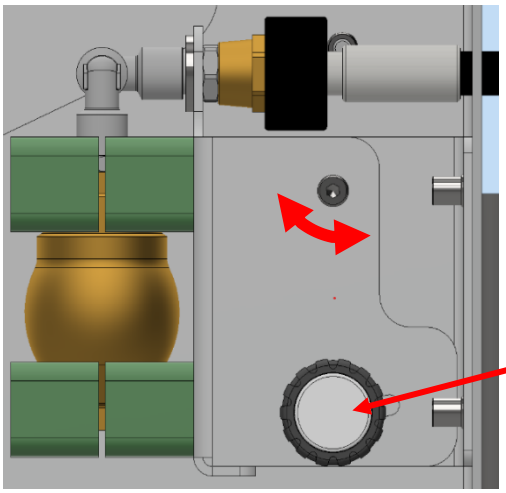
Connecting the lichen remover to the high-pressure cleaner
Before the lichen remover is connected to the high-pressure cleaner, the following steps must be carried out:

- Check all parts of the lichen remover for secure fit. Check all lines and hoses for damage and tightness.
- Check the high-pressure cleaner according to the associated operating instructions.
- Check the high-pressure hose for damages and tightness.
- Rinse the high-pressure cleaner and the high-pressure hose for approximately 30 seconds. Ensure that the water contains no impurities to avoid possible clogging of the rotor nozzles.
- Set the high-pressure cleaner to the minimum water flow using the bypass valve.
-

Now connect the lichen remover to the high-pressure cleaner. Switch on the high-pressure cleaner and adjust the water flow using the bypass valve to a minimum of 80 bar up to a maximum water pressure of 110 bar, as read on the pressure gauge of the lichen remover (not on the high-pressure cleaner).

Angle adjustment of the rotor nozzles

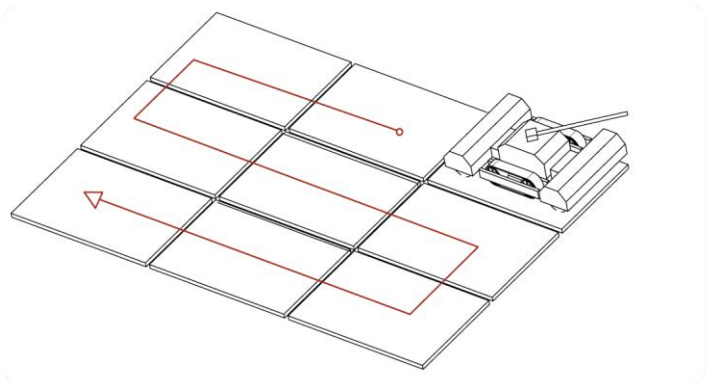
The rotor nozzles of the lichen remover are rotating nozzles.
The angle of the rotor nozzles can be adjusted as needed. To do this, the knurled grip screws **(1)** must be loosened and then the rotor nozzle holder fixed in the desired position.



The rotor nozzles on the lichen remover are delivered as standard pointing vertically downwards. Here, the cleaning circle is evenly distributed, leading to an optimal cleaning result. It should be noted that removed dirt particles can be distributed in different directions.
The angle of the rotor nozzles can be adjusted as desired. This changes the cleaning circle in the direction of travel and is no longer evenly distributed. The changed angle ensures the removal of dirt particles in the forward direction of travel. Compared to the factory setting, this can lead to a reduced cleaning result.

Cleaning with lichen remover

When working with the lichen remover, pay attention to the guidance of the high-pressure hose. As high-pressure hoses are generally stiffer and heavier than low-pressure hoses, they can restrict the machine's driving characteristics and provoke a crash. It is imperative to ensure that the hose is fed from above.



	**DANGER** **Risk of death from falling parts!** **If the operating instructions are neglected, falling components of the glassROBOT pro can lead to the death of uninvolved persons or other living beings!** ⇨ **Read, understand, and apply the operating instructions!** ⇨ **Immediately secure dismantled components against falling!**

9.13.2 Storage, maintenance and care of the lichen remover

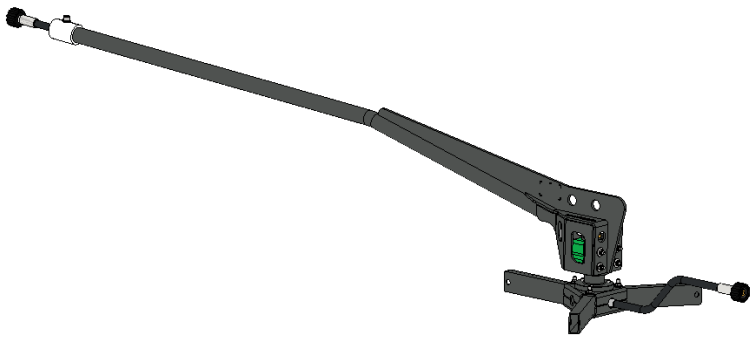
The lichen remover, as well as associated hoses and high-pressure cleaner, must be stored dry and frost-free.
Clean the lichen remover after each usage with low-pressure water without any cleaning agents. For stubborn dirt, use a brush with soft bristles.
Check all parts of the lichen remover for secure fit. Check all lines and hoses for possible damage.
The operating time of the installed rotor nozzles is generally +/- 150 hours before the wear parts should be replaced with a repair kit.
Wear is noticeable when:

- the rotation jet becomes uneven
- the rotational movement of the rotor nozzle becomes more unstable or eventually stops rotating altogether

9.14 Hose guide high-pressure (HD)

Article No.: 705.208

The hose guide HD is designed for cleaning with high-pressure water and is only to be used in conjunction with the lichen remover on the glassROBOT pro. The hose guide HD allows a 360° rotation around its own axis when installed on the glassROBOT pro.

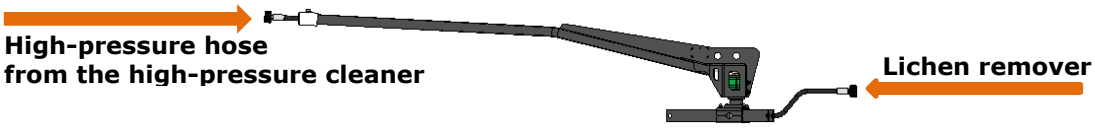


Height:	approx. 350 mm
Width:	approx. 392 mm
Length:	approx. 1,660 mm
Weight:	approx. 3.7 kg

In the bend area of the hose guide tube is a sheet metal collar with 2 adjacent holes. These holes can be used as attachment points if the glassROBOT pro is to be lifted using lifting equipment (e.g. onto glass modules).

