

User Manual

# Promobot Rooky

[promo-bot.ai](http://promo-bot.ai)

Educational platform

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## 1. ROOKY DESCRIPTION

**Promobot Rooky** is a robotic arm of Promobot V.4 robot with seven degrees of freedom, adapted for learning purposes. The robotic arm has a special mounting bracket by which it is attached to the table surface.

For comfortable operation, the robotic arm features reduced (compared to the Promobot V.4 robot) voltage levels on servos for better safety and protective transparent plastic surfaces covering the moving parts of the robotic arm for visibility of movements.

The package contents of the Promobot Rooky educational platform kit is shown in Figure 1.

## 2. TECHNICAL CHARACTERISTICS

### Robotic arm Promobot Rooky

#### Technical Characteristics

- Input voltage ..... ~220/110 V
- Motor power supply voltage ..... 24 V
- Max current ..... 15 A
- Power ..... 350 W
- Number of servos ..... 7
- Interface ..... RS-485
- Total weight of the robotic arm ..... 10 kg

#### Working angles of joints

- Shoulder girdle joint ..... 160°
- Shoulder joint (lifting) ..... 83°
- Shoulder joint (rotation) ..... 173°
- Elbow joint (lifting) ..... 80°
- Elbow joint (rotation) ..... 172°
- Wrist (lifting) ..... 52°
- Fingers (lifting) ..... 75°

## 2.1. Package Contents

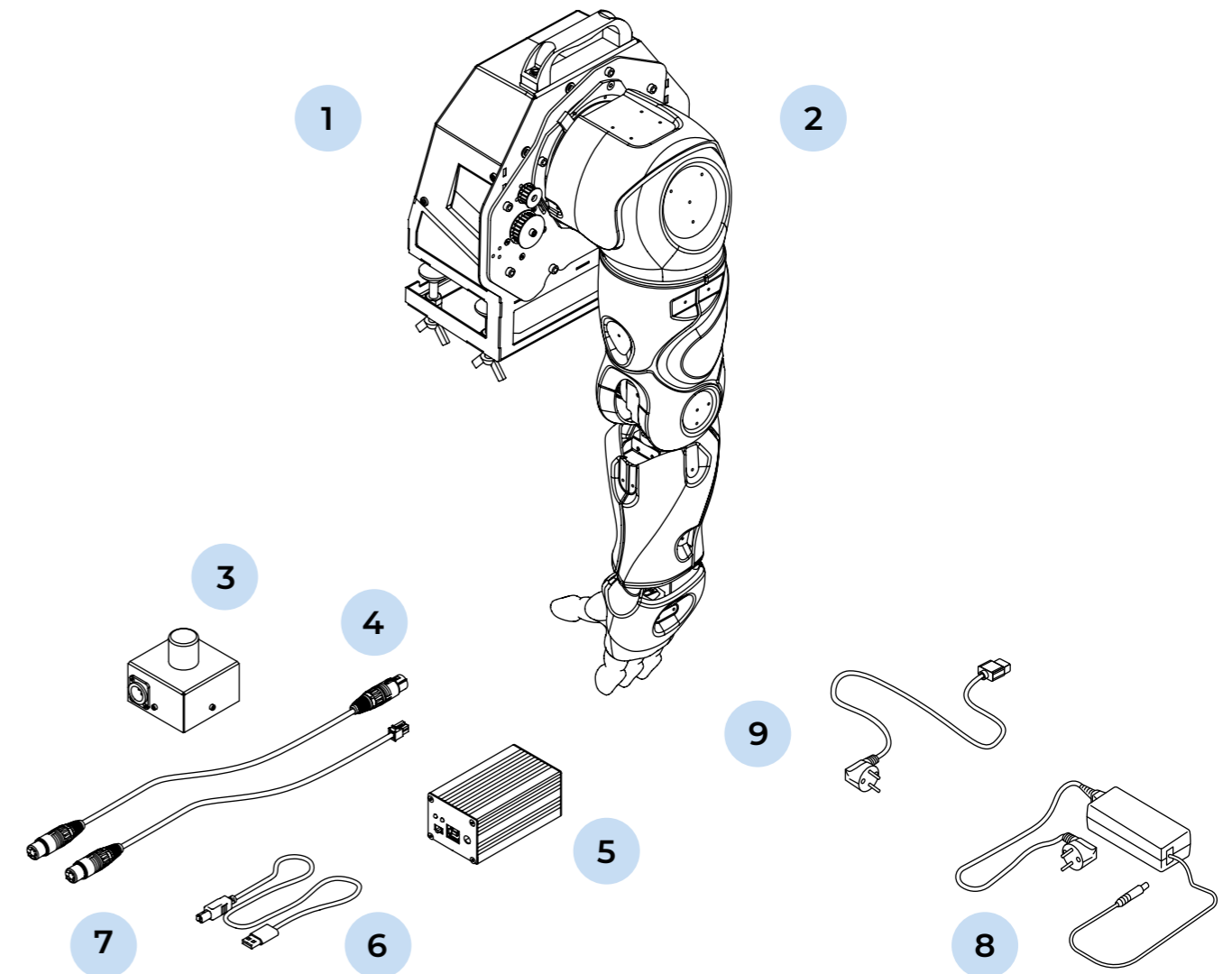


Figure 1. The Promobot Rooky Kit

1. Robotic arm mounting bracket
2. Robotic arm
3. Emergency stop button
4. Cable for connecting emergency stop button to the robotic arm
5. Interface conversion block
6. USB-cable for connecting the interface conversion block to a PC
7. Cable for connecting robotic arm to the interface conversion block
8. Power supply for the interface conversion block
9. Cable for connecting robotic arm to the power supply 220/110 V

## 2.2. Rooky Kinematic Diagram

Figure 2 shows the kinematic diagram of the motion transmission from the motor of the robotic arm to its component parts. The diagram represents information about dimensions of the component parts in millimeters and the angles of rotation of these component parts.

