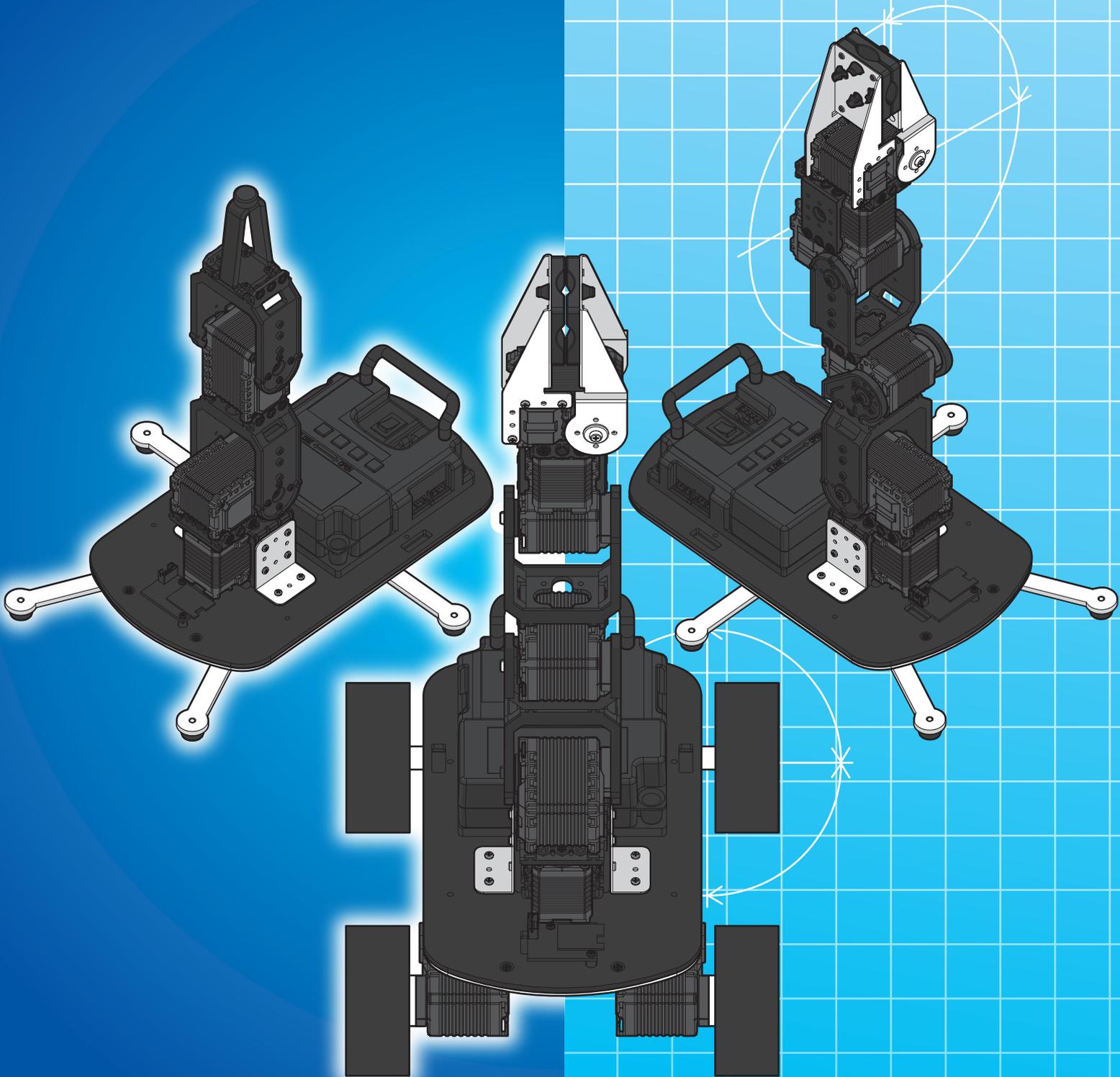


# ROBOTICS ARM IMAGINE YOUR

*XYZrobot*

# POSSIBILITIES



CONSTRUCT OF YOUR IMAGINATION





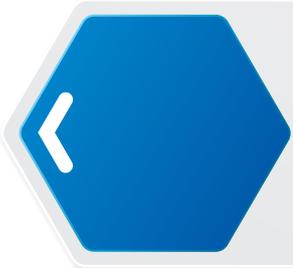
Please read the following information: failure to comply with provided information may lead to voiding the warranty.

This document covers safety, proper handling, and regulatory information for use of your Robotics Arm.

## General Precautions

Caution: To avoid injury, damage to the robot or equipment, please follow the provided guidelines.

- Please read through the directions before starting.
- The robot is not intended for use by children under 15 years old, or any person with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless:
  - Supervised by a person responsible for the child's safety and who has read and understood these instructions.
- Keep the robot away from children under 3 years old at all times to prevent injury or damage.
- Keep components or small parts away from children.
- Keep away from pets and animals of any kind, animals may behave erratically in the presence of the robot.
- First time users should take extra care when handling the robot to minimize injury or damage.
- If the robot is operating abnormally, there is an unusual sound, smell or smoke is detected:
  - Turn the robot OFF immediately.
  - Unplug the robot.
  - Ensure the robot does not tip over or fall down.
  - Remove the battery (remove 1 screw on the back of the battery casing).
- To prevent the spread of fire, keep candles or other open flames away from the robot at all times.
- At all times, keep in mind safety first to prevent injury to individuals using or around the robot.
- Always follow installation and service instructions closely. Keep manuals for future reference.
- Review and follow all safety information provided throughout this manual.
- This guide does not cover all possible safety issues or conditions. Always use common sense and good judgment.
- Warning: Conversion or modifications to this product not expressly approved by the party responsible for compliance could void the user's authority to operate the product.
- The battery will become hot a little during charging, which is normal phenomenon.
- Please take care of this unit and its accessories, keep them clean. Please do not let this unit or accessories exposed to fire/burning cigarette, etc... Try to keep the robot and its accessories dry; please do not let this unit exposed to water or moisture.
- Please do not break, throw or trample the robot.
- Avoid installation in extremely hot, rainy or water splashing, or being placed in high temperature or moist environment.
- Please use the accessories we match for this robot.



## Safety

- Never disassemble or modify the motor in any way, otherwise, warranty of the product will be lost. For non-human faults or breakdown, please contact authorized distributors.
- Please unplug the charging cord from the charger after charging completed to avoid over-charging.
- Keep robot away from face and body when moving.
- Do not use any tools other than those provided in the kit.
- Gears must be replaced after long excessive use.

### **RF exposure warning (For Bluetooth)**

The equipment complies with FCC RF exposure limits set forth for an uncontrolled environment.

The equipment must not be co-located or operating in conjunction with any other antenna or transmitter.

### **Battery safety warning:**

DO NOT throw the battery in fire.

DO NOT short circuit the contacts.

DO NOT disassemble the battery.

DO NOT throw the battery in municipal waste.

The symbol of the crossed out wheeled bin indicates that the battery should not be placed in municipal waste.

### **Important Notice for Use in Healthcare Environments:**

XYZprinting Inc. products are not medical devices and are not listed under UL or IEC 60601 (or equivalent).

You can find the User Guide, the Technical Guide and these Safety Instructions (“Documentation”) at:

<http://www.xyzrobot.com>

You can contact XYZprinting Inc. support at:

<http://www.xyzrobot.com>



## Handling and Personal Safety

### Buttons

- Before using the Robotics Arm, take a moment to locate the Power On/Off and directional buttons and familiarize yourself with the functions.

### Handling

- Handle the robot with care at all times.
- Pick up the robot by the bar in the event of the following situations:
  - If the robot comes close to danger, exposure to water, or falling off a surface.
  - Before the robot knocks over objects.
  - If the robot's operation seems erratic.
- Procedure for handling in a potentially hazardous event:
  1. Pick up the robot by bar even if it is still moving.
  2. Press the Power On/Off button to turn off.
  3. Put the robot in the starting default posture.

Refer to the User Guide for powering on instructions.

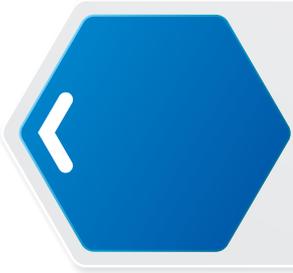
- In case of a power emergency, do not touch the robot.



#### **CAUTION:**

Pinching Hazard

- Avoid carrying and touching the robot when it is moving, walking or getting up to avoid getting pinched.
- Keep hand and fingers out of the joint areas to avoid getting caught in between.
- To avoid injury, do not place your hands in any joint to prevent damage or personal injury.



# Safety

## General

### IMPORTANT:

- The robot requires a clean work space to move around and perform activities.
- Do not insert any foreign objects into any of the component or internal cavities.
- Generally, do not allow or cause the robot to fall down.
- Do not exert strong force against the joints or actuators (motors).
- Do not grab and pull by the head or arms/legs to prevent exerting force on the joints.

## Powering

Please read the user manual that came with the Robotics Arm. It contains important installation and safety instructions.



### CAUTION:

The AC adapter may become hot.

- Do not use the robot when the cables are plugged in to avoid damage.
- Do not use the AC adapter to charge the battery if room temperature is above 45°C (113°F).
- For the maximum battery lifespan, fully charge the battery at least once every 3 months.
- Protect the AC adapter terminals from dirt or other foreign objects.



### CAUTION:

To avoid electric shock:

- Do not plug the power cables into an electrical outlet if the power cable is damaged.
- During a storm, unplug the AC adapter from the socket to protect it from damage.
- Never use an AC adapter that shows signs of damage or excessive wear.



### CAUTION:

Risk of fire or electric shock:

- Use only the provided AC power cable with the AC adapter. Use of any other power cable may damage the robot or AC adapter or affect your safety.
- There is no switch on the AC adapter; to disconnect it, pull the plug. Keep the plug easily accessible at all times to allow easy disconnection.
- Unplug the power adapter if:
  - The adapter is exposed to rain, liquid, or excessive moisture.
  - The adapter case has become damaged.
  - You suspect the adapter needs service or repair.
  - You want to clean the adapter.



## Extension Cables



### CAUTION:

To avoid electric shock:

- Do not use multiple socket adapters or power extension cables that bypass the ground wire or disable grounding.
- When using a power extension cable or a multiple socket adapter, make sure it is grounded and has sufficient current rating. No more than one extension device at a time is recommended for use.
- If using a multiple socket adapter, take care when plugging the power cable, as some types allow incorrect plugging which could result in permanent damage to the robot, as well as cause possible electric shock and/or fire damage.
- Do not plug the robot power cables into an electrical outlet if the power cable is damaged.
- Do not connect or disconnect the power adapter with wet hands.
- Plug the robot power cables only into properly grounded electrical outlets.
- Do not use adapter plugs that bypass the grounding feature, or remove the grounding feature from the plug or adapter.
- If using an extension cable, make sure that the total ampere rating of the products plugged in to the extension power cable does not exceed the ampere rating of the extension cable.
- Use an extension cable or power board designed for grounded plugs and plugged into a grounded wall outlet.

## Working Area

- Start from the default posture before turning on the robot.
- When turned off, it is best to keep the robot in the default posture without the cable plugged unless charging.
- Ensure adequate free space around the robot at start-up.
- Before starting, make sure there is enough free space for operation. This requires a radius of at least 60 cm (24 inches) around the robot to avoid obstacles.
- Generally, leave at least 60 cm (24 inches) all around the robot to avoid damage. In particular, ensure that all cabling is removed from the usable area.
- The working surface must be dry and level; thick carpets or rugs are not recommended for operational stability.
- The robot is designed for indoor use only.
- Keep the robot away from radiators, heat sources and direct sunlight.
- Operating temperatures: between 0°C and 40°C (32°F to 104°F).
- Operating humidity range: between 20% and 80%.
- Do not leave the robot unattended on the floor.



# Safety

## Storing

- Use the shipping packaging and foam to keep the robot protected.
- For long storage periods, remove the battery and store the robot in a dry place, between 0°C and 45°C (32°F to 113°F), free from dust or humidity.
- For maximum battery lifespan, fully charge the battery at least once every three months.
- Storage removal recommendations:
  1. Remove the robot or components from packaging.
  2. Fully charge the battery.
  3. Turn on the robot.

## Cleaning

Before cleaning see the following guidelines:

1. Unplug all cabling from the robot.
2. Disconnect the AC adapter from the socket.
3. Put the robot in the default posture.
4. Switch off the robot.
5. Do not use abrasives, aerosols or other fluids, as they may contain flammable substances or may damage my plastic finish. Never spray or submerge the robot or its components in water or any other liquid.
6. Clean the robot and its components with a soft damp cloth.
7. Allow all components to dry thoroughly before turning the robot on again.

## Special Procedures

### General

- Never oil the joints with any kind of lubricant.
- Do not modify or open any of the actuators.
- Do not drop, crush, bend, deform, puncture, shred, microwave, incinerate any of the components. Doing so can cause fire, electric shock, damage or personal injury.
- When handling sensitive components (e.g., printed circuit board), only hold the board by the edges to prevent damage due to electrostatic discharge (ESD).
- Do not forcibly twist the robot when the power is to prevent damaging the motors (actuators).
- Place the robot on a flat surface prior to the use of the remote control.



## Liquid Spills



### CAUTION:

Use extreme caution when removing wet power cables from a power socket (or extension cable) and only attempt this if it is safe to do so:

- Liquids spilt onto the robot or AC adapter may cause a short-circuit and stop the robot from working. The warranty is automatically void if any liquid seeps inside the AC adapter, whether apparent from the outside or not.
- Do not use the robot in a wet environment.
- Do not connect or disconnect the battery or AC adapter when your hands are wet.
- Do not use the AC adapter if exposed to rain, liquid, or excessive moisture.
- Do not attempt to dry the components with an external heat source such as a hair dryer or an oven.

## Procedures

- If liquid has not seeped inside the torso or battery casing:
  1. Turn off the robot.
  2. Disconnect all cables, including the AC adapter.
  3. Place the robot in the default posture.
  4. Wipe the robot completely dry.
  5. When thoroughly dry, turn on the robot to continue operation.
- If liquid has seeped inside the torso or battery casing:
  1. Disconnect all cabling from the power socket then disconnect the other cabling end from the robot.
  2. Turn off the robot.
  3. Place the robot in the default posture.
  4. Dry the robot as much as possible.
  5. Disconnect and remove the battery casing.
  6. Let the robot air dry completely before installing the battery casing.
  7. Once completely dry, install the battery casing.
  8. Turn on the robot.

**NOTE:** For information on your warranty coverage see the **“Warranty”** on page 101 section in this document.



## Certification

### Regulatory Compliance Information

#### USA

##### Federal Communications Commission (FCC)



FCC ID: SH6MDBT40

This device complies with part 15 of FCC Rules. Operation is subject to the following two conditions:

- (1) This device may not cause harmful interference, and
- (2) This device must accept any interference received, including interference that may cause undesired operation.

**NOTE:** This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at their own expense.

No Unauthorized Modifications

Unauthorized modification may void the equipment authorization from the FCC and will void the warranty.

#### Japan

##### 技術基準適合証明



技術基準認証済みの無線装置を内蔵  
204-420020

#### SRRC (China)

##### China Ministry Industry and Information Technology (CMIIT)

本设备包含型号核准代码（分别）为：CMIIT ID: 2015DJ2435的无线电发射模块。



## Taiwan Wireless NCC Information



CCAF15LP0280T1

本產品內含射頻模  CCAF15LP0280T1

### 低功率電波輻射性電機管理辦法

#### 第十二條

經型式認證合格之低功率射頻電機，非經許可，公司、商號或使用者均不得擅自變更頻率、加大功率或變更原設計之特性及功能。

#### 第十四條

低功率射頻電機之使用不得影響飛航安全及干擾合法通信；經發現有干擾現象時，應立即停用，並改善至無干擾時方得繼續使用。

前項合法通信，指依電信法規定作業之無線電通信。低功率射頻電機須忍受合法通信或工業、科學及醫療用電波輻射性電機設備之干擾。



# Table of Contents

## Introduction

Robotics Arm Introduction .....	12
Safety Warning.....	12
About this Document .....	12
Hardware .....	12
Component Overview .....	13
3D.....	13
6D.....	14
6DW .....	15
Overview of Servos .....	16
Overview and Characteristics of Servos .....	16
General Servo Motor Specifications .....	16
Wiring Connection.....	16

## Component Identification

Robotics Arm 3D Parts List.....	18
Robotics Arm 6D Parts List.....	20
Robotics Arm 6DW Parts List.....	22
Server Motors Identification.....	24
3D.....	24
6D.....	25
6DW .....	26
Frame Placement Identification .....	27
3D.....	27
6D.....	28
6DW .....	29
Board Connector .....	30
MCU Board.....	30
Bluetooth Module.....	30

# Table of Contents



## Hardware Assembly

General Safety and Hardware Preparation.....	32
General Safety .....	32
Servo Hub Preparation.....	32
Servo Preparation .....	33
Order of Assembly .....	36
3D.....	36
6D.....	36
6DW .....	36
3D Assembly .....	38
6D Assembly .....	48
Base Assembly (without Wheels).....	64
Base Assembly (with Wheels).....	76

## Getting Started

Using the Robotics Arm and the AC Adapter .....	90
Charging the Battery .....	91
Charging Time and Battery Life.....	92
Battery Specifications.....	92
Control Panel .....	93
Testing the Robotics Arm .....	94

## Troubleshooting

## Appendix

Specifications .....	99
Robotics Arm.....	99
AI Servo Motor A1-16 .....	100

## Warranty



# Introduction

## Robotics Arm Introduction

The Robotics Arm is a robotic model designed to allow students, researchers, and enthusiasts alike to easily remove and replace parts and components of the frame.

### Safety Warning

The Robotics Arm is built using rotary actuators (servo motors), which are powerful and may be harmful to fingers or materials. Precaution is warranted when working and testing the robot. Make sure there is enough free space to allow for uninterrupted movement.

### About this Document

This document contains information and helpful tips for the assembly and disassembly of the Robotics Arm robot.

In the document, you will find images of the components and their reference names for the purpose of assembly and referencing in the event that replacement parts are needed.

Warranty and support information is also included for your reference and assistance.

### Hardware

The Robotics Arm robot is mainly built with three, six or eight servo motors. Each servo motor has an embedded electric board allowing it to receive signals (torque) and communicate with the remaining servos. By creating a chain with the servo motors (each with a set ID), command signals can be transferred from the beginning to the end of the chain.

#### Setting the Actuator Hub to Zero

The actuator (servo) hubs are shipped mounted on the actuator. They are included as a package. When assembling the servos, the hub must first be aligned to the actuator axis. By setting the hub to zero, it ensures that the zero position of the actuator matches the zero position of the structure.

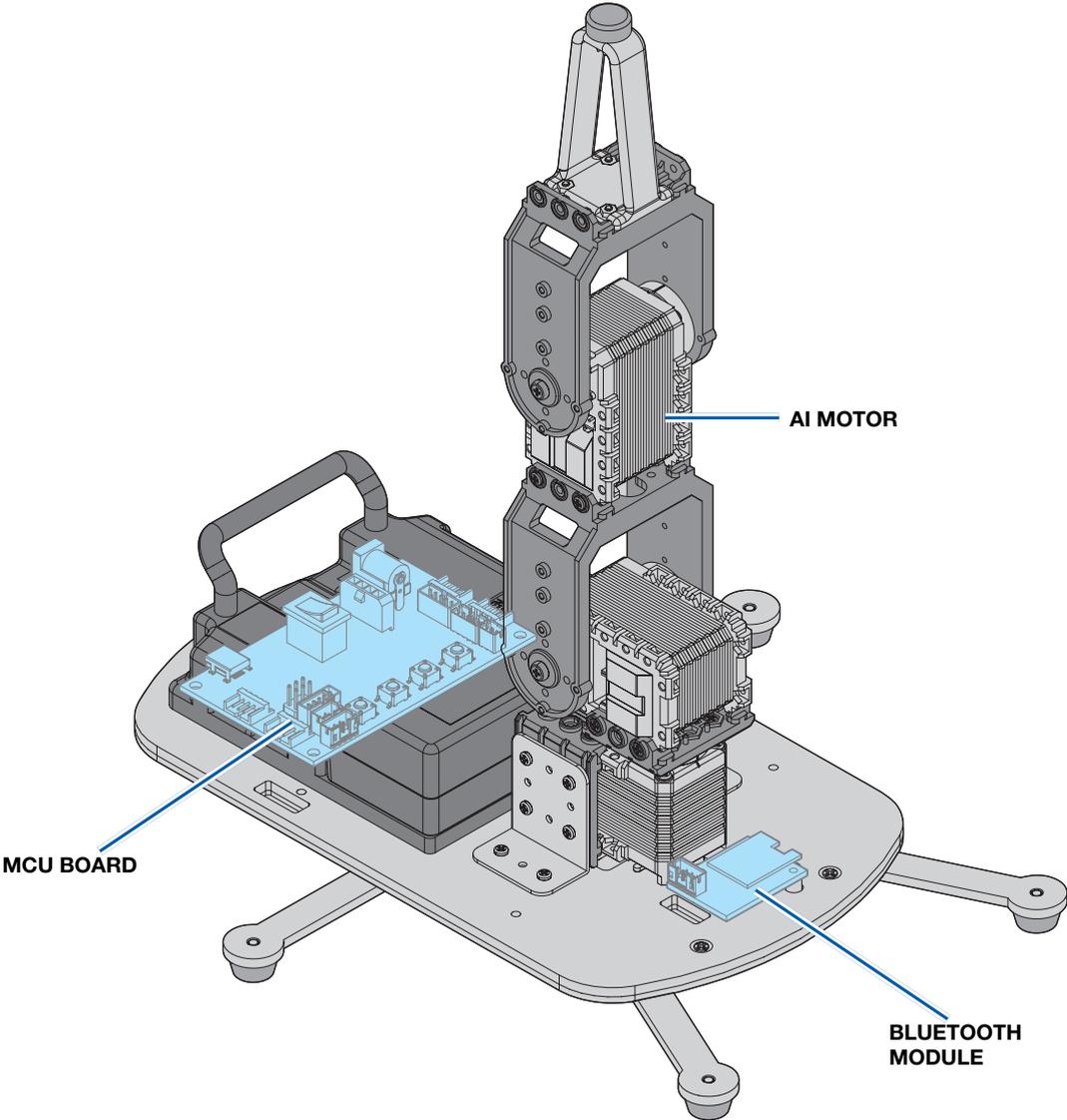
On the hub, there is a beveled line indicating the orientation. The same type of indentation is located on the servo. By matching the two indication lines, you are ensured that the actuator and the hub are properly aligned.

# Introduction

## Component Overview



3D

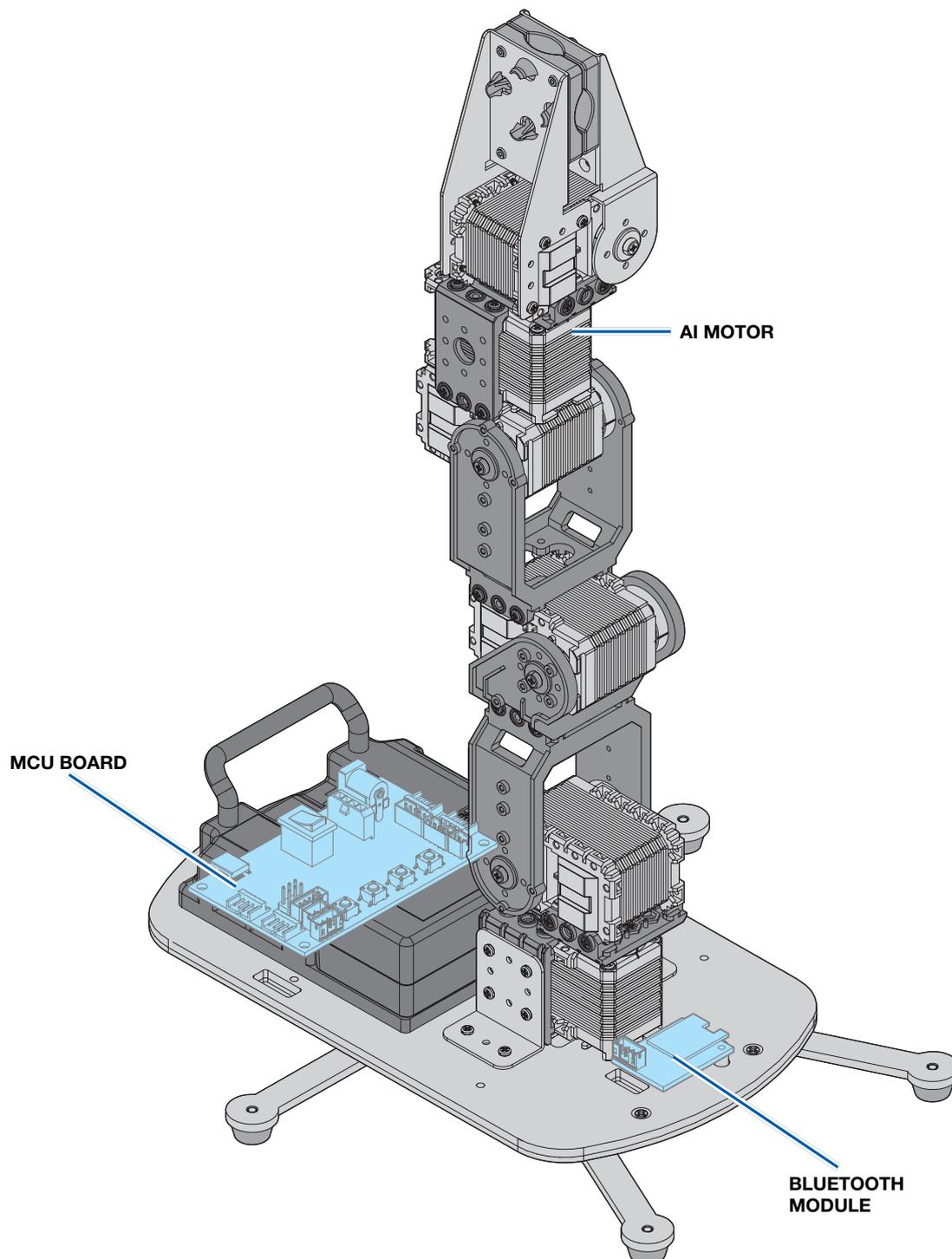


# <01

## Introduction

### Component Overview

6D

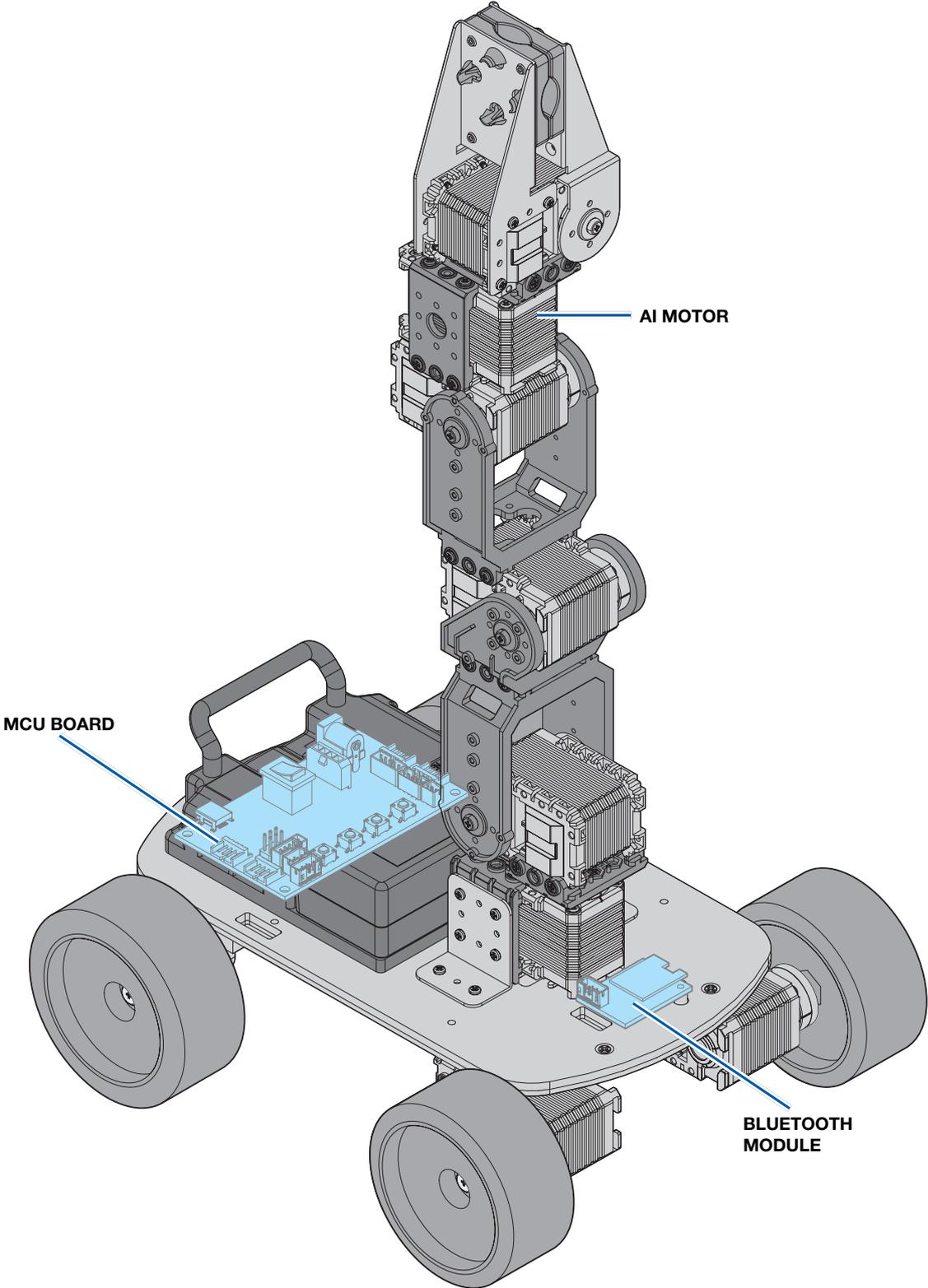


# Introduction

## Component Overview



6DW



# <01

## Introduction

### Overview of Servos

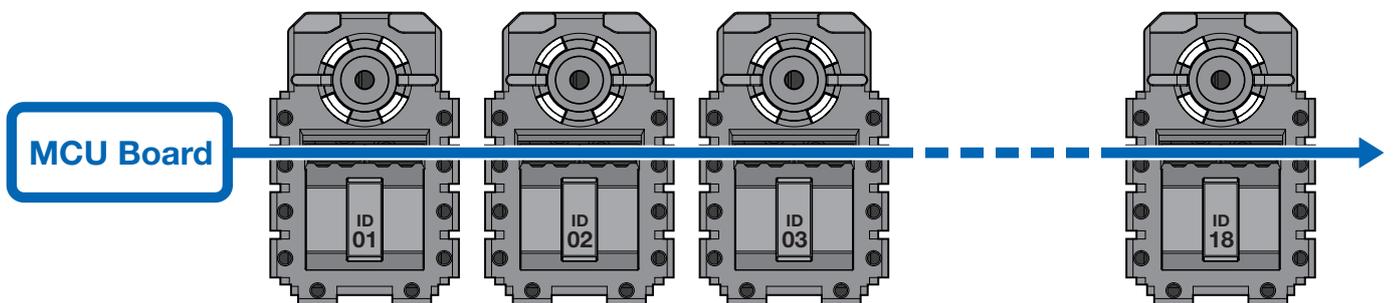
#### Overview and Characteristics of Servos

Servos A1-16 are modular actuators, which combine a gear reducer, a DC motor and an embedded control board in one small package. The servo motors provide the necessary torque to operate the robot. An added function of the motors is to provide information about internal temperature, supply voltage, current, and display operational status through an LED.

