

# HDA-K900 Autonomous Floor Sweeper

Operator Manual

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## Purpose of the operating instructions

These operating instructions contain important information for the safe operation of the K900 Gen II Top, K900 Gen II Smart, K900 Gen II Eco, which are also referred to as "robot" in the following.

Therefore, read the operating instructions carefully and thoroughly:

- before you put the robot into operation,
- before you operate the robot,
- if you are assigned to perform other work on the robot (e.g.: assembly, maintenance, disassembly, ...).

If necessary, look up the facts that are decisive for you again and again.

**Pay particular attention to chapter 2 Basic safety instructions on page 16.**

## Storage of the operating instructions



- These operating instructions are part of the KEMARO K900
- For proper and safe operation of the KEMARO K900, observe these operating instructions.
- Keep these operating instructions safe for later use safely.
- When changing the operator of the KEMARO K900, make sure that the new operator also receives these operating instructions
- Maintain additions and updates to this operating manual conscientiously

## Target groups of these operating instructions

Target group	Tasks
Operator Company	<ul style="list-style-type: none"><li>• Keep these operating instructions available at the robot's place of use hold.</li><li>• All people working on the robot, as well as the supervisory and control personnel are required to read and observe these operating instructions and the accompanying documents, in particular the safety and warning notices.</li></ul>
Operator	Read, observe and follow these instructions and accompanying documents, and in particular the Safety and Warning Notices.

## Definition of target groups

### Operator Company

Business owner who operates the machine and makes the machine available to his employees to perform the assigned work.

### Operator

Staff who operate the machine. Operators are trained and instructed by specialists.



#### Important information on the suitability of Staff

The operator must keep proof of the suitability of staff and document it in writing!

The safety briefing and the suitability of the respective Personnel is carried out and documented by a safety specialist. The associated training courses, instructions and records are fully and completely documented in the operating log.

## Orientation in the operating manual

### Presentation of general information symbols

The following information symbols indicate important information in this manual.

Pictogram	Meaning
	<b>Caution, possible property damage</b> This pictogram indicates that damage to the production system may occur if the handling instructions are not followed and carried out correctly.
	<b>Important information</b> This pictogram indicates important additional information that includes a warning of danger.
	<b>Personnel qualification</b> This pictogram indicates which personnel (target group) is permitted for the actions in the respective chapter.
	<b>Information on machine documentation</b> This pictogram indicates that parts of the Machine documentation must be observed in particular or additionally (e.g. supplier instructions, etc.).
	<b>Instruction</b> This pictogram identifies an instruction and is always placed before an active action to be carried out by the user.

Tab. 1: General symbols and their meaning

## Representation of warnings



### Important information about the warnings in the operating instructions

When operating the machine, actions are required in which Dangers may occur.

These actions are preceded by **warnings** that are mandatory to be observed. **Warnings (as well as commands and Prohibitions) serve your personal protection!**

Observe all warnings in these operating instructions as well as in the areas of the machine and be particularly careful in these cases.

Pass on all warnings to other people who work in and on the machine.

### Warnings - Explanation of signal words

Warnings warn you of situations that can lead to personal injury, death or property damage. They are always introduced with a **signal word** that indicates a certain **hazard level**.

Each **hazard level** has a specific **Signal color** assigned.

The signal words used are **Danger, Warning, Caution, and Note**.

The following table shows the hazard level and signal color assigned to each signal word.

Hazard level (signal word)	Meaning and consequences of non-observance	Warning
DANGER	<b>Imminent</b> danger that leads to <b>serious bodily injury or death</b> .	
WARNING	<b>Potentially</b> dangerous Situation that could lead to <b>serious Personal injury or death</b> .	
CAUTION	<b>Potentially</b> dangerous Situation that could lead to <b>slight Personal injury</b> .	
NOTE	Situation that could lead to a <b>possible Damage to the machine</b> .	

Tab. 1: Design of warnings

## Warning notices - Structure and composition

Regardless of the hazard level, all warning notices are always structured according to the same pattern. Below is an example of the signal word Danger.

⚠ DANGER	
	<b>Type and source of danger</b> Explanation of the type and source of the danger 🔧 Measures to avert the danger

The signal color of the header, in conjunction with the signal word, indicates the respective hazard level.

In the left column, the general hazard symbol  is located as a warning symbol at minimum. It can be supplemented by other symbols that indicate the danger more specifically.

In the right column, the first thing to be described is the **Type of danger and its source**. This is followed by information on the possible **consequences that emanate from the source of danger**.

Finally, it is described how the **imminent danger can be averted**.

### Examples:

⚠ DANGER	
	<b>Rotating knives</b> Amputation of limbs during maintenance work on a running machine 🔧 Switch off the machine before all maintenance work 🔧 Secure the machine against restarting
⚠ WARNING	
	<b>Live terminals</b> Electric shock when touching exposed terminals 🔧 Regular checks to ensure that protective covers are correctly fitted
⚠ CAUTION	
	<b>Hot device parts</b> Risk of burns when touched 🔧 Wear protective gloves
NOTE	
	<b>Risk of breakage</b> The device housing can break if it falls 🔧 Secure the device with a safety device to prevent it from falling

## Representation of mandatory symbols

They consist of a circular blue background with a white pictogram that provides information on the personal protective equipment to be used, for example.

If necessary, mandatory symbols can also be added to the general warning sign in the warning notices.



General Mandatory Symbol



Wear Safety Shoes



Wear protective Gloves



Wear Safety Glasses



Wear appropriate work clothing



Disconnect the main plug before working on live parts



Read the operating instructions



Wear a safety helmet

## Representation of prohibition symbols

Prohibition symbols contribute to greater safety.

They consist of a circular white background with a red border and a crossed-out pictogram that indicates the prohibition. If necessary, prohibition symbols can also be added to the general warning sign in the warning notices if required.



General prohibition symbol



Do not park or store anything here



Use of mobile phones prohibited



Prohibition for people with pacemakers



Entering the area is prohibited



Gloves prohibited



Prohibition of food and stimulants in the workplace



Reaching in prohibited

## Representation of warning symbols

Warning symbols warn of hazards, risks and obstacles.

They consist of a triangle with a yellow background with a black border and a symbol that indicates the hazard. Warning symbols can also be included in the warning information in addition to the general warning sign if required.



Warning of danger point



Warning of dangerous electrical voltage



Warning of crushing hazard



Warning of automatic start-up



Warning of hot surface



Warning of explosion hazard



Warning of fire hazard



Warning of harmful substances

## Representation of contents

The contents of this manual are provided with various symbols to facilitate reading comprehension. The following symbols are used:

- Prerequisites precede an action and must be met for the action (e.g. previous steps).
- If tools are required for the action, they will be available before the action listed.

## Objective of the instructions

1. Action steps are numbered at the beginning.
- Arrows represent intermediate results of the instructions.
  - ✓ The end of an instruction is marked with a check mark.
  - Lists and actions without a fixed order are marked with bullet points marked.

## Glossary

This glossary is intended to explain the technical terms and abbreviations used in these operating instructions. The aim is to provide the user with a clear understanding of the technical terminology and specific terms related to the operation and maintenance of the device.

Term	Definition
LiDAR	LiDAR (Light Detection And Ranging) is a method for optical distance measurement. For this purpose, a laser beam is emitted, which is reflected by the environment. The LiDAR system now measures the transit time of light and can estimate the distance to the reflecting object based on this information.
Chassis	The chassis is the frame and the base frame of the robot.
Gear Self-locking	Self-locking is generally defined as the ability of a mechanical system to hold a position without the need for additional force or braking. This means that the system does not move by itself unless an external torque or force is applied.
Beeper	Device on the robot that emits a warning tone.
Flasher	Strobe light on the robot's chassis for visual perception of the robot.
Web-App	Calling 10.0.0.1 in the web browser (device must be connected to robot Hotspot connected)

Tab. 2: Glossar



## 1 Identification

### 1.1 Machine identification

Autonomous Sweeping Robot

Machine type: K900 Gen II Top, K900 Gen II Smart, K900 Gen II Eco

Product number: 2020093XXXX

Year of manufacture: 2025

### 1.2 Manufacturer information

Headquarter	KEMARO AG
	Hilagstrasse 20
	8360 Eschlikon
	Switzerland
Phone:	+41 71 747 91 11
Fax:	+41 71 540 62 98
E-mail:	info@kemaro.ch
Internet:	www.kemaro.ch

Tab. 3: Manufacturer information

## 1.3 Nameplate

The machine is uniquely identified by the nameplate.

The machine's nameplate is located on the left side of the robot chassis under the dirt container.

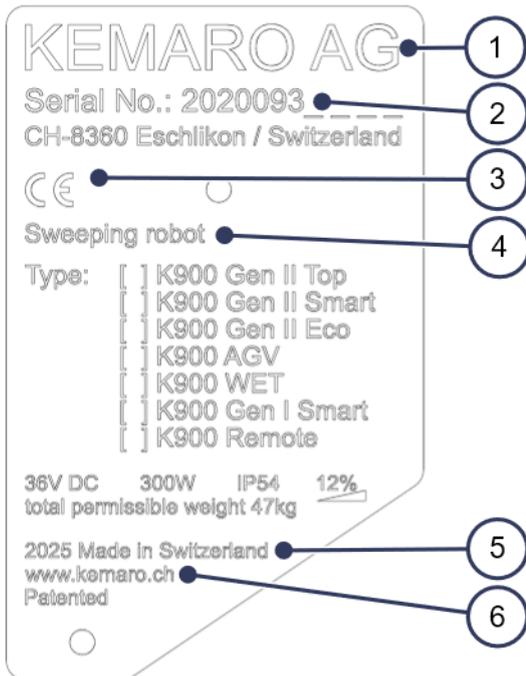


Fig. 1: Nameplate

- 1 Logo
- 2 Product Number
- 3 CE marking
- 4 Machine Designation
- 5 Year of manufacture
- 6 Company Website

1.4 Declaration of Conformity



<b>Name/Adresse des Herstellers</b> <b>Name/address of manufacturer</b>	KEMARO AG Hilagstrasse 20 CH-8360 Eschlikon	
<b>Produkt</b> <b>Product</b>	sweeping robot KEMARO 900 ZS	
Das bezeichnete Produkt erfüllt die Bestimmungen der Richtlinien: The designated product is in conformity with European directives:	<ul style="list-style-type: none"> <li>• 2006/42/EG</li> <li>• 2014/30/EU</li> <li>• 2014/53/EU</li> <li>• 2011/65/EU</li> </ul>	
Angewendete harmonisierte Normen: Applied harmonized standards:	<ul style="list-style-type: none"> <li>• EN ISO 12100:2010</li> <li>• EN ISO 13849-1:2015</li> <li>• EN IEC 61000-6-2:2019</li> <li>• EN IEC 61000-6-4:2019</li> </ul>	<ul style="list-style-type: none"> <li>• EN IEC 61000-6-1:2019;</li> <li>• EN IEC 61000-6-3 :2007 +A1:2010</li> <li>• EN 61000-3-2:2019</li> <li>• EN 61000-3-3:2013 + A1:2019</li> </ul>
Radio frequency control units:	<ul style="list-style-type: none"> <li>• EN 300 328 V1.9.1</li> <li>• EN 301 489-1 V1.9.2</li> <li>• EN 301 489-17 V2.2.1</li> <li>• EN 301 489-52 V1.2.1</li> <li>• EN 301 511 V12.5.1</li> </ul>	<ul style="list-style-type: none"> <li>• EN 301 893 V2.1.1</li> <li>• ETSI EN 301 908-1 V15.2.1</li> <li>• ETSI EN 301 908-2 V13.1.1</li> <li>• ETSI EN 301 908-13 V13.2.1</li> </ul>

**Signed for and on behalf of: KEMARO AG, CH-8360 Eschlikon**

CH-8360 Eschlikon 21. 03. 2024  
Thomas Oberholzer, CINO

Responsible for the technical documentation:

CH-8360 Eschlikon 21. 03. 2024  
Martin Gadiant, CEO

Fig. 2: Declaration of Conformity

## 2 Basic safety instructions

### 2.1 Operator's duty of care



#### Important information

The robot was planned, designed and built taking into account laws, guidelines and standards, a risk assessment and other technical specifications. It therefore corresponds to the state of the art and guarantees the highest level of safety.

However, safety can only be achieved in operational practice if all the necessary measures are taken. It is the responsibility of the operator of the robot to plan these measures and monitor their execution.

The commercial use of the robot means that the operating company is bound by obligations relating to occupational safety. In addition to the Safety instructions in this operating manual must comply with the safety, accident prevention and environmental protection regulations applicable to the area of application.



#### Important information

The operating company of the robot must ensure that the Operating instructions are read and understood by his personnel

#### Technical condition of the robot

The following requirements are placed on the technical condition of the robot and must be ensured by the operator:

- The robot may only be used as intended
- The robot must always be checked for its perfect condition before being switched on technical condition must be checked
- The safety devices must be checked regularly to ensure that they are functioning properly
- The safety and warning notices attached to the robot must not be removed and must be checked regularly to ensure that they are legible and replaced if necessary
- No unauthorized modifications, manipulations or changes may be made to the robot must be carried out
- The robot must be serviced at the prescribed intervals
- The operating instructions must always be freely available in a legible and complete condition at the place of use of the robot, this also applies to the instructions from suppliers

## 2.2 General occupational safety

### 2.2.1 Personnel qualification



#### Important information on personnel qualification

All work on the robot may only be carried out by instructed, trained and authorized persons.

<b>WARNING</b>	
	<p><b>Danger due to inadequate personnel qualifications</b></p> <p>There is a risk of serious injury and significant Property damage if unqualified personnel are in the danger area of the robot or perform work on the robot.</p> <ul style="list-style-type: none"> <li>☛ There is a risk of serious injury and significant Property damage if unqualified personnel are in the danger area of the robot or perform work on the robot.</li> <li>☛ Unqualified personnel must be kept away from the danger area</li> </ul>

### Operating personnel

Before commissioning, the operating instructions must be read and the Safety precautions must be observed. If you are unsure or have any questions, inform your supervisor immediately.

The operating personnel uses, operates and maintains the robot within the scope of the intended use and is informed by the operating company about possible dangers in connection with the work assigned to the robot.

### 2.2.2 Approved personnel

The instructed operating personnel is approved for all tasks in all phases of the robot's life. The operating personnel is encouraged to actively engage with these operating instructions.