Attaching the hose guide HD to the glassROBOT pro is done analogously to the supplied standard hose guide via the three bars. It should be noted that the connection hose to the lichen remover is placed opposite the bolt lock due to the connection.

For connecting the hose guide HD to a high-pressure hose (upper part) and to the lichen remover (lower part), a hand screw connection (M22x1.5) is used. The lower part of the hose guide is screwed to the adapter AG (M22x1.5) on the pressure gauge of the lichen remover.



Notice

The hose guide HD, like all water-carrying parts, must be stored frost-free.

10. Maintenance and inspection instructions

The maintenance of the glassROBOT pro is limited to a minimum. Lubricating or greasing the parts is prohibited and may cause damage.

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 glassROBOT pro 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 washing brush	After and before each usage	Clean with water!	X	
Pollution of driving pads on the driving chains	After and before each usage	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	Prior to every commissioning	Tighten any loose fittings and secure the locks.	X	
Check for deformations and cracks on the machine components.	Before each start	If damaged or malfunctioning, 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	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 ideal grip of the driving pads and to prevent the driving chains from running off (especially when travelling on inclines of up to 25° transversely to the direction of travel and up to 25° in the direction of travel), the driving chain tension must be checked before each start-up.

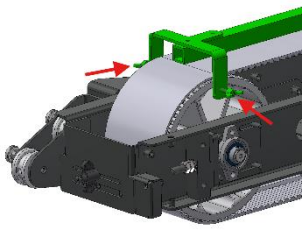
10.1.1 Checking the driving chain tension

(1) Precondition:
The ambient temperature should be between 10 and 20 °C.

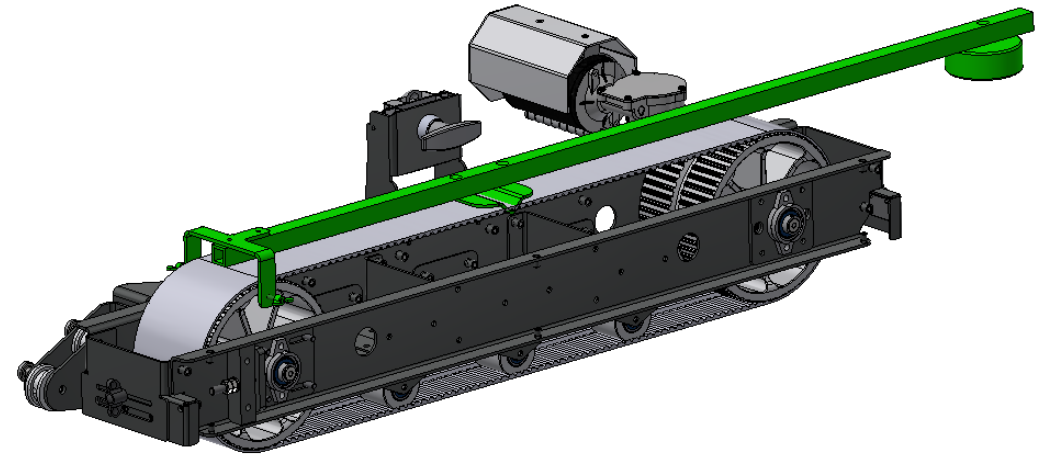
(2) The chassis of the glassROBOT pro must be lifted so far that the driving chains do not touch the ground. (for example with the transport carriage 705.160)

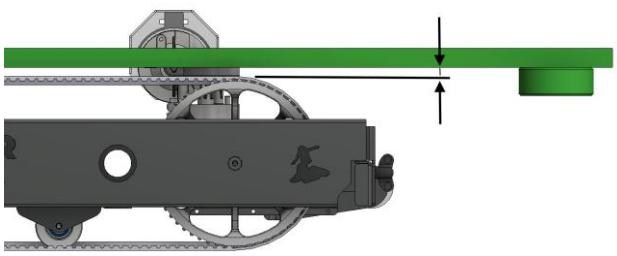
(3) Remove the driving pads from the driving chains.

(4) The driving chain tensioner (703.276) is used to check the driving chain tension. As shown in the picture, the driving chain tensioner is placed on the driving chain so that the two cylinder head screws with the wing nuts are centred under the wheel axle (on the opposite side of the drive). The cylinder head screws are screwed in as far as they will go using the wing nut. The transverse bolt underneath the square pipe then lies centrally between the two wheels on the driving chain. The weight at the end of the square pipe then protrudes beyond the drive wheel.



(5) The distance between the square pipe and the driving chain shall be **12 mm** centrally from the drive wheel.





10.1.2 Setting of the driving chain tension

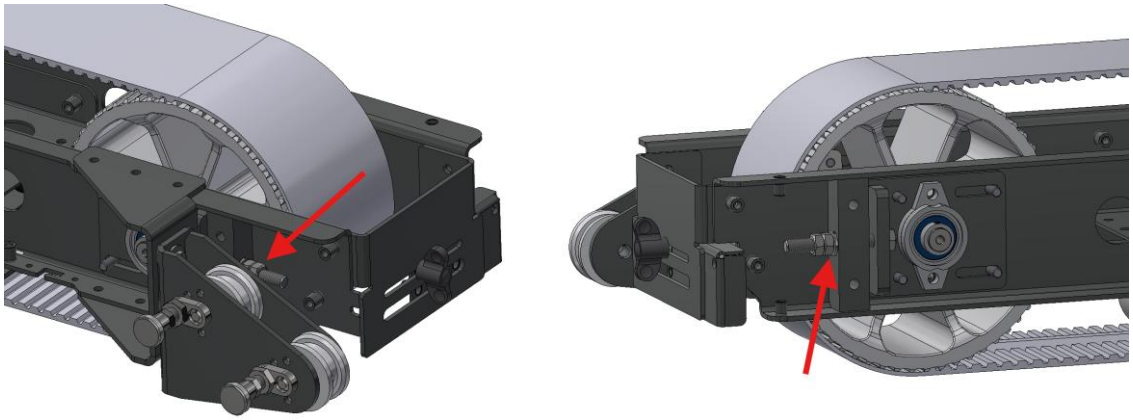
Attention:
This adjustment may only be carried out by appropriately trained personnel! Otherwise contact your vendor.

(1) Precondition:
The ambient temperature should be between 10 and 20 °C.