#### General Servo Motor Specifications

1. Operation voltage : 8 ~ 12 Volt
2. Maximum speed :  $70 \pm 10$  rpm
3. Stall torque : 25.0 kg-cm
4. Rotary position feedback with  $360^\circ$  continuous rotation angle and maximum  $330^\circ$  effective position control range
5. Duplex UART 5V TTL serial communication (default Baud rate: 115,200).

#### Wiring Connection



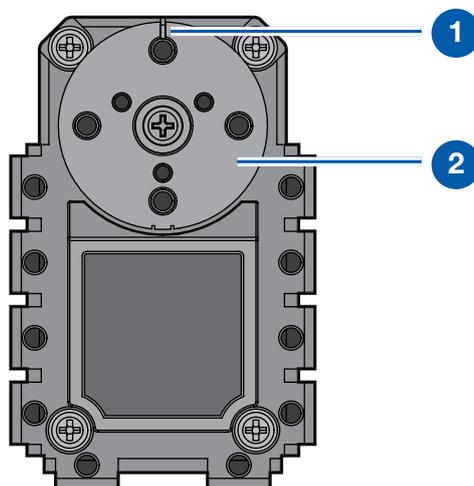
The servo motors are wired together in sequence to allow for communication to the MCU board. In the previous figure, the illustration depicts the wiring scheme used in the robot assembly. Every servo motor has a unique ID value, which is used by the MCU board to identify and send out respective signals. During power up, the status LED blinks the following sequence: red, white, blue and green (twice), to signify a successful power up procedure.

# Introduction

## Overview of Servos

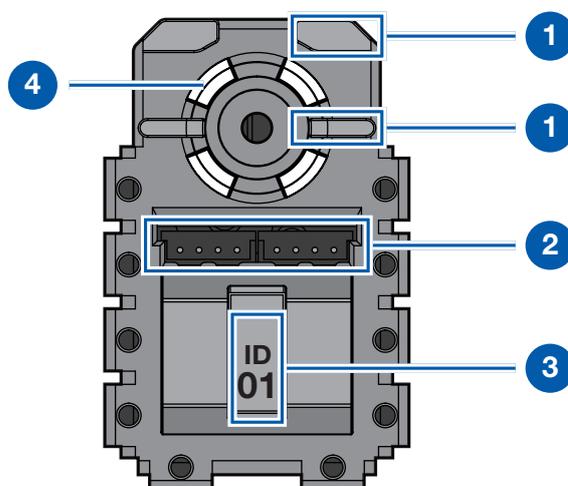


### Front View of Servo



1. Zero Position: The zero position shows the central position of the servo hub.
2. Servo Hub: The servo hub is the rotation output part of the servo motor.

### Back View of A1-16



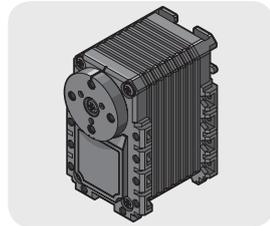
1. Cable Clip: The cable clip provide a route for cables.
2. Cable Connector: The cable connector provides power and communication signal for A1-16.
3. Servo ID: The servo ID shows default identification number.
4. Status LED: LED displays the servo motor status; see the following table for details.

Status Error	Error LED on/off
Normal Operation	LED on (White)
Exceed Potentiometer Range Error	LED on (Blue)
Over Voltage/Temperature/Current Limits Error	LED on (Red) LED off (White)
Requested Packet Error	LED on (Green)

# <02

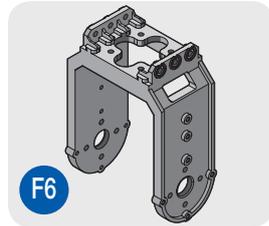
## Component Identification

### Robotics Arm 3D Parts List



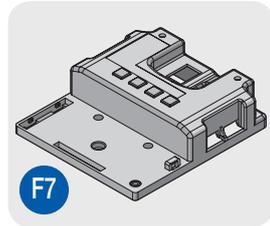
AI MOTOR

x3



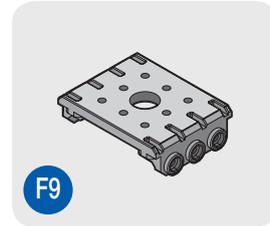
FRAME4

x2



PCB COVER\*

x1



BRACKET1

x1



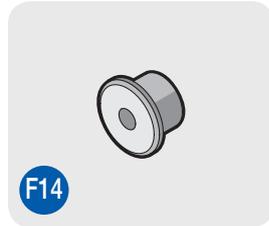
BRACKET5

x2



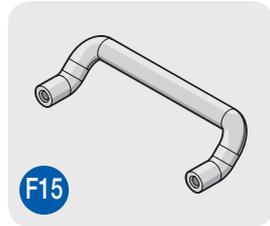
WASHER

x2



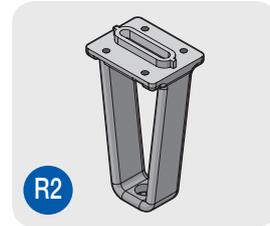
BUSHING

x2



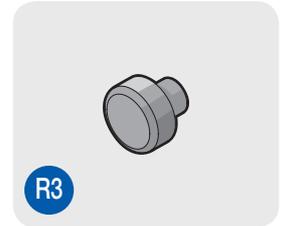
BAR

x1



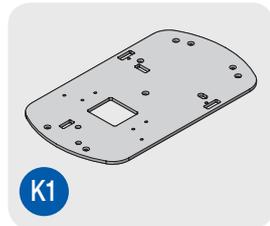
LEG BRACKET

x1



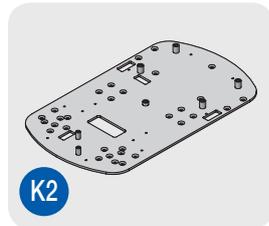
RUBBER FOOT

x1



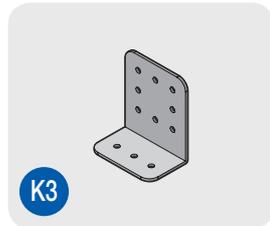
BASE PLASTIC

x1



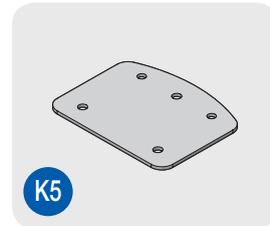
BASE SHEET-METAL

x1



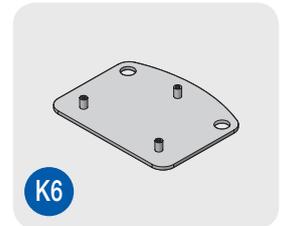
BRACKET6

x2



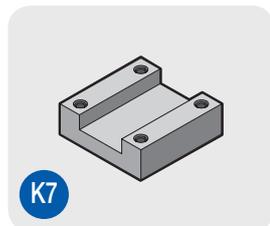
COUNTERWEIGHT-1

x3



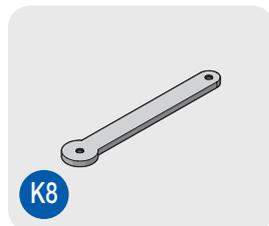
COUNTERWEIGHT-2

x1



EXTEND-BRACKET

x4



EXTEND-BAR

x4



RUBBER-FOOT FRONT

x4

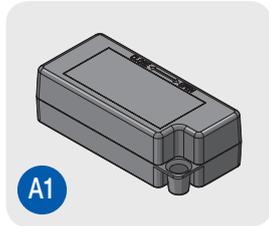


RUBBER-FOOT BACK

x2

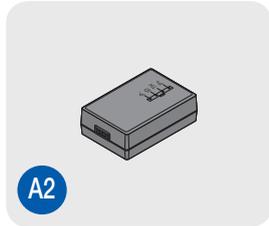
# Component Identification

## Robotics Arm 3D Parts List



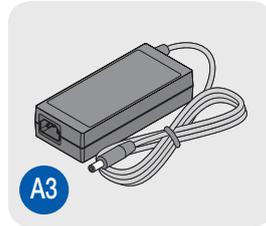
**A1**  
**BATTERY**

x1



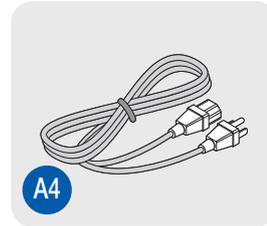
**A2**  
**BATTERY CHARGER**

x1



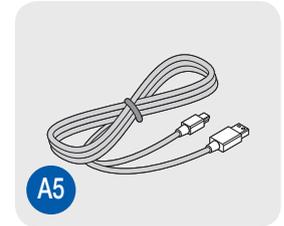
**A3**  
**AC ADAPTER**

x1



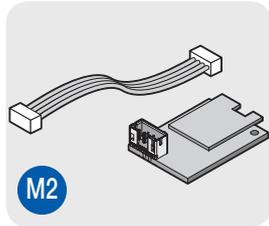
**A4**  
**POWER CABLE\*\***

x1



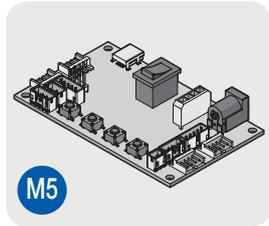
**A5**  
**USB CABLE**

x1



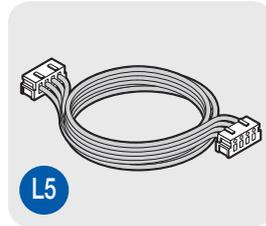
**M2**  
**BLUETOOTH MODULE**

x1



**M5**  
**MCU BOARD**

x1



**L5**  
**180MM**

x3



**S3**  
**M2.0x6L**

x42



**S5**  
**M3.0x6L**

x8



**S6**  
**M3.0x10L**

x2



**S7**  
**M2 NUT**

x4



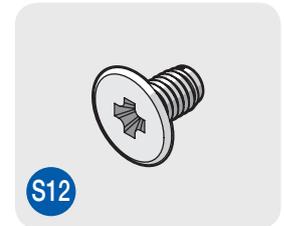
**S8**  
**M2.0x7L**

x4



**S10**  
**M2.0x6L**

x23



**S12**  
**M3.0x5L**

x8

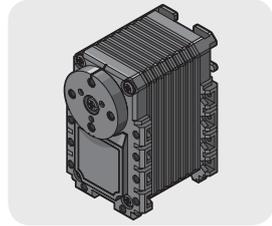
\* Serial number and product stickers are included.

\*\* Components may vary depending on regional requirements.

# <02

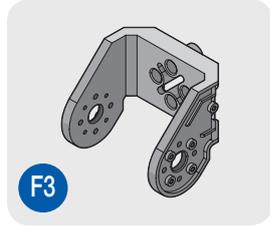
## Component Identification

### Robotics Arm 6D Parts List



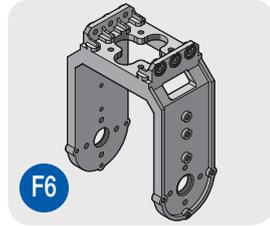
AI MOTOR

x6



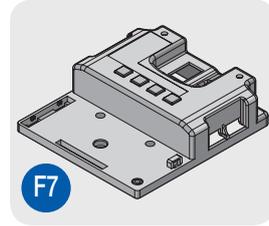
FRAME1

x1



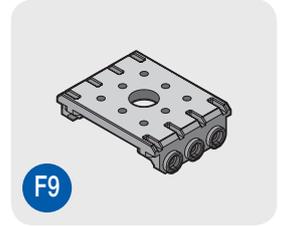
FRAME4

x2



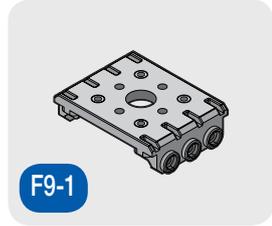
PCB COVER\*

x1



BRACKET1

x2



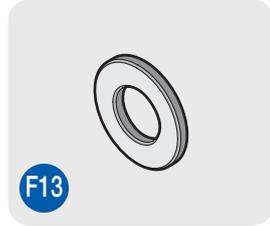
BRACKET5

x2



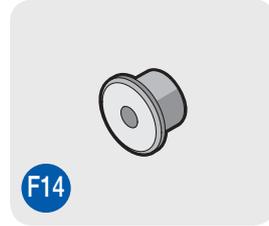
BRACKET3

x2



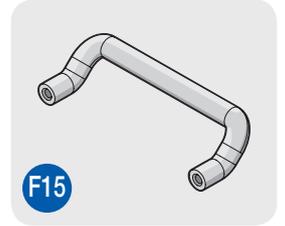
WASHER

x4



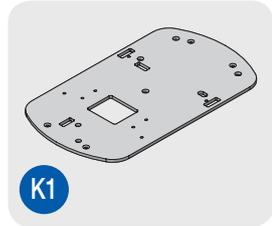
BUSHING

x4



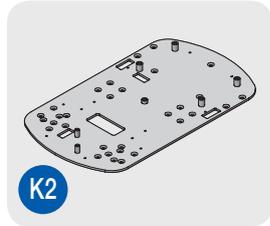
BAR

x1



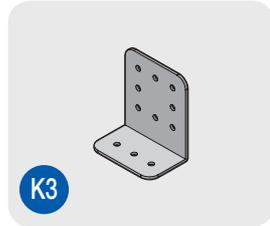
BASE PLASTIC

x1



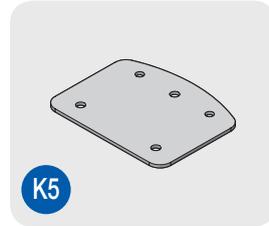
BASE SHEET-METAL

x1



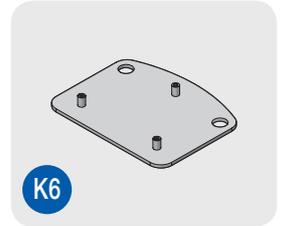
BRACKET6

x2



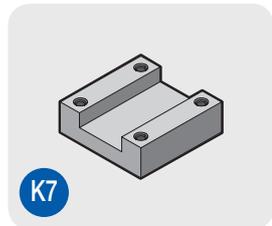
COUNTERWEIGHT-1

x3



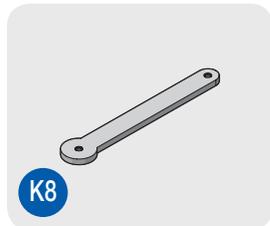
COUNTERWEIGHT-2

x1



EXTEND-BRACKET

x4



EXTEND-BAR

x4



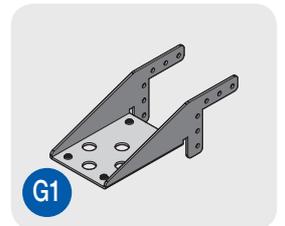
RUBBER-FOOT FRONT

x4



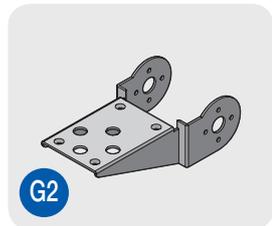
RUBBER-FOOT BACK

x2



CLAMP-A1

x1



CLAMP-A2

x1

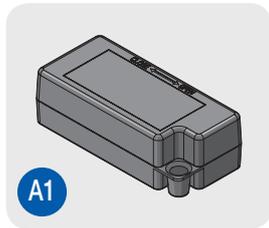


CLAMP-RUBBER

x2

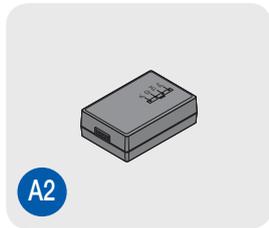
# Component Identification

## Robotics Arm 6D Parts List



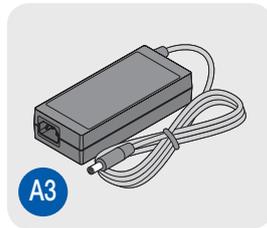
**A1**  
BATTERY

x1



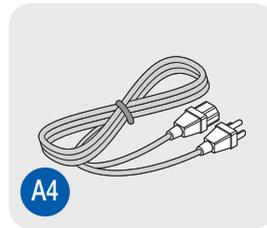
**A2**  
BATTERY  
CHARGER

x1



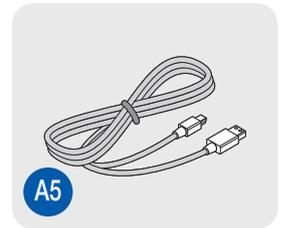
**A3**  
AC ADAPTER

x1



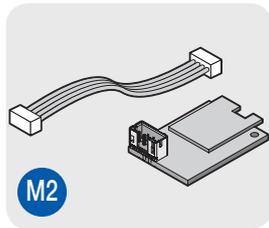
**A4**  
POWER CABLE\*\*

x1



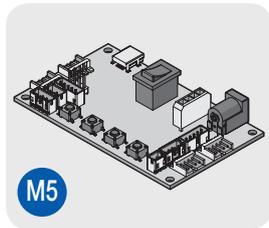
**A5**  
USB CABLE

x1



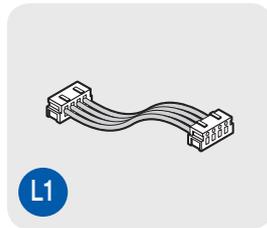
**M2**  
BLUETOOTH  
MODULE

x1



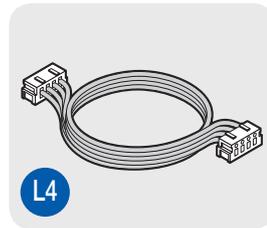
**M5**  
MCU BOARD

x1



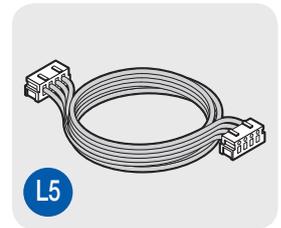
**L1**  
80MM

x1



**L4**  
140MM

x2



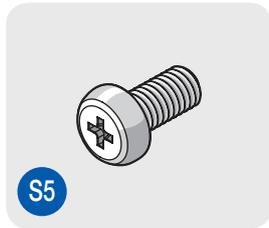
**L5**  
180MM

x3



**S3**  
M2.0x6L

x72



**S5**  
M3.0x6L

x8



**S6**  
M3.0x10L

x4



**S8**  
M2.0x7L

x4



**S10**  
M2.0x6L

x23



**S12**  
M3.0x5L

x8

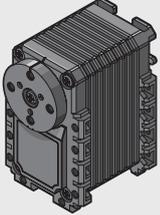
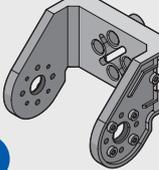
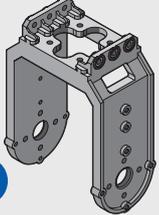
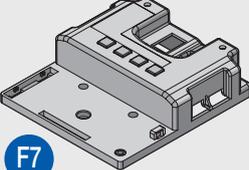
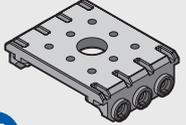
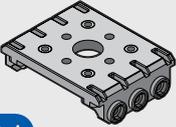
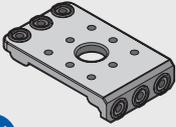
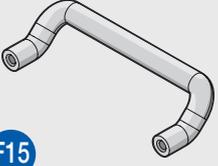
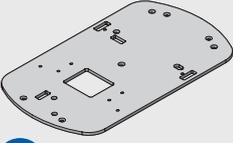
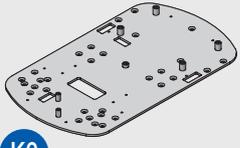
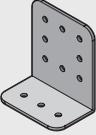
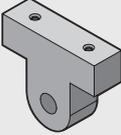
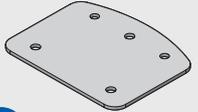
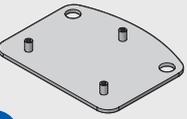
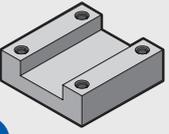
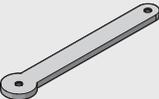
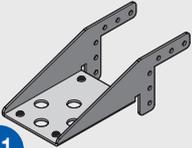
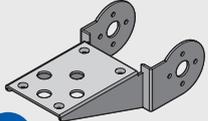
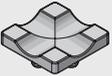
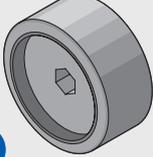
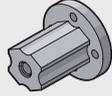
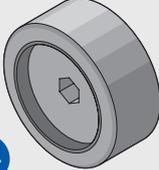
\* Serial number and product stickers are included.

\*\* Components may vary depending on regional requirements.

# <02

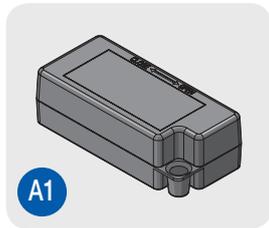
## Component Identification

### Robotics Arm 6DW Parts List

	 F3	 F6	 F7	 F9
AI MOTOR	FRAME1	FRAME4	PCB COVER*	BRACKET1
x8	x1	x2	x1	x2
 F9-1	 F11	 F13	 F14	 F15
BRACKET5	BRACKET3	WASHER	BUSHING	BAR
x4	x2	x4	x4	x1
 K1	 K2	 K3	 K4	 K5
BASE PLASTIC	BASE SHEET-METAL	BRACKET6	BRACKET7	COUNTERWEIGHT-1
x1	x1	x2	x2	x3
 K6	 K7	 K8	 K9	 K10
COUNTERWEIGHT-2	EXTEND-BRACKET	EXTEND-BAR	RUBBER-FOOT FRONT	RUBBER-FOOT BACK
x1	x4	x4	x4	x2
 G1	 G2	 G3	 W1	 W2
CLAMP-A1	CLAMP-A2	CLAMP-RUBBER	WHEEL-FRONT	WHEEL-CONNECTOR CAPSTAN
x1	x1	x2	x2	x2
 W3	 W4			
WHEEL-CONNECTOR PASSIVE	WHEEL-BACK			
x2	x2			

# Component Identification

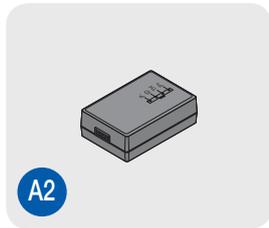
## Robotics Arm 6DW Parts List



A1

BATTERY

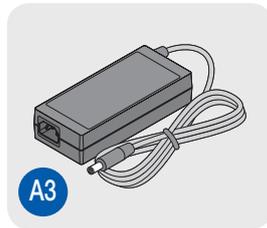
x1



A2

BATTERY CHARGER

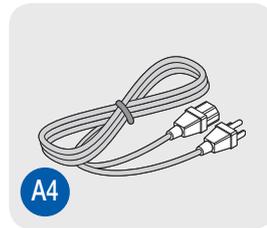
x1



A3

AC ADAPTER

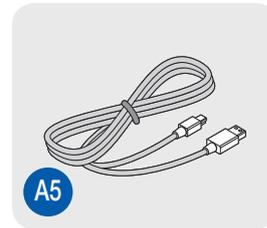
x1



A4

POWER CABLE\*\*

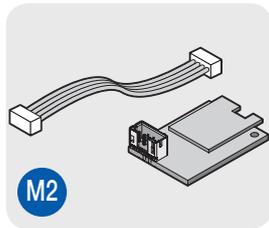
x1



A5

USB CABLE

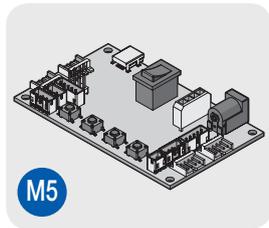
x1



M2

BLUETOOTH MODULE

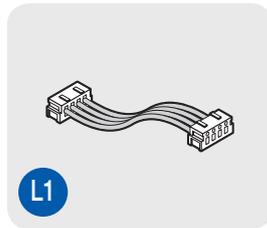
x1



M5

MCU BOARD

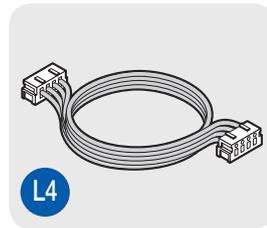
x1



L1

80MM

x1



L4

140MM

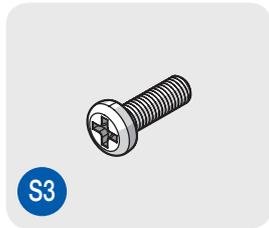
x2



L5

180MM

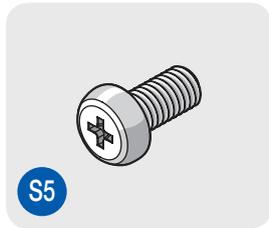
x5



S3

M2.0x6L

x88



S5

M3.0x6L

x8



S6

M3.0x10L

x4



S8

M2.0x7L

x4



S10

M2.0x6L

x35



S11

M4.0x8L

x6



S12

M3.0x5L

x8

\* Serial number and product stickers are included.