Life phase/chapter	Personnel qualification
Delivery, assembly and transport	Instructed operating personnel
Commissioning	Instructed operating personnel
Operating and display elements	Instructed operating personnel
Operation	Instructed operating personnel
Set up	Instructed operating personnel
Maintenance and repair	Instructed operating personnel
Storage and disposal	Instructed operating personnel
Troubleshooting	Instructed operating personnel

Tab. 4: Approved personnel

### Instruction

The personnel working on the robot must be regularly trained and instructed on the robot by the operating company.

Information can be found on page 16, chapter 2, Basic safety instructions and on the internet at [www.kemaro.ch](http://www.kemaro.ch).

### 2.2.3 Personal protective equipment

The personnel is obliged to wear appropriate personal protective equipment (PPE) in compliance with the applicable guidelines and regulations. The required PPE must be provided by the operating company. The operating company must ensure that the personnel uses it properly.



#### Important information on personal protective equipment

When performing work on the robot, the personnel must wear the appropriate PPE.

Please note the following list and the chapter-related list as well as the information provided in the work area on personal protective equipment.



#### Personal protective equipment (PPE)

The degree of protective equipment must be evaluated and determined for each individual case.

The following is a list of recommended PPE:



#### Wear appropriate work clothing

Appropriate work clothing is close-fitting clothing without wide sleeves or protruding parts. It protects against being caught by moving / rotating machine parts.

Also, do not wear rings, chains, ties or other jewelry that could be pulled in.



#### Wear safety shoes

The safety shoes protect the feet from heavy falling parts and from slipping on slippery surfaces.

### 2.2.4 Reasonable lifting and carrying forces

If the permissible values are exceeded during operational work on machines, auxiliary equipment must be available.



#### Important information

The respective national regulations must be observed!

The following values apply to Germany:

Permissible values	Acceptable load (kg) / Frequency of lifting and carrying			
	occasionally		more often	
Age in years	Women <sup>1</sup>	Men <sup>1,2</sup>	Women <sup>1</sup>	Men <sup>2</sup>
15-18	15	35	10	20
19-45	15	55	10	30
>45	15	45	10	25

Tab. 5: Acceptable lifting and carrying forces

- 1) Limit values that should not be exceeded in normal cases without endangering health
- 2) Values that are recommended from an ergonomic point of view

## 2.3 Basic information and protective measures in all Phases of life

Safe handling of the robot begins upon delivery and continues throughout the robot's entire life cycle. The following sections provide detailed information and recommendations for action to ensure the safety of users and the integrity of the robot:

<b>⚠ WARNING</b>	
   	<p><b>Use of personal protective equipment</b></p> <p>Protect yourself and employees present in the same room with appropriate clothing and protective equipment.</p> <ul style="list-style-type: none"> <li>☛ Wear sturdy, closed-toe shoes when in the Cleaning area.</li> <li>☛ Wear safety glasses and a dust mask during servicing and cleaning of the robot, especially when cleaning the air filter.</li> <li>☛ Wear gloves when emptying the dirt container and Removing dirt from the robot. Sharp, sharp-edged dirt particles, for example made of glass or metal, could injure you.</li> </ul>
<b>⚠ WARNING</b>	
	<p><b>Rotating parts</b></p> <p>Loose clothing, jewelry and long hair could be drawn into the robot and cause injury.</p> <ul style="list-style-type: none"> <li>☛ Be especially careful when wearing clothes with long thin ribbons, laces, ties, necklaces, hair bands, jewelry and the like, as well as with open long hair.</li> </ul>

**⚠ WARNING**

	<p><b>Risk of accident due to changes to the robot</b>                  Modifying the robot can lead to damage and thus to accidents.</p> <ul style="list-style-type: none"> <li>⚠ No changes may be made to the robot.</li> <li>⚠ In the event of interventions and changes to the robot or the software the warranty claim against KEMARO AG expires. This applies in particular to opening the control housing or bridging the crash sensors.</li> </ul>
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**2.3.1 Hazards during transport, installation and storage**

This chapter describes the potential hazards that may occur in Connection with the transport, installation and storage of the robot. It is crucial to know these hazards and to observe the corresponding safety measures in order to avoid accidents and damage.

**⚠ CAUTION**

	<p><b>Danger from carrying the robot</b></p> <p>The robot weighs approx. 30 kg and is therefore too heavy to be carried alone. There is a risk of back injury.</p> <ul style="list-style-type: none"> <li>⚠ Carry the robot only in pairs.</li> <li>⚠ Only lift the robot by the two elements provided for this purpose (trolley handle and transport handle).</li> <li>⚠ Never lift it by other assemblies or elements.</li> </ul>
--	---

**NOTE**

	<p><b>Device damage</b></p> <p>Incorrect storage of the robot can cause damage to LiDAR, wheel bearings or chassis.</p> <ul style="list-style-type: none"> <li>⚠ Never place the robot upside down or sideways on one of the drive wheels.</li> </ul>
--	---

**NOTE**



**Device damage**

When pushing the robot manually, the drive wheels can be blocked by the control system or by the self-locking of the gears. Pushing it may cause excessive torque to be applied to the drive unit, resulting in a defect.

- ⚠ Do not push the robot as long as the drive wheels have ground contact.
- ⚠ To move it manually, either use the remote control or lift the robot slightly by the transport handle so that the drive wheels no longer have ground contact. The robot still has ground contact with the steering rollers and can be moved in all directions without great effort.

**2.3.2 Hazards during connection and commissioning**

This chapter explains the possible hazards that can occur when connecting and commissioning the robot. Safe operation of the robot requires that all electrical and mechanical connections are made and checked correctly. Incorrect connections or improper handling can lead to serious injury or damage to the robot.

**⚠ DANGER**



**Danger to life from falling robot**

The robot can fall in rooms with dangerous, unprotected abysses, causing life-threatening injuries. Such are considered to be edges with a fall height of more than 2 meters.

- ⚠ Attach a barrier or other structural measures.
- ⚠ Provide stairs and ramps with marking strips to mark the area as a restricted area.

**⚠ WARNING**



**Demarcated cleaning area**

If the cleaning area is not structurally demarcated, the robot may enter the public area (e.g. road traffic). There is a risk of accident.

- ⚠ Demarcate the cleaning area structurally. A demarcation by means of marking strips is not sufficient.

**⚠️WARNING**

	<p><b>Sensor malfunction</b></p> <p>Moisture on the robot can condense during temperature changes. This can affect the perception of the sensors and lead to dangerous situations.</p> <ul style="list-style-type: none"> <li>☛ In the event of condensation due to temperature changes, wait to use the robot again until the condensation has completely disappeared.</li> </ul>
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**⚠️DANGER**

	<p><b>Risk of accident</b></p> <p>The robot cannot be operated safely if it is not in perfect condition, as it cannot orient itself well in the room and therefore cannot reliably avoid existing obstacles.</p> <ul style="list-style-type: none"> <li>☛ Check the proper condition of the robot at least once a week and check all sensors for cleanliness and function.</li> <li>☛ Contact your local sales and service partner if you cannot fix the defect yourself.</li> </ul>
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**2.3.3 Hazards during operation**

This chapter discusses the potential hazards that may occur during the operation of the robot. The safe and efficient operation of the robot requires an awareness of the risks and consistent adherence to safety guidelines. Potential hazards include mechanical hazards, electrical risks, and environmental and ergonomic factors that could affect the health of users.

**⚠️CAUTION**

	<p><b>Uncontrolled acceleration</b></p> <p>Risk of injury due to uncontrolled acceleration when exceeding the maximum ramp slope.</p> <ul style="list-style-type: none"> <li>☛ Only use the robot up to the maximum ramp slope.</li> <li>☛ When used within the specified slope, it can still roll away from a standstill. In this case, however, the robot only rolls slowly down the slope without accelerating.</li> </ul>
---	---

**⚠WARNING**



**Risk of accident**

When used in ongoing company operations, the robot can be involved in an accident (e.g. run over by a forklift truck, robot cuts off people who get too close).

- 🔊 Use in ongoing operations is at your own risk.
- 🔊 All employees must be informed about the robot (especially drivers of other vehicles, such as forklift drivers).
- 🔊 After assessment by the operator, the beeper, flasher and Headlights can be activated for better visibility.

**⚠DANGER**



**Risk of fire and explosion**

Improperly sweeping up explosive or flammable liquids, gases or materials can create explosive vapors or mixtures.

- 🔊 The robot is not suitable for sweeping up liquids.
- 🔊 Never use the robot to sweep up explosives or flammable liquids, gases and acids/alkalis or solvents (e.g. gasoline, diesel, paint thinner, acetone, battery acid, heating oil, etc.).
- 🔊 Never sweep up reactive dusts (e.g. metal dusts of aluminum, magnesium, zinc) or flammable materials (e.g. coal, flour or wood) with the robot.
- 🔊 Never use the robot in ATEX protection zones.
- 🔊 Do not use the robot to sweep up flammable toxic, corrosive, irritating, radioactive or other harmful substances.
- 🔊 Do not use the robot near flammable or explosive substances and do not sweep up burning or smoldering objects.

**⚠WARNING**



**Risk of accidents due to operation by untrained personnel**

Operating the robot by untrained personnel can lead to accidents and serious injuries.

- 🔊 The robot may only be operated by staff who have been instructed and are familiar with these instructions.
- 🔊 People who are working with the robot for the first time should have the safe handling and application explained by a qualified person or the manufacturer.
- 🔊 All people present must be informed about the use of the robot and know the person responsible.
- 🔊 Vulnerable people, such as children or people with limited physical, sensory or mental abilities, as well as animals, must not be present during the operation of the robot.
- 🔊 The robot must not be played with.
- 🔊 Observe country-specific safety regulations and occupational safety.
- 🔊 Anyone operating the robot must be rested, healthy, in good condition and free from alcohol, drugs and reaction-reducing medication.

**⚠WARNING**



**Rotating parts**

During operation, there is a risk of injury from touching rotating parts.

- 🔊 The robot may be touched during operation only on the control panel.
- 🔊 The robot must not be touched in the area of the brushes, wheels and filter cleaning during operation.

**⚠ CAUTION**

	<p><b>Risk of accident</b></p> <p>Contamination, moisture drops or other influences can lead to false detections. Collisions cannot be completely ruled out. In principle, these collisions are not a problem for the robot, but sensitive objects could be damaged as a result.</p> <ul style="list-style-type: none"> <li>⚠ Dangerous objects that could be knocked over or damaged in a collision (ladders, poles, containers of dangerous substances, electrical appliances, etc.) must not be located in the robot's working area.</li> <li>⚠ Protect touch-sensitive objects such as cars, furniture etc.</li> <li>⚠ Remove hoses, cables, tapes, belts and the like from the Robot's working area, as these can lead to chain reactions.</li> </ul>
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**⚠ CAUTION**

	<p><b>Risk of injury</b></p> <p>To avoid objects, the robot may occasionally reverse a short distance. Since the robot does not have proximity sensors on the rear, it does not recognize when people approach from behind.</p> <ul style="list-style-type: none"> <li>⚠ Do not approach the robot from behind during operation.</li> </ul>
---	---

**2.3.4 Hazards during maintenance and repair**

This chapter describes the potential hazards that can occur during the maintenance and repair of the robot. Regular Maintenance work is essential to ensure the performance and longevity of the robot. At the same time, these activities involve specific risks that affect both the safety of the maintenance person and the integrity of the robot. These include mechanical injury hazards, electrical risks and chemical hazards from cleaning agents and lubricants.

**⚠ CAUTION**

	<p><b>Risk of accident</b></p> <p>The use of unauthorized accessories and spare parts can lead to damage to the robot and thus to accidents.</p> <ul style="list-style-type: none"> <li>⚠ Only use original KEMARO accessories and spare parts and obtain these from the respective sales and service partner or directly from KEMARO.</li> </ul>
---	---

**⚠CAUTION**



**Health hazard**

If the robot is used without an air filter, dirt particles can get into the dust extraction system and be released into the ambient air.

- 🔊 The robot must never be used without a built-in air filter even when the dust extraction is switched off.

**⚠CAUTION**



**Hot device parts**

Risk of burns from hot device parts.

- 🔊 Do not touch the motors, especially the disc brushes, after the robot has been in operation.
- 🔊 Wait until the machine has cooled down, at least 60 minutes.

**⚠WARNING**



**Risk of injury**

Performing maintenance work on a switched-on robot can lead to unwanted activation of an actuator (e.g. brushes or wheel drive).

- 🔊 Always switch off the robot before carrying out maintenance work.

**⚠WARNING**



**Risk of injury**

Performing service work that goes beyond the maintenance work described.

- 🔊 Service work that goes beyond the maintenance work described may only be carried out by qualified personnel from the respective sales and service partner.
- 🔊 Service work may only be carried out with the battery disconnected.

**⚠CAUTION**



**Health hazard from dust**

Inhaling dust can be harmful to your health.

- 🔊 Ensure that the dust extraction system is functioning optimally and that suitable protective equipment is worn when maintaining the robot.
- 🔊 Check the system regularly for function and the filter for contamination and defects.
- 🔊 Replace the filter periodically to avoid unnecessary inhalation and to avoid the spread of dust. In addition, the cleaning performance of the robot is increased by a well-maintained dust extraction system.

**⚠ CAUTION****Risk of injury**

Accidental activation of the robot during service, cleaning and maintenance work can lead to cuts and bruises to the hands. The robot can also get in the way and cause foot injuries.

- ⚠ Always disconnect the battery from the robot during service work.
- ⚠ Always switch off the robot during cleaning work.

## 2.4 Machine-specific hazards

### 2.4.1 Hazards from electrical energy

The electrical connection of the robot to the supply network and work on the electrical equipment may only be carried out by qualified electricians, taking into account the relevant standards and regulations.

The robot's electrical equipment must be checked at regular intervals. Defects such as loose connections, chafed or scorched cables must be rectified immediately.

The robot must be switched off immediately in the event of faults in the electrical power supply.

#### Safety rules

Observe the following safety rules when carrying out work on electrical systems/equipment:

1. Disconnect!
2. Secure against reconnection!
3. Determine freedom from voltage!
4. Ground and short-circuit!
5. Cover or cordon off adjacent live parts!