(2) The chassis of the glassROBOT pro 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) First, the two lock nuts are loosened on both sides of the wheel,
e.g. using an open-end spanner with wrench size 13 mm.



(5) By turning the hexagon screw head, the tension can be increased or decreased. For this, an open-end spanner with wrench size 13 mm can be used, for example. The tension is checked using the chain tensioner.

(6) When the required tension has been reached, the setting must be secured using the lock nuts. To do so, they are turned and tightened on the screw as far as against the wheel axle.
It is important to span equally on both sides so that the wheel does not sit “slanted” in the drive unit frame. See chapter "Adjusting the wheels".

10.2 Checking and setting the parallelism and angularity of the wheels

In order to ensure an ideal grip of the driving pads and to avoid the run-out of the travelling driving chains (especially when travelling on inclines of up to 25° transversely to the direction of travel and up to 25° in the direction of travel), the parallelism of the wheels must be checked before each start-up.

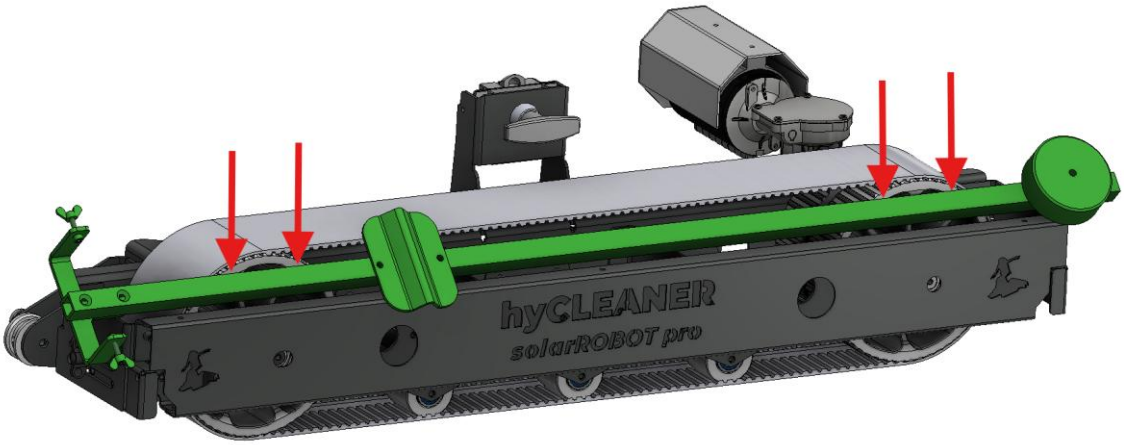
10.2.1 Checking and setting the parallelism and angularity of the wheels

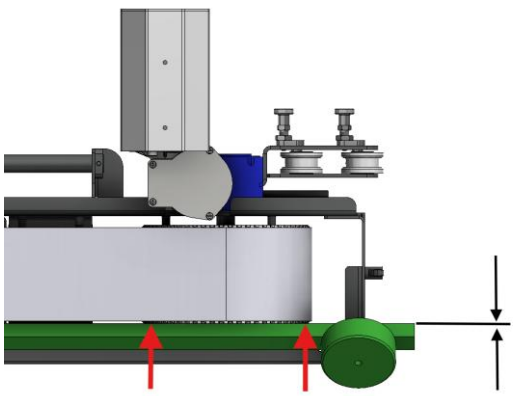
(1) Precondition:
The ambient temperature should be between 10 and 20 °C.

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

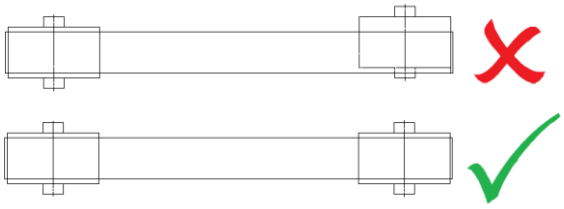
(3) Remove the driving pads from the driving chains.

(4) The chain tensioner can be used for checking. This is put laterally to the wheels. On the drive side, the square tube of the chain tensioner is held against the wheel so that it touches this wheel twice. Subsequently, the parallelism and the squareness of the wheels to each other can be checked.

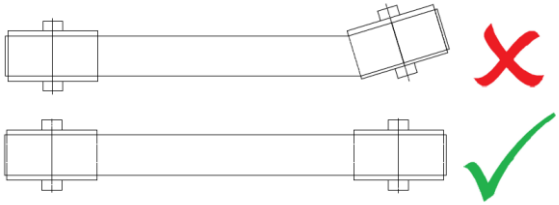




(5) Parallelism:
In order to measure the parallelism, the square pipe is used as described in Section 4. On the other wheel, it can be measured the distance only:
If both points are equally distant from the wheel, a maximum distance of **1,5 mm** is permissible.



(6) Angularity:
In order to measure the angularity, the square pipe is used as described in Section 4. On the other wheel, it can be measured the distance only:
If the square pipe is differently distant on both points, a maximum distance of **1mm** is permissible.



10.2.2 Setting the parallelism and angularity of the wheels

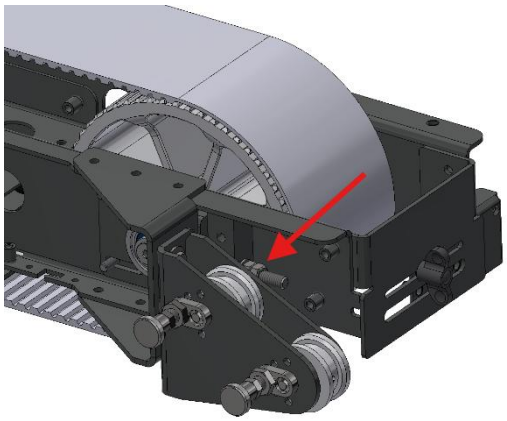
Attention:
This adjustment may only be carried out by appropriately trained personnel! Otherwise contact your vendor.

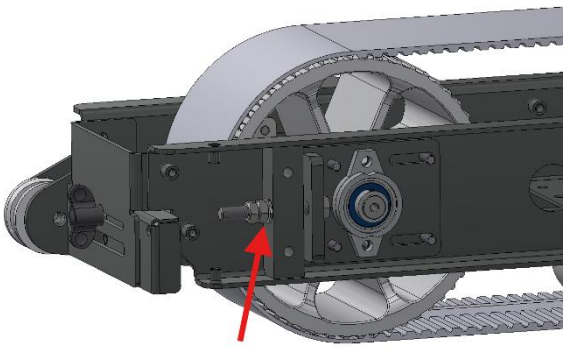
(1) Precondition:
The ambient temperature should be between 10 and 20 °C.