\*\* Components may vary depending on regional requirements.

# <02

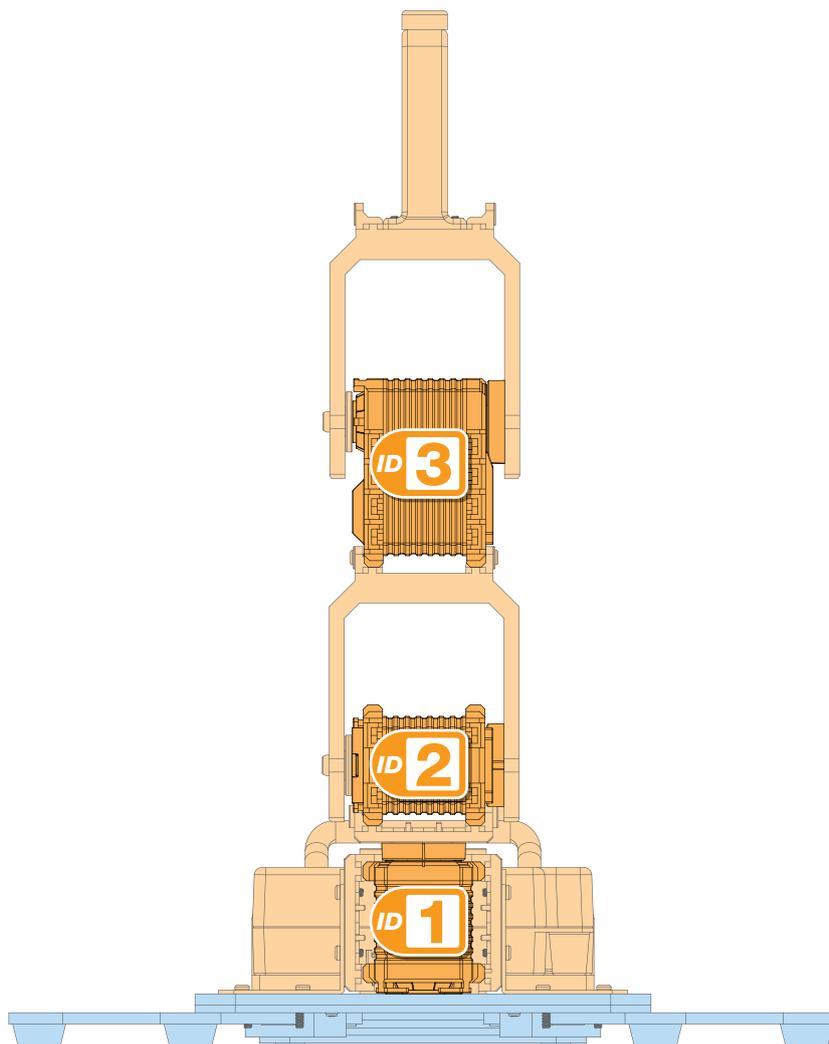
## Component Identification

### Server Motors Identification

The actuators are preconfigured with a respective ID to allow for easier identification and an overall faster assembly process. The following information depicts each actuator along with its ID number. The actuators have been color coded in this manual for easy reference. The actual components are not color coded.

The following image illustrates the front side of the robot with the left and right extended leg views, showing all ID locations.

### 3D

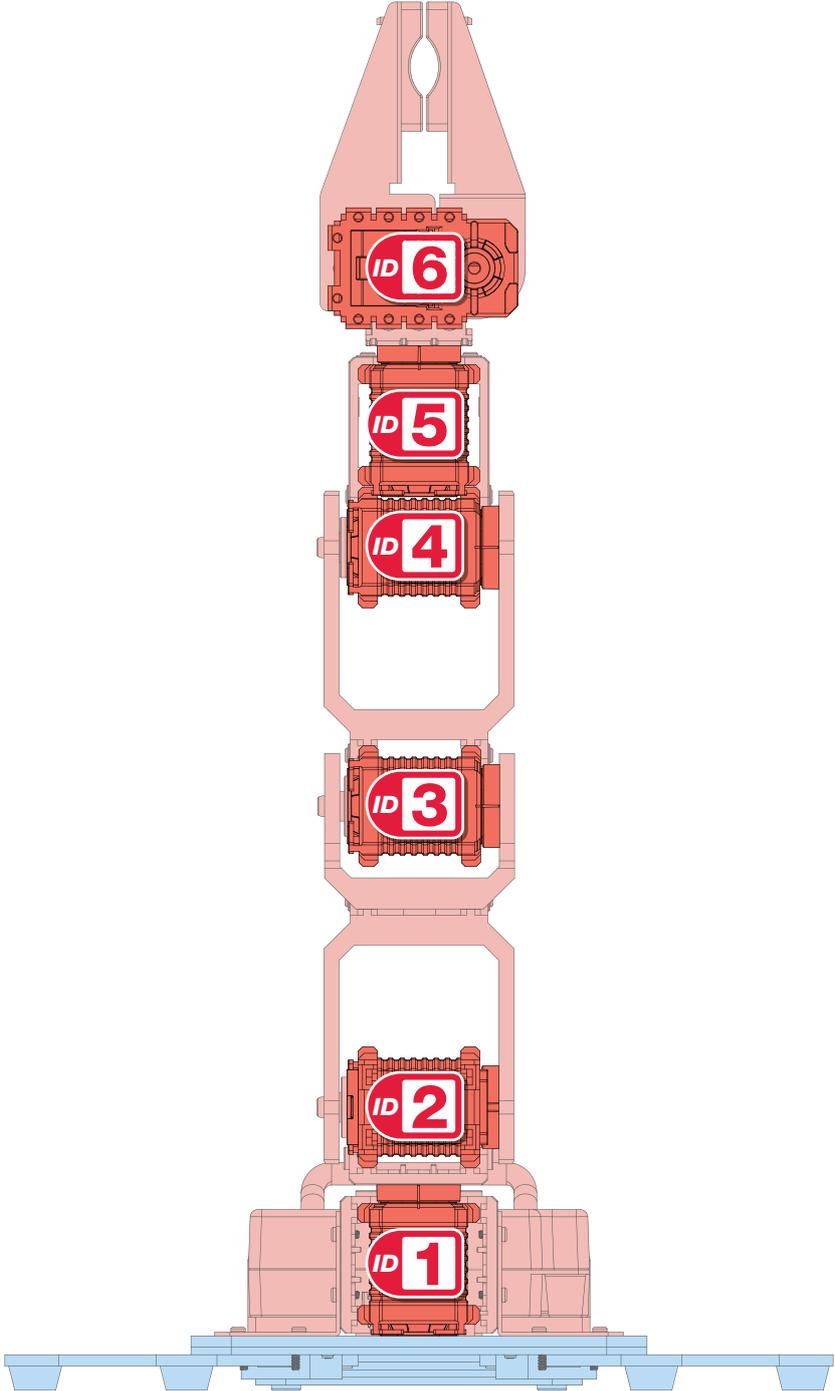


# Component Identification

## Server Motors Identification



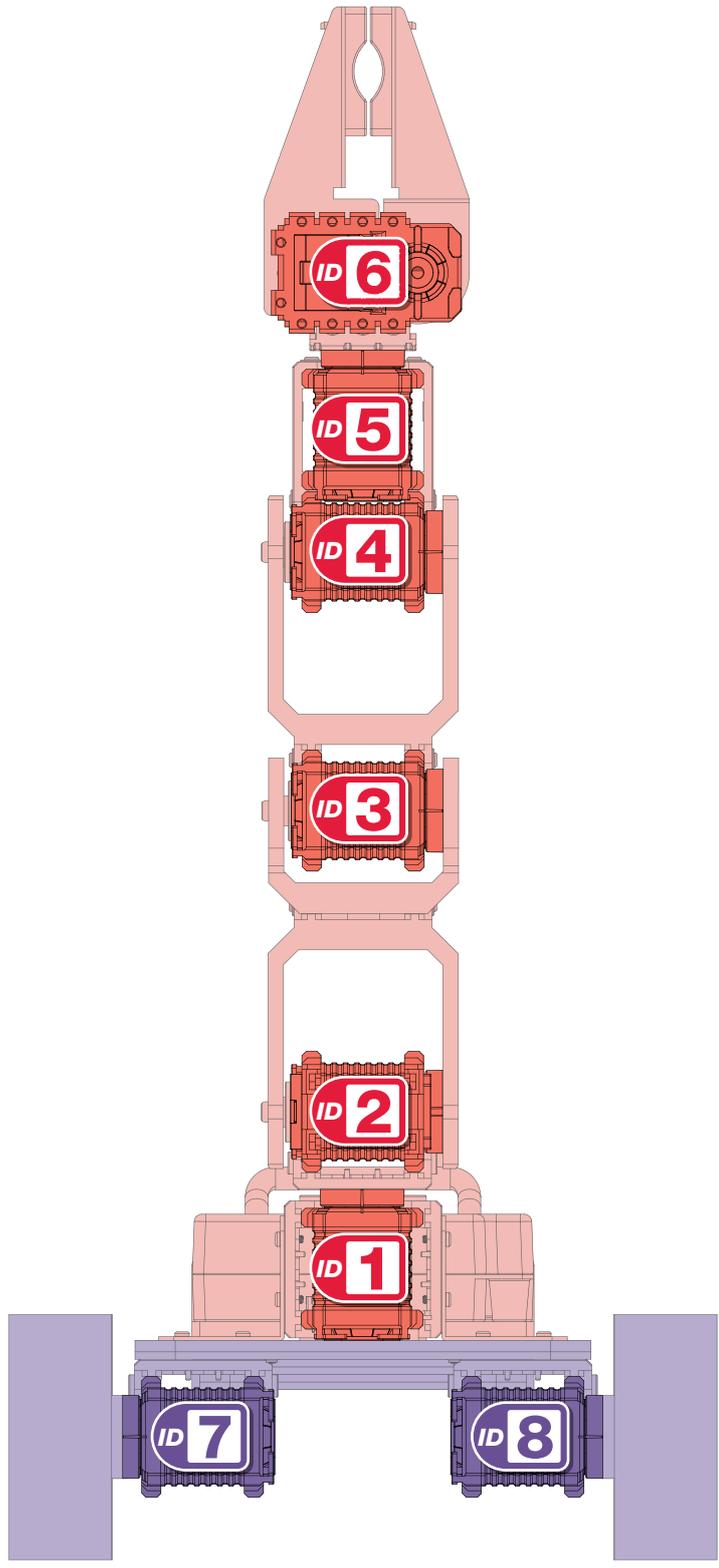
6D



# <02

## Component Identification Server Motors Identification

6DW



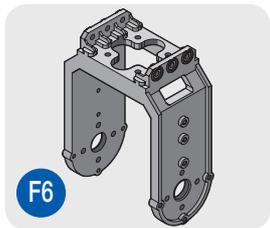
# Component Identification

## Frame Placement Identification



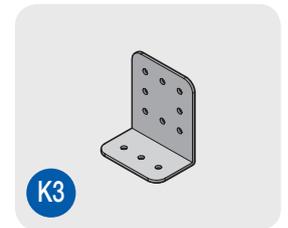
The placement of each frame is illustrated in the following diagram. Each frame represents a different section segment. Some frames require the installation of nuts before starting assembly. See the correlating procedure for further information.

### 3D



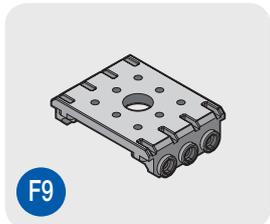
FRAME4

x2



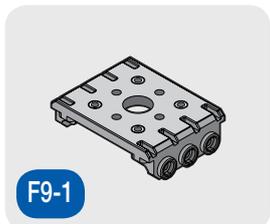
BRACKET6

x2



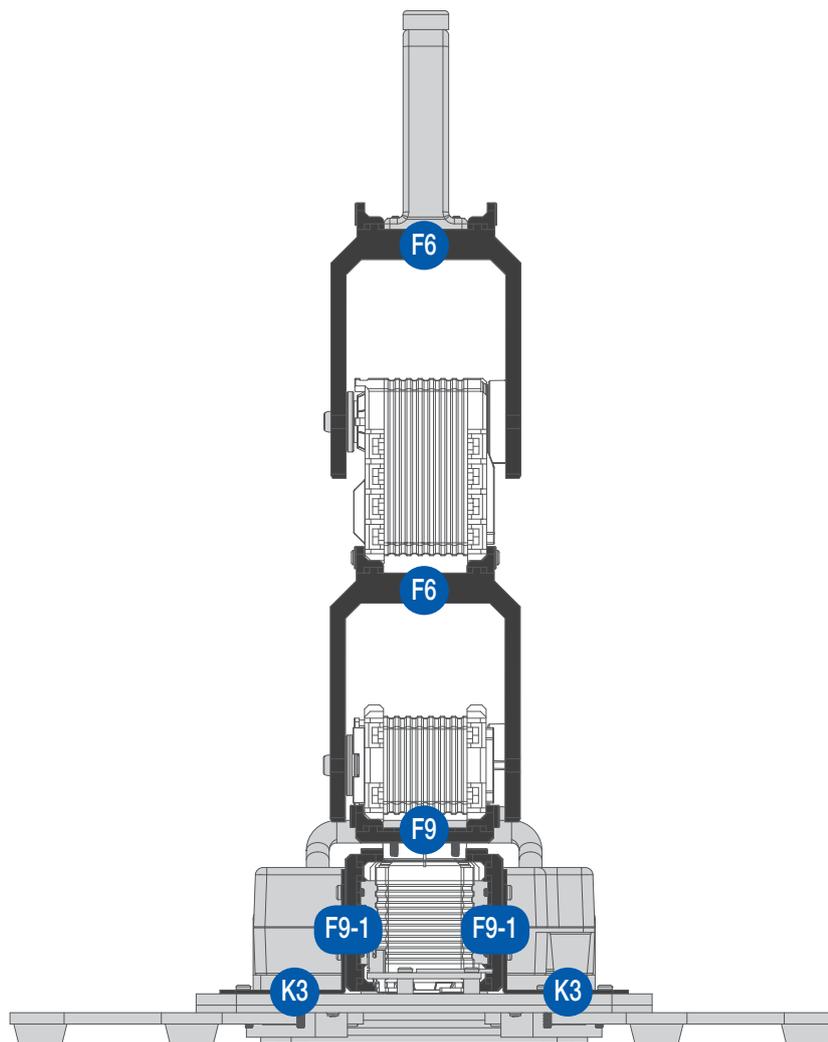
BRACKET1

x1



BRACKET5

x2

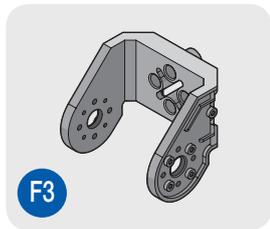


# <02

## Component Identification

### Frame Placement Identification

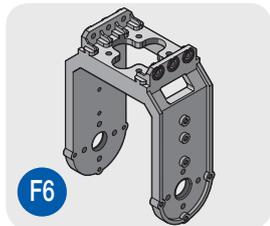
6D



F3

FRAME1

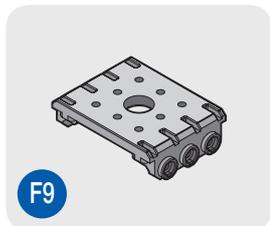
x1



F6

FRAME4

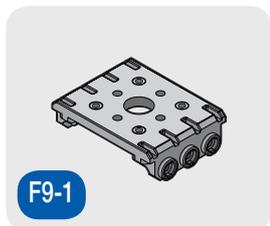
x2



F9

BRACKET1

x2



F9-1

BRACKET5

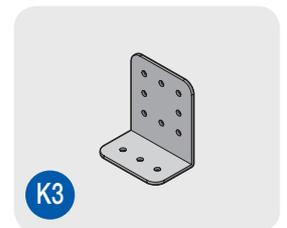
x2



F11

BRACKET3

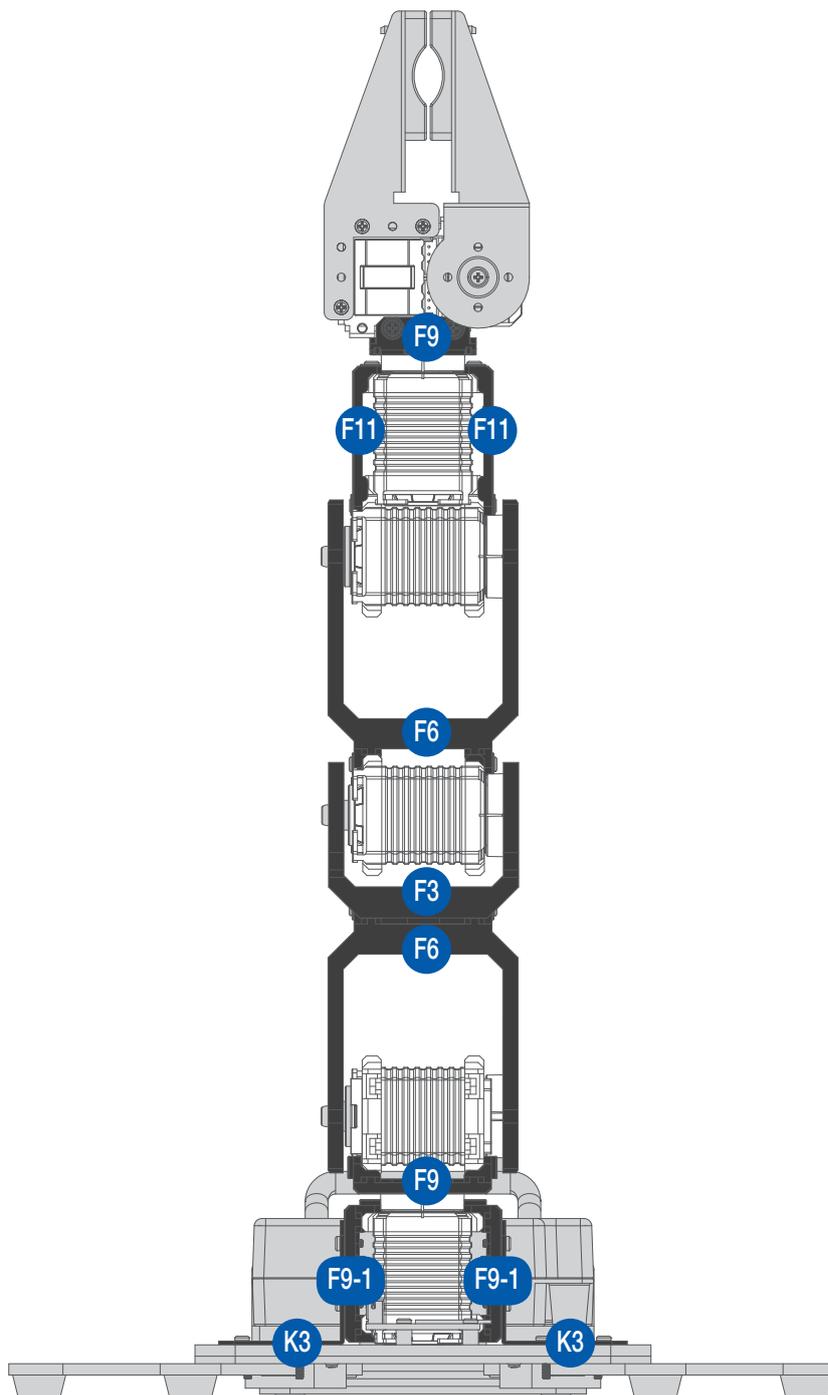
x2



K3

BRACKET6

x2

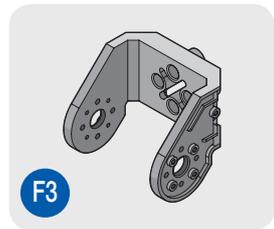


# Component Identification

## Frame Placement Identification

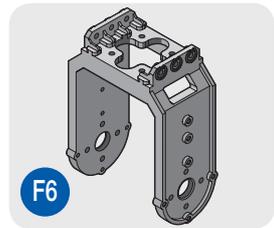


6DW



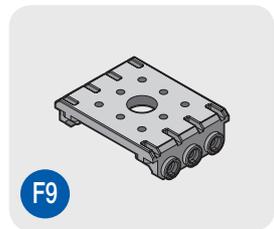
FRAME1

x1



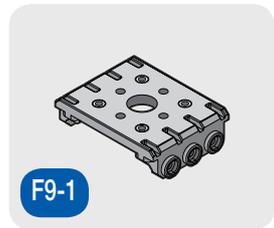
FRAME4

x2



BRACKET1

x2



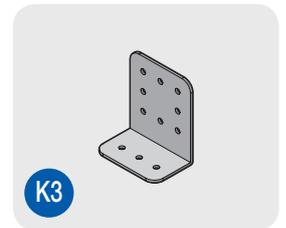
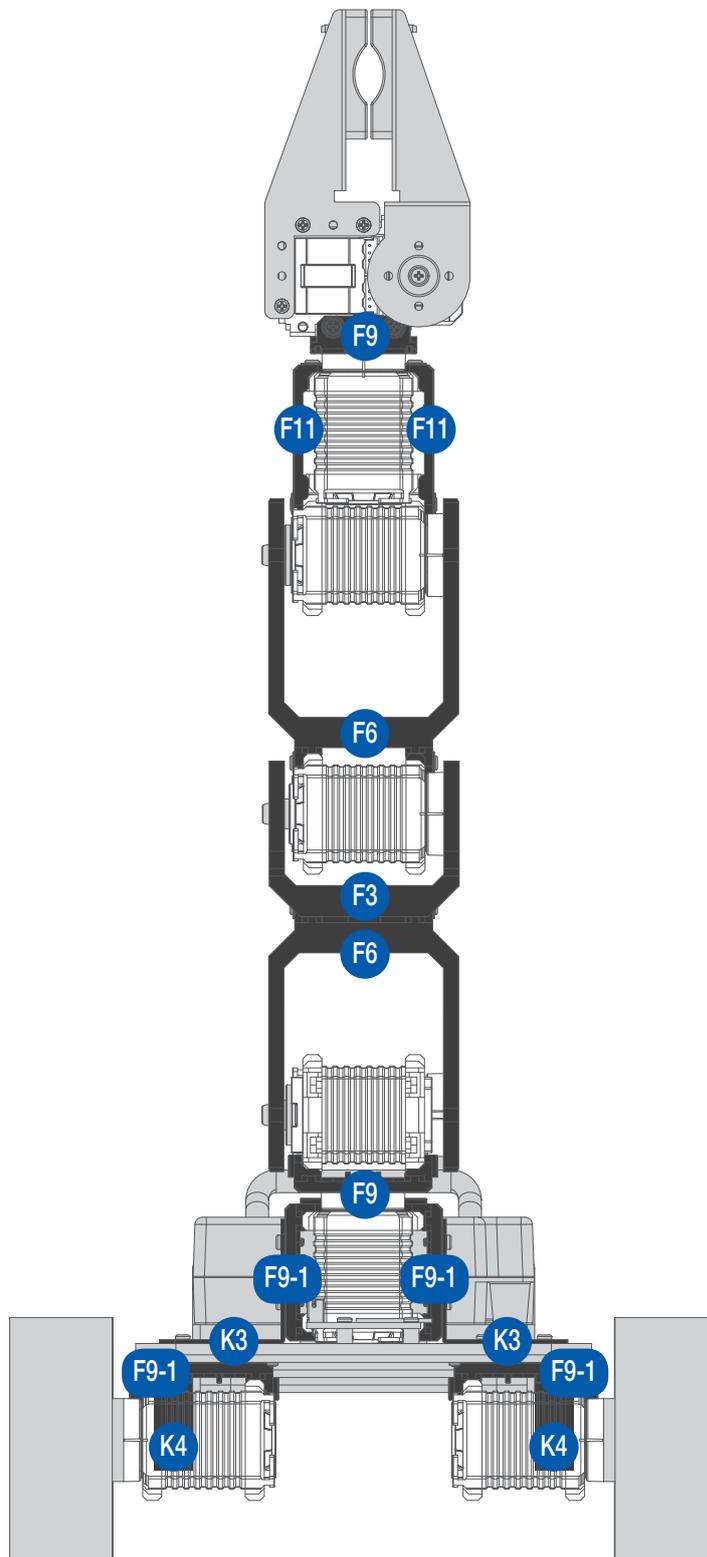
BRACKET5

x4



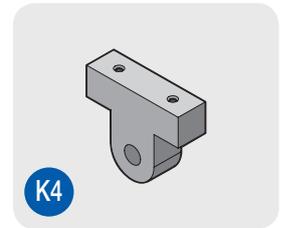
BRACKET3

x2



BRACKET6

x2



BRACKET7

x2

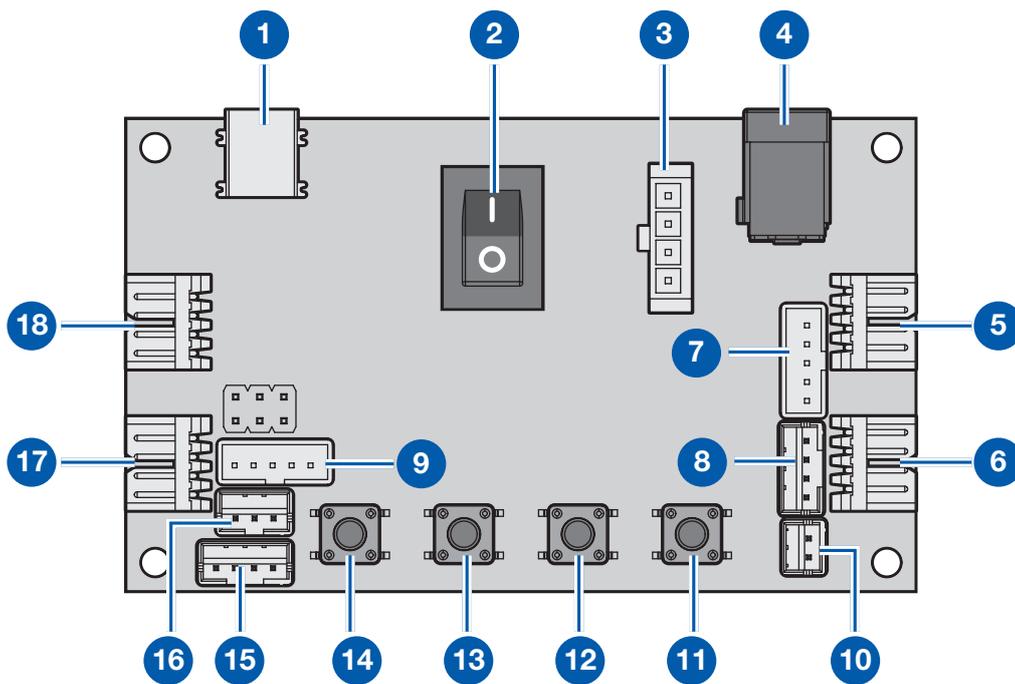
# <02

## Component Identification

### Board Connector

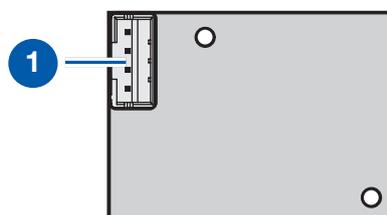
#### MCU Board

1. Mini USB connector
2. Power switch
3. Battery connector
4. Power slot
5. Connector to the ID8
6. Connector to the ID1
7. Not available on this model
8. Not available on this model
9. Not available on this model
10. Not available on this model
11. Programmable button
12. Programmable button
13. Programmable button
14. Programmable button
15. Connector to the Bluetooth module
16. Not available on this model
17. Not available on this model
18. Connector to the ID7



#### Bluetooth Module

1. Connector to the MCU board





This page intentionally left blank.

