

# User Manual

for the Robot Platform Types

Compact Robot Platform

Medium Robot Platform

Flex Robot Platform

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### **Note on Product Variants**

In these operating instructions, various product variants are documented. For operation, maintenance work and extensions, please apply the descriptions applicable to the respective type of robotic platform.

The product characteristics described in this user manual are subject to possible changes. Therefore, no claims to specific properties of the delivered device can be derived from the described properties.

## **1 Safety Instructions**

During operation, the robotic platform can cause injuries by hitting people. The robotic platform can cause damage to objects if it collides with them. The robotic platform may only be used in areas in which a sufficiently large distance to persons and objects can be ensured during the entire operating time so that no persons can be injured or objects damaged even during movements, changes in direction and during deceleration activities.

The robotic platform may only be operated by competent persons. Operation includes control via the remote control and changing the batteries. Knowledge is required for operation, which is imparted in these operating instructions.

The robotic platform may only be switched on under supervision. If the operator moves away from the robotic platform, the power supply must be interrupted by switching off the battery switch. The robotic platform may only be started up with sufficient visual contact so that all movements can be observed by the operator.

Depending on the ambient conditions, the supplied remote control has a limited range of several hundred meters. When operating the robotic platform with a longer distance from the remote control, a possible loss of connection and thus a loss of controllability of the robotic platform must therefore be taken into account.

The robotic platform may only be extended with extensions and superstructures by qualified personnel. Extensions must in turn comply with the relevant guidelines and standards. In addition, extensions to achieve autonomous driving manoeuvres may only be carried out by expert personnel. Extensions may only be put into operation after prior testing, risk assessment and in accordance with the relevant standards.

The robotic platform is not a toy and must not be started up or operated by children.

## **2 Intended Use**

The described product is a remote-controlled robotic platform. By means of the supplied remote control, the platform can be guided in any direction at various speeds. As delivered, the platform can only be operated with sufficient visual contact.

The robotics platform can be used as a basis for laboratory experiments or for own product developments. Additional devices and extensions can be mounted by skilled persons so that operations with these additionally mounted devices are possible. For use as a platform with additional extensions and superstructures or if the robotic platform is structurally modified, please refer to the safety instructions in chapter 1.

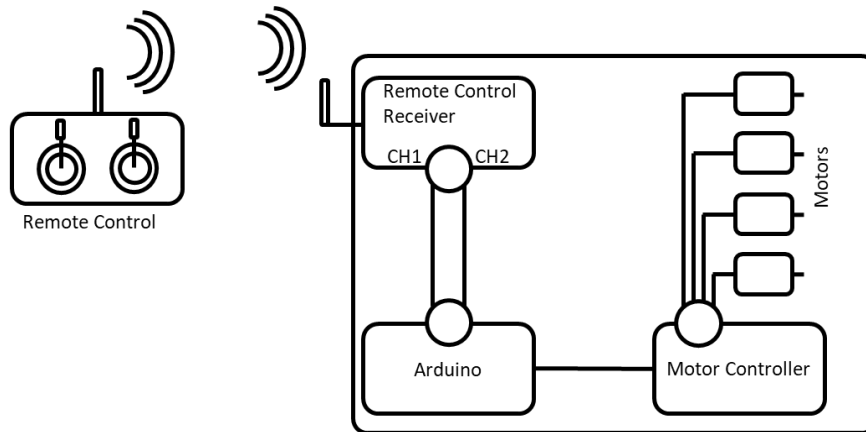
The robotic platform is not suitable for transporting persons, animals or hazardous goods. If this is the intended use, the relevant guidelines must be checked and complied with before the respective use. If necessary, additional certifications of the modified robotic platform or the robotic platform intended for the special purpose are required.

The robotic platform is not suitable for use in potentially explosive atmospheres.

### 3 Overview

#### 3.1 Description

The robotic platform can be controlled with the supplied remote control. Before starting operation, the remote control must be switched on. Afterwards the robotic platform can be switched on. The direction of movement is specified with the joystick on the remote control.



The robotics platform receives the control signals from a remote-control receiver. Via an Arduino with specially adapted firmware, the control signals are forwarded to the motor controller and, in combination with the movements of the right and left wheels, lead to straight or curved movements.