(2) The chassis of the glassROBOT pro 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) First, the two lock nuts are loosened on both sides of the wheel,
e.g. using an open-end spanner with wrench size 13 mm.





(5) The rotation of the wheel is then increased or decreased by turning the hexagon screw heads. For this, an open-end spanner with wrench size 13 mm can be used, for example. The tension is checked with the chain tensioner.

(6) When the required parallelism and angularity have been reached, the setting must be secured using the lock nuts. To do so, they are turned and tightened on the screw as far as against the wheel axle. It is important to check the driving chain tension again afterwards.

11. Troubleshooting

11.1 Troubleshooting glassROBOT pro

Error	Component	Measure	Operator	Vendor
Display/ Vibration reports: Edge detection	Radio remote control 603.239	Drive back on flat subsurface (glass module) Press the button on the joystick on the radio remote control.	X	
Radio remote control - cannot log in	Radio remote control 603.239	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 603.239	Change the battery. Charge the battery.	X	
The machine does not start	Radio remote control 603.239	Switch on or charge the battery if discharged. Unlock the EMERGENCY STOP button on the drive unit and the radio remote control.	X	
The machine does not respond	Radio remote control 603.239	Ensure that the radio remote control is within range of the machine.	X	
Too little water	glassROBOT pro	The hose must be operated with sufficient pressure and have a nominal diameter of at least ½" (25 mm). Additionally, sufficient pressure must be available.	X	

11.2 Troubleshooting charging station

Error	Component	Measure	Operator	Vendor
Indicator light 11 (a) (see chapter Charging station) does not light up (charger 6 A/36 V battery (11))	Charging station	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 (11).	X	
Indicator light 11 (a) (see chapter Charging station) flashes green (charger 6 A/36 V battery (11))	Charging station	Battery defective.		X
Power LED (Figure 1) does not light up (charger for radio remote control (3))	Charging station	Charger for radio remote control is not correctly connected. Check the proper fit of the plugs at both connection ends. Check whether the mains cable is defective. Check the microfuse (603.273) in the cold-device socket (11). Check if the charging cable (Figure 1) is correctly plugged into the charger of the radio remote control (3).	X	

Charging state indicator on the charger of the radio remote control (3) blinks yellow	Charging station	Ambient temperature is high. Place the charging station in a cooler place where the ambient temperature is max. 30° C.	X	
The battery charging time is significantly longer than specified.	Charging station	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 an annual inspection of the glassROBOT pro by the dealer. This way a safe, functional operation of the glassROBOT pro machine is ensured.

13. EC Declaration of Conformity

Original document

EC Declaration of Conformity

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:	glassROBOT pro
Function:	Cleaning solar modules or glass roofs.
Project number:	0103
Manufacturing year:	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, the Low Voltage Directive 2014/35/EU, the Battery Directive 2006/66/EC, and the Radio Equipment Directive 2014/53/EU.

The following harmonised standards were applied:

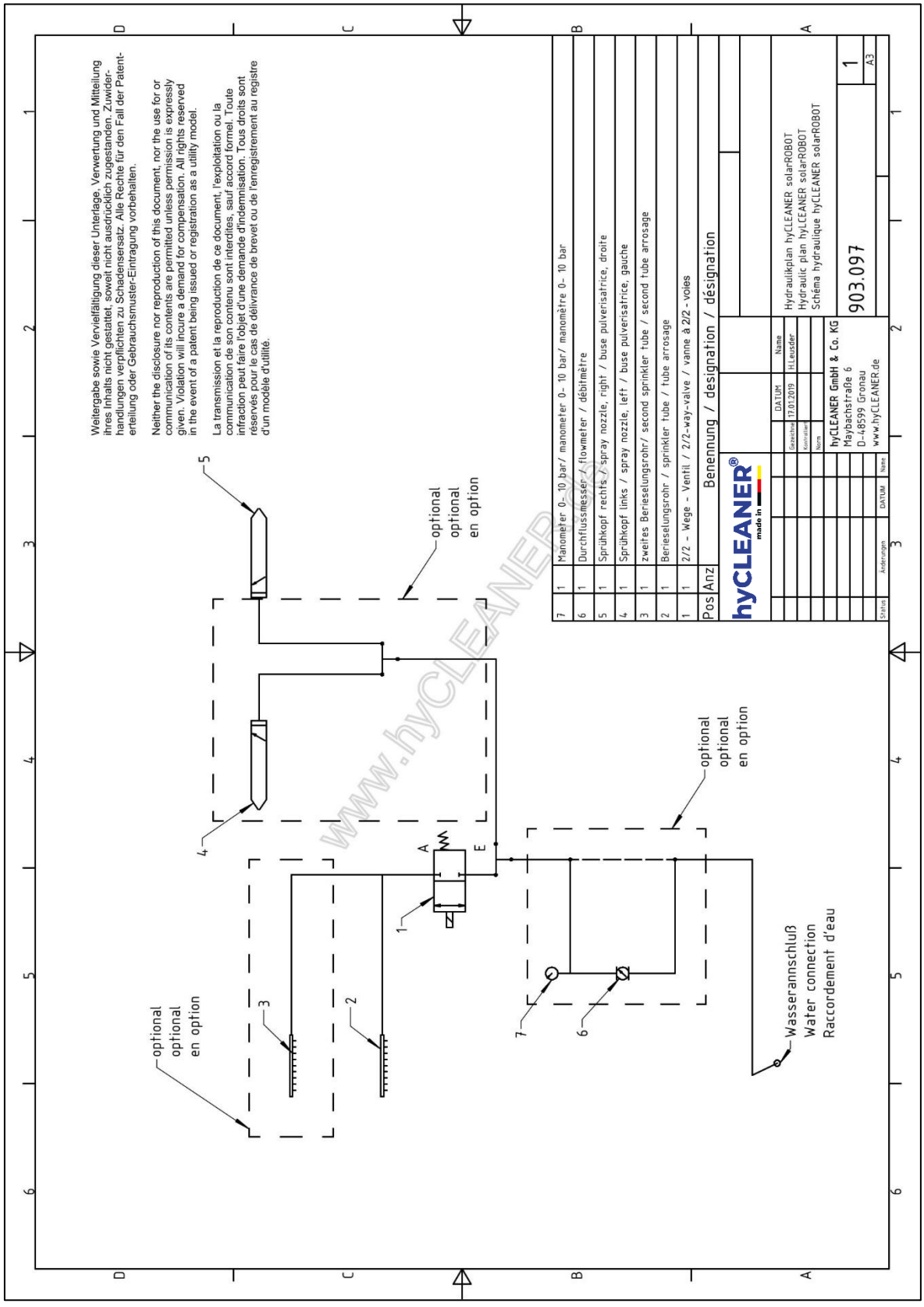
EN 614-1:2006	Safety of machinery - Ergonomic design principles - Part 1: Terms and general principles +A1:2009
EN 614-2:2000	Safety of machinery - Ergonomic design principles - Part 2: Interactions between the design of machinery and the work tasks +A1:2008
EN ISO 4413:2010	Fluid power - General rules 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 - Principles for design (ISO 13850:2015)
EN ISO 14118:2018	Safety of machinery – Prevention of unexpected start-up (ISO 14118:2017)
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