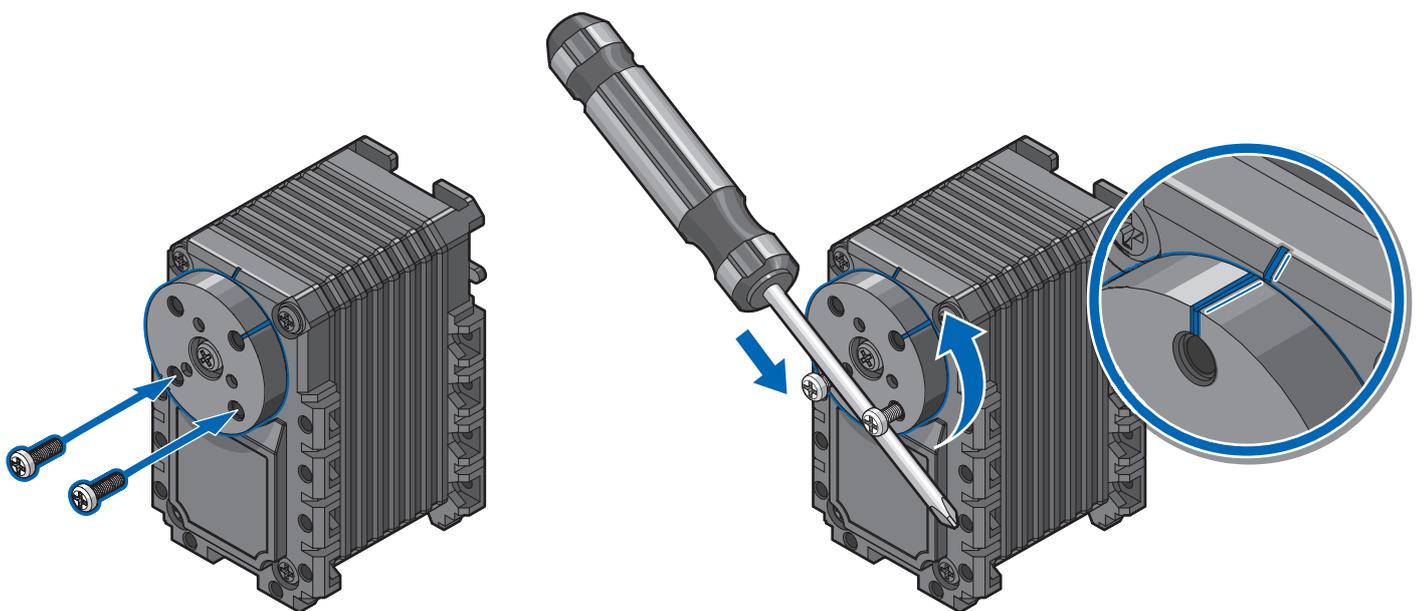
#### General Safety

- Before using, take a moment to locate the Power On/Off and directional buttons and familiarize yourself with the functions.
- Avoid carrying and touching the robot when it is moving, walking or getting up, to avoid getting pinched.
- Keep hand and fingers out of the joint areas, to avoid getting caught in between.
- To avoid injury, do not place your hands in any joint to prevent damage or personal injury.
- Generally, leave at least 60 cm (24 inches) all around the robot to avoid damage. In particular, ensure that all cabling is removed from the usable area.
- The working surface must be dry and level; thick carpets or rugs are not recommended for operational stability.
- The robot is designed for indoor use only.

#### Servo Hub Preparation

Prior to installation of the servo motors, the hub must be aligned with the servo. The process is known as Setting to Zero. Once aligned, the zero position of the servo matches the zero position of the structure around it.

1. Insert two screws on the actuator hub as seen in the following image.
2. Place a screwdriver between the screws and turn it until the line on the hub and the line on the servo are aligned indicating the correct orientation.



# Hardware Assembly

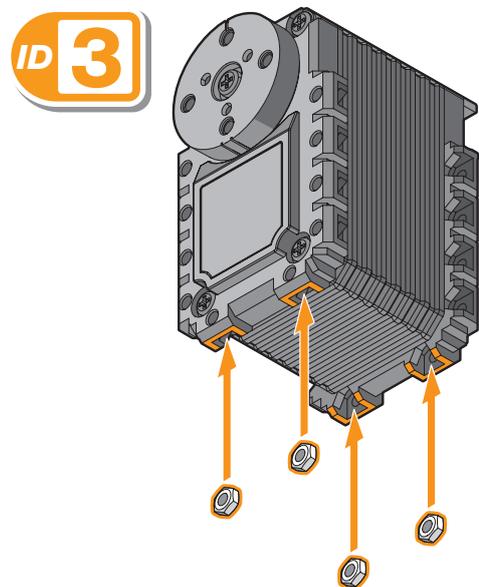
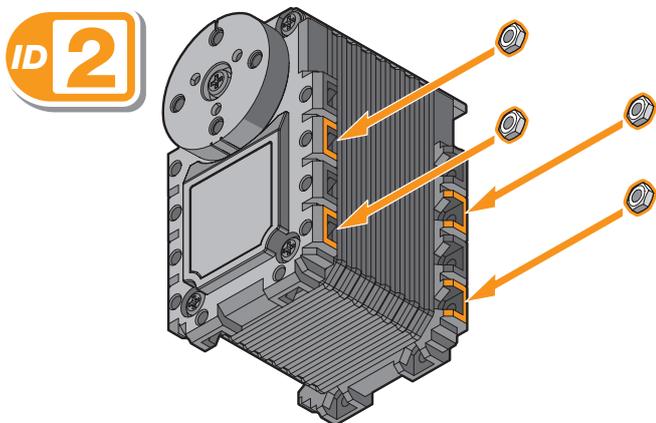
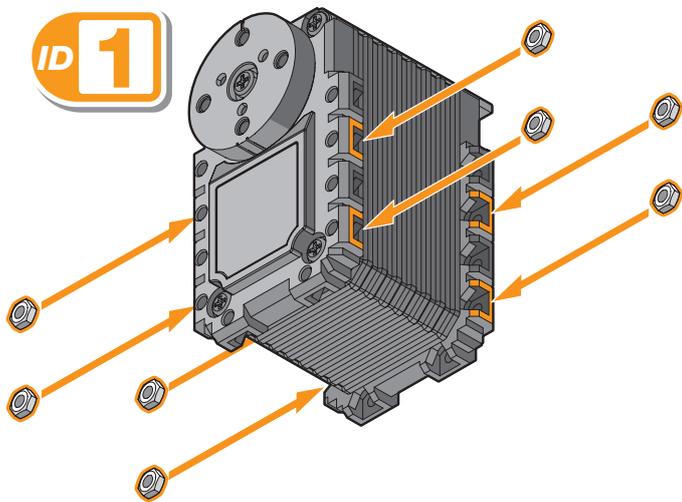
## General Safety and Hardware Preparation



### Servo Preparation

The brackets for each ID contain screw nuts for securing. The position of the screw nuts vary depending on the servo ID. This section includes locations for all the servo motors to serve as a reference for replacement of new servo motors. Refer to the following information to determine the specific location of the screw nuts for each servo ID.

3D

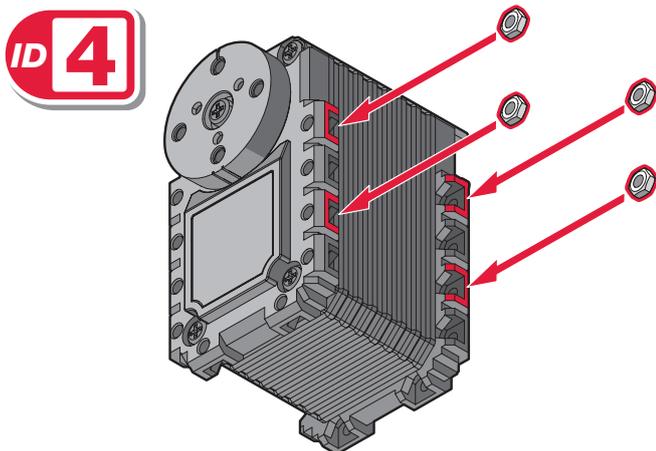
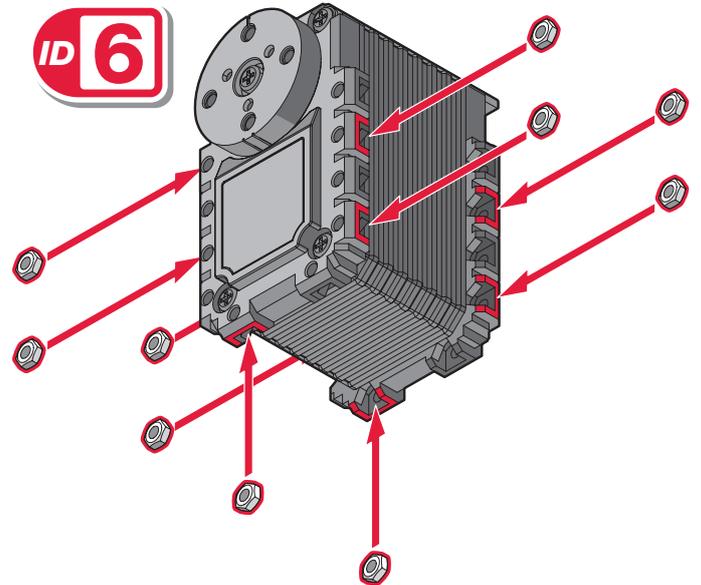
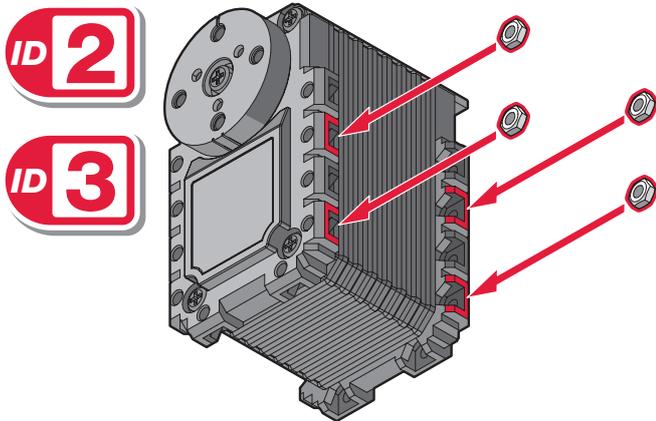
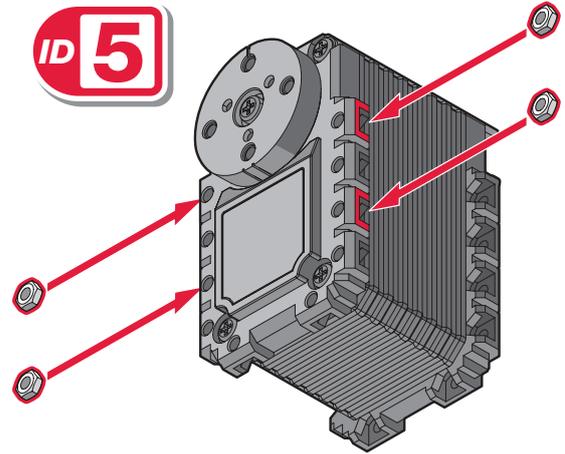
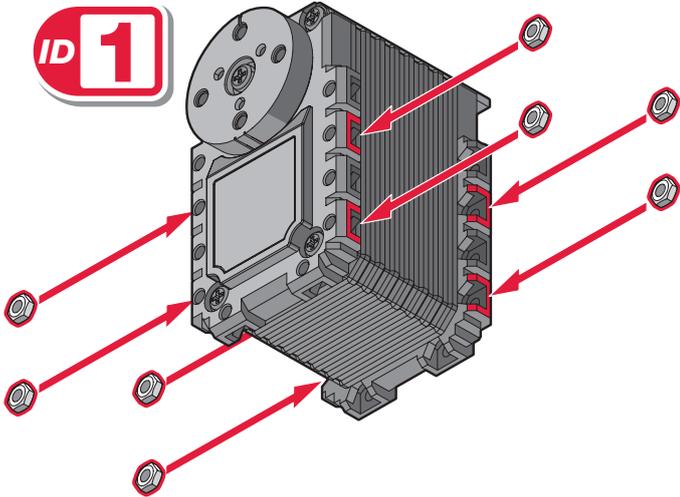


# <03

## Hardware Assembly

### General Safety and Hardware Preparation

6D/6DW

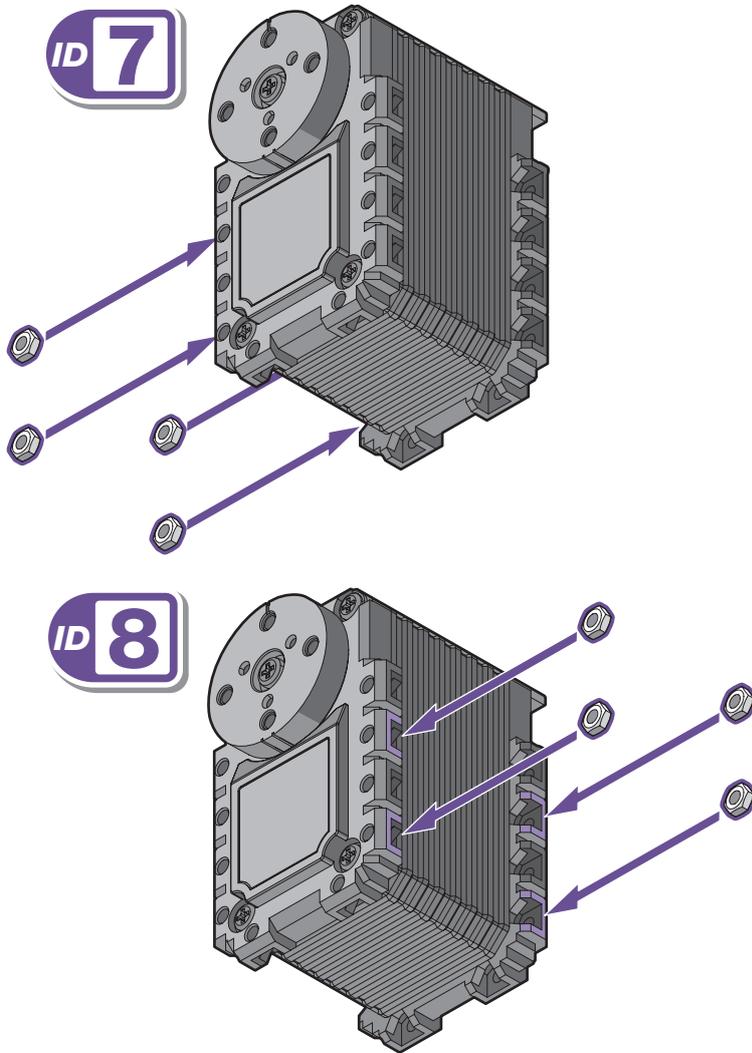


# Hardware Assembly

## General Safety and Hardware Preparation



### Base Assembly (with Wheels)





## Hardware Assembly

### Order of Assembly

The following information is designed to provide you with an optimal installation process to utilize your time and minimize the possibility of installation errors.

#### **3D**

The order of assembly is as follows:

1. 3D Assembly
2. Base Assembly (without Wheels)

#### **6D**

The order of assembly is as follows:

1. 6D Assembly
2. Base Assembly (without Wheels)

#### **6DW**

The order of assembly is as follows:

1. 6D Assembly
2. Base Assembly (with Wheels)



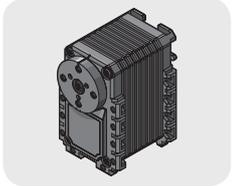
This page intentionally left blank.

# <03

## Hardware Assembly

### 3D Assembly

#### Required Parts



x1

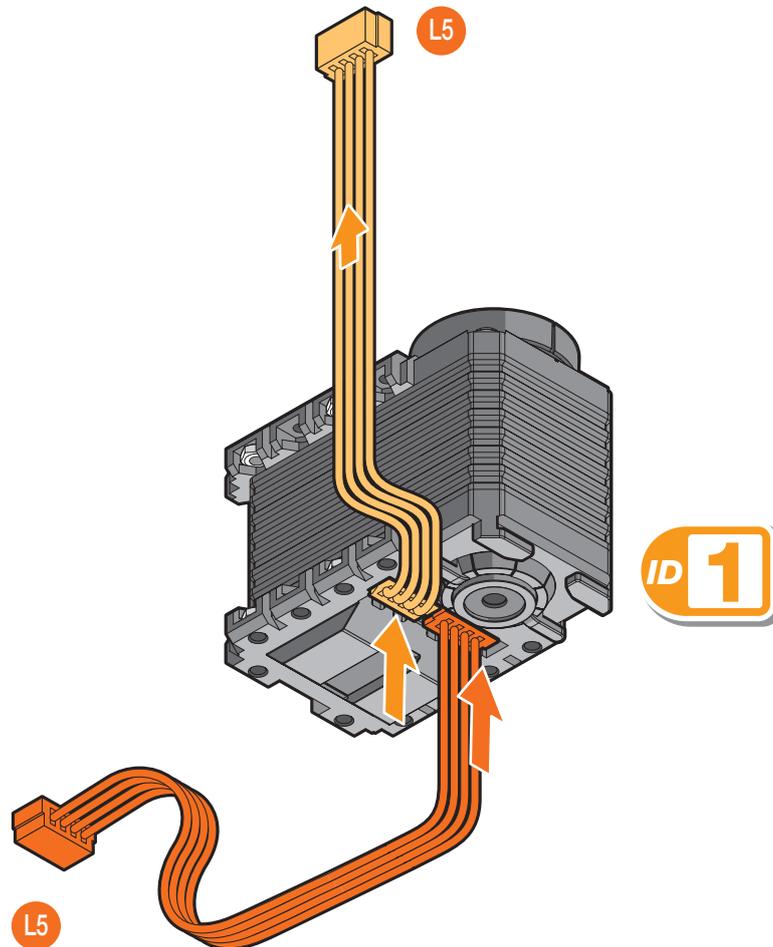


L5

x2

**NOTE:** Make sure the actuator hub is set to zero before installing the bracket. See **“Servo Hub Preparation”** on page 32.

1. Connect the cables (L5) to the actuator (ID1).
2. Route the cable (L5) following the illustration.



L5

ID 1

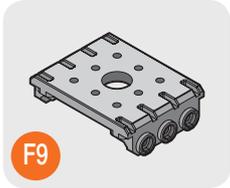
L5

# Hardware Assembly

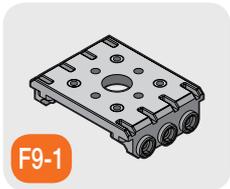
## 3D Assembly



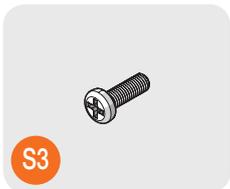
### Required Parts



x1

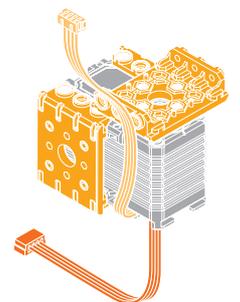
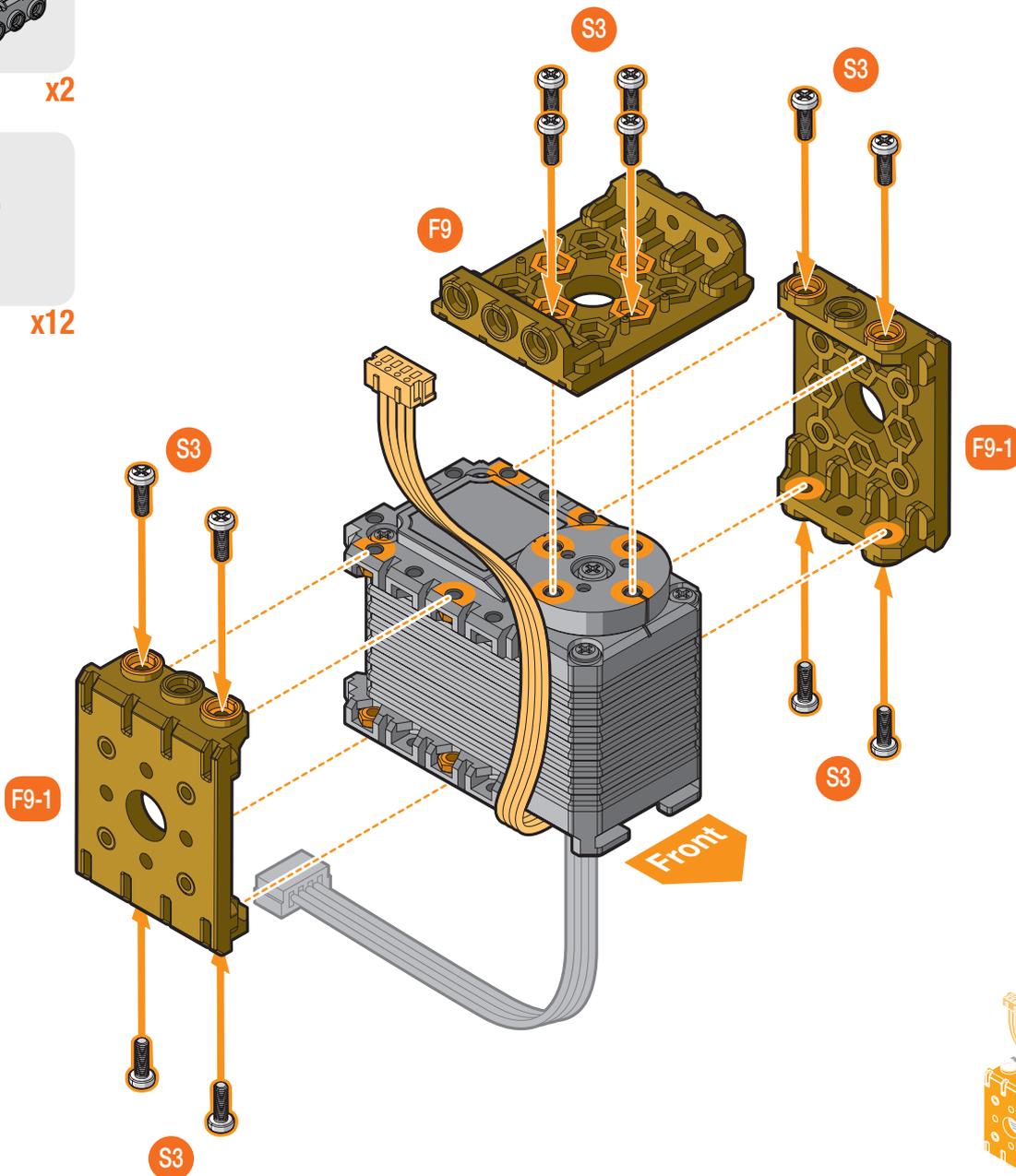


x2



x12

3. Align the bracket (F9) with the actuator (ID1).
4. Secure the bracket (F9) to the actuator (ID1) with screws (S3).
5. Align the bracket (F9-1) with the actuator (ID1).
6. Secure the bracket (F9-1) to the actuator (ID1) with screws (S3).

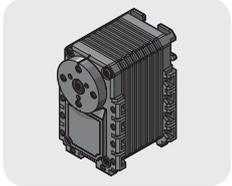


# <03

## Hardware Assembly

### 3D Assembly

#### Required Parts

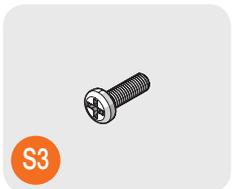


x1



L5

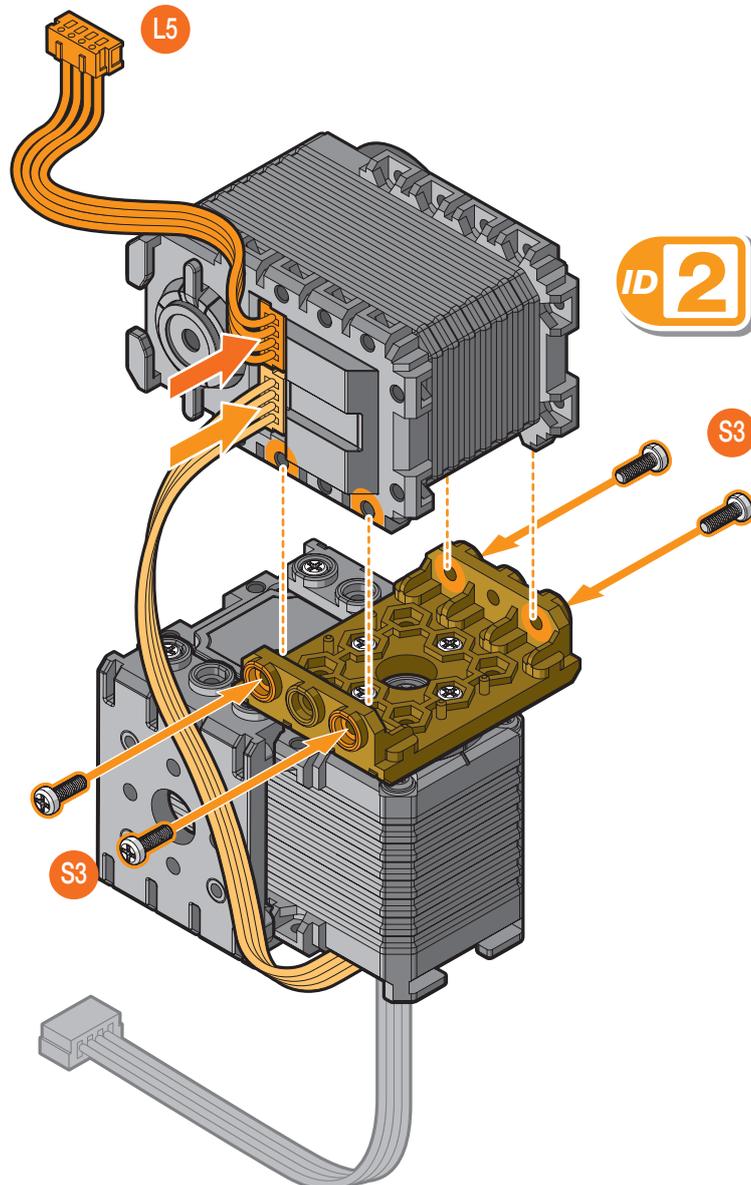
x1



S3

x4

7. Connect the cables (L5) to the actuator (ID2).
8. Align the actuator (ID2) with the bracket (F9).
9. Secure the bracket (F9) to the actuator (ID2) with screws (S3).