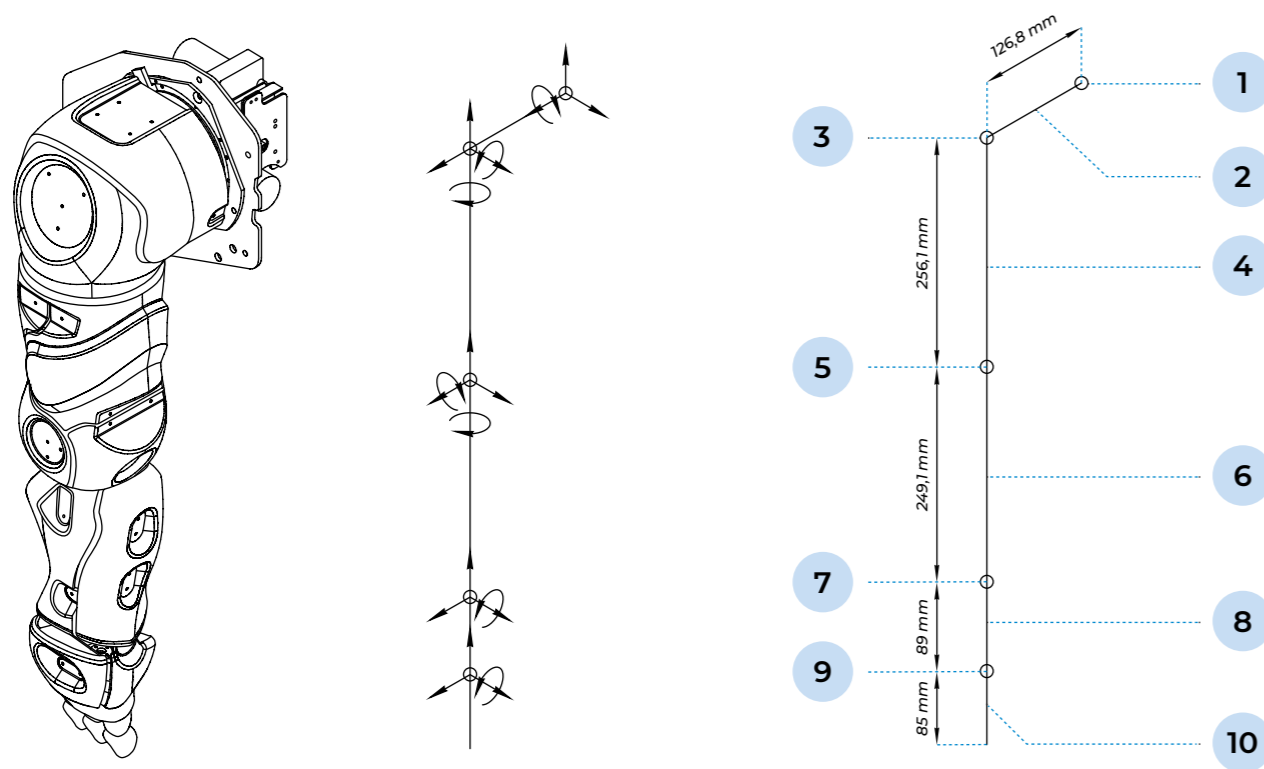


Figure 2. Promobot Rooky kinematic diagram

- |                          |                 |
|--------------------------|-----------------|
| 1. Shoulder girdle joint | 6. Forearm      |
| 2. Shoulder girdle       | 7. Wrist        |
| 3. Shoulder joint        | 8. Hand         |
| 4. Shoulder              | 9. Finger joint |
| 5. Elbow joint           | 10. Fingers     |

## 2.3. Rooky Mounting Bracket

Figure 3 shows the construction of the Rooky mounting bracket. The mounting bracket allows to set the robotic arm on the table surface. The mounting bracket also contains ports to connect cables.