The robotic platform can be extended individually (taking into consideration the safety notes in chapter 1). Electronic components up to a certain size can also be accommodated in the housing of the robotic platform. The available installation space varies depending on the type of robotic platform and corresponds to the following sizes:

|                        |  |
|------------------------|--|
| Compact Robot Platform | 1x Raspberry Pi Zero                     |
| Medium Robot Platform  | 2x Raspberry Pi                          |
| Flex Robot Platform    | 4x Raspberry Pi or 2x NVIDIA Jetson Nano |

#### 3.2 Scope of Supply

After unpacking, all parts should be checked for possible transport damage. If transport damage has occurred, please contact your dealer or our customer service. The delivery of the robotic platform consists of the following parts:

|                        |  |
|------------------------|--|
| Compact Robot Platform | Robot Platform Type Compact<br>1x Remote Control (incl. Batteries)<br>1x BOSCH GBA Rechargeable Battery 18V, 4Ah<br>1x Charger for BOSCH GBA Batteries |
| Medium Robot Platform  | Robot Platform Type Medium<br>1x Remote Control (incl. Batteries)<br>2x BOSCH GBA Rechargeable Battery 18V, 4Ah<br>1x Charger for BOSCH GBA Batteries  |
| Flex Robot Platform    | Robot Platform Type Flex<br>1x Remote Control (incl. Batteries)<br>2x BOSCH GBA Rechargeable Battery 18V, 4Ah<br>1x Charger for BOSCH GBA Batteries    |

### **3.3 Operating Conditions**

The robotic platform can be operated in an environment with a relative humidity of up to 80%. Use in conditions with higher humidity can damage the robotic platform.

In the standard version, the robotic platform is suitable for short-term use in light rain. The cable glands on top of the housing must be protected from water penetration under these operating conditions.

Use in continuous rain or in scenarios with IP65 requirements is not possible.

### **3.4 First Use**

In the delivery state, the supplied rechargeable batteries are located separately from the robotic platform. The rechargeable batteries must be charged before first operation. The batteries can then be inserted into the housing. In order to do so, follow the instructions in sections 4.2.3 and 4.2.4.

## **4 Rechargeable Batteries**

### **4.1 Operating Conditions of the Rechargeable Batteries**

The rechargeable battery can be charged using the charger included in the supplied package. The manufacturer provides recommendations for operation and storage, which should be observed to ensure a long battery life.

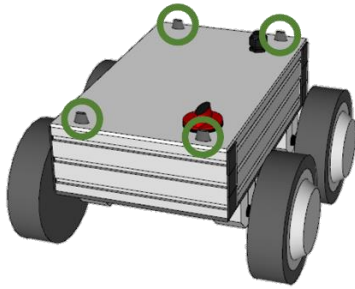
The battery must be protected from heat, e.g. prolonged exposure to sunlight or in a closed car, open fire, contamination and moisture. There may be a risk of explosion and short circuit.

The battery may only be stored and operated under controlled conditions at an ambient temperature between -20°C and +50°C (between -4°F and 122°F). Storage or operation below 0°C (32°F) may result in performance degradation (low available energy) of the battery.

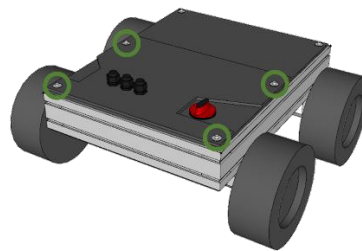
### **4.2 Battery Replacement and Charging**

#### **4.2.1 Open Housing to Access Battery**

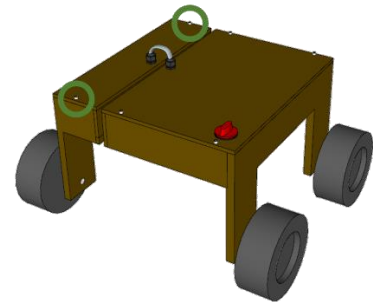
To change the battery, the housing of the robotic platform must be opened. For this purpose, the main switch must first be switched off. A device under voltage must not be opened! The fastening screws of the housing cover with the battery area underneath are shown in the following illustrations according to the different versions.



The housing of the Compact Robotic Platform can be opened at the four wing screws on the top.