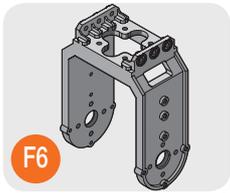


# Hardware Assembly

## 3D Assembly



### Required Parts



x1



x1



x1

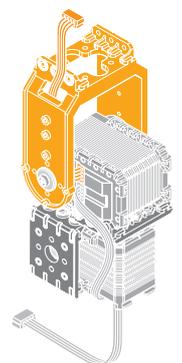
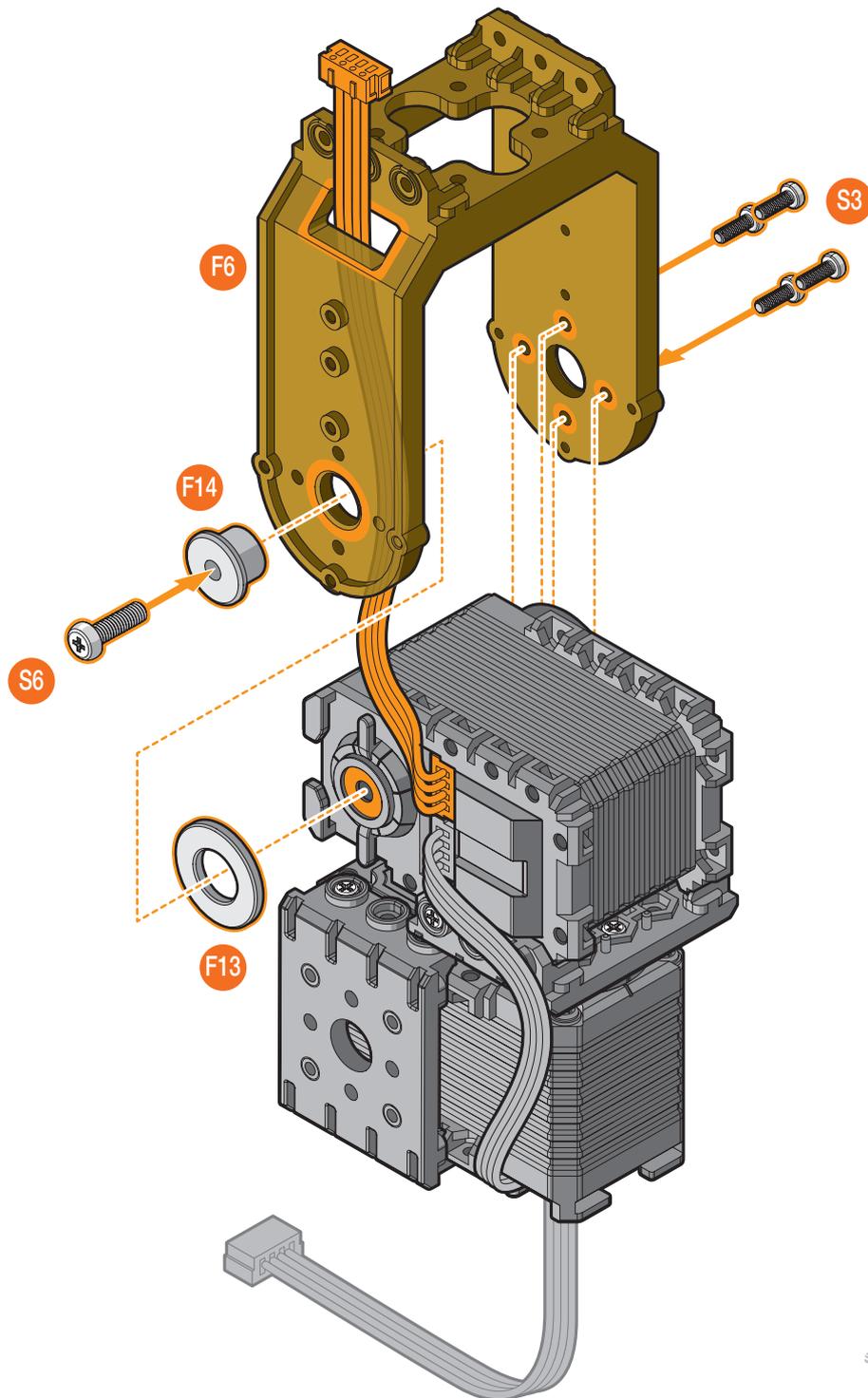


x4



x1

10. Route the cable (L5) through the opening on the frame (F6).
11. Insert the bushing (F14) through the frame (F6).
12. Run the washer (F13) over the inside of the bushing (F14).
13. Install the actuator assembly, ensuring it's aligned with the bushing (F14).
14. Secure the bushing (F14) with a screw (S6).
15. Secure the frame (F6) to the actuator assembly with screws (S3).

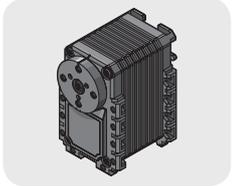


# <03

## Hardware Assembly

### 3D Assembly

#### Required Parts



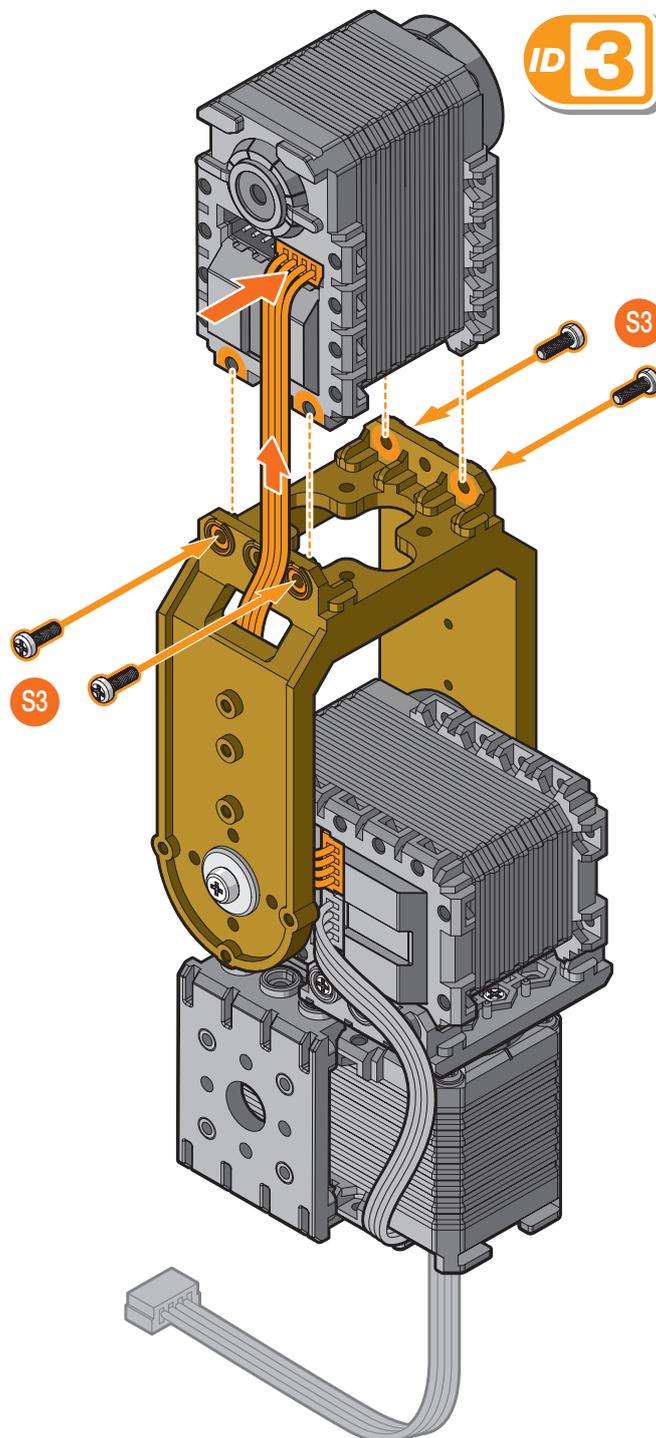
x1



S3

x4

16. Install the actuator (ID3) on the top of the actuator assembly.
17. Secure the frame (F6) to the actuator (ID3) with screws (S3).
18. Connect the cable (L5) to the actuator (ID3).

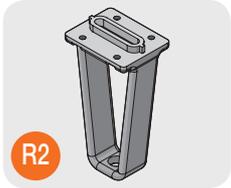


# Hardware Assembly

## 3D Assembly



### Required Parts

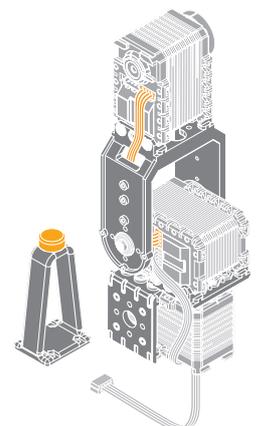
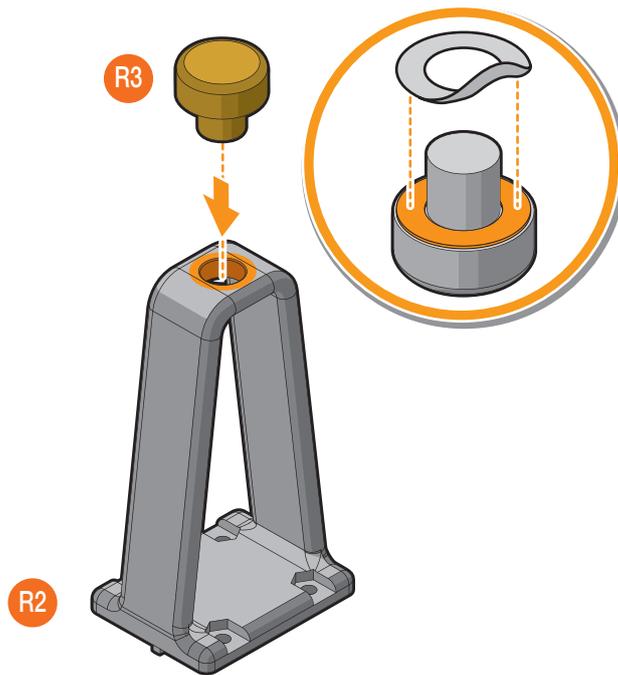


x1



x1

19. Remove the sticker from the rubber foot (R3).
20. Align the rubber foot (R3) with the leg bracket (R2) and install.

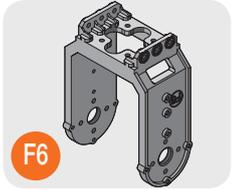


# <03

## Hardware Assembly

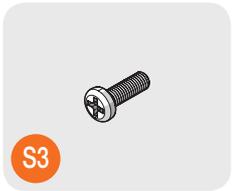
### 3D Assembly

#### Required Parts



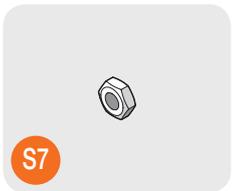
F6

x1



S3

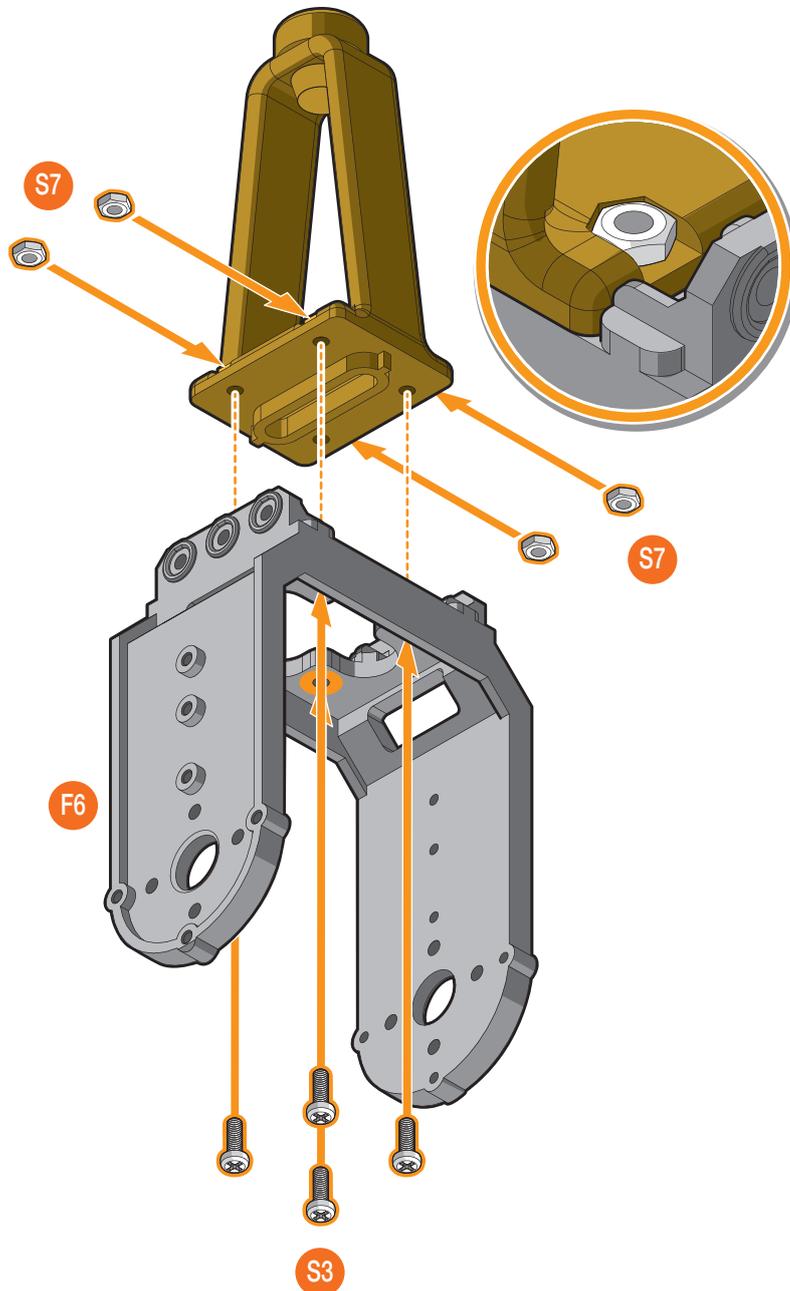
x4



S7

x4

21. Align the frame (F6) with the leg assembly.
22. Align the nut (S7) with the leg assembly.
23. While holding the nut (S7) in place, secure the frame (F6) to the leg assembly with a screw (S1).



# Hardware Assembly

## 3D Assembly



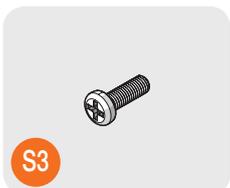
### Required Parts



x1



x1

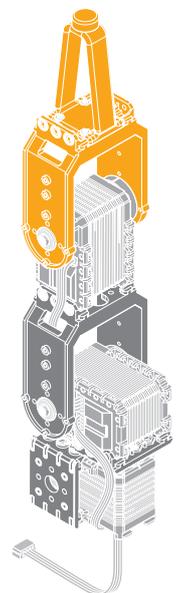
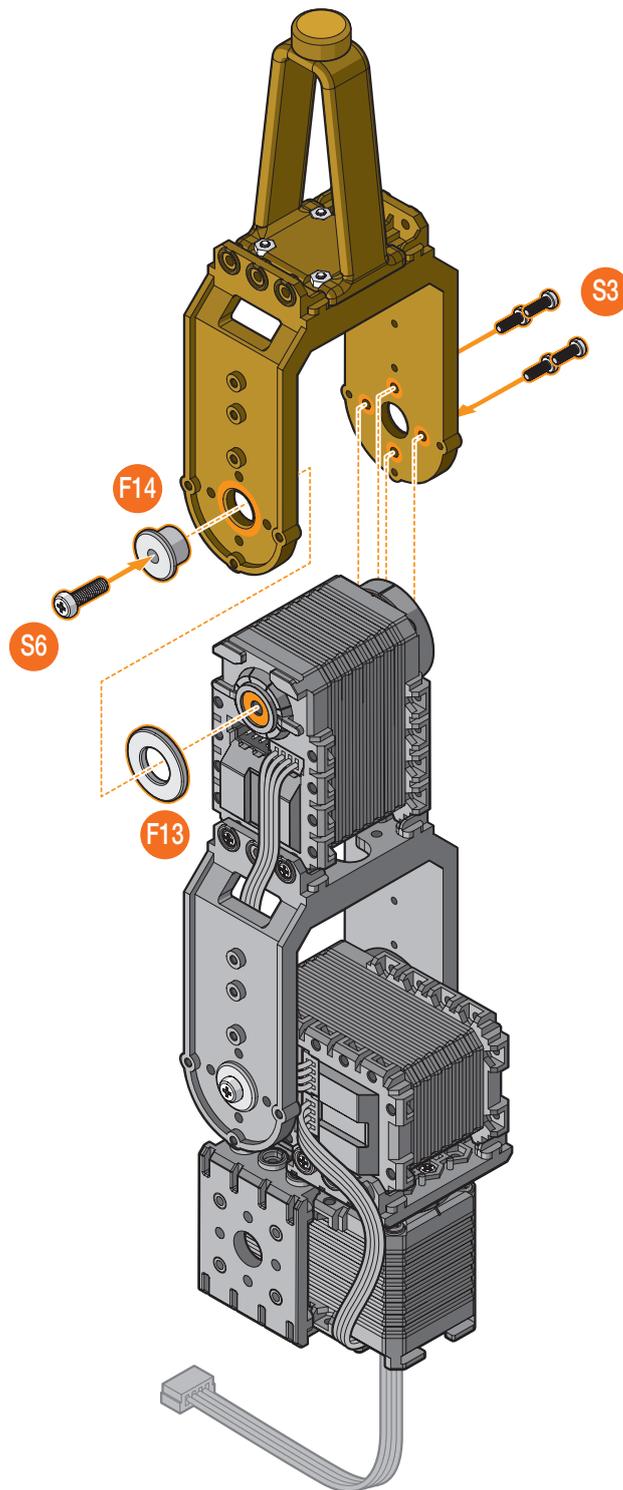


x4



x1

- 24. Insert the bushing (F14) through the leg assembly.
- 25. Run the washer (F13) over the inside of the bushing (F14).
- 26. Install the actuator assembly, ensuring it is aligned with the bushing (F14).
- 27. Secure the bushing (F14) with a screw (S6).
- 28. Secure the leg assembly to the actuator assembly with screws (S3).

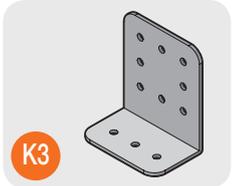


# <03

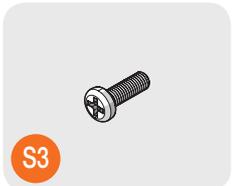
## Hardware Assembly

### 3D Assembly

#### Required Parts



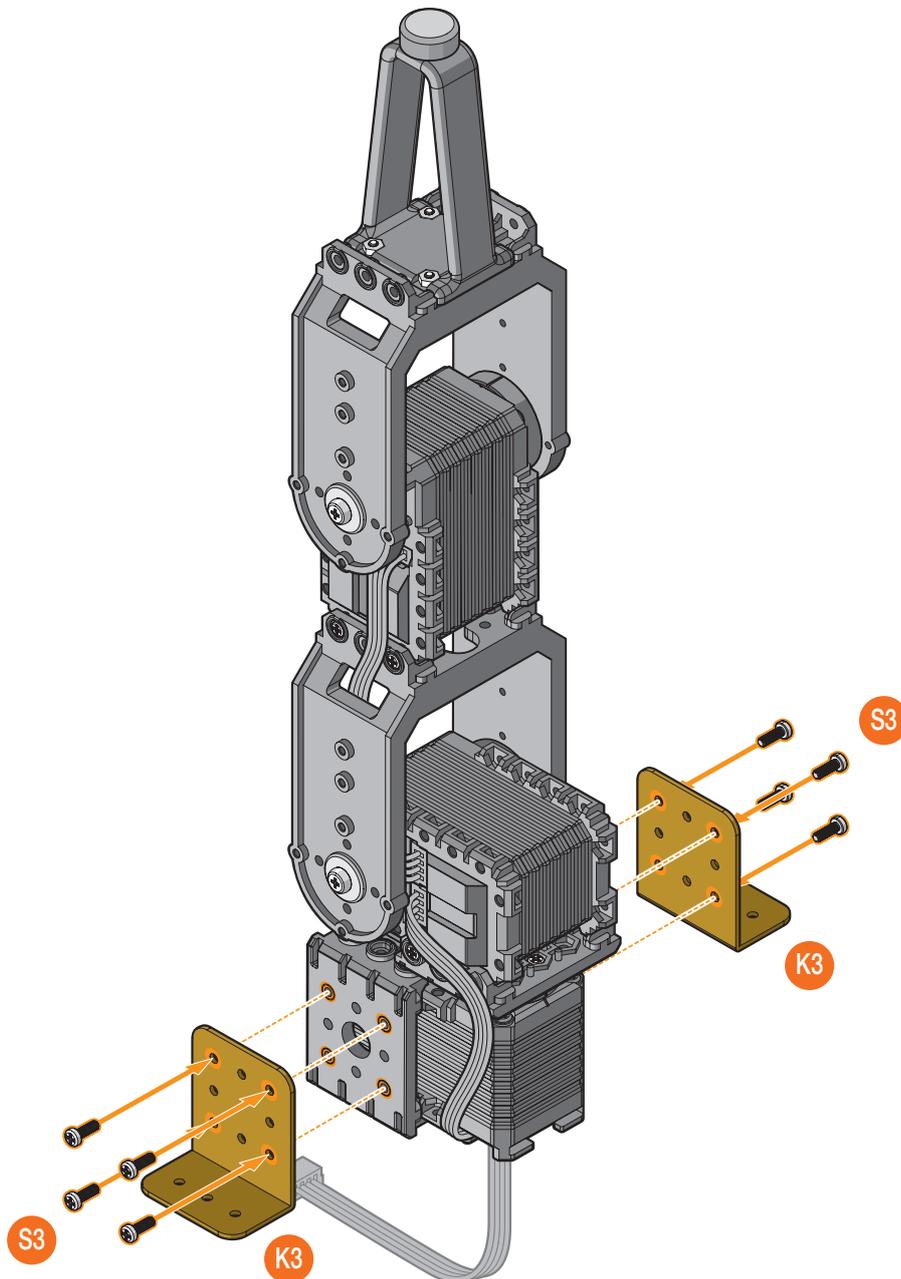
x2



x8

29. Align the bracket (K3) with the actuator assembly.

30. Secure the bracket (K3) to the actuator assembly with screws (S3).



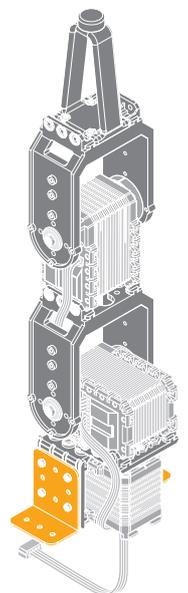
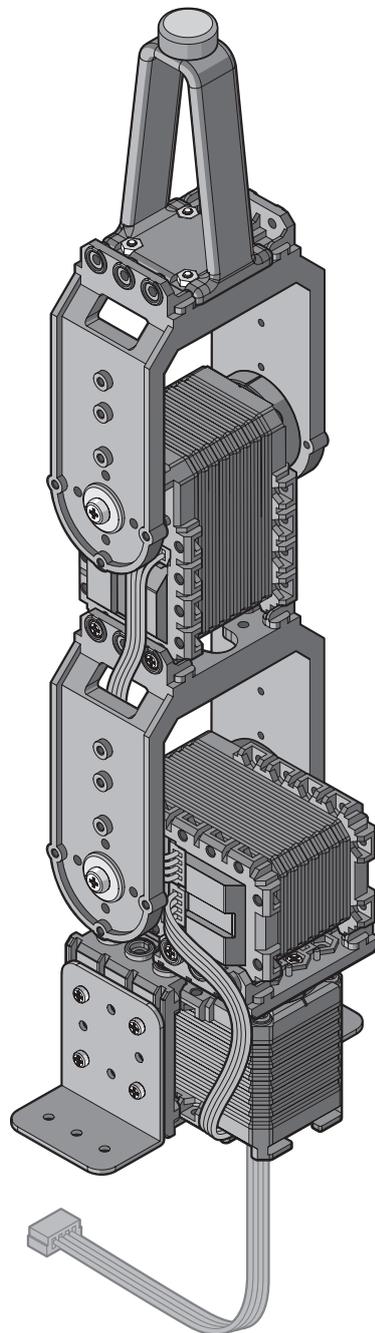
# Hardware Assembly

## 3D Assembly



The main body of Robotics Arm 3D is finished.

For the 3D base assembly, see **“Base Assembly (without Wheels)”** on page 64.

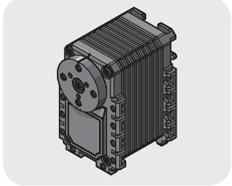


# <03

## Hardware Assembly

### 6D Assembly

#### Required Parts



x1

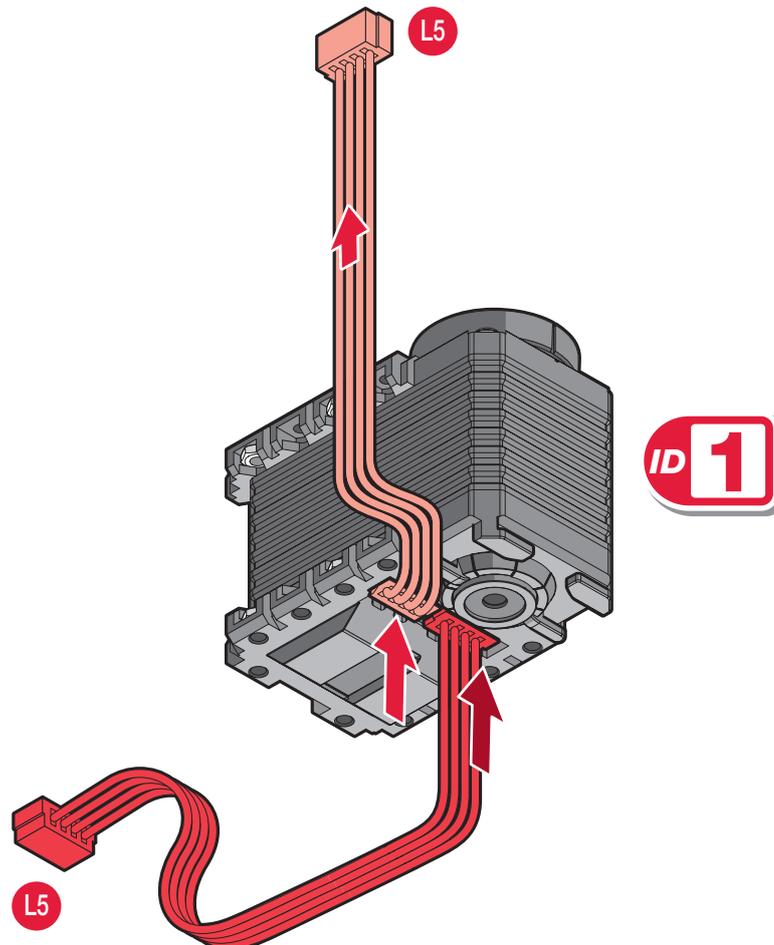


L5

x2

**NOTE:** Make sure the actuator hub is set to zero before installing the bracket. See **“Servo Hub Preparation”** on page 32.

1. Connect the cables (L5) to the actuator (ID1).
2. Route the cable (L5) following the illustration.

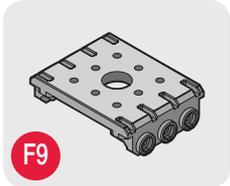


# Hardware Assembly

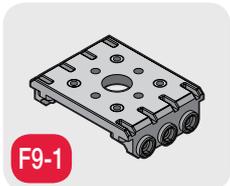
## 6D Assembly



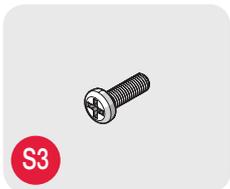
### Required Parts



x1

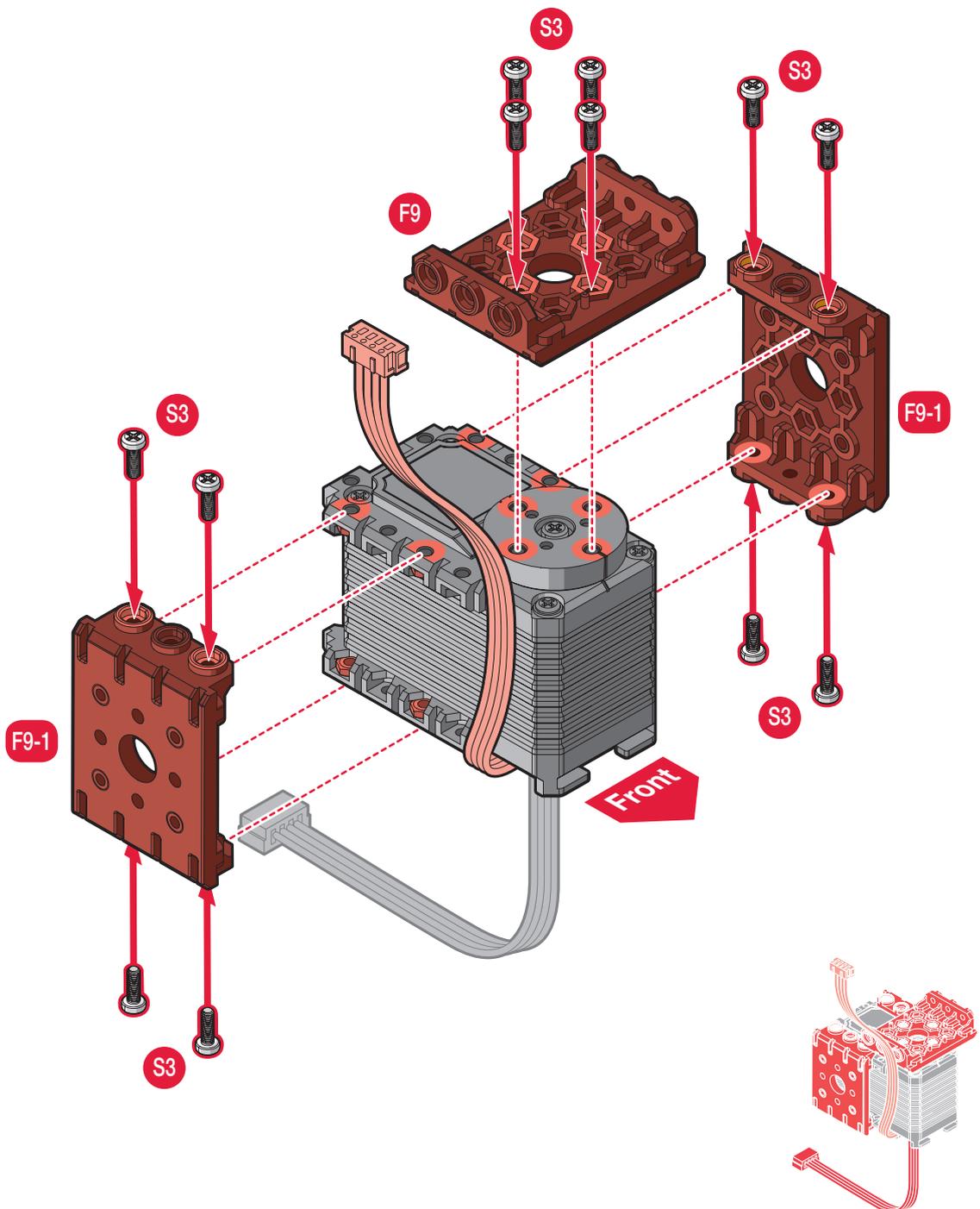


x2



x12

3. Align the bracket (F9-1) with the actuator (ID1).
4. Secure the bracket (F9-1) to the actuator (ID1) with screws (S3).
5. Align the bracket (F9) with the actuator (ID1).
6. Secure the bracket (F9) to the actuator (ID1) with screws (S3).