### 2.4.2 Hazards when charging the robot

This chapter describes the potential hazards that can occur when charging the robot's battery. Charging a battery requires special care, as improper handling can lead to serious safety risks such as overheating, fire or explosion. It is essential that the charging instructions are followed strictly to ensure the safety of users and the life of the battery.

**⚠ DANGER**



**Risk of explosion**

The charging contacts of the charging station and the robot can ignite sparks upon contact.

- ⚡ Never use the robot and charger in potentially explosive environments (ATEX).

**⚠ DANGER**



**Electric shock**

Danger to life from water entering the charger. Danger to life from contamination on the charger. Danger to life from damaged charger, cable and plug.

- ⚡ Never expose the charger to moisture (e.g. dripping water, rain, snow, etc.).
- ⚡ Always keep the charger, charging ports and charging contacts clean.
- ⚡ If you notice any damage, do not use the components under any circumstances.
- ⚡ Check the charging contacts of the charging station and the robot regularly and make sure that the cable connections are tight.
- ⚡ Never open the charger.
- ⚡ Make sure that the charger is installed correctly and is connected.

**⚠ DANGER**



**Fire hazard**

Use of unauthorized chargers.

- ⚡ Only charge the battery with the supplied charger.
- ⚡ Avoid unnecessary charging and do not charge the battery for a long time when you are not using it.
- ⚡ Always use an original battery supplied by KEMARO. The use of other batteries is prohibited, even if the battery appears outwardly identical.

**NOTE**



**Device damage**

The charging contacts of the charging station and the robot have a harmless low voltage. These contacts are short-circuit proof, but the following applies:

- ⚡ Avoid short-circuiting the contacts.

<b>⚠ DANGER</b>	
	<p><b>Fire hazard</b></p> <p>The charger can get hot during the charging process. It can get very hot, especially at high ambient temperatures.</p> <ul style="list-style-type: none"> <li>⚠ Do not place the charger on an easily flammable surface.</li> <li>⚠ Do not mount the charger on an easily flammable wall (e.g. paper, textiles, chemicals).</li> <li>⚠ Do not operate the charger in a flammable or damp environment.</li> <li>⚠ Keep the area around the charging station free of dust, dirt and other contaminants.</li> <li>⚠ Be careful when touching the charger during the charging process, as it can get hot during the charging process.</li> <li>⚠ Note the mains voltage of the charger. The voltage of the power source must match the information on the charger's rating plate.</li> </ul>

### 2.4.3 Hazards from being drawn in

This chapter discusses the potential hazards that can arise from objects or body parts being drawn into the robot. The robot has moving parts and suction mechanisms that can pose a significant hazard during operation if used improperly.

<b>⚠ WARNING</b>	
	<p><b>Rotating parts</b></p> <p>Loose clothing, jewelry and long hair could be drawn into the robot and cause injury.</p> <ul style="list-style-type: none"> <li>⚠ Be especially careful when wearing clothes with long thin ribbons, laces, ties, necklaces, hair ties, jewelry and the like, as well as open long hair.</li> </ul>

### 2.4.4 Hazards from ejected parts

This chapter describes the potential hazards that can arise from ejected parts during robot operation.

<b>⚠ CAUTION</b>	
	<p><b>Risk of injury</b></p> <p>A sharp object (e.g. a chip) gets caught in the brushes and is thrown out.</p> <ul style="list-style-type: none"> <li>⚠ Always get out of the way of the approaching robot and make sure the robot doesn't cut you.</li> <li>⚠ Make sure that any personnel present are aware that the robot is in operation.</li> </ul>

## 2.4.5 Hazards from oils, greases, lubricants and other chemical substances

This chapter deals with the potential hazards that may arise from handling oils, greases, lubricants and other chemical substances in connection with the robot. These substances may be used to lubricate moving parts or to clean the device and pose risks to the health and safety of users.

### NOTE



#### Device damage

The use of lubricants or silicone oils causes swirled-up dust to stick to it. This forms an abrasive paste, which can lead to increased wear and thus to malfunctions.

- ⚠ Do not use any lubricants or silicone oils for the maintenance and care of the robot.
- ⚠ All sliding and bearing points are either specially designed for dry running or lubricated for life.

## 2.4.6 Thermal hazards

This chapter deals with the potential hazards that can arise from thermal effects during the operation of the robot.

### DANGER



#### Fire hazard

If the robot is used without an air filter, dirt particles can get into the fan electronics and lead to a fan fire.

- ⚠ The robot must never be used without an installed air filter, not even when the dust extraction is switched off.

## 2.4.7 Hazards from accessories

Only accessories and additional equipment that comply with the manufacturer's specifications may be used on the robot. The manufacturer is not liable for any damage caused by the use of unauthorized third-party products or changes to the accessories or additional equipment.

## 2.5 Important information for battery / charger



#### Warranty information

Improper handling, short circuit or opening of the battery will void any warranty claims!

- The lithium-ion battery installed in the robot is a quality product and meets the required safety regulations and standards.
- The battery does not have a classic memory effect.
- It is recommended to fully charge the battery at the beginning of use and after longer breaks and then completely discharge it. These 1-2 recommended charging cycles are used to calibrate the battery management system.
- If the robot is stored for a longer period of time, a possible deep discharge of the battery should be avoided. To do this, store the battery with a battery charge level of 50% and check the charge level of the battery approximately every 3 months. If necessary, charge it to approx. 50%.
- Charge the battery completely before using it for the first time after storage.
- Store the battery in a frost-free, cool and dry place. The optimal storage temperature is 10°C - 20°C.
- The battery can generally be connected to the charger for a longer period of time. That, however, may lead to a higher electricity consumption.
- Interrupting the charging process does not damage the battery.
- The ambient temperature for charging the battery must be within a temperature range from 0°C - 40°C. However, the battery reaches its maximum lifespan when it is charged at ambient temperatures between 10°C and 30°C.
- A temperature range of -10°C - 45°C is permitted during the discharge process. Note that the battery capacity decreases sharply at low temperatures.



### **The battery is to be regarded as a wearing part and is not indefinitely durable**

If the battery cannot be charged, the cell voltage has fallen below the critical value and the battery is defective. In addition, a significantly shortened operating time after charging indicates that the battery is used up.

- In the event of a defective or used battery, please contact KEMARO customer service.
- Shipping the battery by forwarding agent or parcel service is not permitted without special Packaging and labeling. Before shipping, check the relevant guidelines of the countries concerned or consult the freight forwarder in this regard.
- The lifespan of the battery can be extended if it is well cared for and, above all, stored and used under the right conditions. With increasing age, the capacity of the battery will decrease even with good care.

### **2.5.1 Hazards from installed battery**

This chapter deals with the potential hazards that can arise from the battery installed in the robot. Batteries are central components of modern devices but also harbor specific risks that can impair the safety and health of users.

<b>⚠ DANGER</b>	
 	<p><b>Risk of fire and explosion!</b></p> <p>The battery can explode if not used properly or ignite due to a short circuit.</p> <ul style="list-style-type: none"> <li>⚠ Never use the robot to sweep up explosive or flammable liquids, gases, and acids/alkalis or solvents (e.g. gasoline, diesel, paint thinner, acetone, battery acid, heating oil, etc.).</li> <li>⚠ Observe the separately supplied operating instructions of the charger before first use.</li> <li>⚠ Do not open or disassemble the battery.</li> <li>⚠ Protect the battery from heat (e.g. from constant sunlight), fire and immersion in water.</li> <li>⚠ Keep small metal objects (e.g. paper clips, nails, screws, keys, etc.) away from the stored battery. These could cause a bridging of the contacts.</li> <li>⚠ Do not subject the battery to mechanical shocks.</li> </ul>
<b>⚠ DANGER</b>	
 	<p><b>Risk of skin irritation and burns</b></p> <p>If used incorrectly, liquid may leak from the battery.</p> <ul style="list-style-type: none"> <li>⚠ Avoid contact with leaking liquids.</li> <li>⚠ If contact with leaking liquids occurs, rinse the affected body parts with water.</li> <li>⚠ If the liquid comes into contact with mucous membranes (e.g. eye) seek immediate medical attention.</li> </ul>
<b>⚠ DANGER</b>	
	<p><b>Electric shock</b></p> <p>Danger to life when using a damaged battery.</p> <ul style="list-style-type: none"> <li>⚠ Do not subject the battery to mechanical shocks, there is a risk that the battery will be damaged.</li> <li>⚠ Never use a damaged battery.</li> <li>⚠ Keep the battery clean and dry and away from children.</li> </ul>

## 2.6 2.6 Safety and monitoring devices

### 2.6.1 Safety and monitoring devices

#### General

The safety devices on the robot serve to protect personnel from hazards caused by the robot, which was built according to applicable legal regulations and is safe to operate. Constructively unavoidable danger points are marked with

warning signs on the robot and safety instructions in the operating manual.

The robot may only be operated if all safety devices and safety-related devices are present and functional.

<b>⚠ DANGER</b>	
	<p><b>Danger due to disassembly or manipulation of and on safety devices</b></p> <p>The disassembly or manipulation of and on safety devices can result in serious irreversible or even life-threatening injuries, serious health-damaging effects or considerable property damage.</p> <ul style="list-style-type: none"><li>⚠ Do not disassemble any safety devices.</li><li>⚠ Do not manipulate safety devices.</li><li>⚠ Check all existing safety devices in regular intervals.</li></ul>
<b>⚠ WARNING</b>	
	<p><b>Risk of accident due to missing or defective safety devices</b></p> <p>Bodily injury may occur if unauthorized Changes are made to the safety devices.</p> <ul style="list-style-type: none"><li>⚠ Check the protective devices for functions before operation and replace defective safety devices.</li><li>⚠ Do not change any safety devices.</li></ul>

### 2.6.2 Existing safety devices

#### 2.6.2.1 Object recognition

The robot uses various sensors to detect its surroundings and cleans without colliding with obstacles. The robot can also navigate in complete darkness. Nevertheless, depending on the setting, collisions with Objects may occur:

1. Very thin object
2. Object with low height

If there is a collision, this is determined via 3 mechanisms:

1. Collision sensors on the front cover
2. Blocking of the disc brushes
3. Overload on the drive wheels

In this case, the robot stops, moves back a bit and continues in a different direction. If the robot is in a very tight environment and can no longer free itself (frequent collisions), the cleaning process stops. The operator must then guide the robot back to the station.

## 2.6.2.2 Safety instructions on the device

There is a warning notice on the frame plate behind the LiDAR unit on the device. This is covered by the dirt container.

<b>⚠ CAUTION</b>	
	<p><b>Laser radiation</b></p> <p>The robot contains a sensor (LiDAR) that works with laser radiation. The laser in this sensor is classified as Class 1. Class 1 lasers pose no danger under reasonably foreseeable operating conditions.</p> <p>👁 Nevertheless, avoid looking directly into the laser beam, otherwise eyesight may be irritated.</p>

## 2.6.2.3 Information for emergencies

### Behavior in case of emergency

In the event of an emergency on the machine, it must be shut down via the emergency stop devices on the machine. It must be checked whether there are any injured people.



### Important information for your safety

You are responsible!

In any case, the safety instructions in chapter "3 Basic safety instructions" and the locally applicable safety regulations must be observed and complied with.

### Behavior in case of accident

In the event of an accident, follow the following rescue chain:

1. Initiate immediate measures
2. Call the emergency number (rescue service or fire brigade)
  - WHO is reporting?
  - WHAT happened?
  - HOW did it happen?
  - WHERE did it happen?
  - WAIT for questions!
3. Inform the factory gate about the alarm and arrival of the rescue service as well as about the accident site
4. Provide first aid
5. Wait for and instruct the rescue service

### Behavior in case of fire

In the event of a fire, follow the following rescue chain:

1. Keep calm
2. Report the fire immediately and with precise information about the location of the fire and the extent of the fire
3. Call the emergency number (rescue service or fire brigade)
  - WHO is reporting?

- WHAT happened?
  - HOW did it happen?
  - WHERE did it happen?
  - WAIT for inquiries!
4. Warn employees and colleagues
  5. Switch off ventilation, transport and heating systems
    - Close pipelines
    - Close the main gas valve
    - If necessary, de-energize electrical systems
  6. Leave the danger area via stairwells and marked escape and rescue routes
    - **DANGER:** Do not use elevators!
    - Crouch down (protection from smoke and heat)
    - Carry out defined measures in accordance with the fire protection regulations
    - Saving human lives takes precedence over firefighting
  7. Without endangering yourself, participate in the rescue until the fire brigade arrives  
Participate in rescue and extinguishing measures
  8. Throw fire blankets, coats or similar over burning people and wrap them in it (if necessary, smother the fire by rolling the injured person)
  9. Never extinguish burning fat with water
  10. When the fire brigade arrives, instruct their incident commander, house, escape and  
Hand over rescue route plans and corresponding keys

### Suitable extinguishing agents

Use suitable extinguishing agents for firefighting:

Water

- Extinguishing water can be used in electrical systems with and without voltage despite impurities and dissolved salts if safety distances are observed. A spray jet is better than a full jet, as the atomization improves the insulating effect.

Carbon dioxide

- A CO<sub>2</sub>-Fire extinguisher is ideal for fires in electrical systems because it is non-conductive. However, from a volume fraction of 8% in the air, it has a suffocating effect and poses a risk to life, especially in narrow, poorly ventilated rooms. Respiratory protection and minimum distances are mandatory.

### **WARNING**



#### **Toxic fumes can be produced in fires!**

Toxic fumes can lead to suffocation or other health risks.

- 🚫 Wear appropriate protective equipment during firefighting measures
- 🚫 Do not carry out firefighting against the wind

### 3 Machine description, structure and function

#### 3.1 Intended use

The robot is to be used exclusively for the intended use described here.

The robot is intended exclusively for dry cleaning of solid and level floors inside buildings. If in doubt, check before the first use whether the floor to be cleaned is suitable for dry cleaning by means of Sweeping robot. The robot is intended for industrial use, such as in warehouses, forwarding companies, assembly and factory halls, retail and wholesale or parking garages. The robot may only be used if:

- It is in perfect technical condition.
- The personnel has the necessary safety and hazard awareness.
- The instructions in the operating manual are followed.

#### 3.2 Reasonably foreseeable misuse

The robot is not intended for any purpose other than the intended use listed here.

In principle, any use other than the intended use is considered improper use. This means that safe operation is no longer guaranteed. The operating company and not the manufacturer is responsible for all personal injury and property damage resulting from improper use.