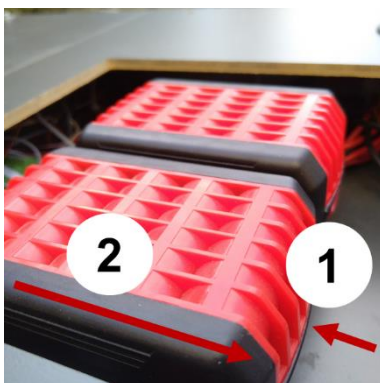
The housing of the Medium Robotic Platform can be opened at the six hexagon socket screws on the top. Only part of the housing cover needs to be removed to access the batteries.



The housing of the Flex Robotic Platform can be opened at the four hexagon socket screws on the top side. To access the batteries, only the smaller housing cover on the right side in the direction of drive must be opened.

#### 4.2.2 Remove Battery

Opening the housing exposes the rechargeable batteries (number according to the scope of delivery described in section 3.2). Each individual battery is fixed in the holder by a click mechanism. By pressing the red button (point 1 in left picture) on the front of the battery, the battery can be pushed in the direction of the red button (point 2 in left picture) and thus removed from the holder.



Remove the battery by releasing the click mechanism and pulling the battery out of the holder.



Pressing the button displays the current battery status.

The current battery status can be checked with the button (point 3 in the right picture). The LEDs (marked 4 in the right picture) are then illuminated according to the battery status.

#### 4.2.3 Charging the Battery

The charger included in the scope of delivery can be used for charging the battery. Alternatively, all other chargers for BOSCH GBA 18 Volt are also suitable. The battery must be inserted into the charger. After successful charging, the charger signals by the integrated LED that the battery is fully charged.

#### 4.2.4 Inserting the Battery and Closing the Housing

The charged battery must be inserted into the holder. To fix the battery in the holder, make sure that the click mechanism integrated in the battery is engaged. The battery is only correctly inserted when it can no longer be moved in the holder.

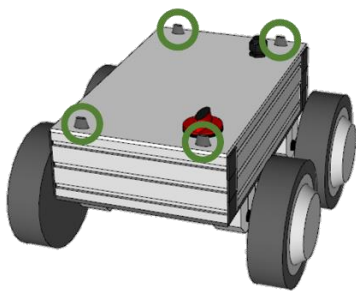
Finally, the housing can be closed with the screws mentioned in section 4.2.1. Ensure that the housing is securely closed before putting the robotic platform into operation.

## 5 Mounting of Extensions and Superstructures

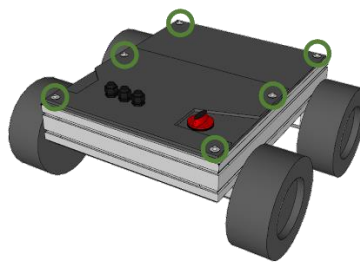
### 5.1 Open Housing

For extension with electrical components or changes to the software, the housing of the robotic platform can be opened completely to make all electrical components accessible. First, the main switch must be turned off for this purpose. A device under voltage must not be opened!

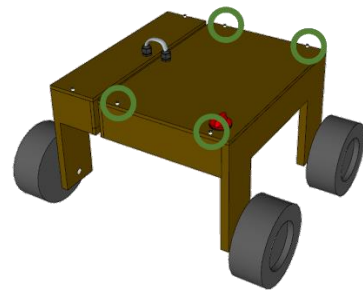
Afterwards, the screws of the housing cover can be loosened as shown in the following illustrations according to the different versions.



The housing of the Compact Robotic Platform can be opened at the four wing screws on the top.



The housing of the Medium Robotic Platform can be opened at the six hexagon socket screws on the top.



The housing of the Flex Robotic Platform can be opened at the four hexagon socket screws on the top.

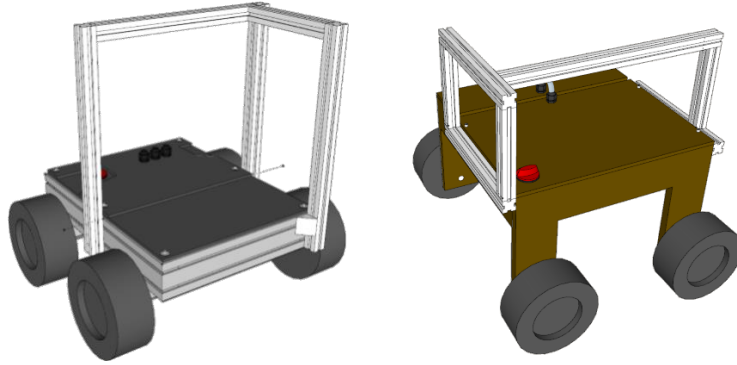
### 5.2 Mechanical Mounting

The housing of the Compact and Medium Robotic Platforms is made of B-type groove 8 aluminium profiles. Extensions can be mounted to this profile with M6 screws. Angles (see illustration) or B-type groove 8 automatic connectors, for example, can be used for fastening.