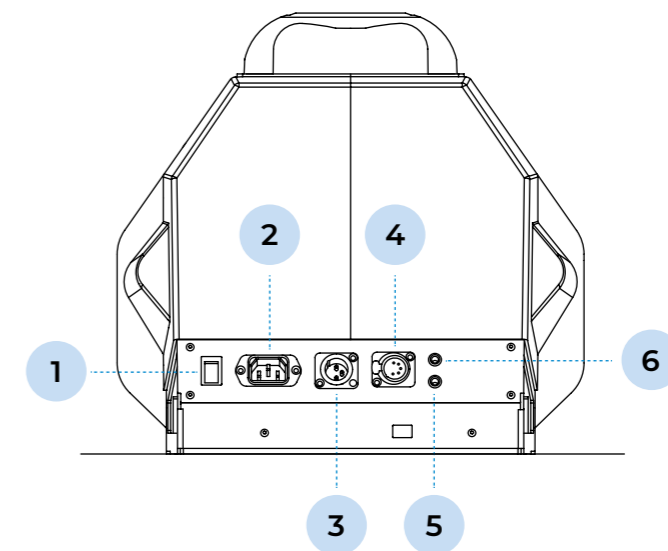


Figure 3. The Promobot Rooky mounting bracket

1. 220/110 V power circuit break button
2. Port for connecting to 220/110 V mains
3. Port for connecting an emergency stop button (24V)
4. Port for connecting an interface conversion block
5. Indication of 24V output power supply
6. Indication of output power supply of emergency stop button (24V)

## 2.4. Interface Conversion Block

**Interface conversion block** is a converter of USB and RS-485 interfaces. It allows to connect the Promobot Rooky to a PC, which makes it possible to develop programs for controlling Promobot Rooky movements.

### Technical Characteristics

- Input voltage ..... ~220/110 V
- Output voltage ..... 12 V
- Interface ..... USB 2.0
- Device operation interface ..... RS-485

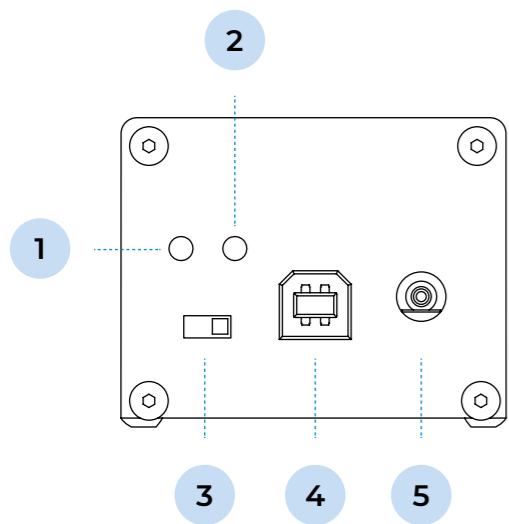


Figure 4. Side A of the interface conversion block

1. Output power indication
2. Input power indication
3. Power switch
4. USB port for connecting to a PC
5. Power port

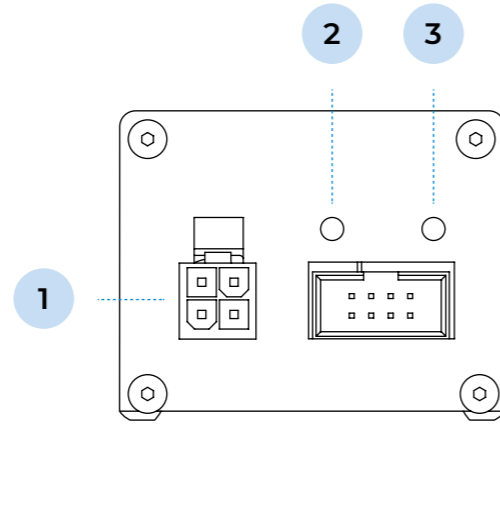


Figure 5. Side B of the interface conversion block

1. Port for connecting a robotic arm
2. Indication of data reception from the robotic arm (RX)
3. Indication of data transmission to the robotic arm (TX)

## 2.5. Emergency Stop Button

The **emergency stop button** is designed to urgently stop the robotic arm's movement. The button has two states: not pressed (Figure 7) and pressed (Figure 8). Pressing the button activates an emergency stop of the robotic arm. To return the button to its original state (when it is ready to be pressed) turn it clockwise as shown in Figure 8. The button is in its original state if it is in the extreme vertical position (Figure 8). Returning the button to its original state leads to the power supply be returned to the device so the Promobot Rooky can move again.

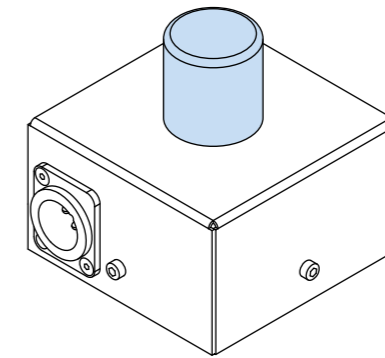


Figure 6. The emergency stop button

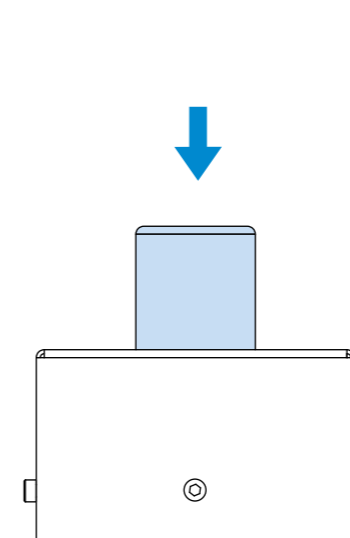


Figure 7. The emergency stop button (not pressed)