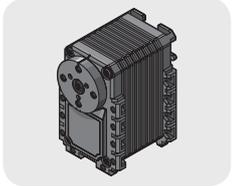


# <03

## Hardware Assembly

### 6D Assembly

#### Required Parts

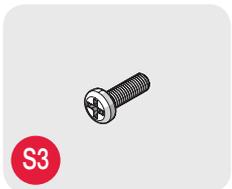


x1



L5

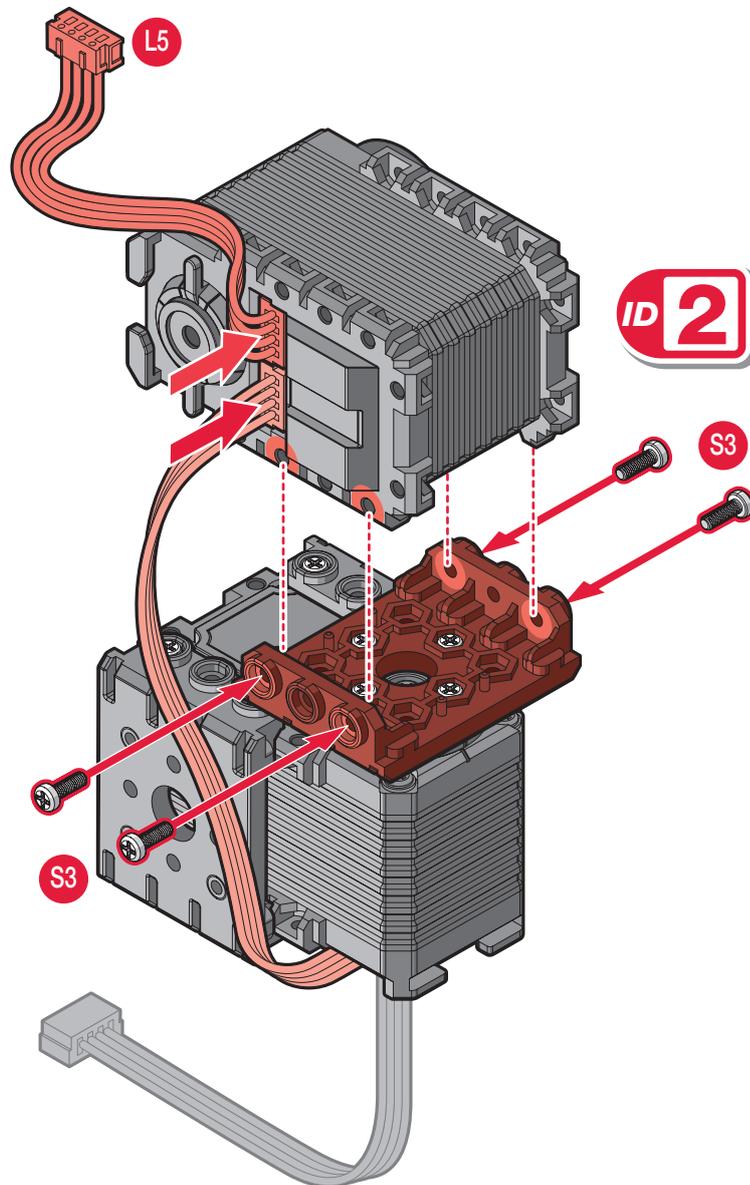
x1



S3

x4

7. Connect the cables (L5) to the actuator (ID2).
8. Align the actuator (ID2) with the bracket (F9).
9. Secure the bracket (F9) to the actuator (ID2) with screws (S3).



# Hardware Assembly

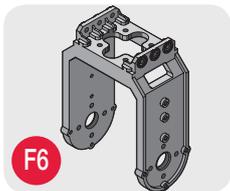
## 6D Assembly



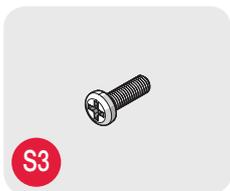
### Required Parts



x1



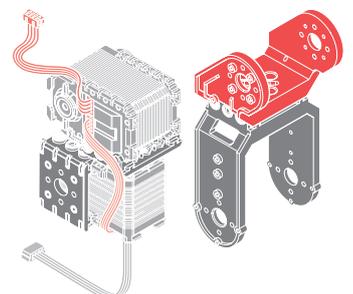
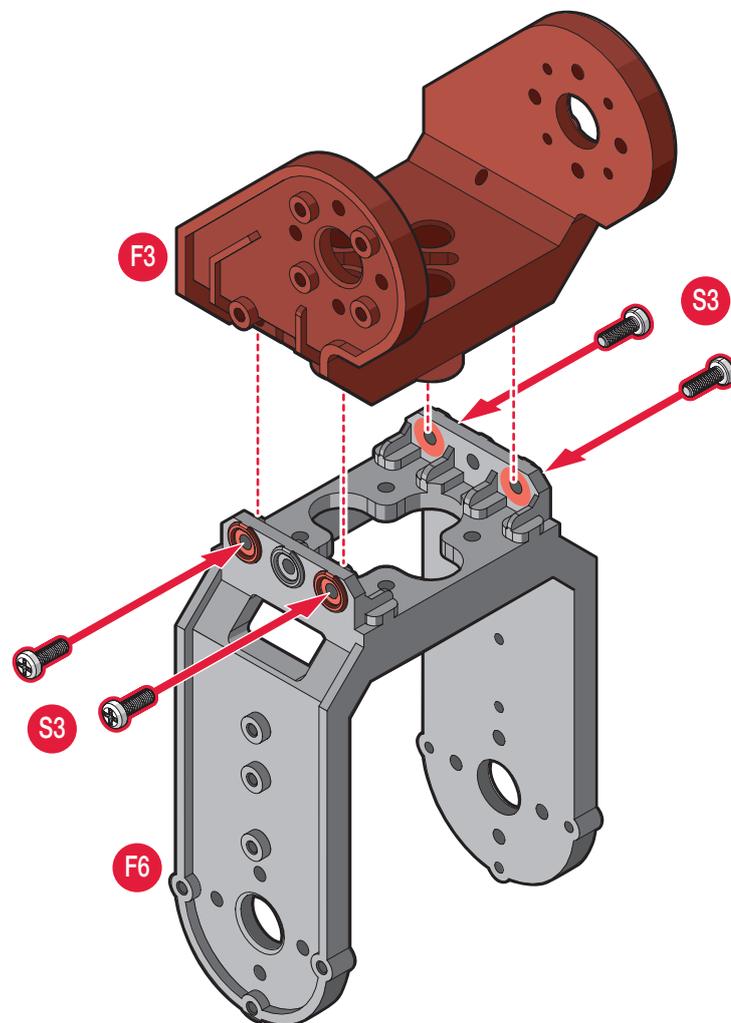
x1



x4

10. Align the frame (F3) with the frame (F6).

11. Secure the frame (F6) to the frame (F3) with screws (S3).



# <03

## Hardware Assembly

### 6D Assembly

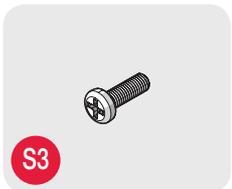
#### Required Parts



x1



x1

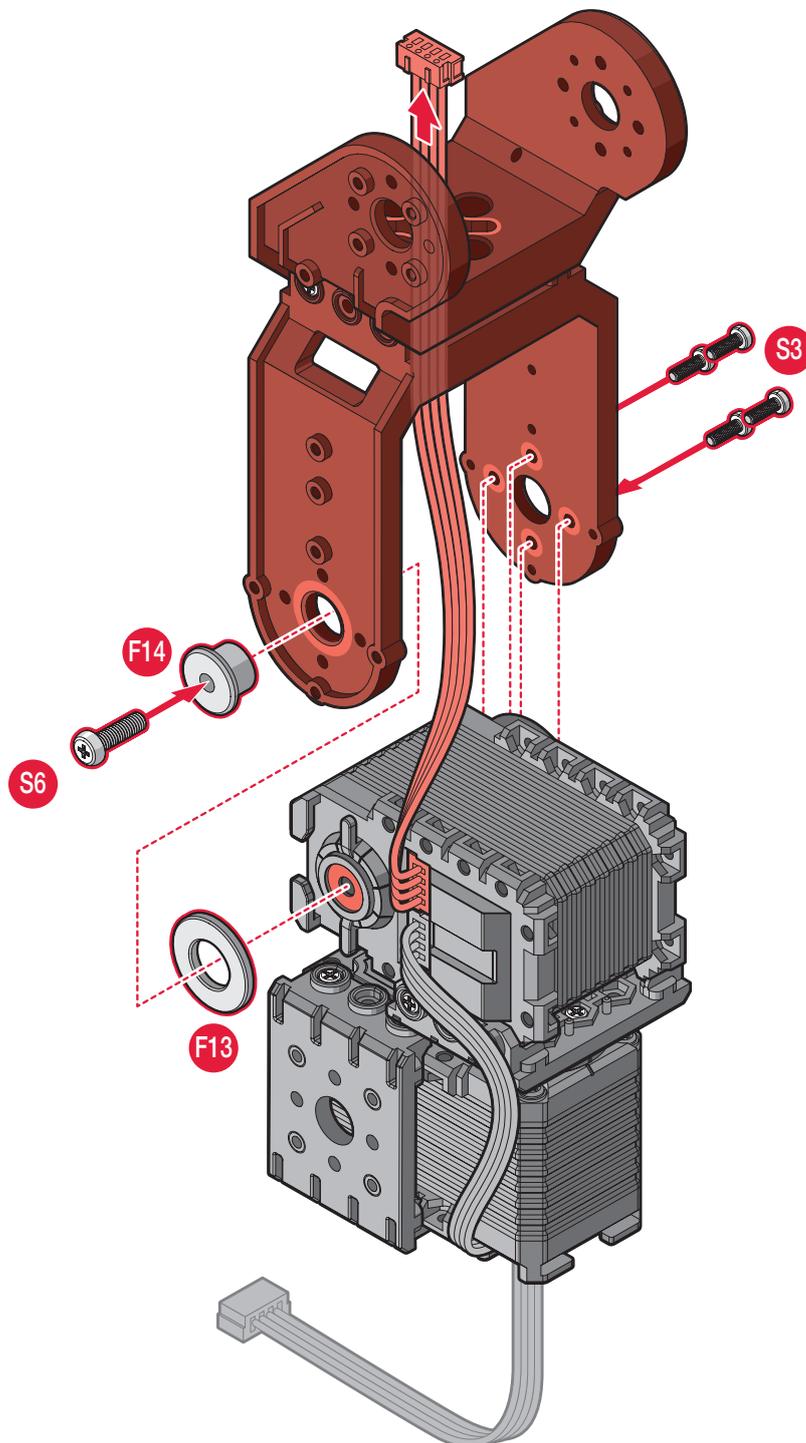


x4



x1

12. Route the cable (L5) through the opening on the frame (F3).
13. Insert the bushing (F14) through the frame.
14. Run the washer (F13) over the inside of the bushing (F14).
15. Install the actuator assembly, ensuring it is aligned with the bushing (F14).
16. Secure the bushing (F14) with a screw (S6).
17. Secure the frame (F6) to the actuator assembly with screws (S3).

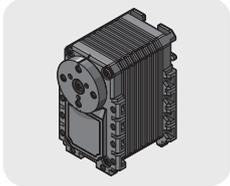


# Hardware Assembly

## 6D Assembly



### Required Parts



x1



L4

x1



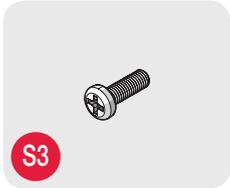
F13

x1



F14

x1



S3

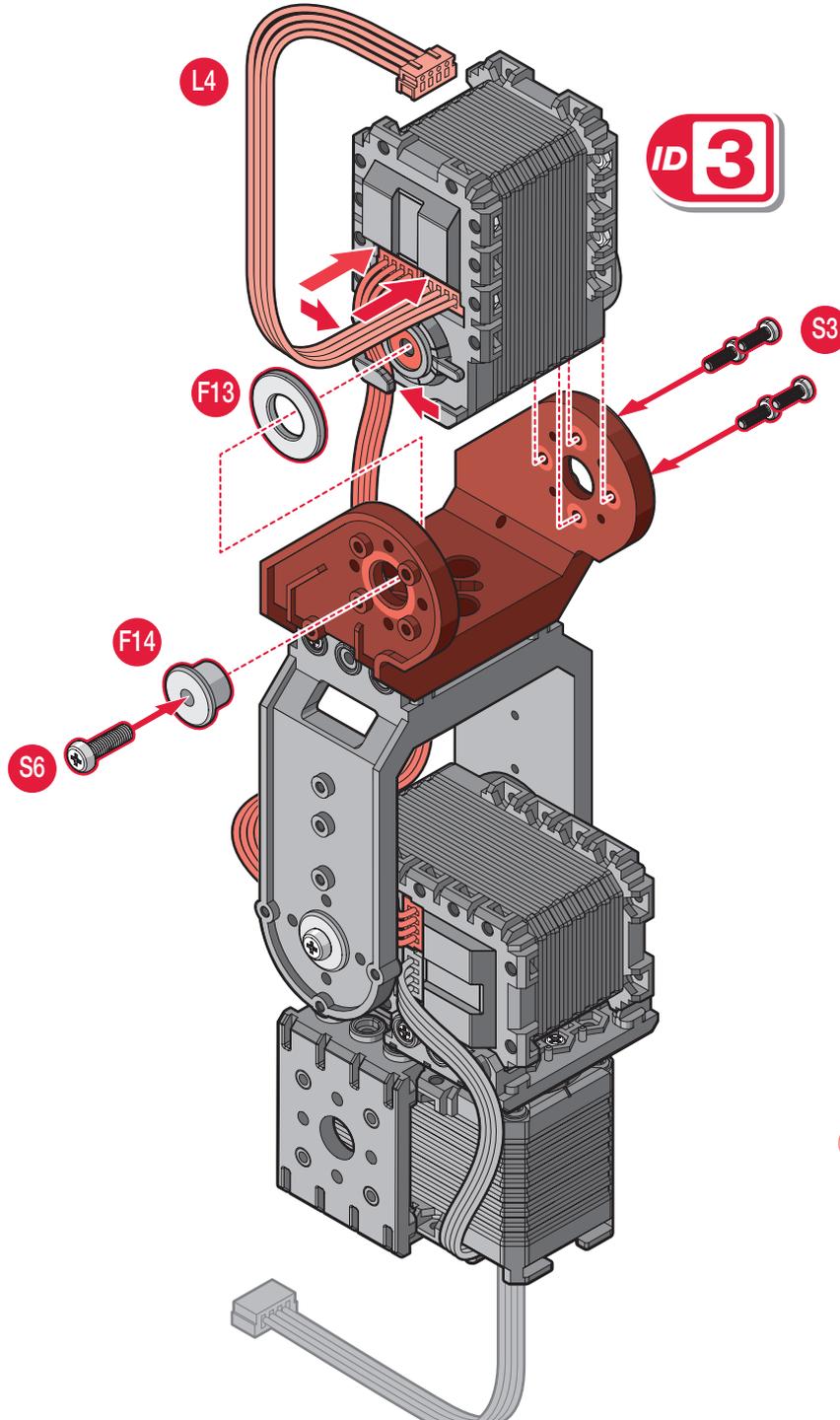
x4



S6

x1

18. Connect the cable (L5) to the actuator (ID3) then route the cable (L5) through the cable clips on the actuator (ID3).
19. Connect the cable (L4) to the actuator (ID3).
20. Insert the bushing (F14) through the frame (F6).
21. Run the washer (F13) over the inside of the bushing (F14).
22. Install the actuator assembly, make sure it's aligned with the bushing (F14).
23. Secure the bushing (F14) with a screw (S6).
24. Secure the frame (F6) to the actuator assembly with screws (S3).

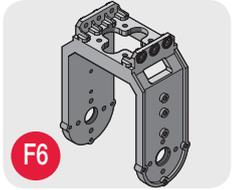


# <03

## Hardware Assembly

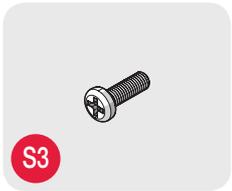
### 6D Assembly

#### Required Parts



F6

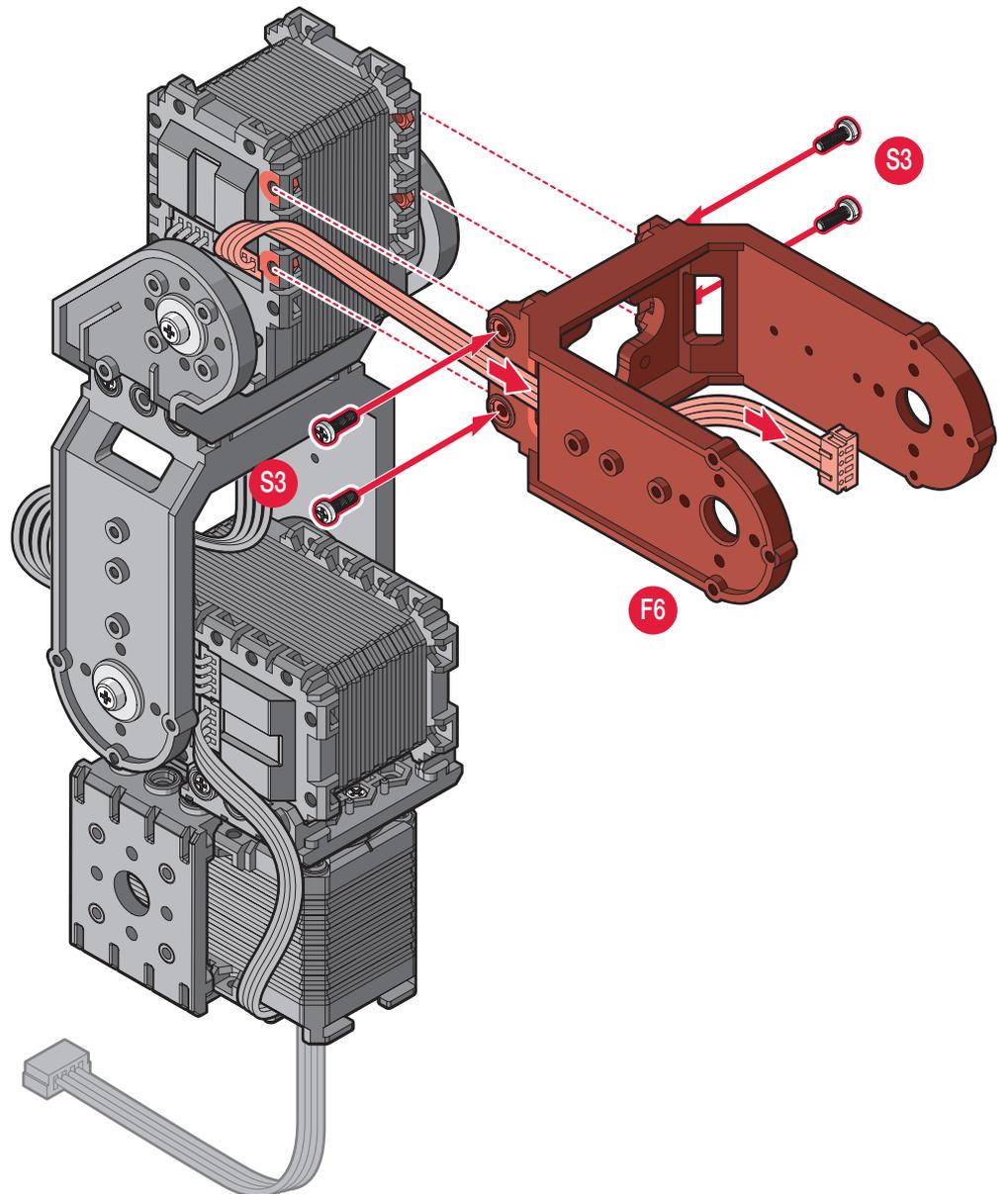
x1



S3

x4

25. Route the cable (L4) through the cable well on the actuator (ID3).
26. Route the cable (L4) through the opening on the frame (F6).
27. Align the frame (F6) with the actuator (ID3).
28. Secure the frame (F6) to the actuator (ID3) with screws (S3).

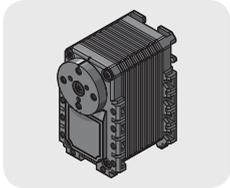


# Hardware Assembly

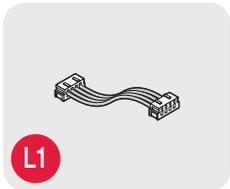
## 6D Assembly



### Required Parts



x1



L1

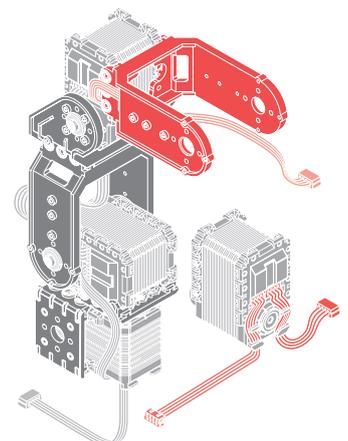
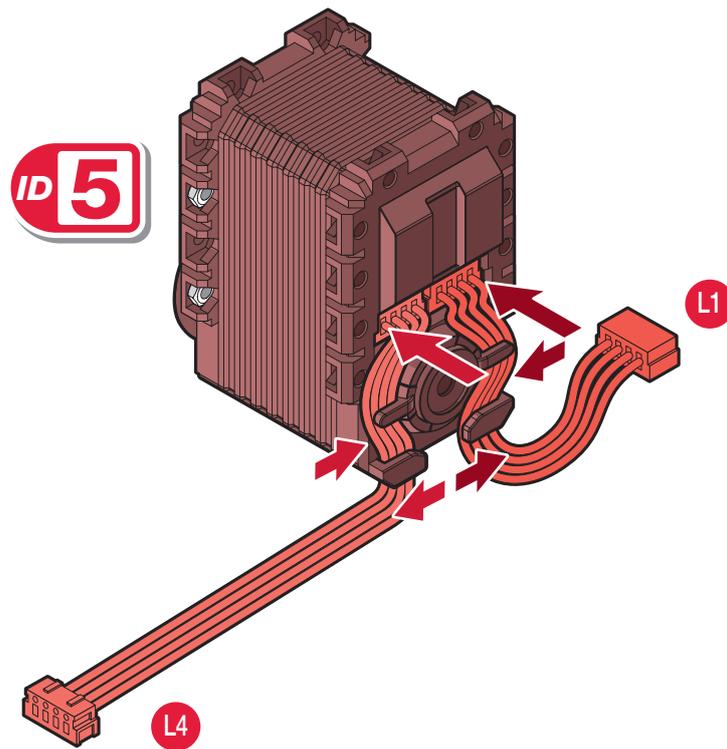
x1



L4

x1

29. Connect the cables (L1 and L4) to the actuator (ID5) then route the cables (L1 and L4) through the cable clips on the actuator (ID5) following the illustration.

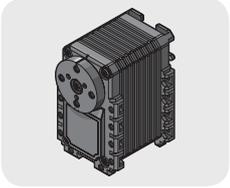


# <03

## Hardware Assembly

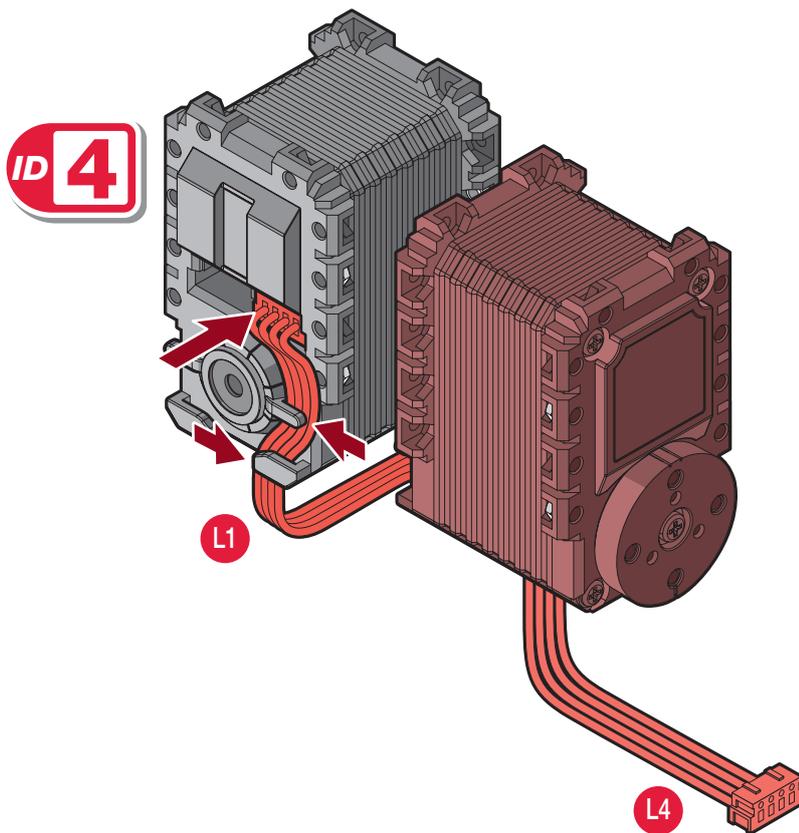
### 6D Assembly

#### Required Parts



x1

30. Route the cables (L1) through the cable clips on the actuator (ID4) following the illustration.

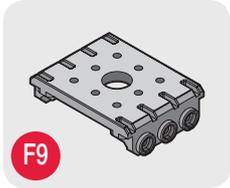


# Hardware Assembly

## 6D Assembly



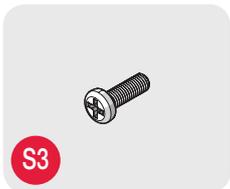
### Required Parts



x1

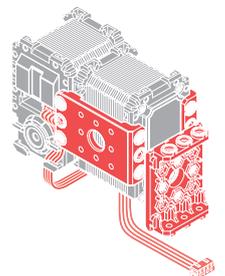
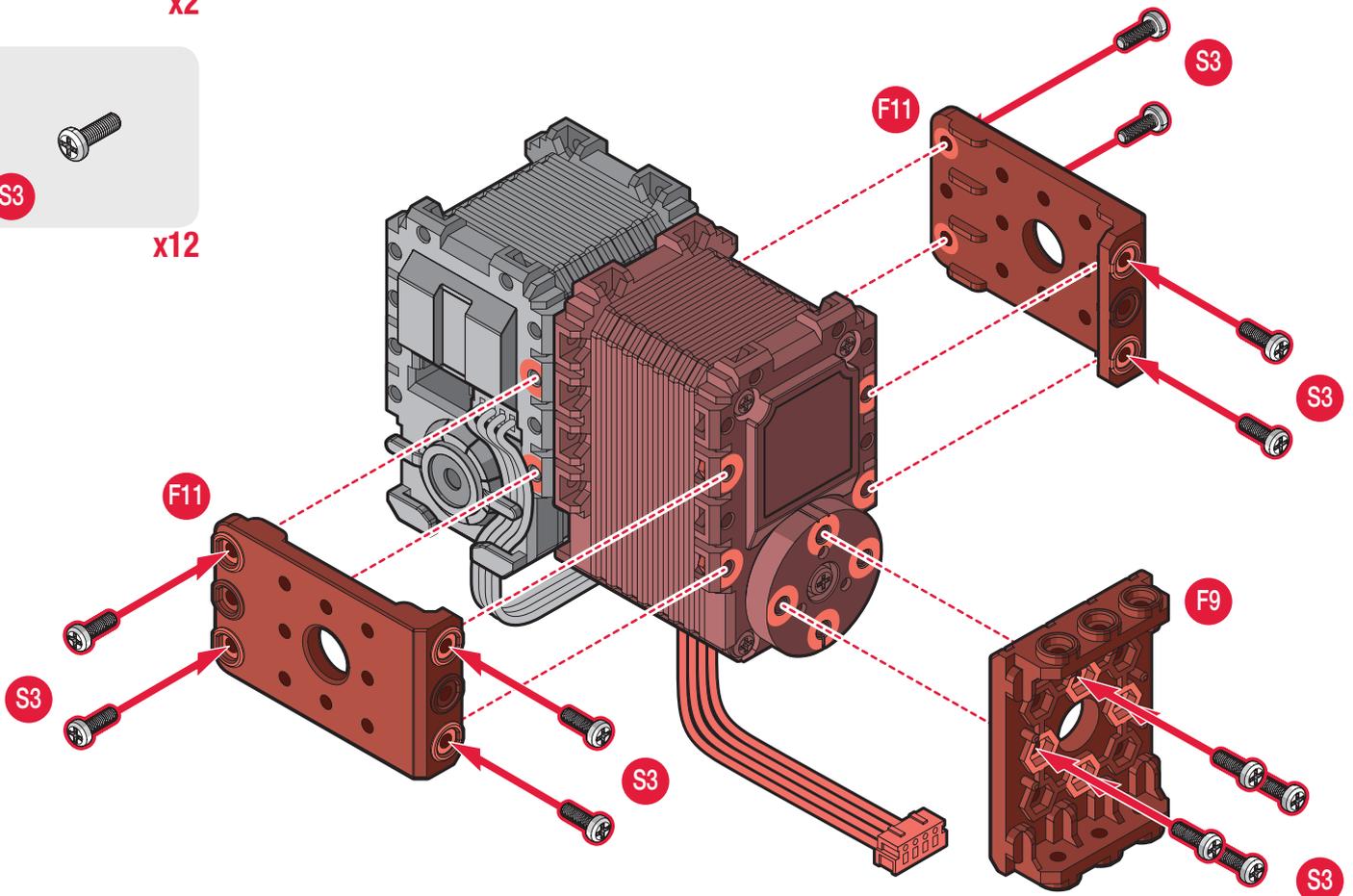


x2



x12

- 31. Align the bracket (F11) with the actuator (ID5).
- 32. Secure the bracket (F11) to the actuator (ID5) with screws (S3).
- 33. Align the bracket (F9) with the actuator (ID5).
- 34. Secure the bracket (F9) to the actuator (ID5) with screws (S3).