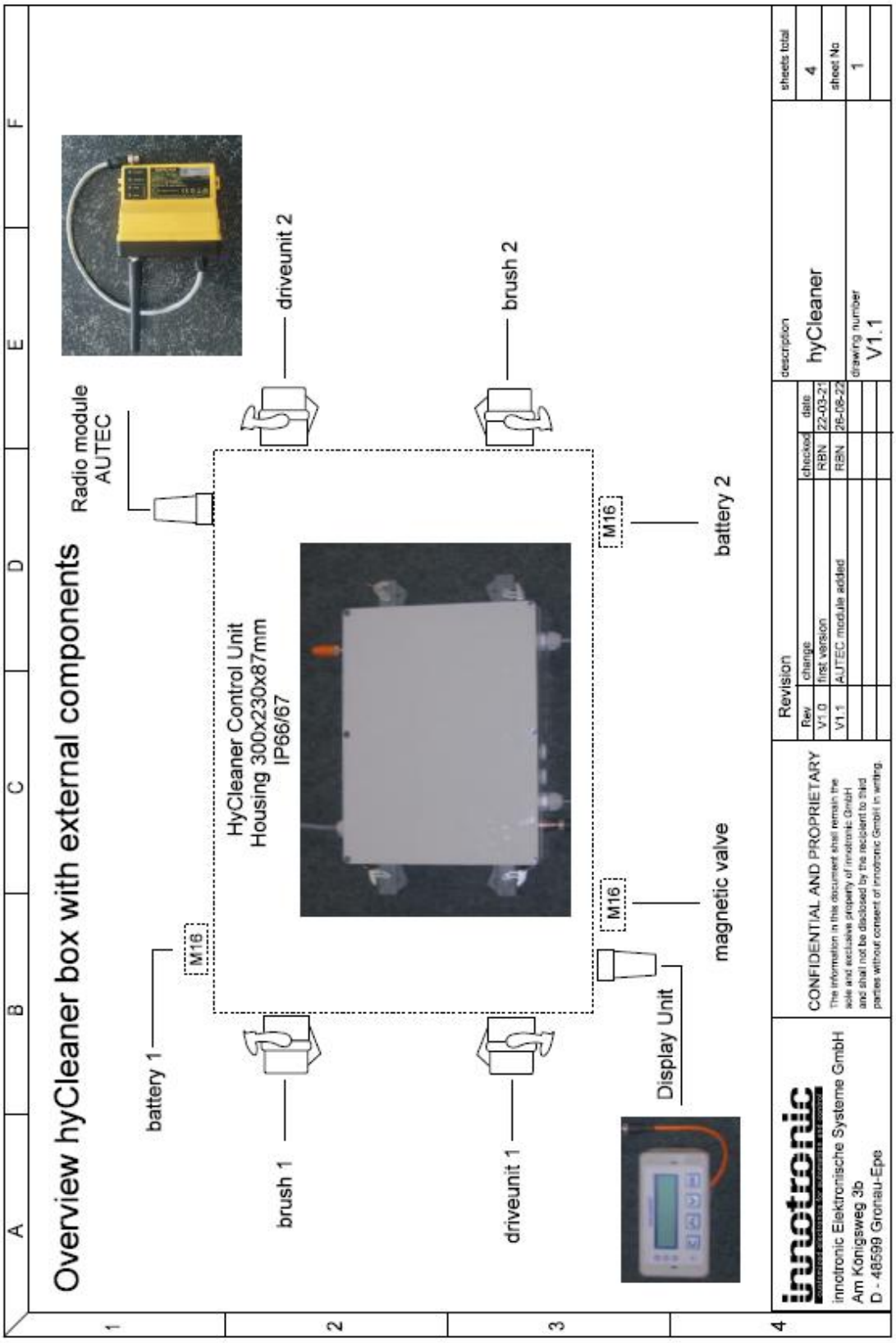
Gronau, 27 February 2025
Place, Date

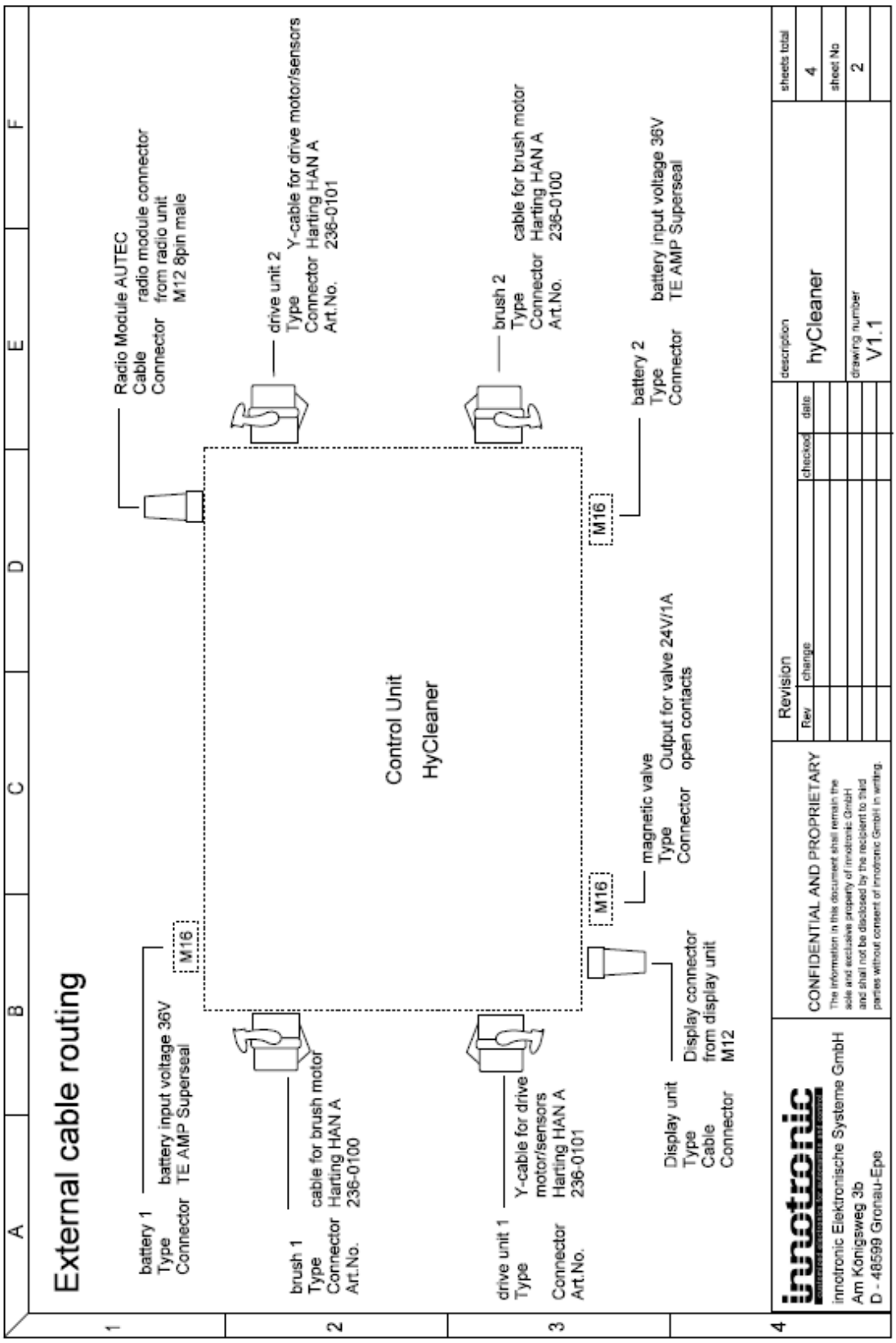
Project Engineer / Signature

14. Hydraulic plan of the glassROBOT pro



15. Electrical plan with bill of materials




External cable routing
Control Unit
HyCleaner
battery 1
Type
Connector
battery input voltage 36V
TE AMP Superseal
M16
brush 1
Type
Connector
Art.No.
cable for brush motor
Harting HAN A
236-0100
drive unit 1
Type
Connector
Art.No.
Y-cable for drive motor/sensors
Harting HAN A
236-0101
Display unit
Type
Cable
Connector
Display connector
from display unit
M12
M16
magnetic valve
Type
Connector
Output for valve 24V/1A
open contacts
M16
battery 2
Type
Connector
battery input voltage 36V
TE AMP Superseal
brush 2
Type
Connector
Art.No.
cable for brush motor
Harting HAN A
236-0100
drive unit 2
Type
Connector
Art.No.
Y-cable for drive motor/sensors
Harting HAN A
236-0101
Radio Module AUTEC
Cable
Connector
radio module connector
from radio unit
M12 8pin male
innotronic
innotronic Elektronische Systeme GmbH
Am Königsweg 3b
D - 48599 Gronau-Epe