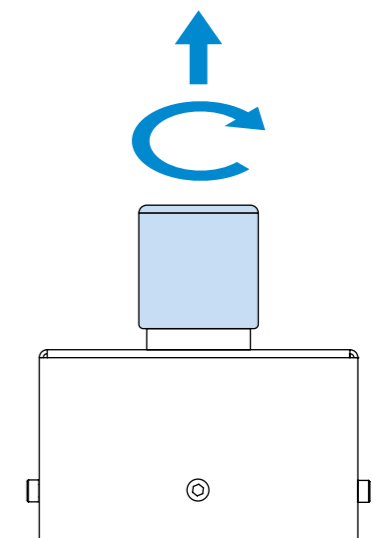


Figure 8. The emergency stop button (pressed)

### 3. INSTALLATION TERMS AND CONDITIONS

When selecting a location to work with the Promobot Rooky, follow the general safety rules for operating electrical appliances: place the kit away from sources of dampness, water vapour, flammable liquids and gases. Ensure compliance with safety regulations. The work area of the Promobot Rooky is shown in Figure 9.

#### Recommended surface characteristics for mounting:

- Tabletop thickness ..... 1.5 cm to 5 cm
- Tabletop height ..... 65 cm and more
- Tabletop workspace ..... 90 cm x 70 cm and more

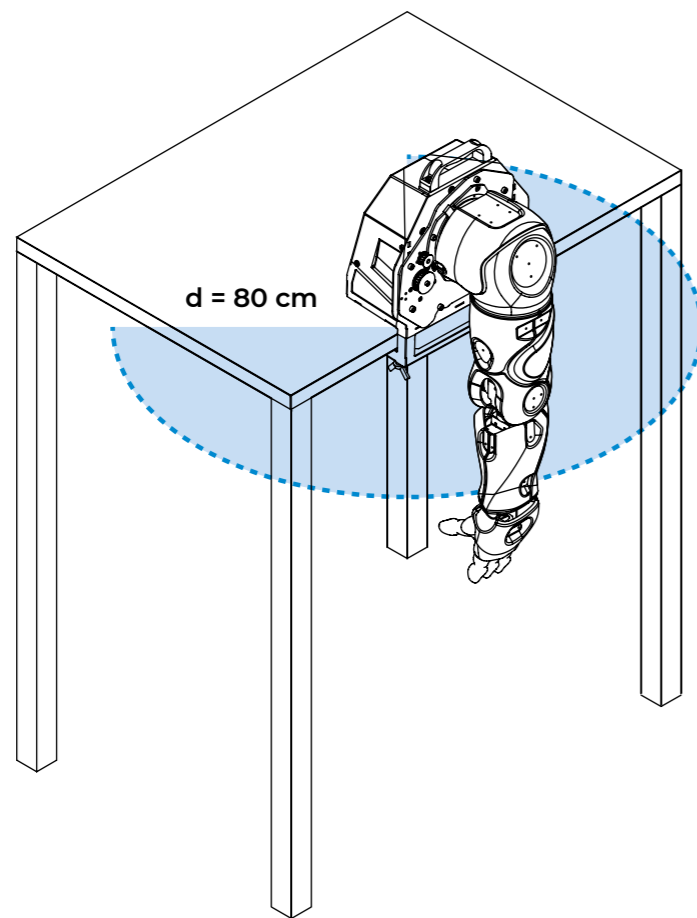


Figure 9. Rooky work area

### 4. SAFETY PRECAUTIONS

#### Observe the following instructions in order to work safely with the Rooky:

1. Follow the general safety rules for the use of electrical appliances.
2. If you don't know how to work with electronics, consult a specialist or an experienced user before starting work.
3. Before starting work make sure that the Promobot Rooky is firmly attached to the tabletop.
4. Before performing Promobot Rooky movements, make sure that there are no people or any obstacles in the work area of the Promobot Rooky.
5. The Promobot Rooky is not intended for use by people with reduced physical, sensory or mental capabilities unless they are under control or instructed to use the device by a specialist responsible for their safety.
6. Working with the robotic arm can be traumatic/injurious. Do not touch the robotic arm while it is moving.
7. Place the emergency stop button in an easily accessible place on the table while working with the robotic arm.
8. It is prohibited to use any movement interlocks that are not designed by the manufacturer. Do not fixate moving parts of the robotic arm.
9. Regularly inspect the power cable for damage and wearout. You should use the power cable only if it is completely undamaged.
10. In any abnormal situation, immediately press the emergency stop button. Here are examples of abnormal situations: unplanned arm movement, damage of electronic parts of the arm, moisture on the arm, people or any obstacles in the work area.
11. Before direct interaction with the moving parts of the robotic arm, press the emergency stop button.