M6 screws and hammer nuts for B-type groove 8 can be used to mount other extensions to the aluminum profile.



Example of mounting extensions to securely attach measuring devices to the Medium (left) and Flex (right) Robotic Platforms. Mounting at three points reduces vibrations during drive.

The housing of the Flex Robotic Platform can be extended by means of B-type groove 8 aluminium profiles on the front and rear housing walls. This allows extensions to be mounted in the same way as for the Compact and Medium Robotic Platforms.

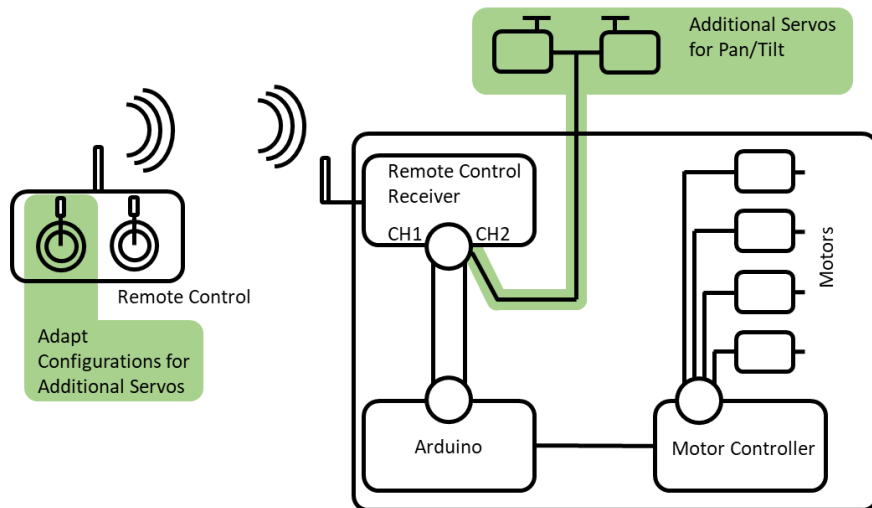
Due to the design of the Flex Robotic Platform, loads should be mounted centrally with regard to the direction of movement. Overloads in the front or rear housing area can lead to deflection of the joint even at rest and thus changes the direction of movement.

### 5.3 Extension of Remote-Control Receiver

The remote-control receiver included in the scope of delivery can be used with additional channels besides to those already in use. This allows the robotics platform to be extended, for example, with a pan/tilt mechanism for an additional FPV (First Person View) camera.

For this purpose, on the one hand, the additional servos must be mounted mechanically and connected by the respective cables to the remote-control receiver. It is recommended to use the additional channels from CH3 upwards to avoid an accidental misconfiguration in the interaction between remote control and remote-control receiver. On the other hand, the remote control must be configured in such a way that the additional servos can be controlled correctly in terms of function and the respective directions. In the following figure, the areas of the necessary changes are marked in green.

When making changes to the remote-control, the existing configuration of the remote-control receiver and the channels to be used should remain unchanged. If the settings of the pre-installed channels are changed, the correct basic functionality of the robotics platform is at risk.



In addition to the exemplarily mentioned extension with a pan/tilt mechanism, further additional components are also possible based on the already installed control system (remote-control/remote-control receiver). This allows the robotics platform to be adapted to different applications.

#### 5.4 Electrical Integration

The integration of additional electrical components may only be carried out by trained specialist personnel. The expansion and modification of the existing electrical installation can lead to damage and thus to a loss of warranty and guarantee.

Extending components can be operated with the supply voltage of 18 Volts via the cable glands in the housing. Depending on the operating voltage of additional components, a DC/DC converter must be used if necessary to provide the required supply voltage. When dimensioning the DC/DC converter, the necessary power of the additional consumer must be considered.