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Revision
Rev
change
checked
date
description
hyCleaner
drawing number
V1.1
sheets total
4
sheet No
2

Connection of external components

Brush 1

1. Mot+	+ Supply Brush 1
2. Mot-	- Supply Brush 1
3. -	not connected
4. -	not connected

Brush 2

1. Mot+	+ Supply Brush 2
2. Mot-	- Supply Brush 2
3. -	not connected
4. -	not connected

Valve

1. +24V	+ Supply Valve
2. 0V	- Supply Valve

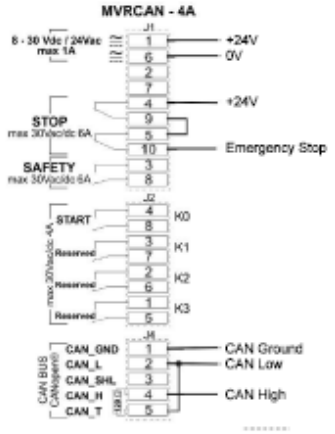
Drive 1

1. MOT+	+ Supply Drive 1
2. MOT-	- Supply Drive 1
3. +24V	Supply Sensor 1/2
4. 0V	0V Sensor 1/2
5. Sensor 1 Out	Output Sensor 1
6. Sensor 2 Out.	Output Sensor 2

Drive 2

1. MOT+	+ Supply Drive 2
2. MOT-	- Supply Drive 2
3. +24V	Supply Sensor 3/4
4. 0V	0V Sensor 3/4
5. Sensor 3 Out	Output Sensor 3
6. Sensor 4 Out.	Output Sensor 4

Radio Modul AUTEC intern



Display

1. 5V	Supply Display +
2. 0V	Supply Display -
3. TxD	TxD Controller Unit
4. RxD	RxD Controller Unit
5. -	not connected

Radio Modul AUTEC

1. +24V	Supply +
2. 0V	Supply -
3. +24V	Supply +
4. STOP	Emergency Stop
5. CANH	CAN High
6. CANL	CAN Low
7. CANG	CAN Ground
8. -	not connected