## 5. GETTING STARTED

### 5.1. Unpacking and Mounting

1. Open the shipping box.
2. Remove the upper part of the polyethylene foam logement (Figure 10)

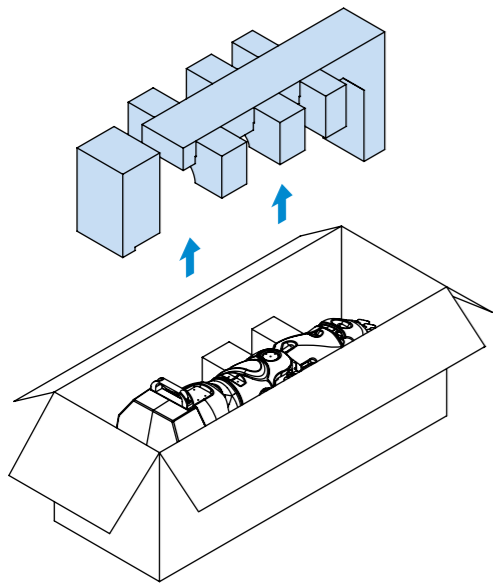


Figure 10.  
Promobot Rooky unpacking

3. Carefully take the robotic arm out of the polyethylene foam logement holding by the highlighted positions (Figure 11).

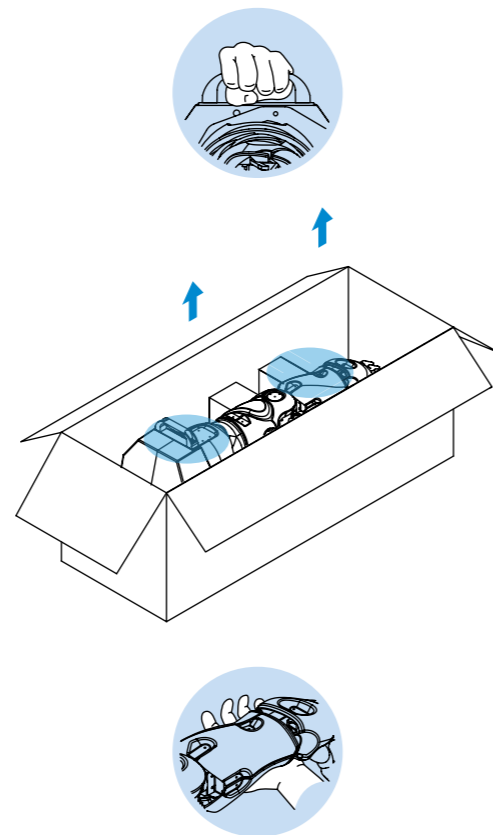


Figure 11.  
Taking the robotic arm out of its package



Warning! Before unpacking the robotic arm, pay attention to its weight (~10 kg)