# <03

## Hardware Assembly

### 6D Assembly

#### Required Parts



F13

x1



F14

x1



S3

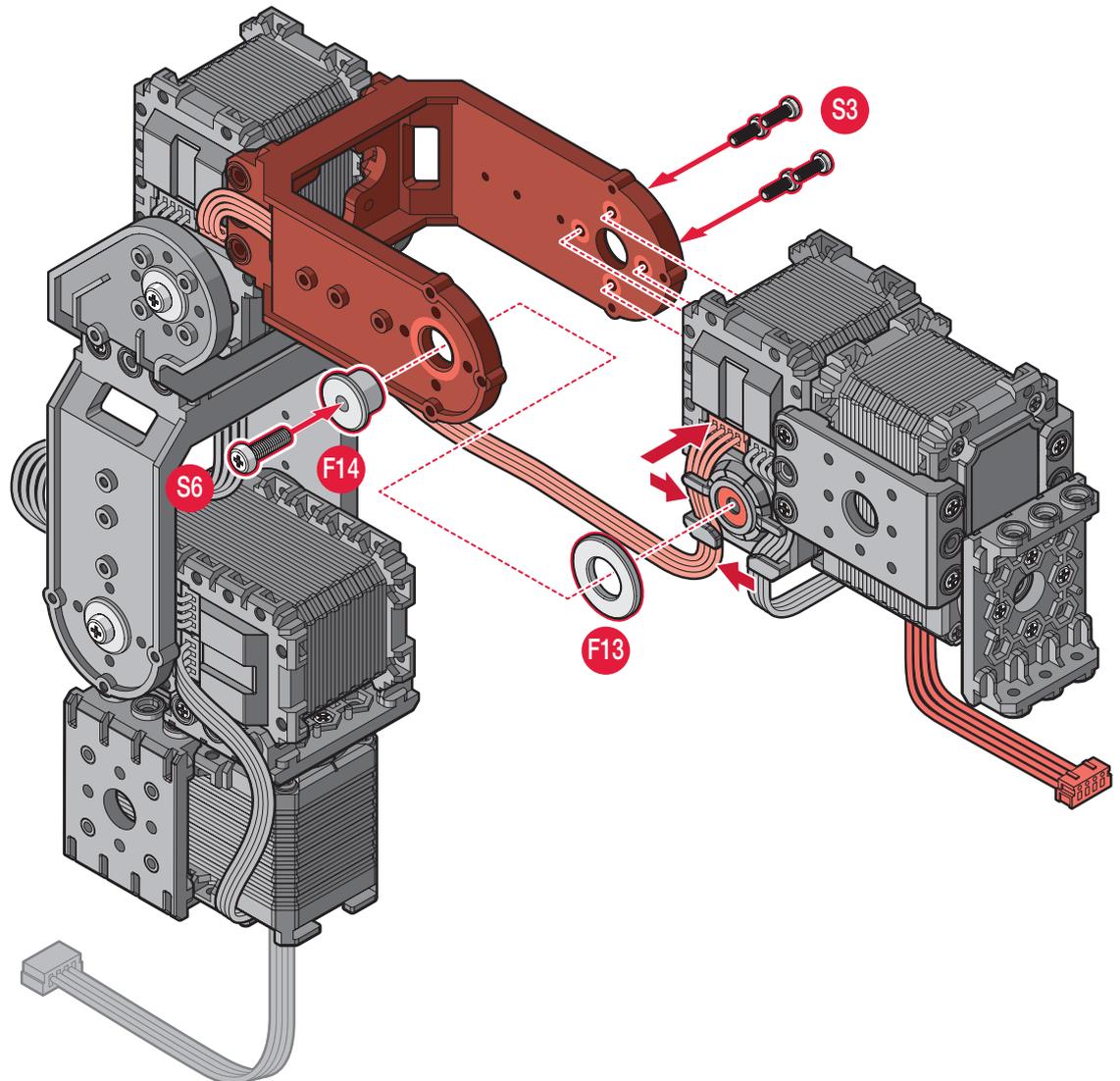
x4



S6

x1

35. Connect the cable (L5) to the actuator (ID4) then route the cable (L5) through the cable clips on the actuator (ID4).
36. Insert the bushing (F14) through the frame (F6).
37. Run the washer (F13) over the inside of the bushing (F14).
38. Install the actuator assembly, make sure it's aligned with the bushing (F14).
39. Secure the bushing (F14) with a screw (S6).
40. Secure the frame (F6) to the actuator assembly with screws (S3).

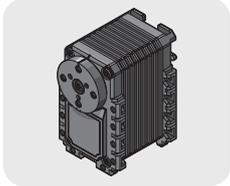


# Hardware Assembly

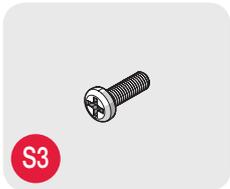
## 6D Assembly



### Required Parts

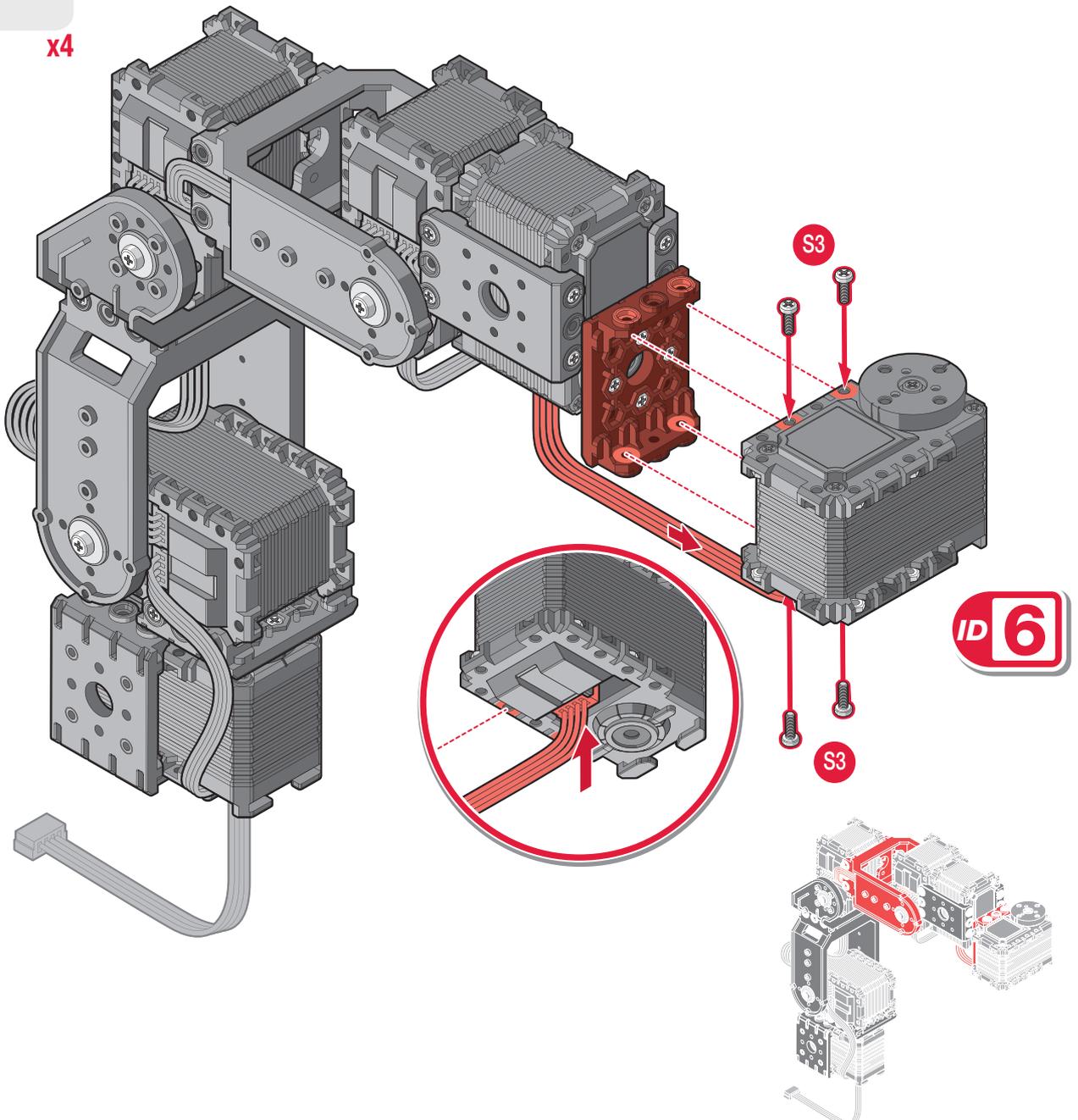


x1



x4

41. Align the actuator (ID6) with the bracket (F9).
42. Secure the bracket (F9) to the actuator (ID6) with screws (S3).
43. Connect the cable (L4) to the actuator (ID6).



# <03

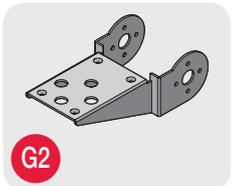
## Hardware Assembly

### 6D Assembly

#### Required Parts



x1

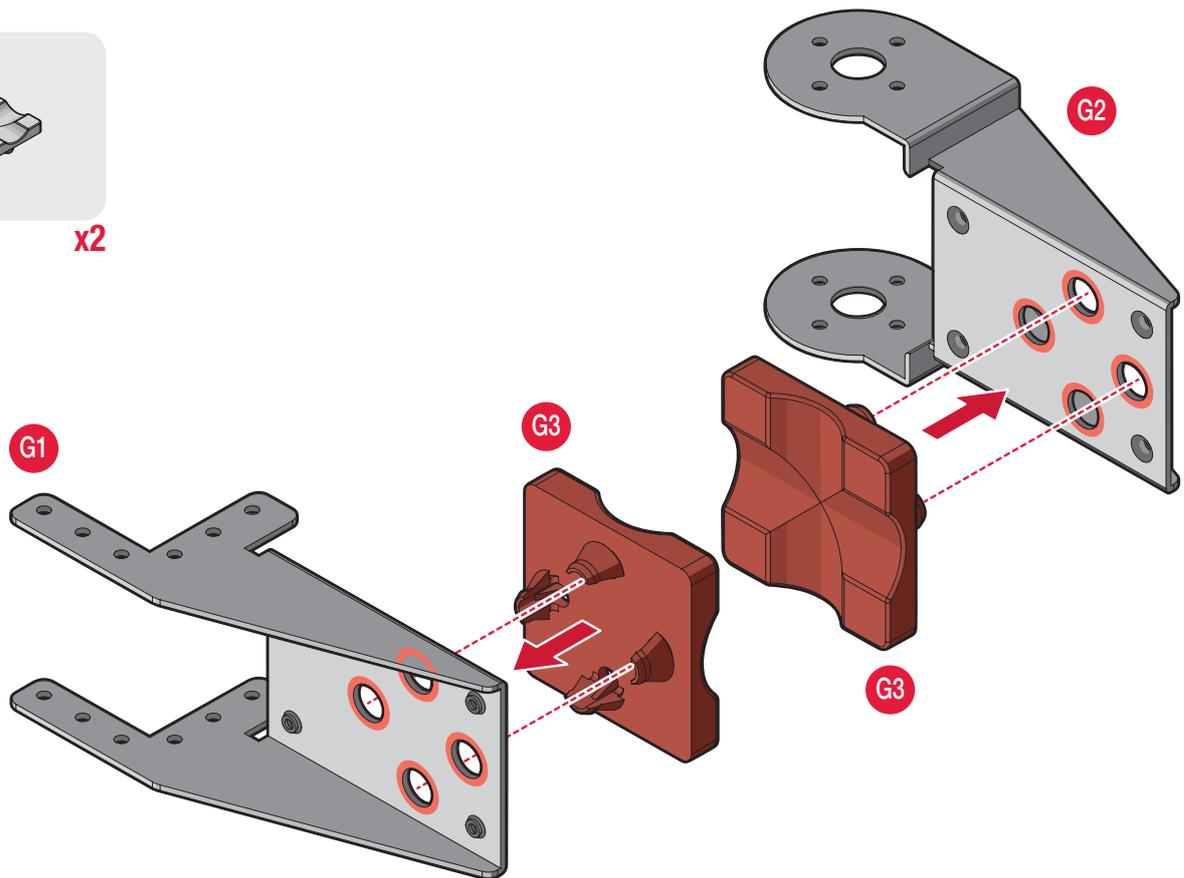


x1



x2

44. Align the clamp rubbers (G3) with the clamps (G1 and G2).
45. Secure the clamp rubbers (G3) to the clamps (G1 and G2) by pushing the prongs of the clamp rubbers (G3) through the holes in the clamps (G1 and G2).



# Hardware Assembly

## 6D Assembly



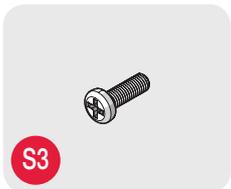
### Required Parts



x1



x1

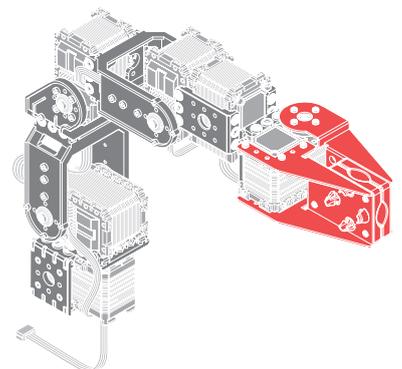
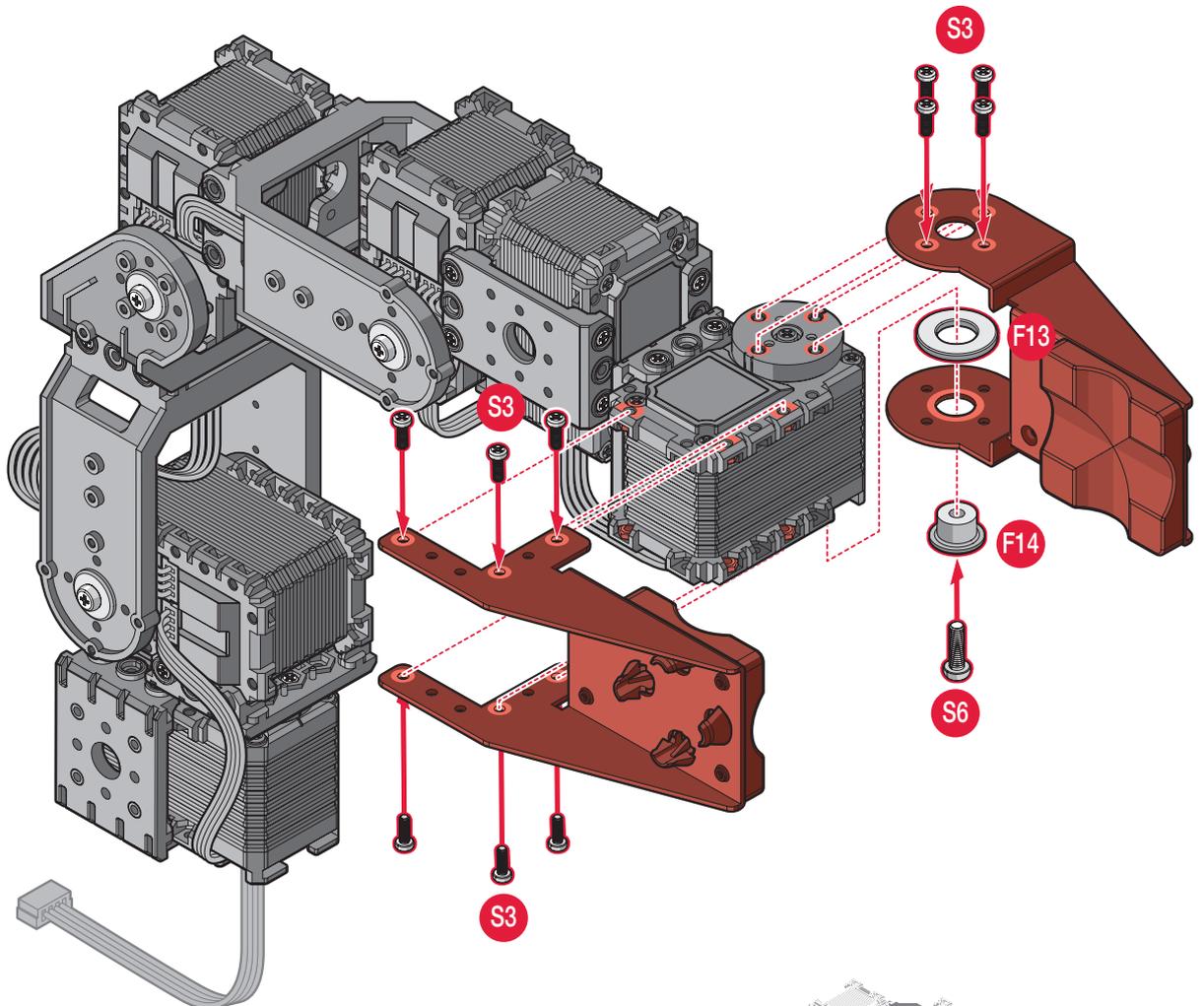


x10



x1

46. Insert the bushing (F14) through the clamp assembly (G2).
47. Run the washer (F13) over the inside of the bushing (F14).
48. Install the actuator (ID6) ensuring it is aligned with the bushing (F14).
49. Secure the bushing (F14) with a screw (S6).
50. Secure the clamp assembly (G1 and G2) to the actuator (ID6) with screws (S3).

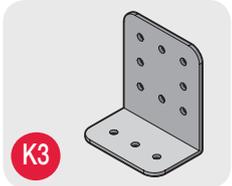


# <03

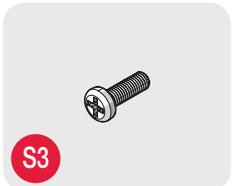
## Hardware Assembly

### 6D Assembly

#### Required Parts



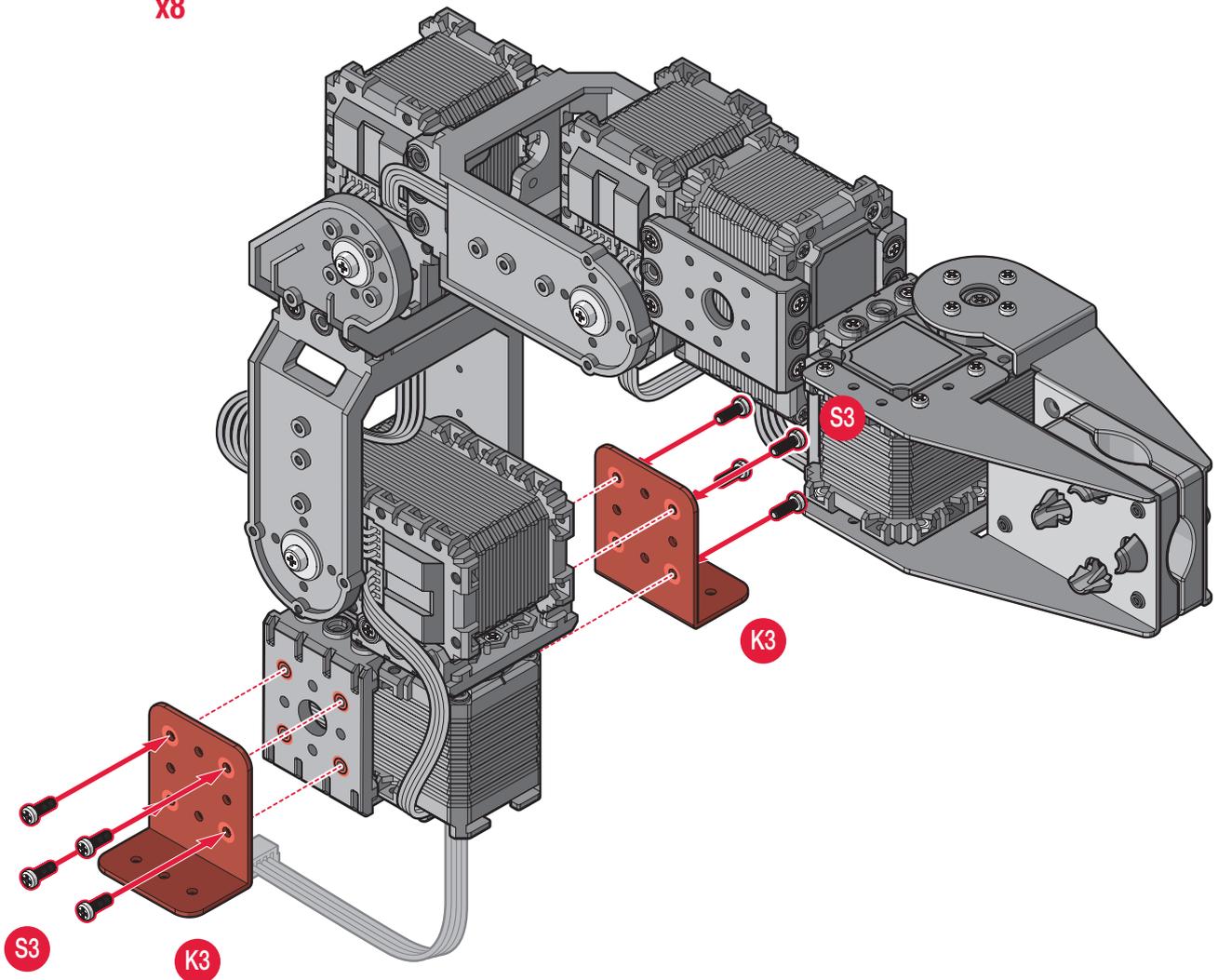
x2



x8

51. Align the bracket (K3) with the actuator assembly.

52. Secure the bracket (K3) to the actuator assembly with screws (S3).



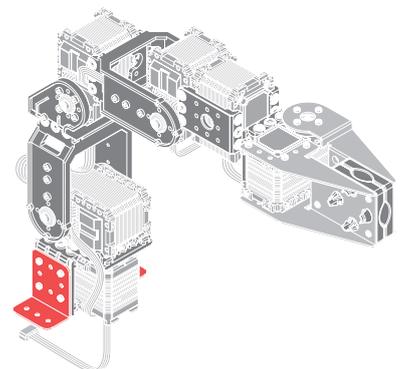
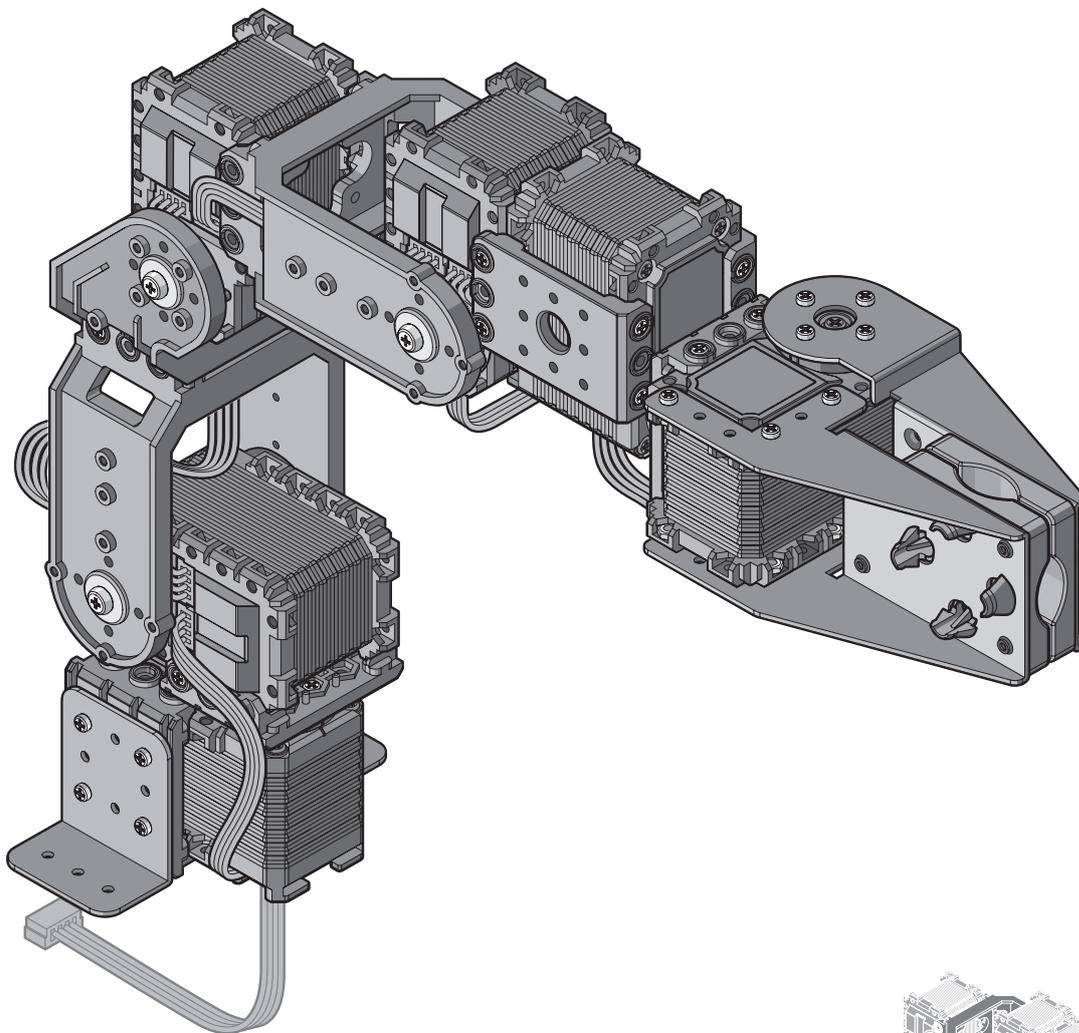
# Hardware Assembly

## 6D Assembly



The main body of Robotics Arm 6D is finished.