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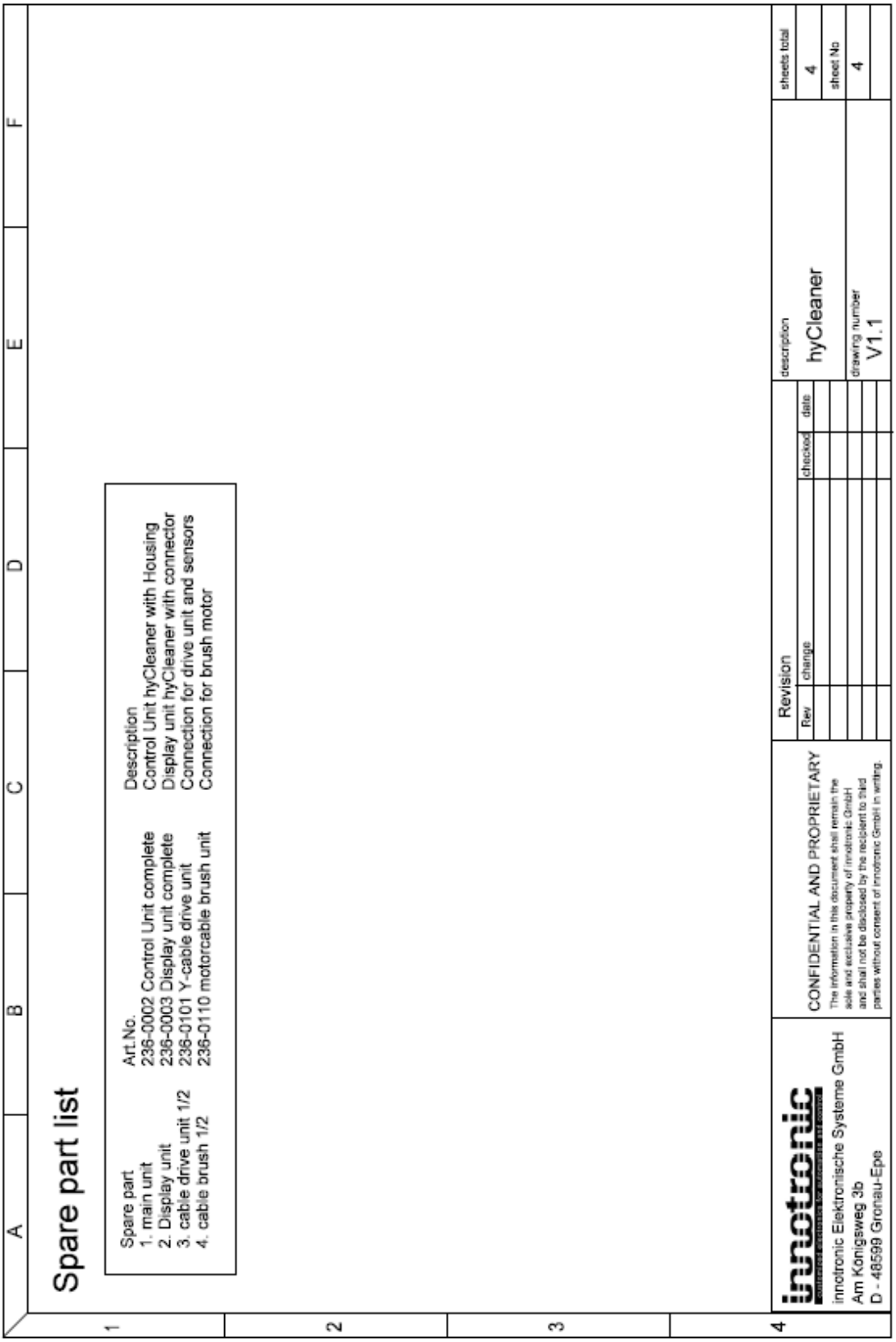
Revision			
Rev	change	checked	date

description	hyCleaner
drawing number	V1.1
sheets total	4
sheet No	3


Spare part list
Spare part
1. main unit
2. Display unit
3. cable drive unit 1/2
4. cable brush 1/2
Art.No.
236-0002 Control Unit complete
236-0003 Display unit complete
236-0101 Y-cable drive unit
236-0110 motorcable brush unit
Description
Control Unit hyCleaner with Housing
Display unit hyCleaner with connector
Connection for drive unit and sensors
Connection for brush motor
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Revision
Rev
change
checked
date
description
hyCleaner
sheets total
4
sheet No
4
drawing number
V1.1
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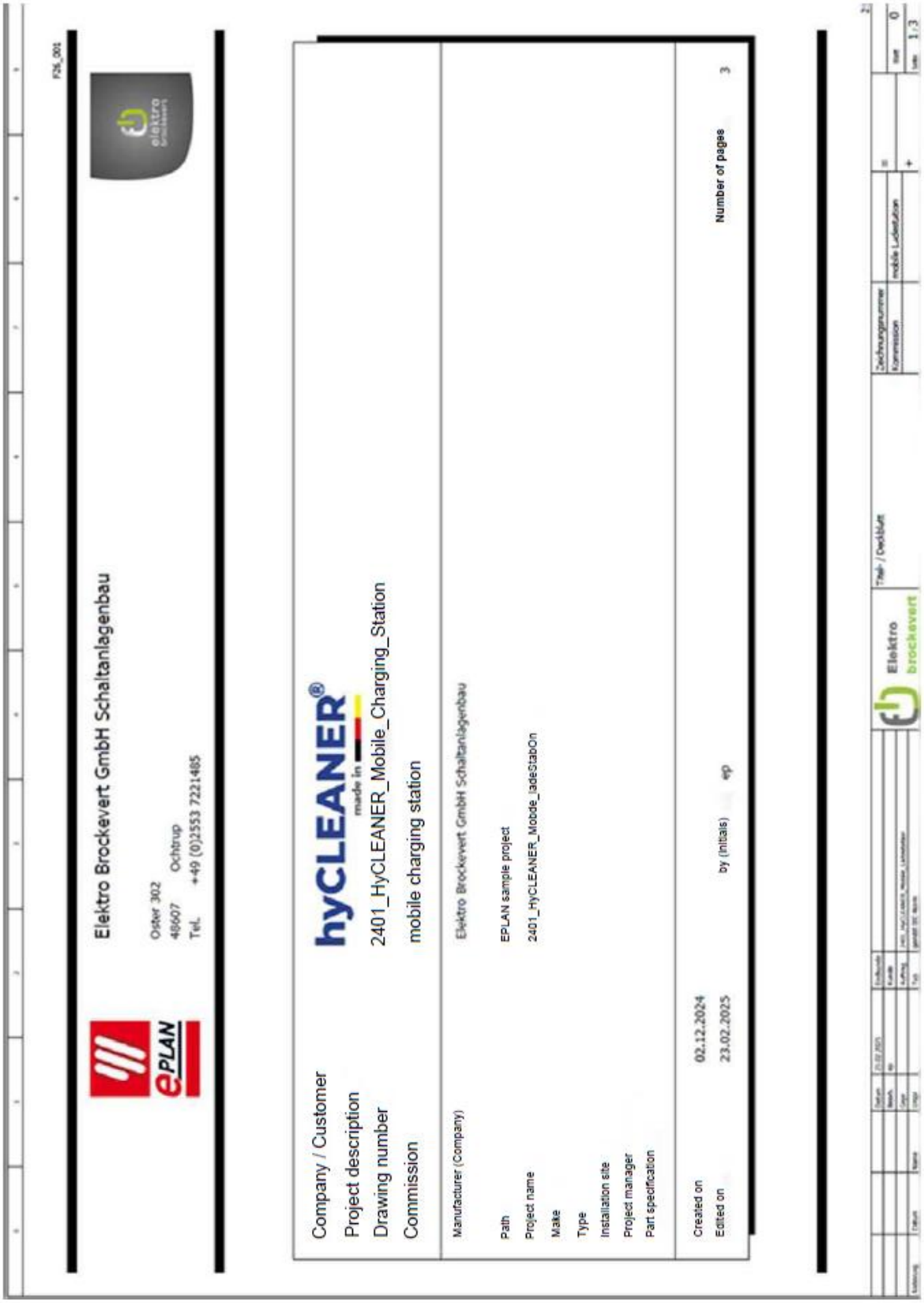
16. Wiring diagram of the charging station