4. Mount the bracket on the tabletop (Figure 12).

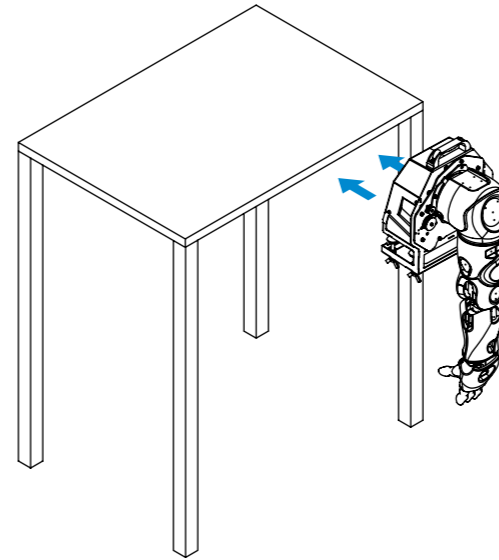


Figure 12.  
Mounting the robotic arm on the tabletop

5. Fasten the bracket to the tabletop (Figure 13).

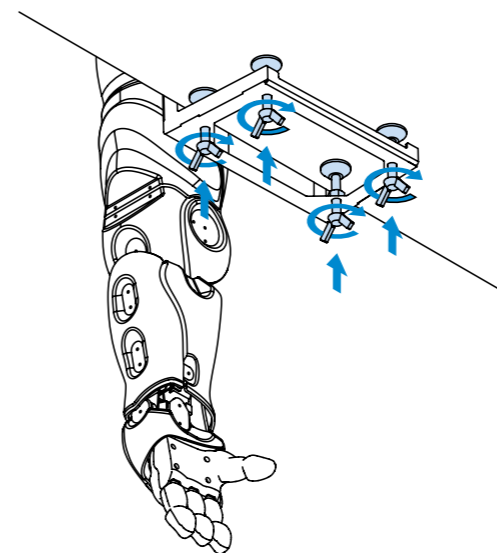


Figure 13.  
Fastening the robotic arm to the tabletop

6. Remove a plastic bag from the robotic arm.
7. Remove the stand-logement from the packaging (Figure 14).

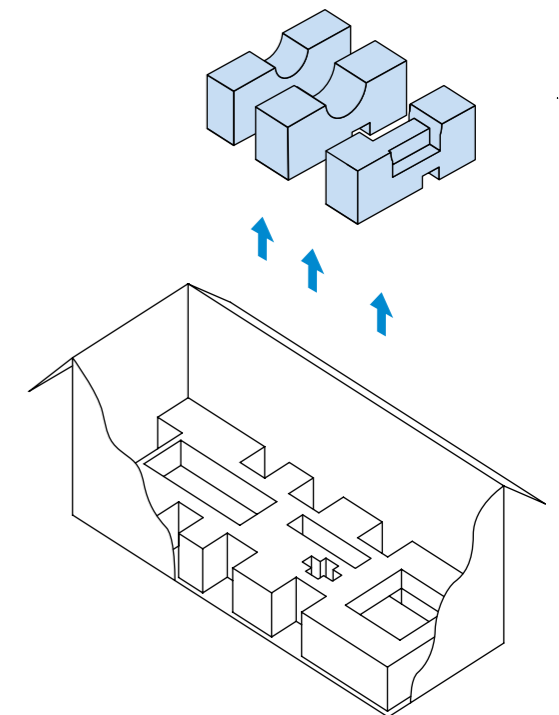
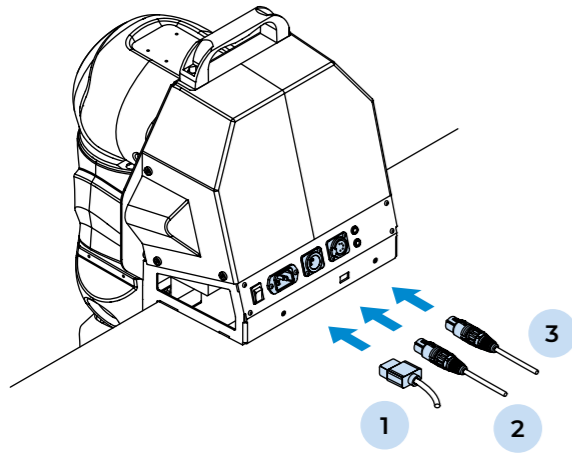


Figure 14.  
Removing the stand-logement

8. Take out the rest of the equipment shown in Figure 1 from the bottom of the package: emergency stop button (3), interface conversion block (5), power supply (8) and cables (4, 6, 7, 9).

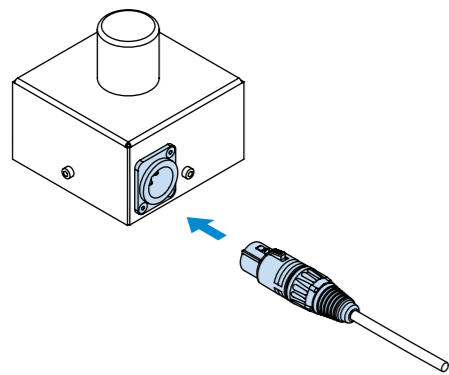


9. Connect the 220/110 V power supply cable (1), emergency stop button cable (2) and interface conversion block cable (3) to the Promobot Rooky mounting bracket, as shown in Figure 15. The cables are shown in Figure 1.



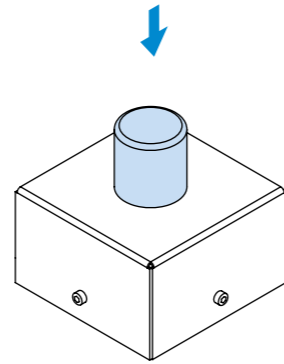
**Figure 15.**  
Connecting cables to the Promobot Rooky mounting bracket

10. Connect the cable (2) to the emergency stop button (Figure 16).



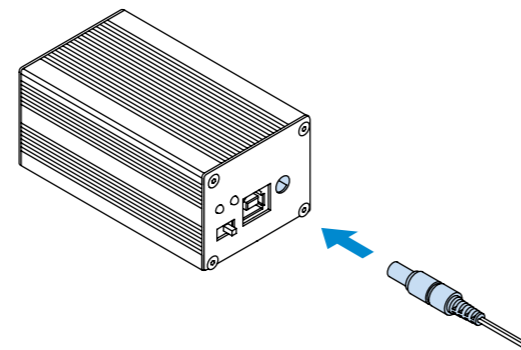
**Figure 16.**  
Connecting the cable to the emergency stop button

11. Press the emergency stop button (Figure 17).



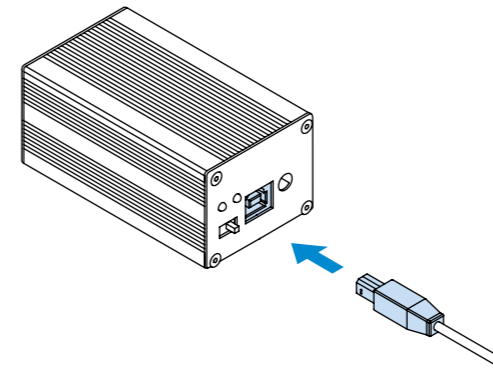
**Figure 17.**  
Pressing the emergency stop button

12. Connect the power supply to the interface conversion block as shown in Figure 18.



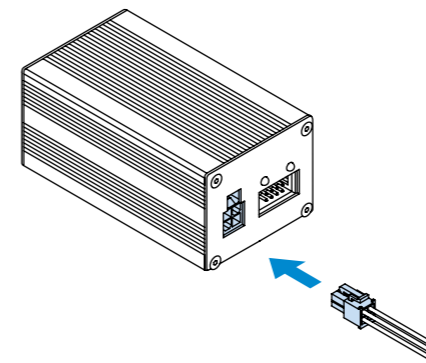
**Figure 18.**  
Connecting the power supply to the interface conversion block