For power supply and communication of external consumers, the cable glands (see following figure) can be used.

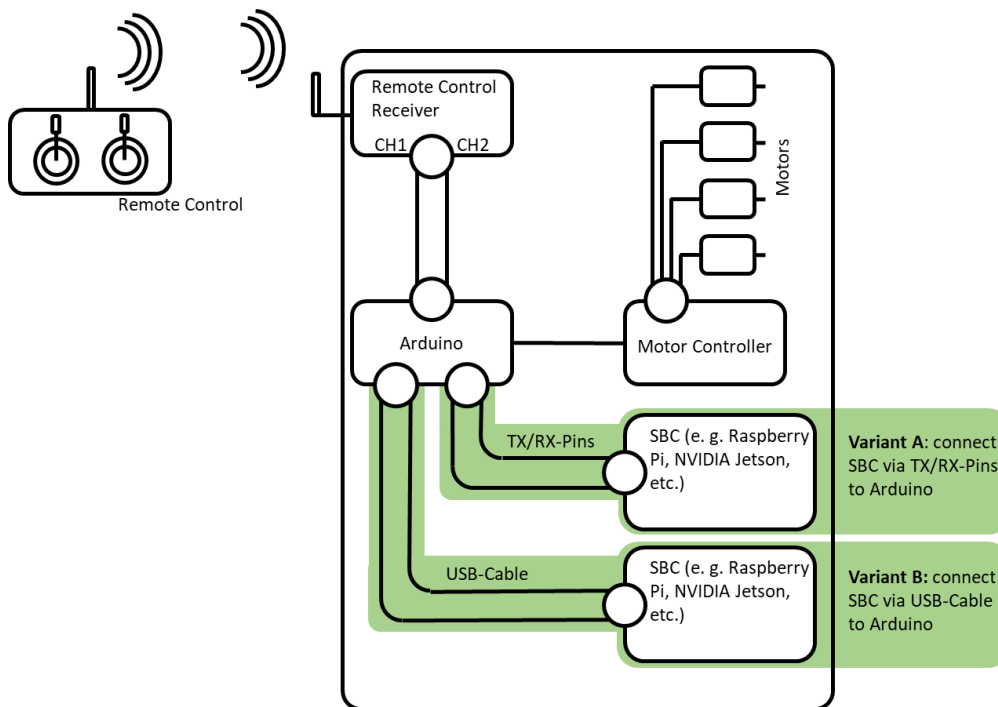


With the help of the cable glands, electrical connections can be made to external components located outside without modifying the housing.

## 5.5 Software and Communication to additional SBC

To customize the pre-installed software for individual use cases, it is available for customers free of charge. If required, please contact customer service or download the software from the source indicated in our support section on the website.

For the communication between Arduino and an additional SBC (Single Board Computer), like for example a Raspberry Pi or a NVIDIA Jetson Nano, different possibilities are available. In the following figure two possibilities are shown as examples. Here the serial interface (UART) is used.



Different variants for the connection of the Arduino to a Single Board Computer (SBC) to realize higher-level controls and to issue commands to the Arduino for the control of the motors.

A first possibility (variant A in the picture) for the communication exists by means of TX/RX-pins at both computing units, Arduino and your SBC. It is absolutely necessary to pay attention to the respective voltage levels. If necessary, level converters must be used to avoid damage. Please refer to the data sheet of your SBC for such connections. Another possibility (variant B in the picture) is the connection via a standardized USB cable.

## 6 Disposal Information

The rechargeable batteries included in the scope of delivery have been developed and manufactured by battery manufacturers in accordance with the relevant guidelines.

The present product and especially the contained rechargeable batteries must not be disposed in household waste.

Please contact the manufacturer, dealer or your waste disposal company for disposal questions.



## **7 Product Conformity**

The products of sciota robotics have been developed, manufactured and designed with regard to safety in use and evaluated in compliance with the relevant directives and laws in the European Union. sciota GmbH will provide you with corresponding declarations of conformity on request to [support@sciota-robotics.com](mailto:support@sciota-robotics.com).



## **8 Contact**

sciota robotics is interested in the successful use of the delivered robotic platforms and will support you if any questions arise. Please contact us and we will help for a safe and reliable operation of the robotic platforms in your application:

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