Foreseeable misuse also includes the absorption of flammable liquids, burning or smoldering objects, as well as use in potentially explosive environments (ATEX).

In addition, the robot can crash during operations in rooms that have dangerous, unprotected abysses, causing life-threatening injuries. Such are considered to be falling edges, which have a fall height of more than 2 meters.

#### 3.3 Conversions and changes

For safety reasons, conversions and modifications to the robot are only permitted after consultation with the manufacturer.

The use of non-original spare parts can void the liability for resulting consequences. Therefore, always use only the specified spare parts, this applies especially to safety-relevant components.

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## 3.4 Technical data

### Dimensions and weight

	Value	Unit
Length/Depth	79	cm
Width	72	cm
Height	35	cm
Working width	90	cm
Weight	32	kg
Weight of dirt container empty	4	kg
Permissible total weight dirt container	15	kg

Tab. 6: Dimensions and weight

### Operating values

	Value	Unit
Protection class	54	IP
Area coverage (theoretical)	1000	m <sup>2</sup> /h
Maximum Driving speed, approx.	0.7	m/s
Maximum ramp slope	12	%
Operating temperature	-20 - 45	°C
Ambient temperature for battery charging	0 - 40	°C
Storage temperature of the robot	-10 - 45	°C
Recommended storage temperature	10	°C
Relative humidity during operation, non-condensing	25 - 85	%

Tab. 7: Operating values

### Connection values and power - electricity

	Value	Unit
Battery type	Lithium-Ion	-
Battery voltage, nominal	36	V
Battery capacity	540	Wh

	Value	Unit
Runtime (depending on cleaning setting)	2 – 5	h
Power consumption (depending on cleaning setting)	110-300	W
Charging time, approx.	2.5	h
Mains voltage charger	100 – 240 ±10%	V~
Mains frequency charger	50/60	Hz
Power consumption charger	300	W
Filter area fine dust filter	2	m <sup>2</sup>
Air filter dust class	M	

Tab. 8: Connection values and power – Electricity

## Emission values

	Value
Sound power level at low dust extraction power	66 db(A)
Sound power level at maximum dust extraction power	72 db(A)

Tab. 9: Emission values

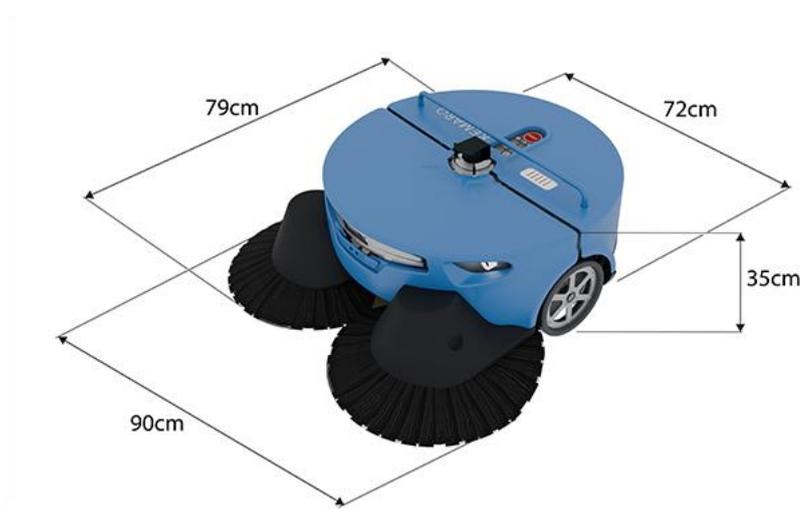


Fig. 3: Dimensions of the robot

### 3.5 Location requirements

In order to ensure the trouble-free operation of the robot, the following location requirements and installation conditions must be met.

### Space requirements for charging station

The space requirement must be determined according to the installation instructions of the charging station.

### Floor

The floor for setting up the robot must be level and horizontal.

### Temperature

The ambient temperature must be between -20 °C and +45 °C to ensure smooth operation.

### Electrical connection

The values and qualities regarding the electrical connection must be taken from the technical data.

## 3.6 Equipment and accessories

The equipment and accessories of the robot correspond to the wording of the order confirmation.

**In addition to the equipment supplied, there are no additional accessories.**

## 3.7 Structure

### 3.7.1 General overview



#### **Important information about the working areas and the cleanliness of the**

The following areas on the robot must always be freely accessible:

- Working area in front of the robot.
- Area for maintenance and repair work.

Cleanliness and order must be maintained on the robot and in its working area.

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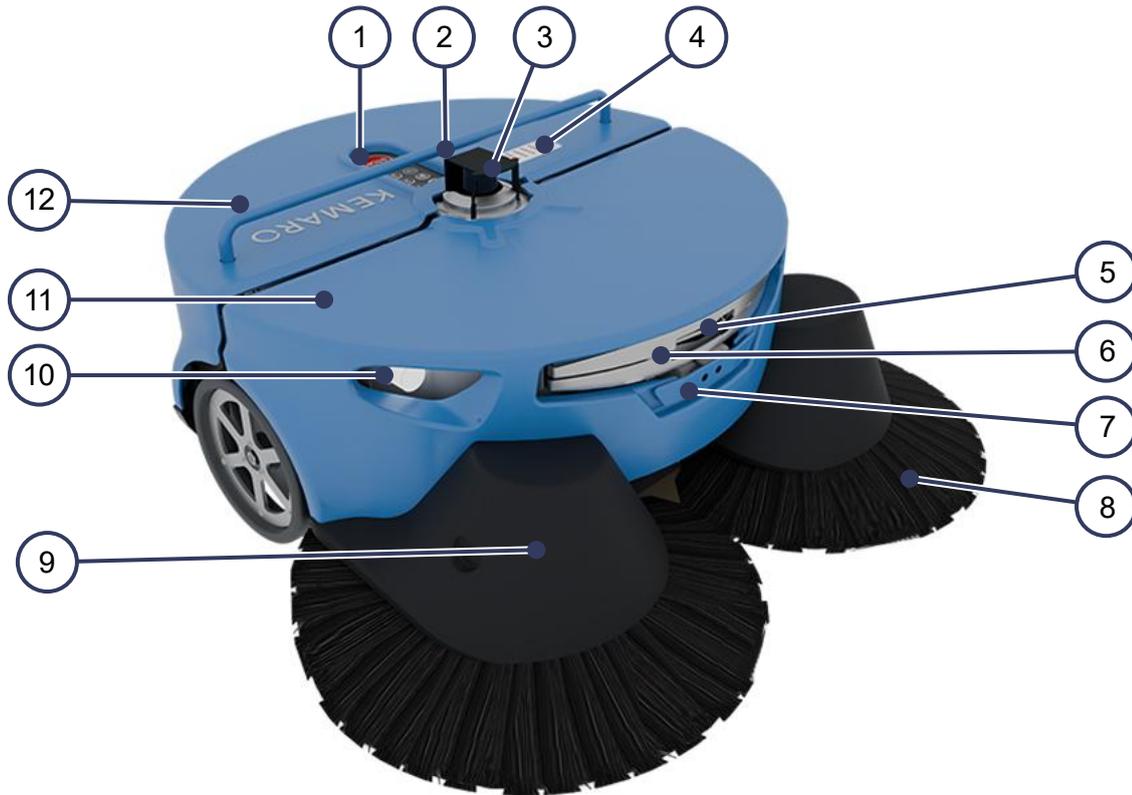


Fig. 4: Machine structure (front view)

- 1 Control panel
- 2 Dirt container handle
- 3 LiDAR
- 4 Flasher
- 5 3D Sensor
- 6 Battery charging contact
- 7 Trolley handle
- 8 Disc brush
- 9 Humps
- 10 Headlights
- 11 Cover
- 12 Dirt Container

## 3.7.2 Robot

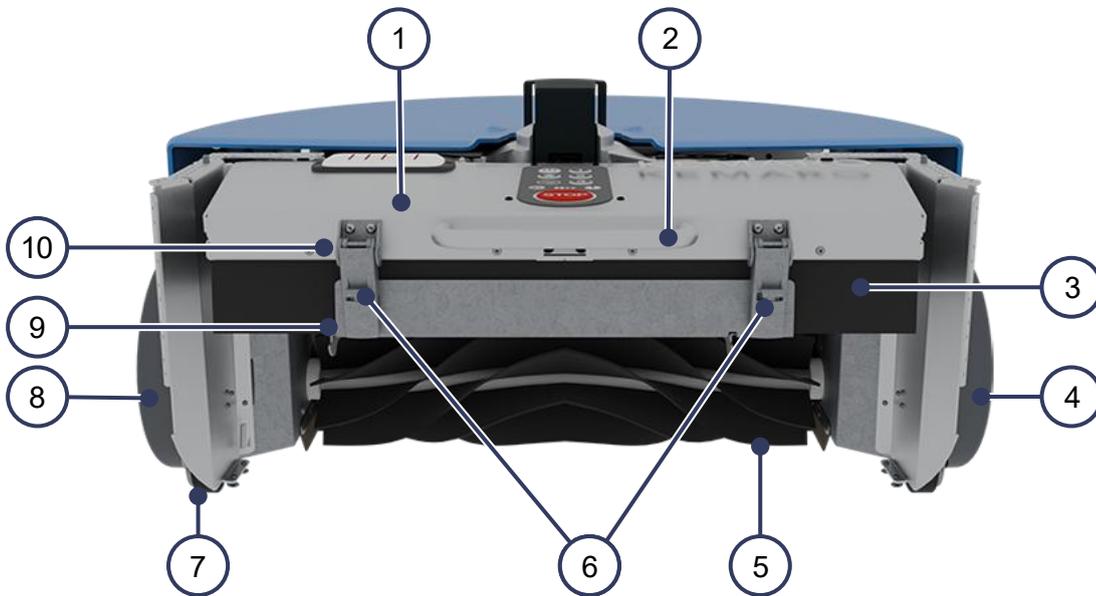


Fig. 5: Rear view

- 1 Air filter box
- 2 Transport handle
- 3 Air filter
- 4 Drive wheel right
- 5 Roller brush
- 6 Air filter cover
- 7 Transport roller
- 8 Drive wheel left
- 9 Air filter bracket
- 10 Optional filter cleaner

### 3.7.3 Charging station

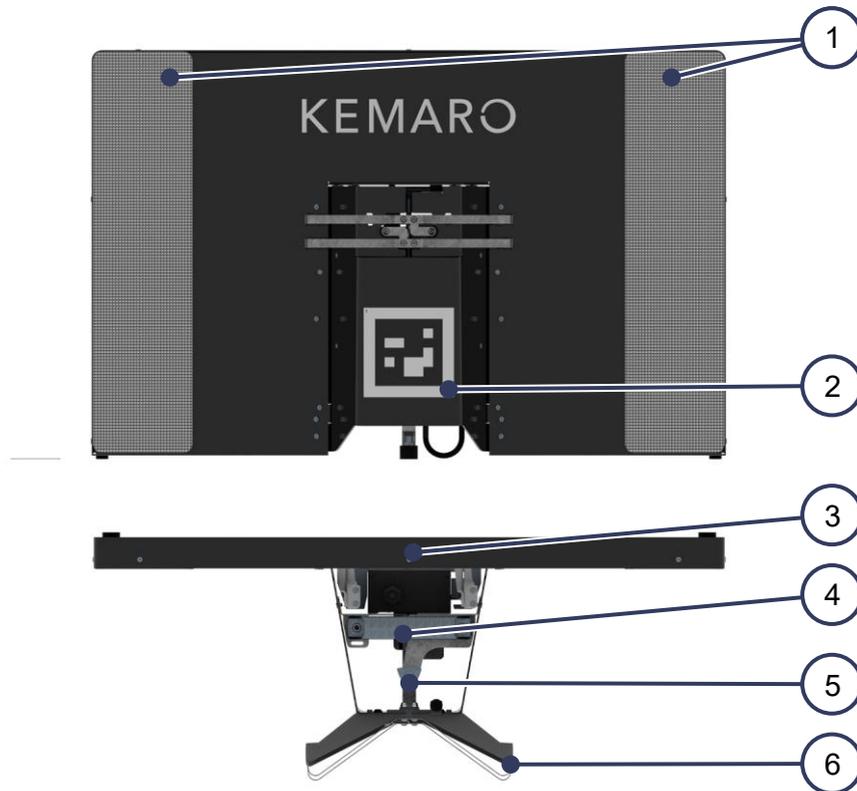


Fig. 6: Structure of the charging station from the front and from above

- 1 Reflection stripes
- 2 QR code
- 3 Wall mount
- 4 Charger with LED
- 5 Alignment aid
- 6 Charging contacts

## 3.8 Functional and system description

### 3.8.1 Robot

The machine is designed for dry cleaning of solid and level floors inside buildings. In the rear area of the robot is the removable dust/dirt container. The dust whirled up during sweeping is collected by the built-in air filter to keep the air clean in the vicinity of the robot.

### 3.8.2 Charging station

The charging station is responsible for charging the built-in battery. It is permanently mounted on a wall and requires sufficient free space so that the robot can always find it. The robot recognizes the charging station by the marking strips attached there.

### 3.8.3 Interfaces

The robot has the following interfaces:

- Charging contacts
- WIFI
- LTE

### 3.8.4 Safety and monitoring devices

#### 3.8.4.1 Fall prevention

The robot is equipped with a fall sensor for added safety. This sensor is located on the front wheels of the robot.

#### The fall prevention works as follows:

The wheels are pressed onto the ground by the weight of the robot. This ensures stable operation during normal use.

If the robot encounters an area without ground support, such as on a staircase, the wheels fold down. At this moment, the fall sensor detects immediately the lack of ground contact.

The robot responds to the missing wheel by stopping operation immediately. This safety feature minimizes the risk of accidents and protects both the robot and potential users.

## WARNING



### Risk of injury

A faulty fall sensor will result in failure to detect stairs and the robot falling. This can result in injuries to the leg area

- Maintain the fall protection regularly as described in the corresponding chapter.
- Mark or zone out stairs.

## 4 Delivery, assembly and transport

### 4.1 Introductory safety information



#### **Personnel qualification**

The following personnel is authorized for "Transport, installation and storage":

- Transport company with relevant expertise.
- KEMARO AG personnel with relevant professional experience and expertise in handling the robot.
- All electrical work may only be carried out by instructed and authorized Operating personnel



#### **Important information for your safety**

You are responsible!