13. Connect the interface conversion block to a PC via cable as shown in Figure 19.



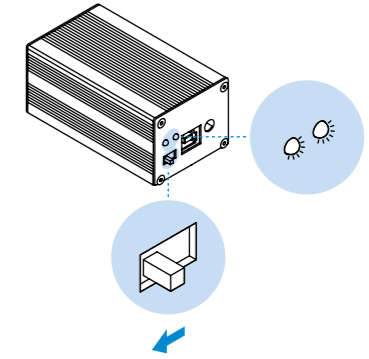
**Figure 19.**  
Connecting the interface conversion block to a PC

14. Connect the interface conversion block to the Promobot Rooky mounting bracket using cable as shown in Figure 20.



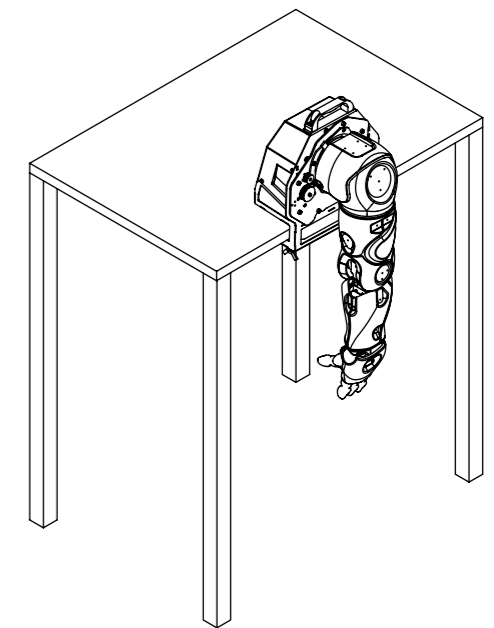
**Figure 20.**  
Connecting the interface conversion block to the Promobot Rooky mounting bracket

15. Turn on the interface conversion block, check the input and output power indication (Figure 21).



**Figure 21.**  
Turning on the interface conversion block and checking the power supply

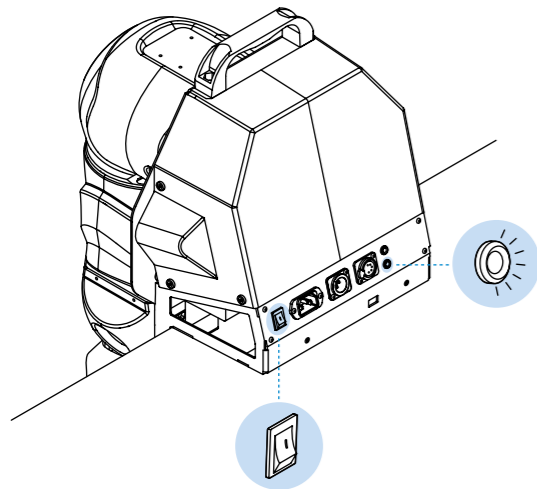
16. Plug a 220/110 V power cable into an electric outlet, then connect the cable to the Rooky mounting bracket.
17. Set the Rooky robotic arm to the zero position (Figure 22).



**Figure 22.**  
Promobot Rooky in its zero position

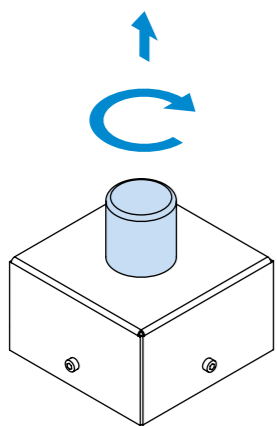


18. Turn the power circuit break button of the Rooky mounting bracket to the ON position, check the input power indication (Figure 23).



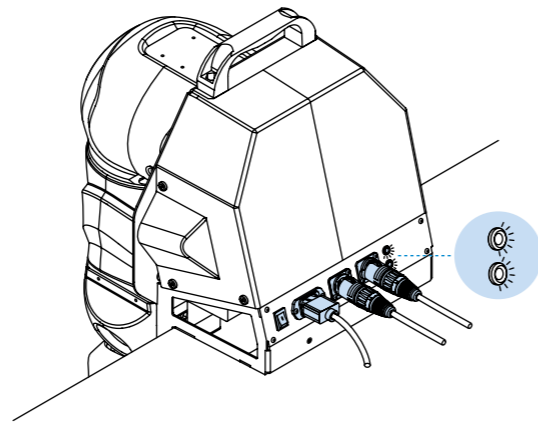
**Figure 23.**  
Turning on and checking the Rooky input power supply

19. Set the emergency stop button to its original state (when it is ready to be pressed) (Figure 24).



**Figure 24.**  
Turning the emergency stop button clockwise

20. Check the output power indication at the Rooky mounting bracket (Figure 25).



**Figure 25.**  
Checking the output power of the Rooky

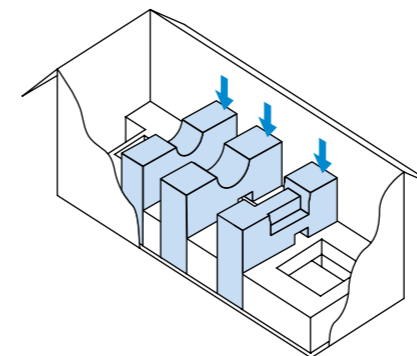
21. To continue working with the Rooky robotic arm and for more information, visit the website:  
[github.com/Promobot-education/rooky/](https://github.com/Promobot-education/rooky/)