Execution of the switchgear according to the following guidelines and standards:

Low Voltage Directive 2014/35/EU
Electromagnetic Compatibility Directive 2014/30/EU
Low-voltage switchgear and controlgear assemblies - Part 2: Power switchgear and controlgear assembly DIN EN 61439-2; VDE 0660-600-2:2012-06
Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity for industrial environments DIN EN 61000-6-2_2016-05; VDE 0839-6-2

Voltages

Operating voltages:

3/N/PE 50Hz, 400V +5% -3%

Control voltages:

230VAC 50Hz
24VDC

Solenoid valves for:
Gas, air, water & hydraulics:

[x] 230VAC / 50Hz
[ ] 24VDC

Auxiliary voltage

[x] 12VDC
[x] 24VDC

Wiring

The wiring is done flexibly.
According to the circuit diagram of:
Top to bottom or left to right

Wiring colours:

L1	= Brown
L2	= Black
L3	= Grey
Neutral conductor	= Light blue
Protective conductor	= Green / yellow
PEN conductor	= Green / yellow with light blue ends
Control voltage 230 VAC (L)	= Red
Control voltage 230 VAC (N)	= White
Control voltage 24 VDC (L+)	= Blue
Control voltage 24 VDC (L-)	= Violet
Measuring line	= Grey
External voltage	= Orange

Switchgear

Switchgear (colour):

RAL 7035 = Grey

Cable entry:

[ ] Top
[ ] Botton

Customer specification:

[ ] Yes
[x] No

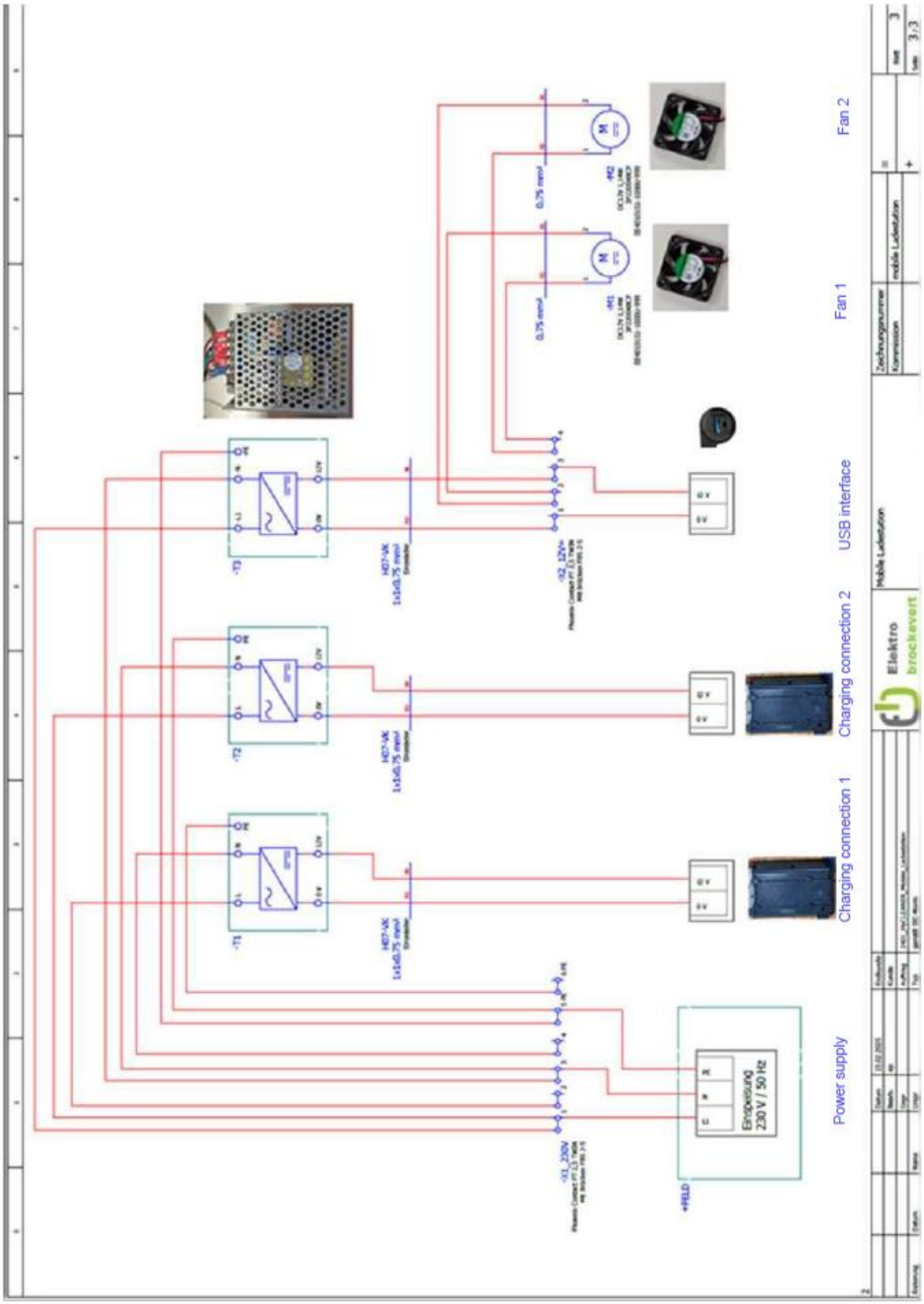
Main switch:

[ ] Front mounting
[ ] Side mounting left
[ ] Side mounting right

Control cabinet base:

[ ] Yes
[x] No
[ ] 170mm
[ ] 200mm

Elektro brockevert


Fan 2
Fan 1
USB interface
Charging connection 2
Charging connection 1
Power supply
Elektro
brockevert
Mobile Labstation
Einspeisung
230 V / 50 Hz