In any case, the safety instructions in the chapter "Basic safety instructions" and the locally applicable safety regulations must be observed and complied with.

### 4.2 Delivery

#### 4.2.1 Scope of delivery

The following parts are included in the scope of delivery:

- Robot
- Dirt container
- Charging station
- Remote control

#### 4.2.2 Checking for transport damage

Remove the device from the packaging and check the entire scope of delivery for any transport damage.

## 4.3 Packaging

### Unpack robot

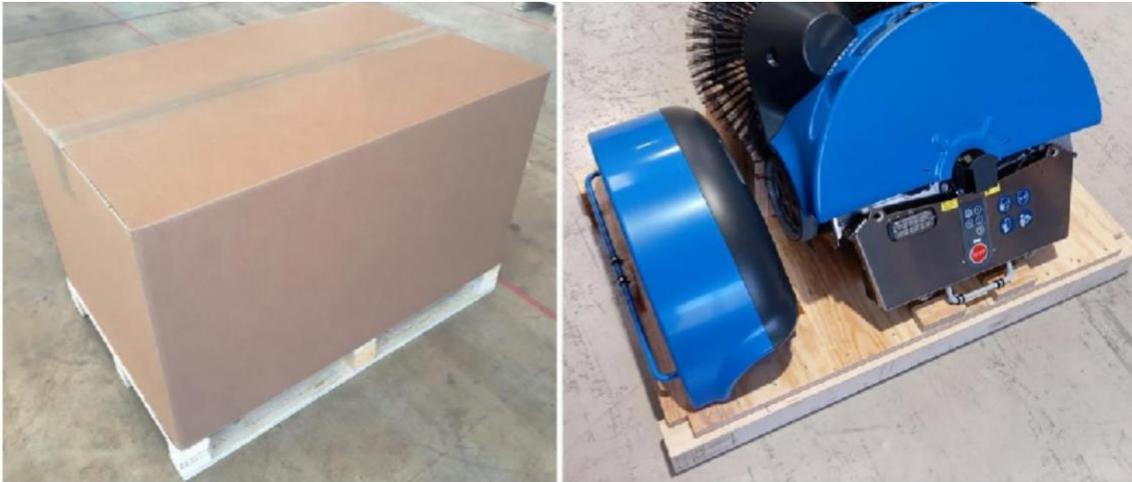


Fig. 7: Packed robot

1. Remove the cardboard box.

ⓘ The cardboard box can be used as a base during assembly.



Fig. 8: Fixed dirt container and wall bracket

2. Remove the two pipe clamps on the dirt container and place the Dirt container aside.
3. Remove the screw and set the wall bracket aside.



Fig. 9: Fixed wheel and handle

4. Remove the 2 cable ties on the wheels and the two pipe clamps on the handle.



Fig. 10: Trolley handle / Robot removed from the pallet

5. Pull out the trolley handle to the mark. Lift the robot in pairs carefully by the trolley handle and the handle at the back off the wooden pallet.



Fig. 11: Accessory box

6. Remove remote control, charging station, cable, operating instructions and Charging station.

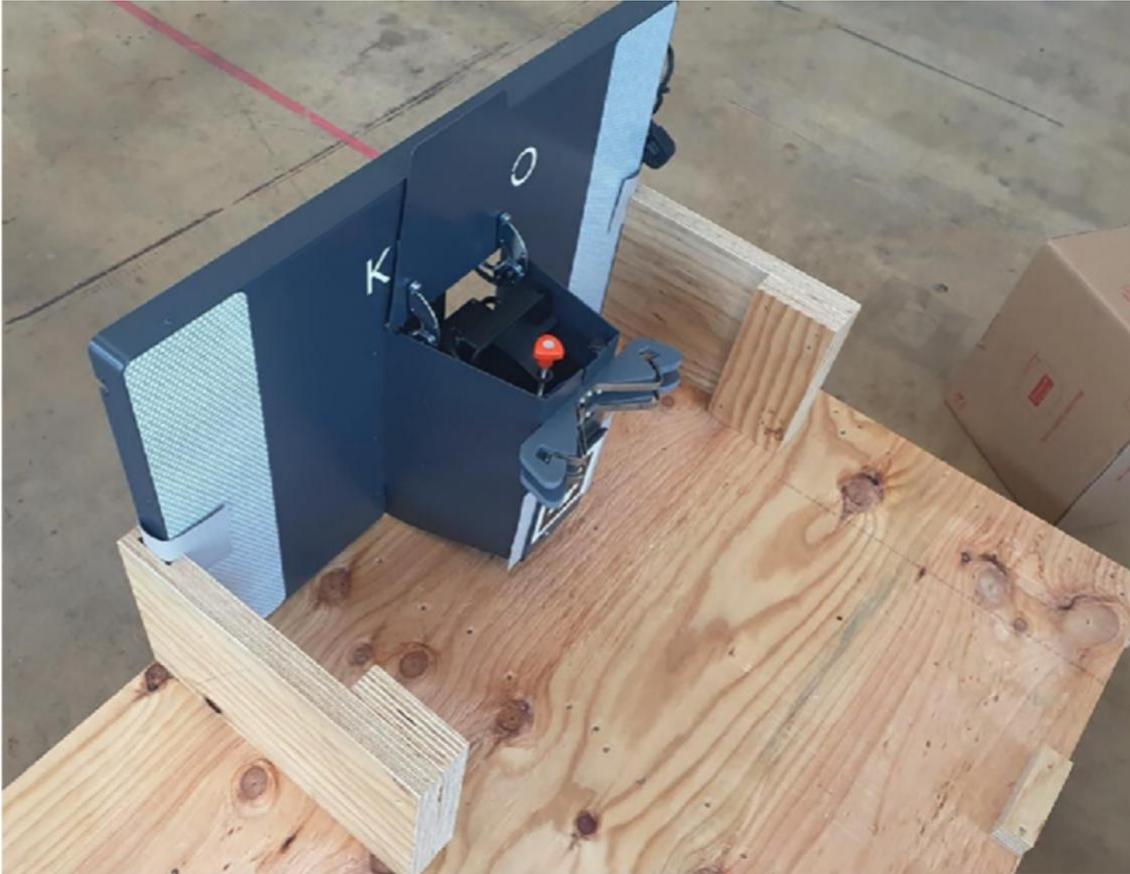


Fig. 12: Charging station in transport packaging

7. Open the lid of the charging station. Lift the charging station by the handle from the packaging.

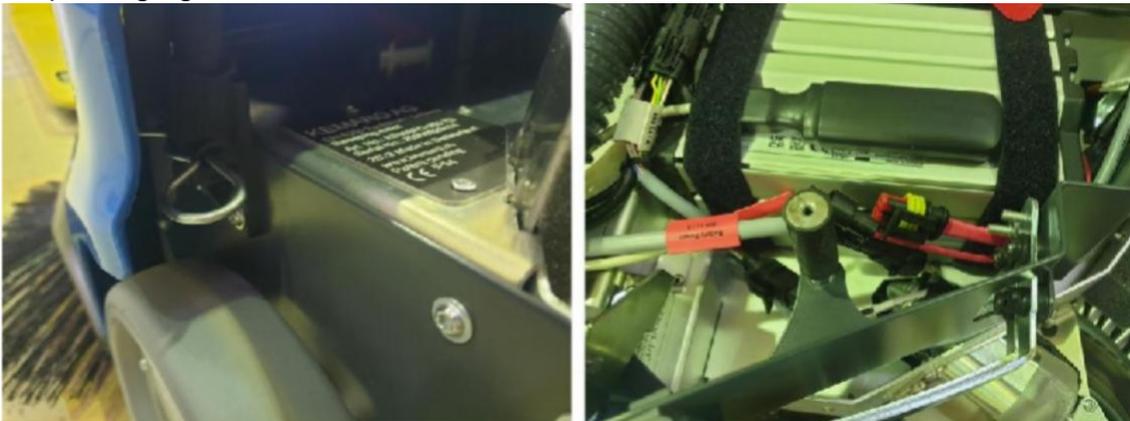


Fig. 13: Split pin of the hood and battery cable

8. Disassemble the hood. To do this, remove the 2 split pins above the wheels. Pull the trolley handle out a little and lift the hood over it.
9. Connect the 2 battery cables (red). Assemble the hood, making sure that the hood is secured by the split pins. Install the dirt container.

## 4.4 Assembly

### 4.4.1 Assembly of the dirt container

<b>⚠ CAUTION</b>	
	<p><b>Crushing hazard</b> Fingers can be crushed when inserting the dirt container after emptying.</p> <ul style="list-style-type: none"><li>👉 Always hold the dirt container by the handle</li><li>👉 Keep your fingers well away from potential pinch points</li></ul>



Fig. 14: Assembly of the dirt container

1. Hold the dirt container with one hand on the dirt container handle and with the other hand on the handle recess in the rear lower area of the dirt container.
2. Slide the dirt container slightly raised over the robot.
3. Hang the dirt container so that the dirt container is on the same height as the hood.
  - ✓ The dirt container is assembled.



Fig. 15: Correctly attached dirt container

#### 4.4.2 Disassembly of the dirt container

### WARNING



#### Risk of injury

There is a risk of back injury when emptying the dirt container. Especially with the Heavy Load option, a high weight of the filled dirt container (greater than 10kg) is possible.

- Follow the procedure in these operating instructions when emptying the dirt container.
- Lift the dirt container with a straight back and bent knees to ensure correct posture and avoid injury.
- Lowering the load should also be done from the knees to prevent injuries.



Fig. 16: Dismantling the dirt container

1. Lift the dirt container straight up.
2. Remove the dirt container by moving it backwards away from the robot. away.
  - ✓ The protective container is dismantled.

**NOTE**



**Equipment damage**

Malfunctions due to start-up with the dirt container removed.

- ⚠ Always interrupt the cleaning program before dismantling of the dirt container.

## 4.5 Transport

### 4.5.1 Permissible means of transport



Fig. 17: Extended trolley handle for transport

The robot can be transported as follows:

- Move using the trolley handle or carrying handle
- Carry (2 people)

### 4.5.2 Moving the device

<b>NOTE</b>	
	<p><b>Device damage</b></p> <p>If the trolley handle slips out of your hand, the robot will fall on the front rollers. This could damage the robot.</p> <p>🔊 Hold the trolley handle firmly during transport.</p>

The robot can be moved to the place of use using the trolley handle. Proceed as follows:

1. Remove the dirt container.
2. Pull the trolley handle out of the rest position.
  - ✓ The robot can now be moved by one person.

**NOTE**



**Malfunction**

If the trolley handle is not properly engaged, this could lead to malfunctions during operation.

⚠ After use, always push the trolley handle completely into the rest position.

**4.5.3 Carrying the device (2 people or transport handle)**

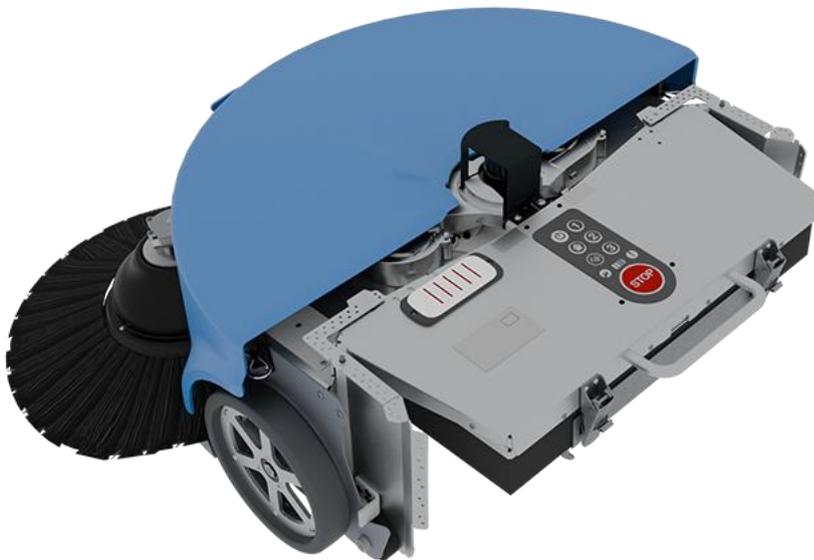


Fig. 18: Transport handle with the dirt container removed

If there is no other option, the robot can be carried by 2 people. Proceed as follows:

- The robot must be switched off.
- 1. One person lifts the robot by the trolley handle, while the other person simultaneously lifts it by the transport handle at the rear of the air filter box.
  - ① The trolley handle may be extended by a maximum of one hand's width.
  - ① The robot must never be lifted only by the trolley handle, otherwise it may be damaged.
  - ✓ The robot can now be carried.

## 5 Setup and Installation

### 5.1 Introductory Safety Notes



#### Personnel Qualification

The following personnel are authorized for "Setup and Installation":

- KEMARO AG personnel with special knowledge of setup and teaching from training by specialist personnel on the machine
- All electrical work may only be carried out by instructed and authorized operating personnel.



#### Important information for your safety

You are responsible!

In any case, the safety instructions in the chapter "Basic Safety Instructions" and the locally applicable safety regulations must be observed and complied with.

### 5.2 Installation of the charging station

#### 5.2.1 Free space around the charging station

When installing the charging station, make sure that there is enough free space for the robot in front and on both sides.



#### Note

- Do not place the charging station in a corner. The more free space, the more reliably the robot can approach the charging station
- Do not place any boundary cones or other highly reflective objects within 2 meters of the charging station.

#### 5.2.2 Set up charging station

Find a suitable place to set up the charging station. Make sure there is enough free space around the charging station (see 5.2.1 Free space around the charging station on page 53).

1. Remove the robot and the charging station from the packaging.

①The charging station consists of 2 parts.

2. Find a suitable place to set up the charging station. Pay attention to sufficient free space around the charging station (see chapter 5.2.1. Free space of the charging station).

3. Fix the wall bracket to a stable, non- flammable wall with screws.

4. Place the charging station in the wall bracket.

①The mains connection cable **must** be fixed to the charging station and must not be loose lie on the floor, especially if extension cables are used. Otherwise, the robot could get caught in the cable.

### 5.2.3 Adjust the height of the charging contacts

Adjust the height of the charging contacts using the alignment aid (see Fig. 7: Structure of the charging station).