## 6. COMPLETION OF WORK

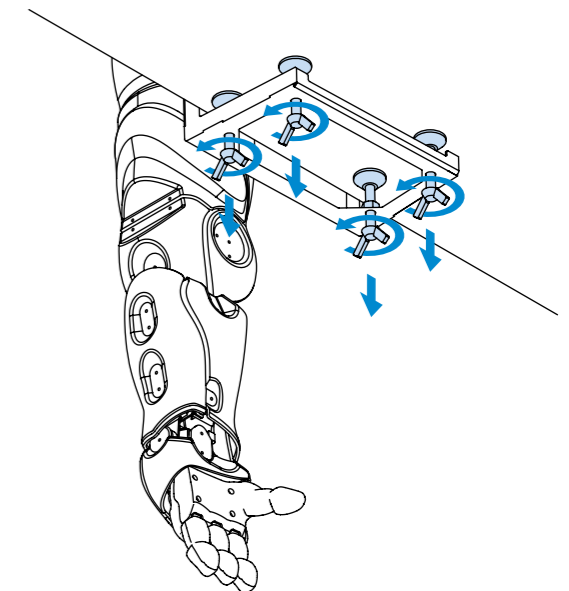
### 6.1. Dismounting and Packing

To complete your work with Promobot Rooky, proceed as follows:

1. Press the emergency stop button.
2. Turn the power circuit break button of the Rooky mounting bracket to the OFF position.
3. Disconnect the cables from the Rooky mounting bracket.
4. Disconnect the power cable from 220/110 V mains.
5. Disconnect the cable from the emergency stop button.
6. Disconnect the cables from the interface conversion block.
7. Disconnect the power supply from the interface conversion block and 220/110 V mains.
8. Disconnect the cable from the PC.
9. Place the interface conversion block, emergency stop button, power supply and cables in their respective locations at the bottom of the package.
10. Install the stand-logement in the package (Figure 26).
11. Put a plastic bag on the Promobot Rooky.
12. Unscrew the Promobot Rooky mounting bracket off the tabletop (Figure 27).

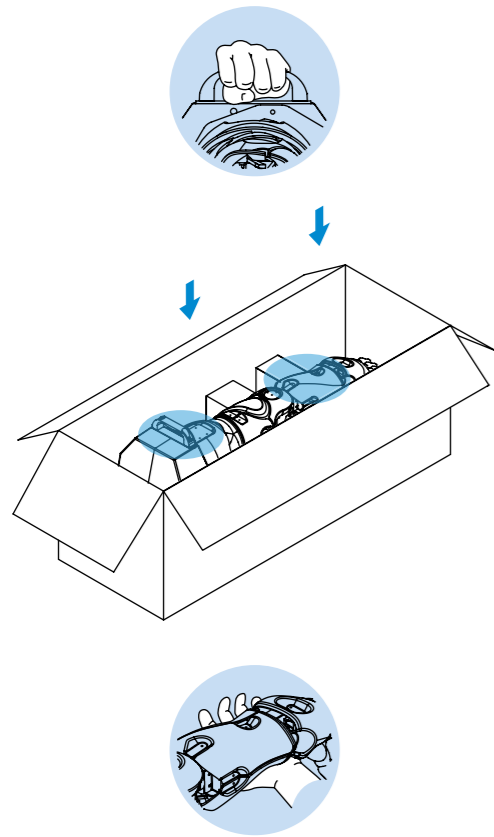


**Figure 26.**  
Installing the stand-logement



**Figure 27.**  
Unscrewing the Promobot Rooky off the tabletop

13. Carefully place the Rooky robotic arm into its package, holding by the highlighted positions (Figure 28).



**Figure 28.**  
Packing of the Promobot Rooky

14. Ensure that the stand-logements are perpendicular to the base of the package.
15. Place the upper part of the polyethylene foam logement into the package.
16. Close the shipping box.

## 7. USE, TRANSPORT AND STORAGE CONDITIONS

1. Before use make sure that the Promobot Rooky in a good working condition. Visually inspect the device and then turn it on and check its operability.
2. The Rooky robotic arm can be used for a long time if the conditions of use and storage are observed and faults are rectified in a timely manner.
3. Do not use abrasives or solvents to clean the device.
4. Do not use aggressive chemicals (acids, etc.) that can react with plastic parts of the Promobot Rooky and cause it's damage.
5. Do not allow liquids to enter the technological gaps of the Promobot Rooky. Do not immerse the device in liquid.
6. The Promobot Rooky in its shipping box can be transported by all types of enclosed transport. It is recommended to transport at air temperatures between +10°C and +35°C and a relative humidity of up to 70%.
7. If transporting the Promobot Rooky in sub-zero temperatures, it is necessary to leave it to warm up to at least +10°C. Let the robotic arm stand powered-off in a heated room for at least two hours before turning it on.
8. Ensure that the Promobot Rooky shipping box is not a subject to any impact or movement inside the vehicle during transportation.
9. The Promobot Rooky should be stored in a heated and ventilated room away from direct sunlight, at a temperature between 0°C and +40°C (+25°C recommended) and a relative humidity of 65%. To avoid undesirable consequences, unauthorized persons or children should not be allowed in the storage area.





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