1. Position the charging station cleanly on the wall and place the robot at the charging station.
2. Then adjust the height of the charging contacts with the alignment aid so that the charging contacts of the charging station and the robot are centered to each other.
  - When the robot moves to the charging station, it exerts a slight pressure on the charging station.

① If the charging station is not well put against the wall, the distance can be adjusted with the rubber buffer (see Fig. 17: Rear view of the charging station with rubber buffer)

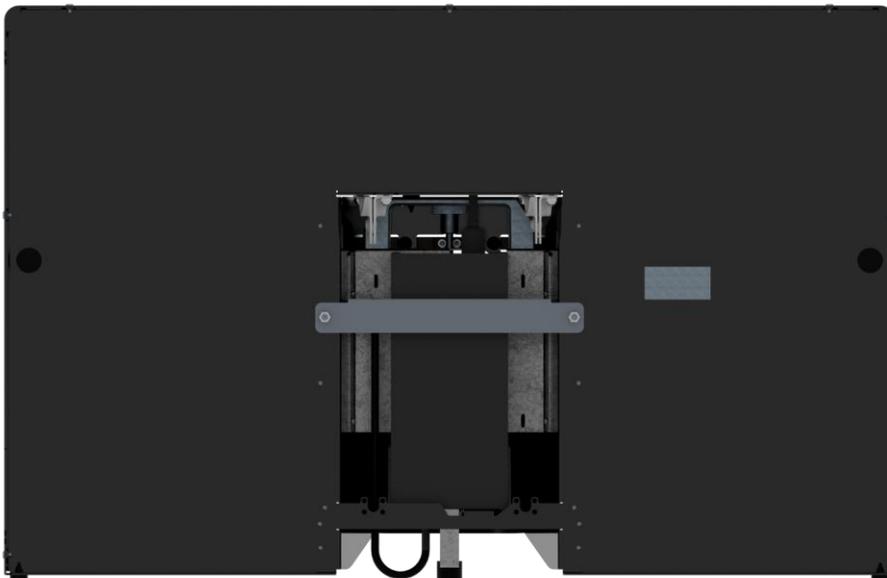


Fig. 19: Rear view of the charging station with rubber buffer

The reflection strips and 2D code on the charging station are used by the robot to find and approach the charging station. Clean the reflection strips and the 2D code from time to time (do not use aggressive cleaning agents). If these markings are scratched or defective, replace them.



#### **Clean the charging contacts regularly!**

Dirty charging contacts can cause charging problems

- Regularly clean the charging contacts on the robot and on the charging station to ensure that good contact is achieved.

## 5.2.4 Configuration

### 5.2.4.1 Cleaning settings

The robot can be accessed via the robot's WIFI hotspot. With this interface, a cleaning map can be created or viewed, as well as various cleaning settings configured and a schedule set.

### 5.2.4.2 Connecting to the robot

1. Use your smartphone, tablet or laptop to select the WIFI hotspot «Kemaro\_202009XXXX».

① The WIFI name contains the serial number of the device.

2. Enter the supplied password to establish a connection.
3. Enter «10.0.0.1» in your browser.
  - The web app will open.



#### **Note!**

When using with a mobile phone, the mobile data connection may need to be deactivated first

### 5.2.4.3 Cleaning parameters

Cleaning parameters can be set in the configuration area of the web app and are loaded the next time cleaning is started.

## 6 Operating and display elements

### 6.1 Operating and display elements, operating modes



#### **Important information for your safety**

You are responsible!

In any case, the safety instructions in chapter "2 Basic safety instructions" and the locally applicable safety regulations must be observed and complied with.

Familiarize yourself with the operating and display elements, because this is the only way to operate the machine optimally!

### 6.2 Operating elements, display and control instruments

The device has the following controls:

- Control panel on the robot
- Remote control
- Web app

### 6.3 Control panels

#### 6.3.1 Control panel on the robot

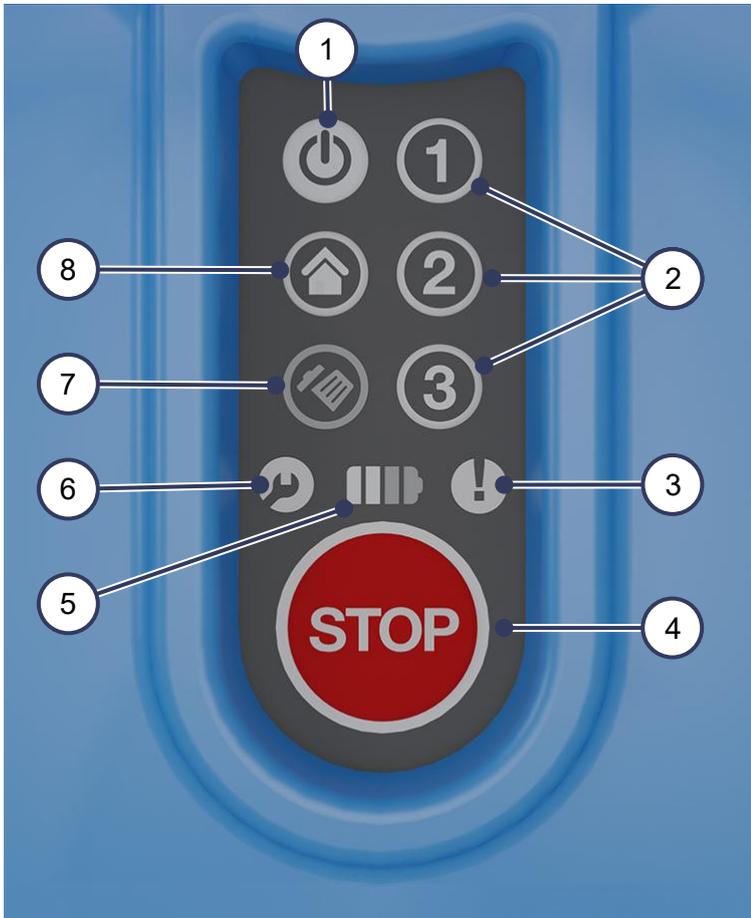


Fig. 20: Control panel on the robot

Symbol	Function	Description
<b>1. On/Off - button</b>		
	<ul style="list-style-type: none"> <li>• Short Press</li> <li>• Long press (&lt;2 s)</li> <li>• Long Press (&gt;10 s)</li> <li>• Button lights up</li> <li>• Button flashes</li> </ul>	<ul style="list-style-type: none"> <li>• The robot turns on. The 3 cleaning buttons and the homing button flash during startup</li> <li>• The robot turns off</li> <li>• Forces a shutdown of the robot</li> <li>• The robot is switched on</li> <li>• The robot is in standby mode</li> </ul>

Symbol	Function	Description
<b>2. Configured Cleaning</b>		
	<ul style="list-style-type: none"> <li>Press button</li> </ul>	<ul style="list-style-type: none"> <li>The buttons start the stored cleaning program, these buttons can be configured in the web app</li> </ul>
<b>3. Homing</b>		
	<ul style="list-style-type: none"> <li>Press button</li> </ul>	<ul style="list-style-type: none"> <li>The button starts to light up. The robot returns to the starting position / charging station</li> </ul>
<b>4. Emptying</b>		
	<ul style="list-style-type: none"> <li>Press button</li> </ul>	<ul style="list-style-type: none"> <li>The robot indicates a possible full dirt container. The display is reset by pressing the button</li> <li>Flashes when the filter cleaning is active</li> <li>The filter cleaner can be started by pressing for 3s</li> </ul>
<b>5. Maintenance Indicator / Service Mode / Remote connection</b>		
	<ul style="list-style-type: none"> <li>Lights up</li> <li>Flashes</li> </ul>	<ul style="list-style-type: none"> <li>Maintenance Indicator</li> <li><b>In normal operation:</b> The robot needs to be serviced / The robot is in online maintenance mode</li> <li><b>Remote connection:</b> The robot is connected to the WIFI</li> <li><b>Service mode:</b> The robot is in commissioning / service mode</li> </ul>
<b>6. Error Display</b>		
	<ul style="list-style-type: none"> <li>Lights up</li> </ul>	<ul style="list-style-type: none"> <li>An error prevents operation</li> </ul>
<b>7. Battery Indicator</b>		
	<ul style="list-style-type: none"> <li>Lights up</li> <li>Flashes</li> </ul>	<ul style="list-style-type: none"> <li>Indicates the battery level</li> <li>The battery is charging. The charging process only takes place when the robot is switched on</li> </ul>

## Operating and display elements

### Symbol

### Function

### Description

#### 8. Stop button



- Press button
  - The current cleaning process is paused. The cleaning can then be continued (same cleaning mode) or the robot can be sent to the charging station.
- Longer Press (> 3 s)
  - The robot stops and ends the cleaning process.

If cleaning is started from the control panel, the robot cleans until the battery capacity is low.

#### 6.4 Remote control

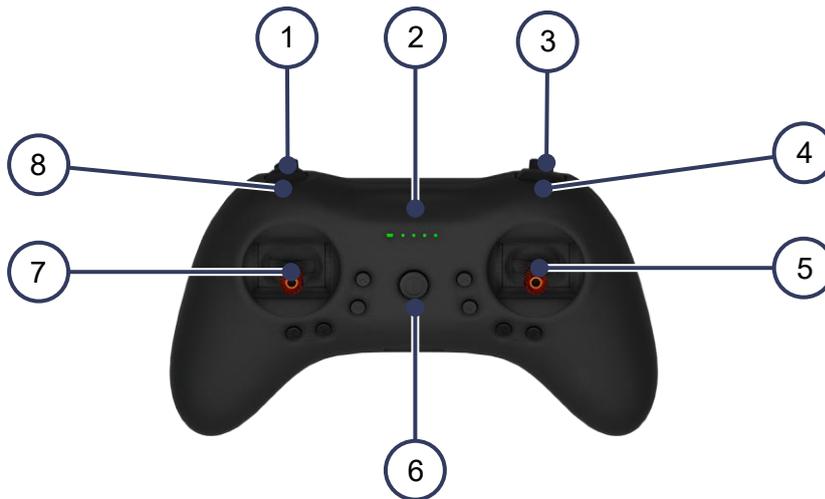


Fig. 21: Remote control

### Symbol

### Function

### Description

- |   |                            |   |
|---|----------------------------|---|
| 1 | RC activate (three stages) | 1. Off<br>2. On (with headlight)<br>3. On (with beeper+flasher) |
| 2 | Battery Indicator          | Shows the charge level of the remote control                    |
| 3 | Fan power (three stages)   | 1. Off<br>2. 50%<br>3. 100%                                     |
| 4 | Brushes backwards          | The brushes turn away from the robot                            |
| 5 | Direction control          | The lever steers the robot in all directions                    |

6	On / Off	Turns the remote control on or off
7	Forward	Controls the speed at which the robot moves forward
8	Brush speed	Controls the speed of the two brushes



**All other controls are inoperative.**

## ⚠ DANGER



### **Risk of accident due to operation via the remote control**

In remote control mode, the sensors in the robot are not effective. In this mode, the robot only follows the driving commands that are received via the remote control and therefore does not stop in front of obstacles by itself.

- ⚠ The operator must have a clear view of the robot at all times in order to have control over the situation and, if necessary, immediately be able to stop or swerve. He must not be distracted.
- ⚠ Do not steer the robot too close to fall edges (take reaction and evasion routes into account).
- ⚠ No persons may be in the possible fall area.
- ⚠ Always keep an eye on the charge level of the remote control and end the remote control mode in good time. If the charge level of the remote control battery is too low, the robot can no longer be controlled.
- ⚠ Please note the separate operating instructions for the remote control.
- ⚠ If the radio connection is interrupted, the robot stops automatically.

The robot can be controlled manually with the remote control. The autonomous control of the robot is completely switched off then . As soon as the remote control is switched on and set to active, buttons 1, 2, 3 and Homing light up on the robot. The robot now only reacts to the remote control.



### **Notes for remote control operation**

The sensors are switched off in remote control mode!

### **⚠ DANGER**



#### **Fire hazard**

Charging the remote control batteries.

- ⚠ Only charge the remote control batteries within the Remote control using the supplied USB charger and USB cable.
- ⚠ The remote control must be switched off for charging.

## **6.5 Fault indicators**

Please consult the web app to display the fault.

## 7 Deployment

### 7.1 Introductory Safety Notes



#### **Personnel Qualification**

The following personnel are authorized for "Connection, Assembly and Deployment":

- KEMARO AG personnel with relevant professional experience and expertise in handling the machine
- All electrical work may only be carried out by instructed and authorized qualified electricians



#### **Important information for your safety**

You are responsible!

In any case, the safety instructions in chapter 3 "Basic Safety Instructions" and the locally applicable safety regulations must be observed and complied with.

#### 7.1.1 First Deployment

The first deployment takes place together with KEMARO AG or a sales partner.

## 8 Operation

### 8.1 Operating and display elements, operating modes



#### Personnel qualification

The following personnel are authorized for "Operation":

- KEMARO AG personnel with special knowledge of setting up and teaching from training by specialist personnel on the robot
- All electrical work may only be carried out by instructed and authorized qualified electricians



#### Important information for your safety

You are responsible!

In any case, the safety instructions in chapter 3 "Basic Safety Instructions" and the locally applicable safety regulations must be observed and complied with.

### 8.2 Switch on the robot

➤ Before switching on the robot, make sure that the battery is charged.

1. Switch on the robot by briefly pressing the On/Off button.

### 8.3 Switch off the robot

1. Press and hold the On/Off button for at least 2 seconds.

① The device switches off.

- If the On/Off button is pressed for more than 10 seconds, this will force a Shutdown of the device.

### 8.4 General operation

- ✓ In principle, no further installation is necessary for the operation of the K900. The only exceptions are the fixed installation of the charging station and physical boundaries of stairs or ramps.

Unless otherwise set, the robot tries to clean every area it can reach.

The robot continuously records the environment with its sensors and saves it in a map. This allows it to remember its starting position (charging station) in order to return to it when the battery capacity is low.

#### 8.4.1 Manual start

1. Start the robot via the control panel with buttons 1-3.

- ✓ The robot cleans in the stored cleaning mode until the battery level is low. There is no automatic restart after charging.

## 8.4.2 Time-controlled mode

1. Start the time-controlled cleaning via the web app.

The robot cleans until the battery level is low. After charging, the robot restarts until the set time has expired.

## 8.5 Cleaning via web app

Cleaning can also be started via the web app.

### Functions of the web app:

- Automatic software update
  - Online cleaning reports with map display
  - Status, error message and robot position
  - Intuitive operation on tablet, smartphone or laptop
  - Individual configuration of cleaning programs
1. Open the web app in the browser
  2. Start cleaning via the "START CLEANING" button on the Dashboard
  3. If cleaning is started from the control panel, the robot cleans until the Battery capacity is low.

## 8.6 Charging station

The charging station enables automatic charging of the robot. In order for the robot to be able to approach the charging station independently, the cleaning process must be started directly from the charging station or from a maximum of 5m visual distance to the charging station. If this is the case, the robot will go to the charging station as soon as the battery charge level is low.



### Information

The charging station must not be moved while the robot is in operation!

## 8.6.1 Charging process

The charger has an LED that indicates the status of the charging process:

LED charger	Charging process
Blinks green	Standby, no robot detected at charging station
Lights up green	Charging process completed, battery is full
Blinks red	Error case (contact KEMARO Support)
Lights up red	Battery is charging

Tab. 10: Charging process

## 8.7 Shutdown due to cleaning stop

1. To switch the robot on again, press the corresponding program button (1-3) to continue the interrupted cleaning
2. Press one of the other program buttons (1-3) to select a desired Restart cleaning program
3. Press the Homing button to drive the robot to the charging station

## 9 Troubleshooting

### 9.1 Introductory safety notes



#### Personnel qualification

The following personnel are authorized for "Troubleshooting ":

- KEMARO AG personnel with special knowledge of setting up and teaching from training by specialist personnel on the robot
- All electrical work may only be carried out by instructed and authorized qualified electricians



#### Important information for your safety

You are responsible!

In any case, the safety instructions in chapter 3 "Basic Safety Instructions" and the locally applicable safety regulations must be observed and complied with.

### 9.2 Troubleshooting measure

#### 9.2.1 Simple troubleshooting

If the error indicator flashes, there is an error that prevents the robot from operating. Possible causes of errors and their checks:

Error	Check
Fall sensors respond	Is the robot standing on a level surface? Are all four wheels on the ground?
Brushes do not turn	Can all three brushes rotate freely? Is an object jammed or wrapped around the brushes?
Drive wheels do not turn	Are the drive wheels free? This can also be checked with the Remote control.

Tab. 11: Simple troubleshooting

#### 9.2.2 Complex troubleshooting

If an error occurs, the robot's error indicator lights up red. The web app gives Information about the error with instructions that must be followed to fix the problem.

If you cannot eliminate the error and the error continues to occur even after repeated restarts, please contact customer service.

## 10 Maintenance and repair

### 10.1 Introductory safety information



#### Personnel qualification

The following personnel are authorized for "Maintenance and repair ":

- KEMARO AG personnel with relevant professional experience and Expertise in handling the robot.
- All electrical work may only be carried out by instructed and authorized qualified electricians



#### Important information for your safety

You are responsible!

In any case, the safety instructions in chapter 3 "Basic Safety Instructions" and the locally applicable safety regulations must be observed and complied with.

### 10.2 Measures before maintenance and repair work

Switch off the device before any maintenance or repair work.

#### CAUTION



#### Risk of injury

Accidental activation of the robot during service, cleaning and maintenance work can lead to cuts and bruises to the hands. The robot can also start moving and cause foot injuries.

- ⚠ Always disconnect the robot's battery during service work.
- ⚠ Always switch off the robot during cleaning work.

### 10.3 Measures after maintenance and repair work

After each maintenance or repair work, carry out a test cleaning to ensure the correct function of the robot.

10.4 Notes on maintenance and servicing work

<b>NOTE</b>	
	<p><b>Device damage</b></p> <p>The use of lubricants or silicone oils causes stirred-up dust to stick to them. This creates an abrasive paste, which can then lead to more friction, increased wear and tear and thus to malfunctions.</p> <ul style="list-style-type: none"> <li>⚠ Do not use any of the following for the maintenance and care of the robot Lubricants or silicone oils.</li> <li>⚠ All sliding and bearing points are either designed specifically for dry running or lubricated for life.</li> </ul>

10.4.1 Notes on activities and cycles



All maintenance work can be carried out by instructed operating personnel.

The following maintenance work must be carried out regularly, depending on the operating conditions, but at least once a week:

Type of maintenance	Execution
Check disc brushes	Check disc brushes, remove dirt and check that they can rotate freely. If necessary, dismantle and remove dirt.
Check roller brush	Check roller brush, remove dirt and check that it can rotate freely. If necessary, dismantle and remove dirt.
Check air filter	Check the air filter and clean if necessary; Vacuum the air filter or, if there is no other option blow it out in the open air (personal Protective equipment). If the air filter or sealing ring is defective, replace the air filter exchange.
Clean 3D sensor and LiDAR	Clean carefully with a soft cloth. If necessary, use compressed air (< 8 bar).
Remove dirt	Remove any dirt left inside the robot, especially in the area between the disc brushes and the roller brush.
Steering rollers and drive wheels	The steering rollers and drive wheels are on Check for wear / contamination.
Check fall prevention mechanism	Manual movement of the hinge to check the mechanism.

Type of maintenance	Execution
Check rubber lips	Check the rubber lips (sweeping lip and on roller brush) for correct position and check for wear
Check foam seals (dirt container/air filter box)	Check the foam seal in the dirt container (glued on inside at the top) for wear. Check the foam seals on the side of the air filter box for wear
Clean charging contacts	Clean the landing contacts on the robot and on the charging station

Tab. 1: Komplexe Störungsbeseitigung

## 10.4.2 Notes on cleaning

<b>NOTE</b>	
	<p><b>Device damage</b></p> <p>The use of unauthorized cleaning materials can cause damage to the robot.</p> <ul style="list-style-type: none"> <li>⚠ Do not use aggressive chemicals to clean the robot</li> <li>⚠ Use a microfiber cloth with some lukewarm water</li> </ul>

## 10.5 Maintenance

### 10.5.1 Fall protection check

Checking the fall protection mechanism.

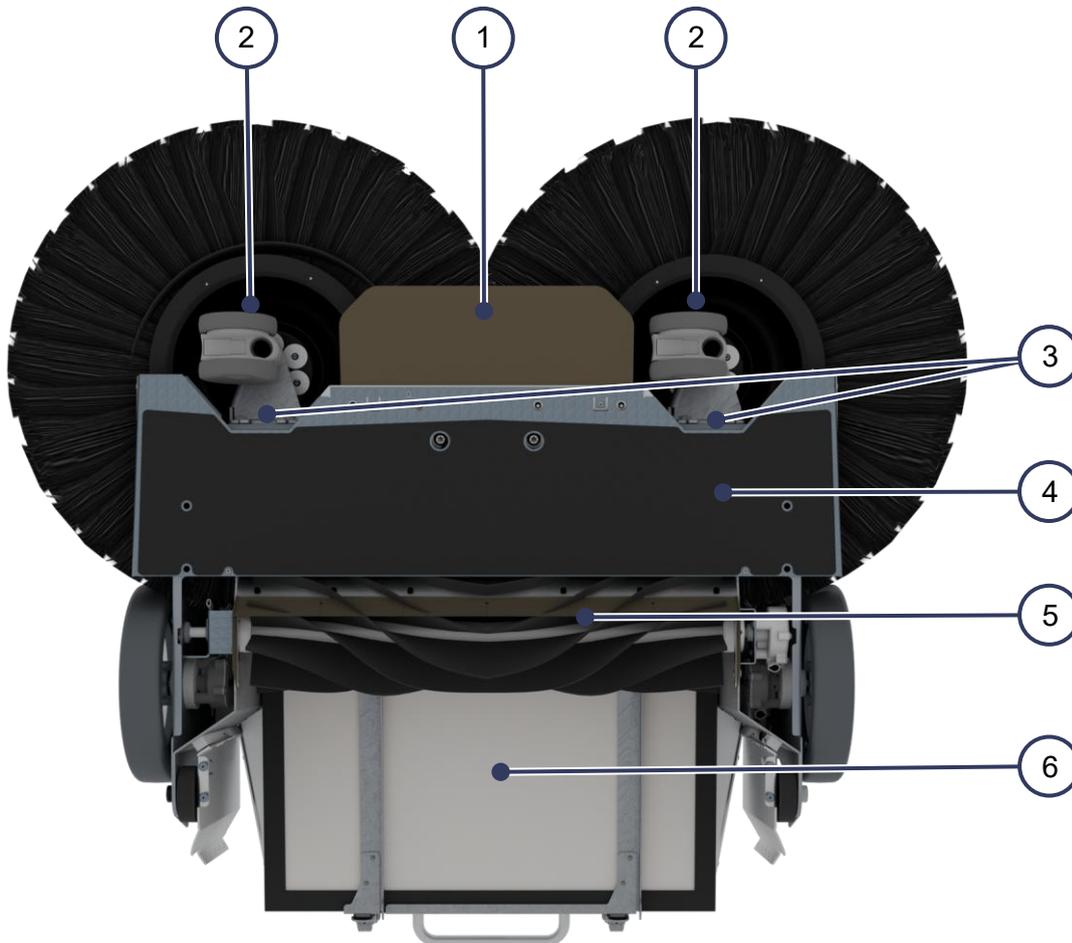


Fig. 22: View of the robot from below

1. Sweeping lip
2. Fall sensor (covered)
3. Steering roller
4. Anti-slip mat
5. Roller brush
6. Filter cleaner

The fall protection is the most important safety device of the robot. It must be checked and maintained at least once a week for correct function. Proceed as follows:

1. Switch off the robot.
2. Remove the dirt container.
3. Pull out the transport handle and lift the robot at the front.

- ① The robot may be placed on the transport handle at the rear, but the air filter must be correctly installed, otherwise the air filter brackets may be bent!
    - The steering castors must now be folded down as shown in the graphic (Fig. 21: View of the robot from below).
  - 4. Move the steering castors by hand to both end positions, check whether the entire travel can be completed without any problems, whether dirt has accumulated anywhere and whether there is not too much mechanical play.
  - 5. Clean the mechanism, especially in the area of the hinge and the fall sensor. Remove dirt that has wrapped around the fall protection (packaging film, tapes, etc.).
  - 6. Check the anti-slip mat for defects and remove dirt / Dust accumulations.
  - 7. Check the smooth running of the plate brushes at this opportunity.
  - 8. Lower the robot back onto the floor, switch it on and wait until it is ready for operation.
  - 9. Lift the robot again at the trolley handle as soon as the steering castors lose contact with the floor, the error display on the control panel must start to flash. Check both sensors by folding a hinge towards the sensor in each case.
    - The error must remain.
- ① If this is the case, the fall detection is working as desired.

### 10.5.2 Maintain dust extraction



Fig. 23: Opened air filter brackets with loosened air filter

The dust extraction system creates negative pressure under the entire housing of the KEMARO K900 and ensures that dust is extracted and does not get into the environment. A flat pleated filter with a filter area of 2 m<sup>2</sup> in total filters the Particles from the extracted air.

The better the system is maintained, the better and more efficient the dust extraction works. The air filter must be checked and cleaned regularly.

### 10.5.2.1 Clean filter

1. Remove the filter as described in the corresponding chapter (see 11.5.2.2 Filter remove).
2. Vacuum the air filter. If there is no other option, the air filter can also be blown out with the help of compressed air.

ⓘ Never blow out the air filter in enclosed spaces (think of your health and use personal protective equipment such as goggles, dust mask).

Cleaning the filter only removes coarse dirt; fine dust settles in the filter medium and hinders the air flow over time. If you notice a reduced dust extraction performance despite the filter being cleaned, or if the filter has a defect, it is necessary to replace the air filter. The maintenance cycles and changing the air filter are very dependent on the operating conditions. Until you have gained some experience with the system, we recommend that you carry out maintenance more frequently. If the air filter has become damp, it must be completely dried before the next use.

### Notes for robots with built-in air filter:

<b>⚠ DANGER</b>	
	<p><b>Fire hazard</b></p> <p>If the robot is used without an air filter, dirt particles can get into the fan electronics and cause a fan fire.</p> <p>🔊 The robot must never be used without a built-in air filter even if the dust extraction is switched off.</p>
<b>⚠ CAUTION</b>	
	<p><b>Health hazard</b></p> <p>If the robot is used without an air filter, dirt particles can get into the dust extraction system and be released into the ambient air.</p> <p>🔊 The robot must never be used without a built-in air filter even if the dust extraction is switched off.</p>
<b>NOTE</b>	
	<p><b>Equipment damage</b></p> <p>If the robot is used without an air filter, dirt particles can get into the dust extraction system and lead to the destruction of components.</p> <p>🔊 The robot must never be used without a built-in air filter even if the dust extraction is switched off.</p>

Device versions without a built-in air filter are excluded from this.

## Maintenance and repair

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### 10.5.2.2 Remove filter

1. Remove the dirt container as described in the corresponding chapter
2. Open both air filter locks while holding the air filter in place
3. You can loosen and fold down one lock at a time
4. Now the filter can be removed and cleaned / replaced

### 10.5.2.3 Install filter

1. Remove dirt and dust from the filter bracket
2. Check the air filter seal
3. Place the filter in the filter bracket (seal facing up) and position it in the center
4. Fold the filter brackets up and close the air filter locks
5. You can fold up and close one filter bracket after the other, it is not necessary to hold both locks at the top at the same time and then close them.
6. Check that the air filter flap is closed correctly and seals properly
7. The seal on the air filter should be compressed to approx.  $\frac{1}{3}$  –  $\frac{1}{4}$  of its relaxed height everywhere (i.e. to approx. 2-3 mm) so that it seals optimally. If this value is not reached, the preload can be readjusted by turning the locks.

### NOTE



#### Device damage

If an air filter is used that does not have the correct dimensions and properties or is poorly installed, the system is not tight, and dirt particles can get into the dust extraction system. This can cause damage to the robot

- ⚠ Only use original KEMARO air filters
- ⚠ Check that the filter is installed correctly
- ⚠ Make sure that the filter brackets are closed correctly

### CAUTION



#### Health damage

If an air filter is used that does not have the correct dimensions and properties or is poorly installed, the system is not tight, and dirt particles can be released into the ambient air.

- ⚠ Only use original KEMARO air filters
- ⚠ Check that the filters are installed correctly
- ⚠ Make sure that the filter brackets are closed correctly

### 10.5.3 Check rubber lips

Check the correct position and wear of the sweeping lip and rubber lips around the roller brush (position as shown in Fig. 21: View of the robot visible from below).

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### 10.5.4 Maintain sensors

The cleaned air from the dust extraction is guided via an air duct system over the optical sensors. This results in an extended cleaning interval time for the optical sensors. Therefore, care should be taken to ensure that the dust extraction is always well maintained. Nevertheless, the sensors must be cleaned.

Contamination of the sensors has a negative effect on navigation. If the robot stops and turns more often without an obstacle, this could be an indication of dirty sensors.

Switch off the robot to clean the sensors.

#### 10.5.4.1 LIDAR

##### Cleaning material

1. Compressed air (for dust)
2. Microfiber cloth or a soft, lint-free cloth
3. Neutral cleaning agent (Used for oil and stubborn stains)

##### Cleaning process

1. Please prepare 3 or more pieces of cloth. One for a mild detergent, a damp cloth and a dry cloth.
  2. Remove the dust with compressed air (max. 8 bar)
  3. For oil or heavy stains, dampen a cloth with diluted water with neutral cleaning agent and squeeze it firmly until no more drops of water come out. Use water for normal stains.
    - ①The lens is made of polycarbonate. Therefore, no alkaline Cleaning agents or solvents (alcohol, etc.) should be used.
  4. Wipe the optical lens horizontally with the prepared damp cloth.
    - ①Rubbing the dry lens surface with a dry cloth alone can cause static electricity and the dust easily adheres to the lens.
  5. If you used a neutral cleaning agent in step 3, please wipe with a damp cloth to remove the cleaning agent.
  6. Please wipe with a dry cloth and make sure that there are no more damp areas available.
    - ①If the LiDAR is in a dark or shady place and no direct lighting is received, the dirt on the lens is difficult to see. Please use an LED flashlight to check the condition of the lens.
    - ①Be careful and avoid scratches on the lens. The scratches on the lens can be recognized as objects.
-

### 10.5.4.2 3D sensor

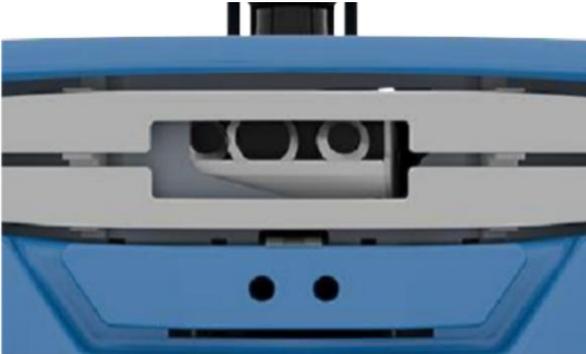


Fig. 24: 3D sensor

Use a clean, dust-free cloth and clean the lens of the 3D sensor.

### 10.5.5 Disassembly of the hood



Fig. 25: Position of the spring cotter pin on the right

Perform the following steps to disassemble the hood:

1. First, remove the dirt container.
2. Then pull the trolley handle forward slightly and remove the two spring cotter pins above the drive wheels (see Fig. 24: Position of the spring cotter pin on the right).
3. After that, the hood can be lifted slightly and extended forward become.
4. If the hood is far enough away from the plate brushes, it can also be removed from the Trolley handle can be pulled out.

### 10.5.5.1 Mounting the hood



Fig. 26: Rubber buffer pin in the guide

- Make sure that the trolley handle is extended far enough so that you can easily guide it through the opening in the hood.
  1. Lift the hood back over the plate brushes.
  2. Move the hood further back.
  3. The 2 rear rubber buffer pins must be in the corresponding guides above the Drive wheels. First insert one rubber buffer pin into the guide and only then the other. You may need to help the second pin a little with your fingers.
    - The two front centering devices automatically slide into their guides. If this is not the case, you can move the hood slightly back and forth to center the front pins.
    - The hood is correctly installed when it is at the same height as the correctly mounted dirt container.
  4. Now reattach the two spring cotters. Press lightly from above on the hood above the corresponding guide.
  5. Check that the spring cotter is seated correctly. To do this, pull lightly on the hood upwards. If the hood cannot be pulled upwards, the spring cotter is seated correctly. If this is the case, the spring cotter must be removed again and reassembled with slight pressure from above onto the hood.
  6. Finally, reassemble the dirt container.
    - ① After each assembly of the hood, the reset capability and free movement of the hood must be checked. Move the hood in all directions. After each relief, the hood should return to its original position.

**⚠ CAUTION****Risk of collision**

Incorrect installation of the hood can affect the collision sensors and lead to detection errors of the LIDAR. As a result, the robot may not immediately detect potential collisions.

- ⚠ Ensure that the hood is installed correctly.
- ⚠ When installing the hood, make sure that no objects or cables can lift the hood.
- ⚠ Never attach additional markings or similar in the field of vision of the LiDAR.

**10.5.6 Maintenance of the disc brushes****10.5.6.1 Replacing disc brushes**

1. Remove the hood (see 11.5.5 Removing the hood).
2. Unplug the two disc brush motors.

① The two disc brush drives are identical. The following instructions apply to the left and right disc brush drives.

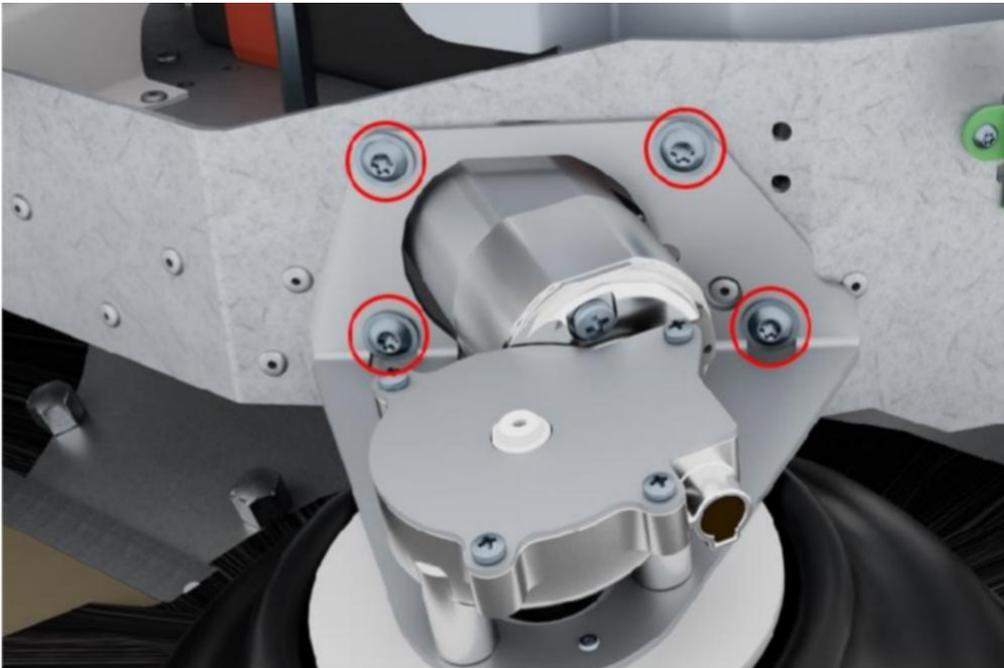


Fig. 27: Left disc brush holder

3. Loosen the 4 screws on each of the disc brush holders (see Fig. 26: Left Disc brush holder).
4. Now you can remove the entire disc brush drive with a slight twisting motion from its original position, pull the motor out of the recess and extend the disc brushes over the steering rollers. If you cannot turn the drive enough, it helps if you lift the robot slightly at the front so that the steering rollers can fold down

5. Turn the drive so that the plate brush is at the bottom and the motor is at the top. If you put the plate brush down in between, make sure that it is resting on the motor so that the bristles are not bent.
6. If something has wrapped around the motor shaft/brush body, it is necessary to remove the entire brush body, you do not need to do steps 8 and 9.



Fig. 28: Flange connection of the plate brushes with 6 screws (only 4 visible)

7. You can now see the flange connection with the 6 screws (see Fig. 27: Flange connection of the plate brushes with 6 screws (only 4 visible)).
8. Loosen the 6 screws and remove the brush.
9. If you only want to change the brushes, you can omit steps 11-13.
10. Turn the drive so that the motor is at the bottom and the brush body is at the top.



Fig. 29: Flange connection (clamping ring) of the plate brushes

11. You will now see another flange connection (clamping ring) and the associated 6 screws and washers (see Fig. 28: Flange connection (clamping ring) of the plate brushes).
12. Remove the screws and pull the brush body off the clamping ring. Now you can remove tapes or other dirt that has wrapped around the motor shaft.
13. Carry out the assembly in the reverse order of the steps mentioned above through.
14. Make sure that the cables are routed cleanly again and that the screws are secured with Screw locking (e.g. Loctite 243).
15. After installing the hood, always check whether the brushes are running without streak.

## 10.6 Maintenance

### 10.6.1 Maintain roller brush

Due to the geometry, long, thin dirt particles (such as packaging film, tapes, etc.) can wrap around the roller brush. Sometimes it is easier to remove the roller brush to remove the tapes.

#### 10.6.1.1 Remove roller brush

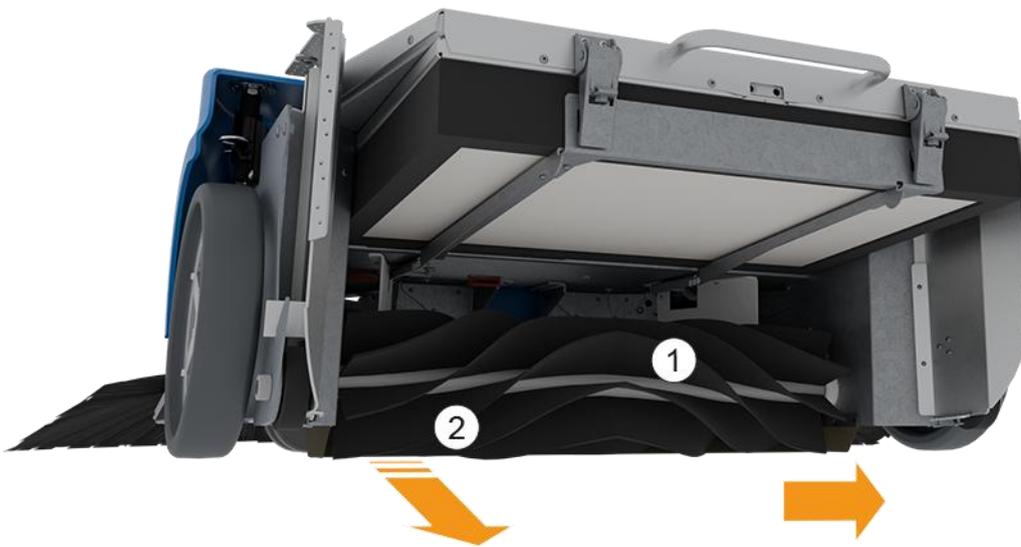


Fig. 30: Removing the roller brush

1. Remove the dirt container (see 4.3.3 Removing the dirt container).
2. Hold the roller brush and push it to the right (1).
3. Pull the roller brush out of the driver on the left and remove the Roller brush from the robot (2).

### 10.6.1.2 Mount roller brush

1. Make sure the roller brush is oriented correctly. The one formed by the bristles Arrow points upwards (see Fig. 29: Removing the roller brush).
2. Insert the roller brush into the right driver.
3. Push the roller brush to the right until you can also insert the roller brush on the left can insert into the driver.
4. Remove the lateral pressure and twist the roller brush until the Drivers engage on both sides.

## 10.7 Spare parts

### 10.7.1 General information about the spare parts list

Only use original accessories and original spare parts, they guarantee safe and trouble-free operation of the machine. You can order accessories and spare parts using the contact form at [www.kemaro.ch](http://www.kemaro.ch).

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## 11 Storage and disposal

### 11.1 Introductory safety information



#### Personnel qualification

The following personnel are authorized for "Storage and disposal":

- KEMARO AG personnel with relevant professional experience and Expertise in handling the machine
- All electrical work may only be carried out by instructed and authorized Qualified electricians

### 11.2 Storage

#### 11.2.1 Storage conditions

Store the robot in its packaging in a frost-free, cool and dry place at an ambient temperature of  $-10^{\circ}$  -  $45^{\circ}$  C.

If the robot is stored for a longer period of time, KEMARO recommends disconnecting the battery from the robot in order to prevent deep discharge of the battery. Proceed as follows:

1. Remove the dirt container.
2. Remove the hood of the robot. To do this, remove the 2 split pins above the Wheels.
3. Pull the trolley handle out slightly and lift the hood over it.
4. Disconnect the two battery cables (red).
  - The battery is now disconnected.
5. Then reassemble the hood.
  - ✓ The robot can now be stored.

### 11.3 Disposal

#### 11.3.1 Dismantling

<b>⚠ DANGER</b>	
	<p><b>Danger to life from electrical current and other energies</b></p> <p>Serious injury or death from electric shock or other energies on the machine.</p> <p>⚡ Disconnect the machine and the charging station before dismantling any external power supply</p>



#### Important information about dismantling

The machine may only be dismantled by instructed and authorized specialist personnel.

### 11.3.2 Proper disposal of materials and the environment



#### **Important Information**

The goal is to dispose of waste in a proper and environmentally sound manner. During individual maintenance work or when dismantling the robot, waste materials may be generated that need to be disposed of. Recommendations are given by the relevant bodies for this purpose

The recommendations for disposing of waste materials are derived from the regulations that apply at the place and time this guide was created. As the operator and user of a robot, you have a duty to inform yourself about the waste disposal regulations applicable to your region and to act accordingly.

#### **Packaging**

The transport packaging must be completely removed during initial commissioning. Please recycle the packaging material or dispose of it properly and in an environmentally friendly manner.

#### **Robot**

The KEMARO K900 consists of various components and materials. If components or the battery have to be replaced or disposed of, the national or regional regulations of the country of use must be followed (dispose of / treat / recycle). The same procedure must be followed if the robot is permanently decommissioned. The robot does not belong in the garbage, please take the robot to an environmentally friendly recycling facility.

#### **Disposal points**

Please refer to your region for the relevant disposal points.



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