For the 6D base assembly, see **“Base Assembly (without Wheels)”** on page 64 or 6DW base assembly; see **“Base Assembly (with Wheels)”** on page 76.

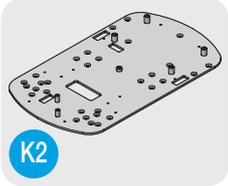


# <03

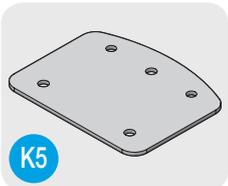
## Hardware Assembly

### Base Assembly (without Wheels)

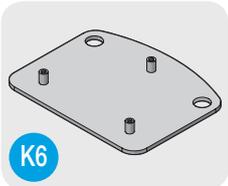
#### Required Parts



x1



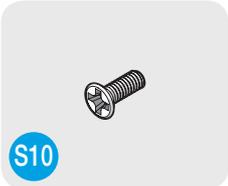
x3



x1

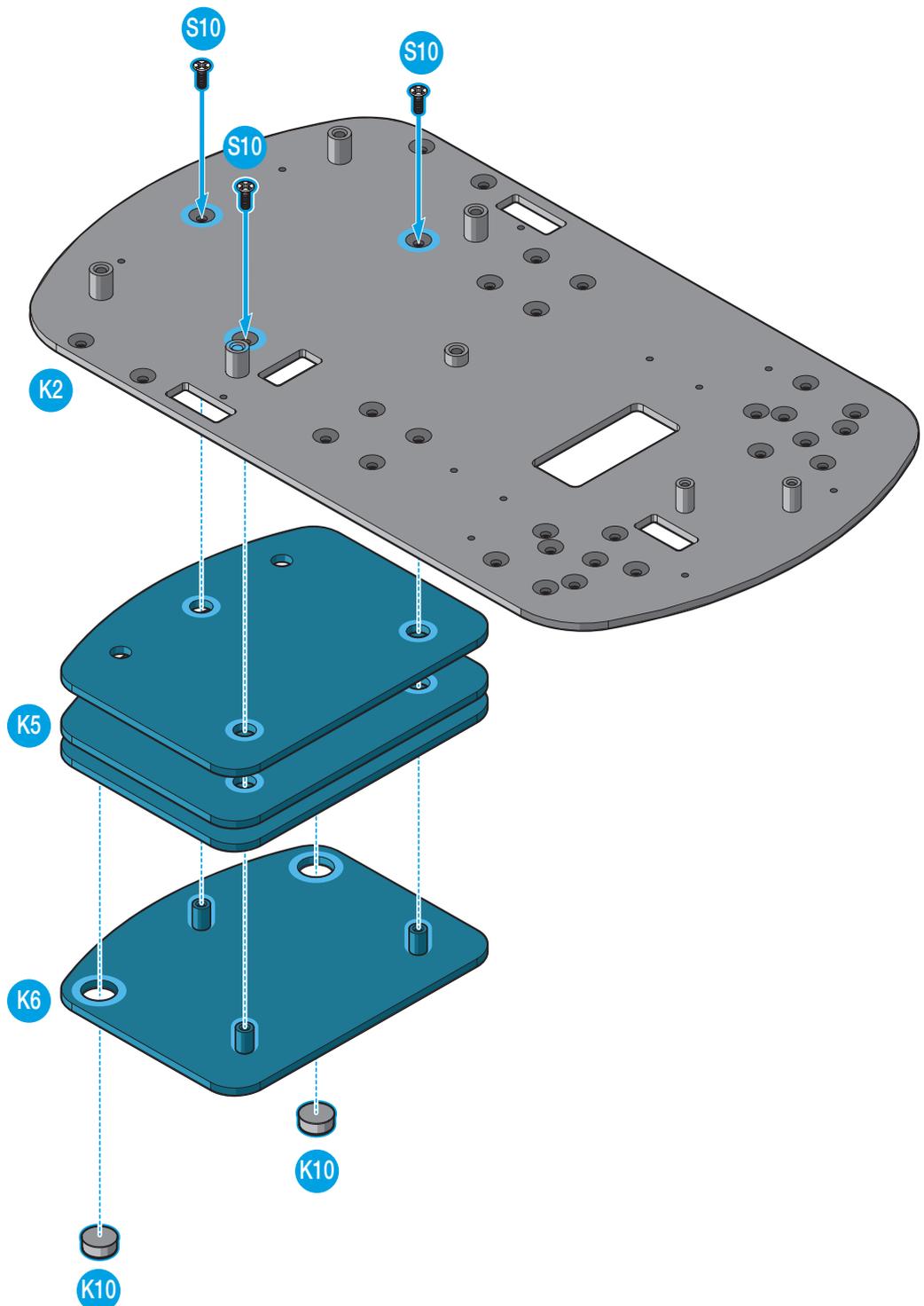


x2



x3

1. Install the rubber foot (K10) on the counterweight-2 (K6).
2. Align the counterweight-1 (K5) on the counterweight-2 (K6).
3. Align the counterweights (K5 and K6) with the base sheet (K2).
4. Secure the base sheet (K2) to the counterweights (K5 and K6) with screws (S10).

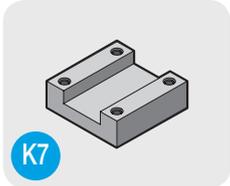


# Hardware Assembly

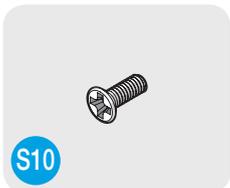
03 >

## Base Assembly (without Wheels)

### Required Parts

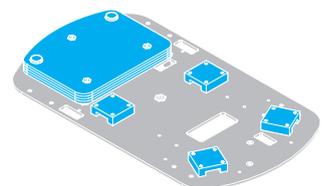
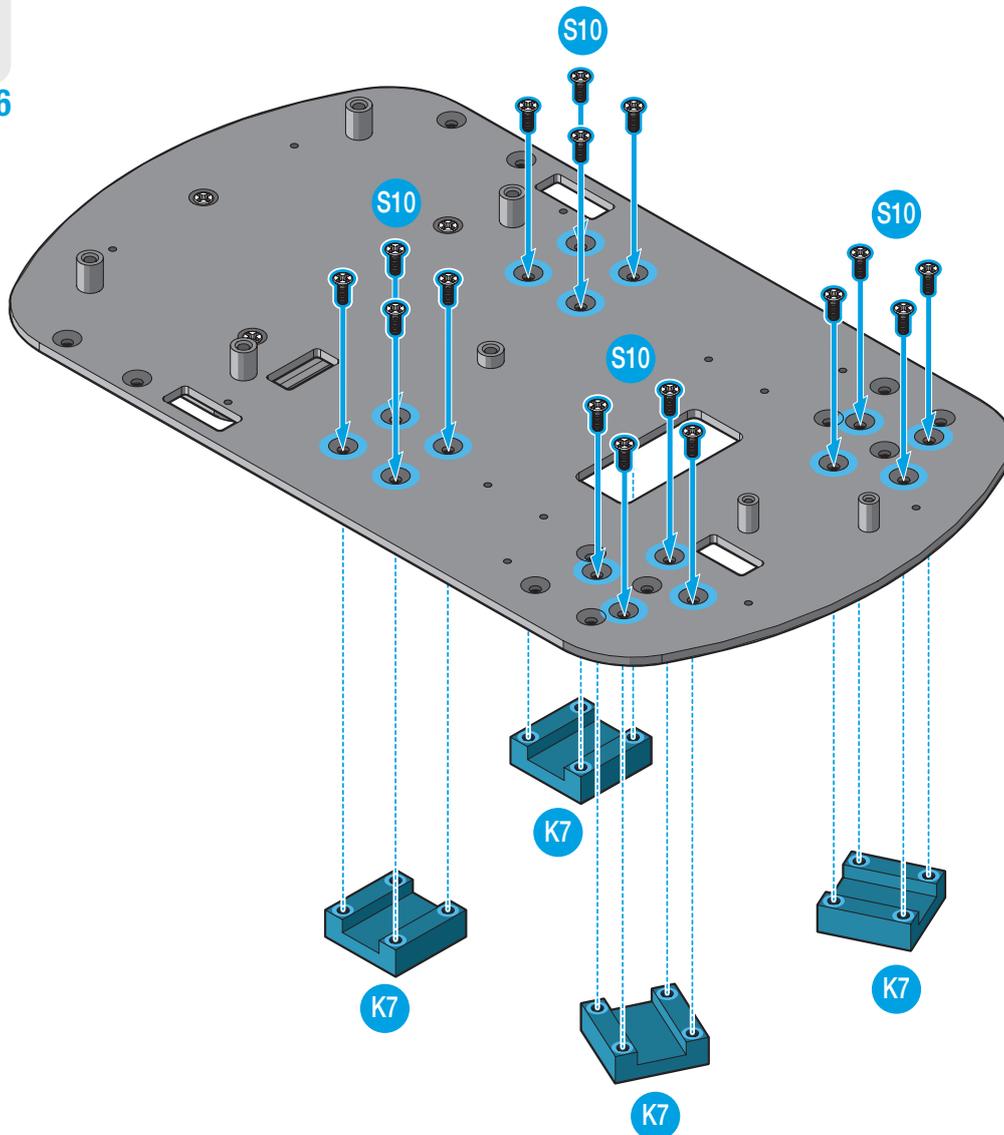


x4



x16

5. Align the extend bracket (K7) with the base sheet assembly.
6. Secure the base sheet assembly to the extend bracket (K7) with screws (S10).

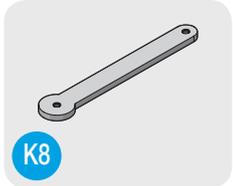


# <03

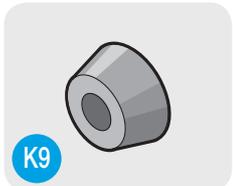
## Hardware Assembly

### Base Assembly (without Wheels)

#### Required Parts



x4



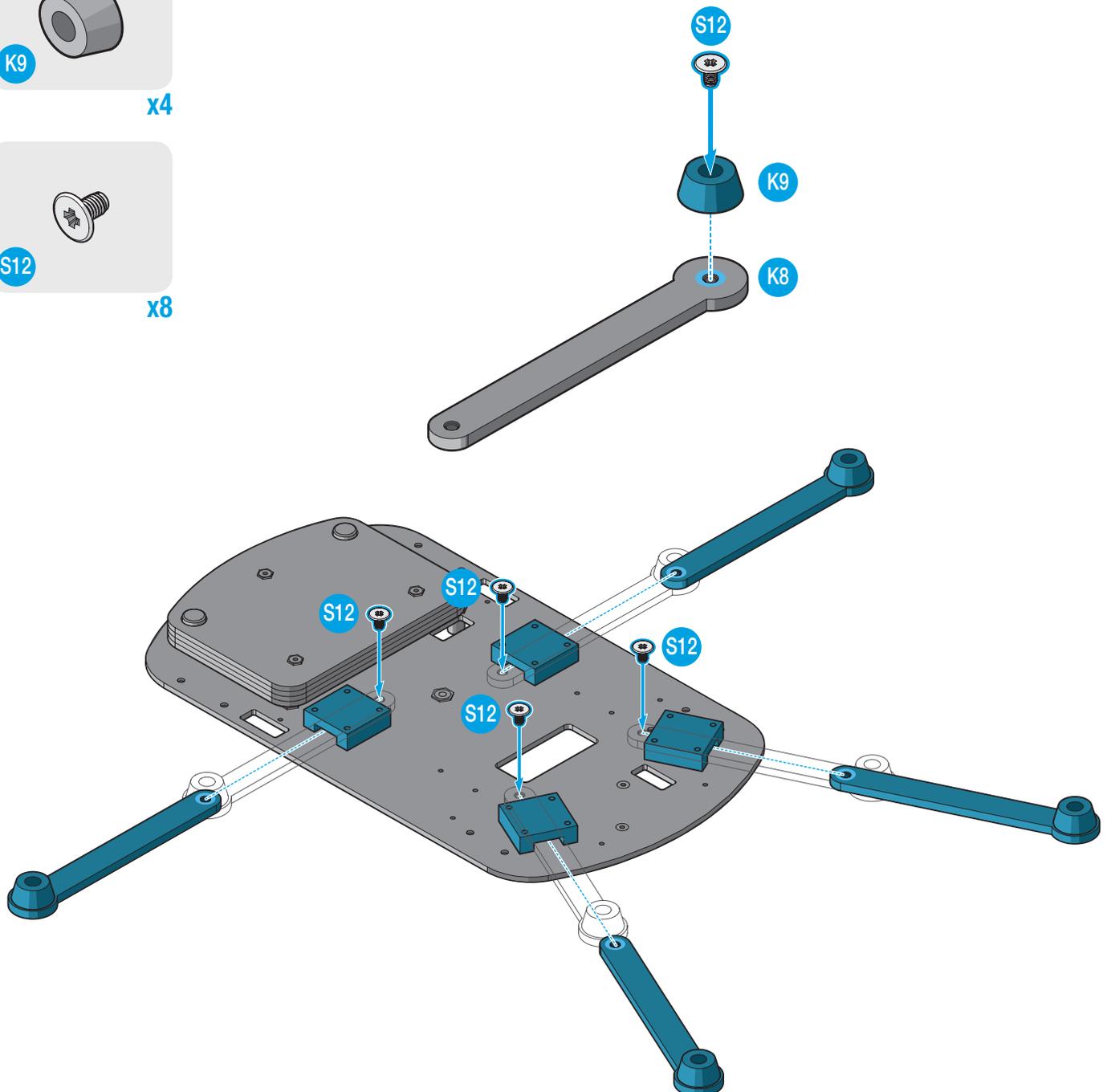
x4



x8

7. Align the rubber foot (K9) with the extend bar (K8).
8. Secure the rubber foot (K9) with a screw (S12).
9. Install the extend bar assembly through the extend bracket (K7), ensuring the extend bar assembly aligns with the hole on the base sheet (K2).
10. Secure the extend bar assembly to the base sheet assembly with screws (S12).

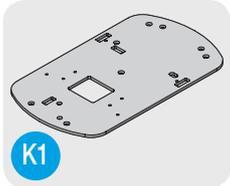
**NOTE:** When securing the extend bar assembly, do not lock it in the end with screw (S12). The extend bar assembly must be free to move.



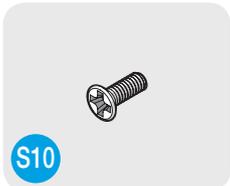
# Hardware Assembly

## Base Assembly (without Wheels)

### Required Parts

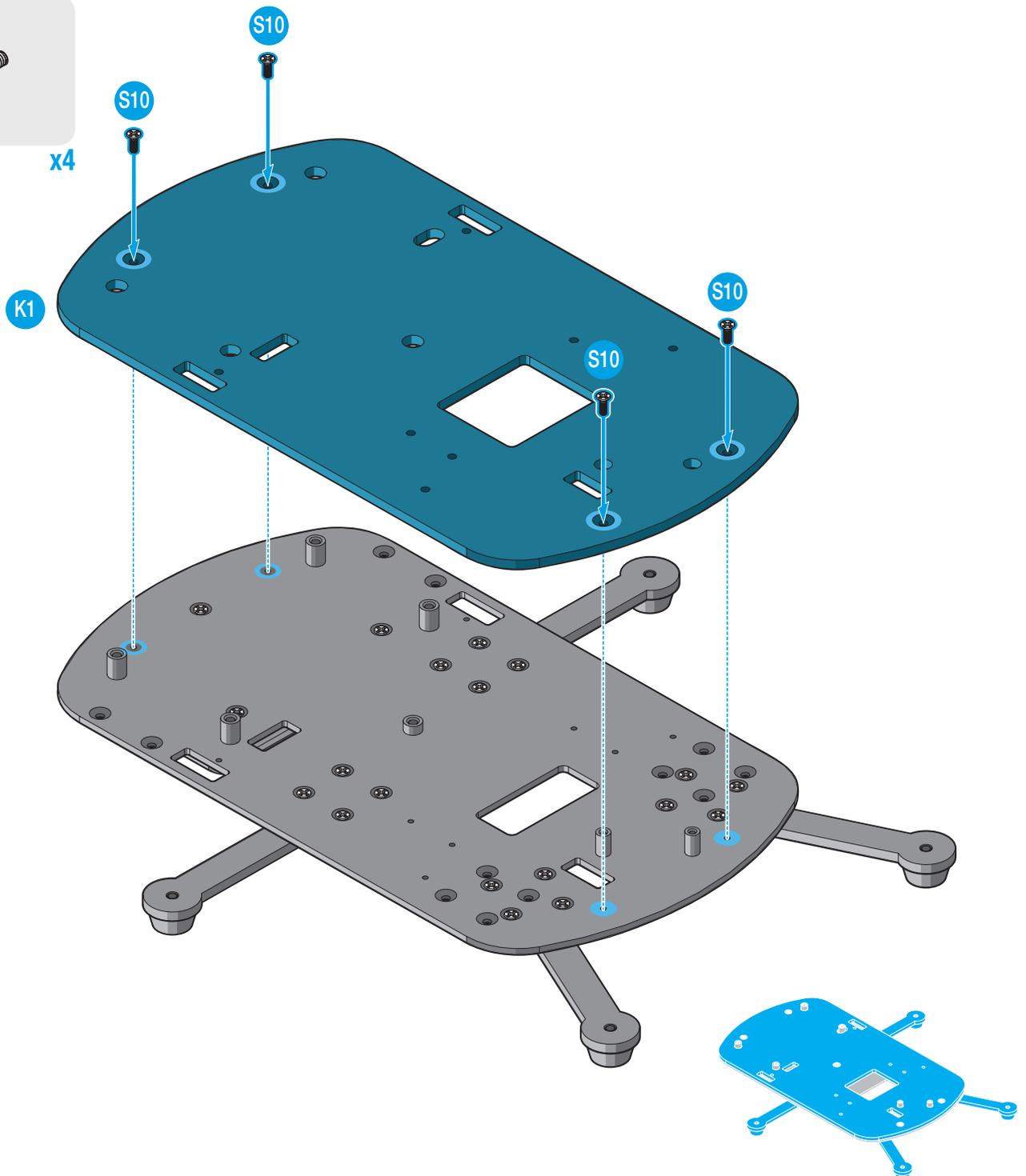


x1



x4

11. Align the base (K1) on the base sheet assembly.
12. Secure the base (K1) to the base sheet assembly with screws (S10).

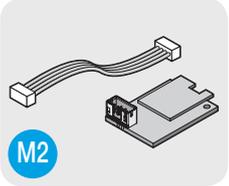


# <03

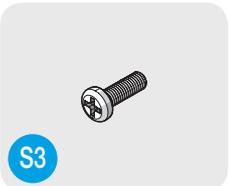
## Hardware Assembly

### Base Assembly (without Wheels)

#### Required Parts

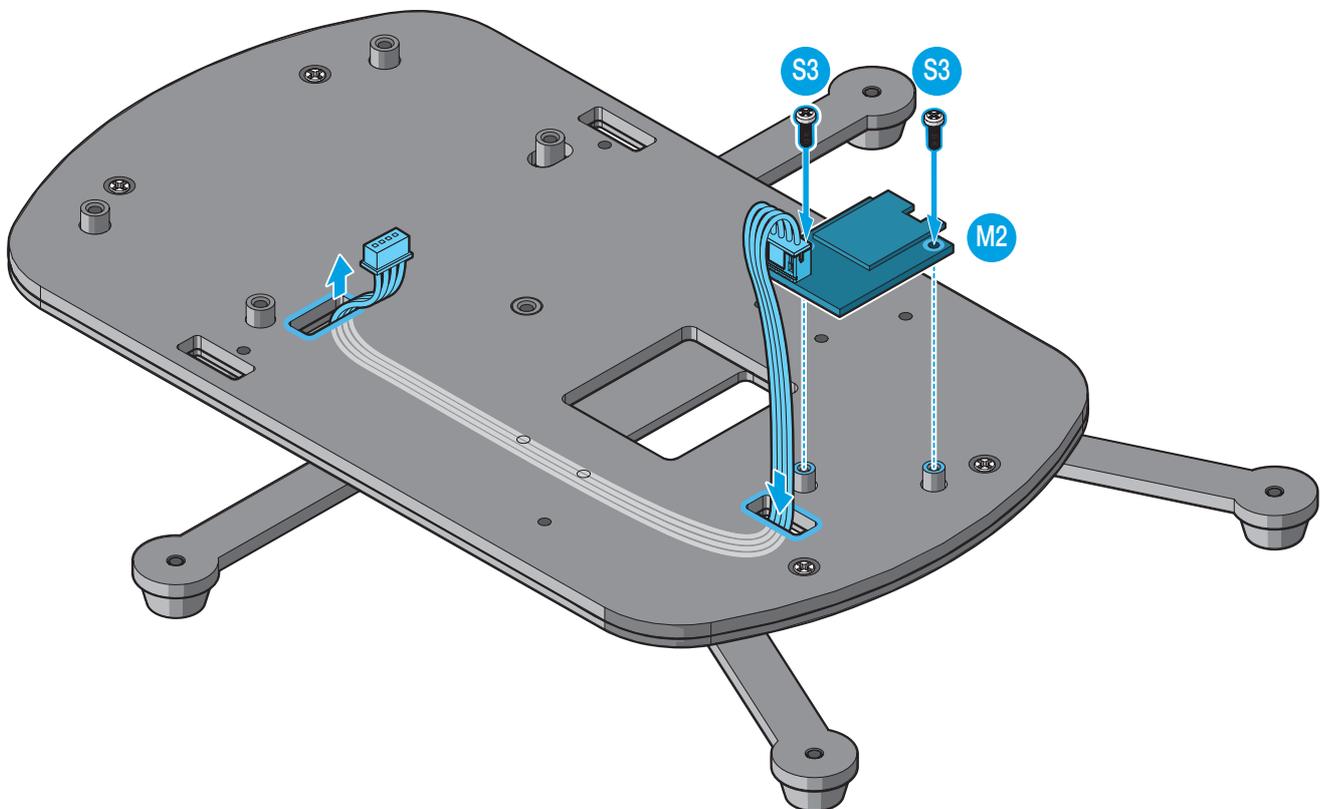


x1



x2

13. Connect the cable to the connector on the Bluetooth module (M2).
14. Route the Bluetooth cable following the illustration.
15. Align the Bluetooth module (M2) with the base assembly.
16. Secure the Bluetooth module (M2) to the base assembly with screws (S3).

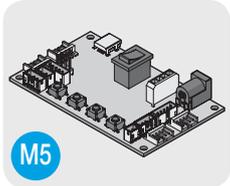


# Hardware Assembly

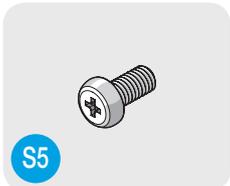
## Base Assembly (without Wheels)



### Required Parts



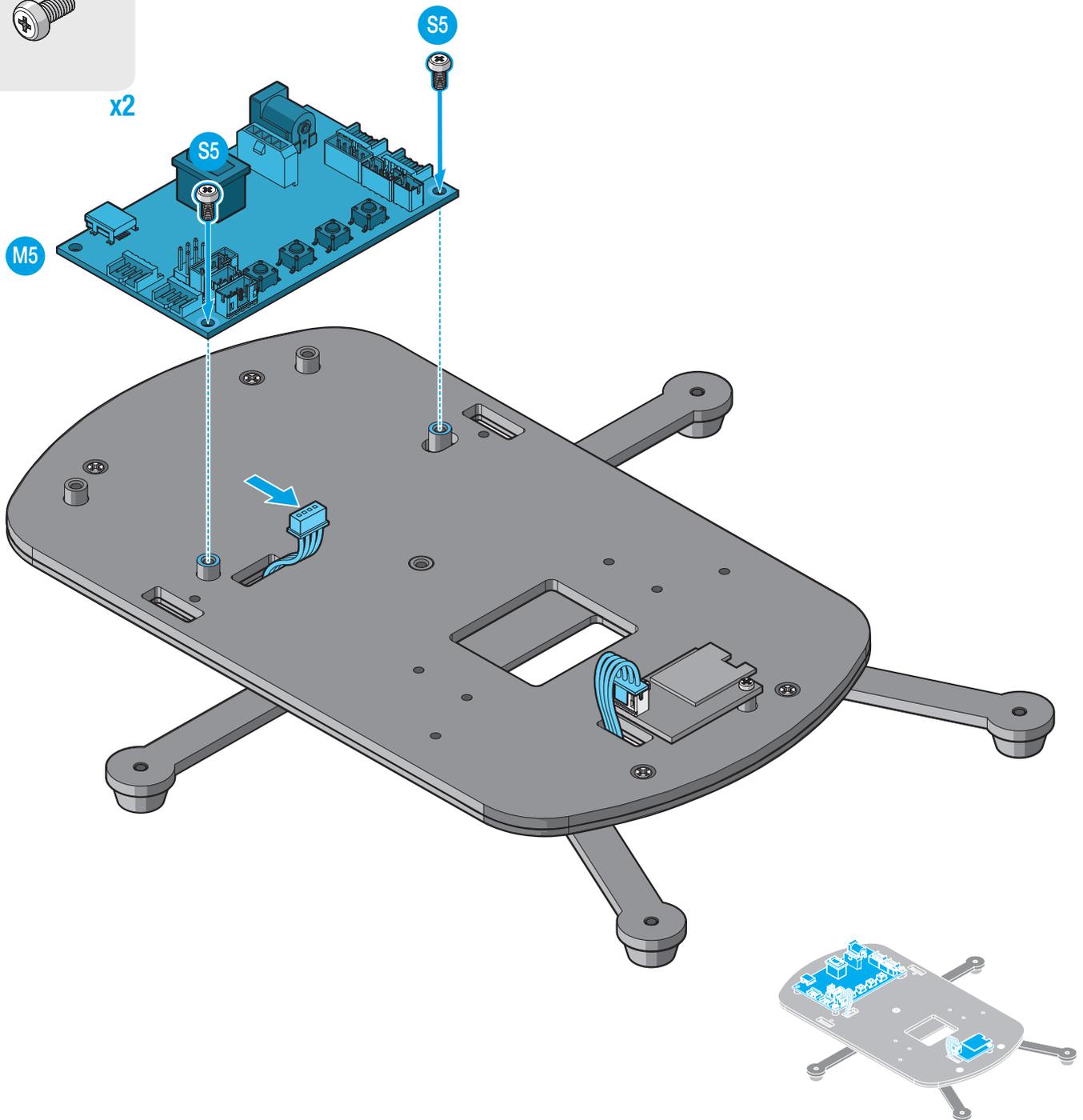
x1



x2

**17.** Align the MCU board (M5) with the base assembly. Ensure the MCU board (M5) does not cover the Bluetooth cable.

**18.** Secure the MCU board (M5) to the base assembly with screws (S5).

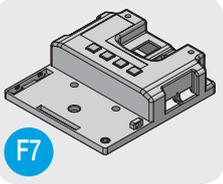


# <03

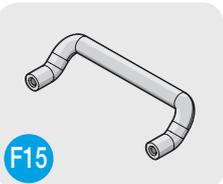
## Hardware Assembly

### Base Assembly (without Wheels)

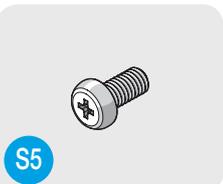
#### Required Parts



x1

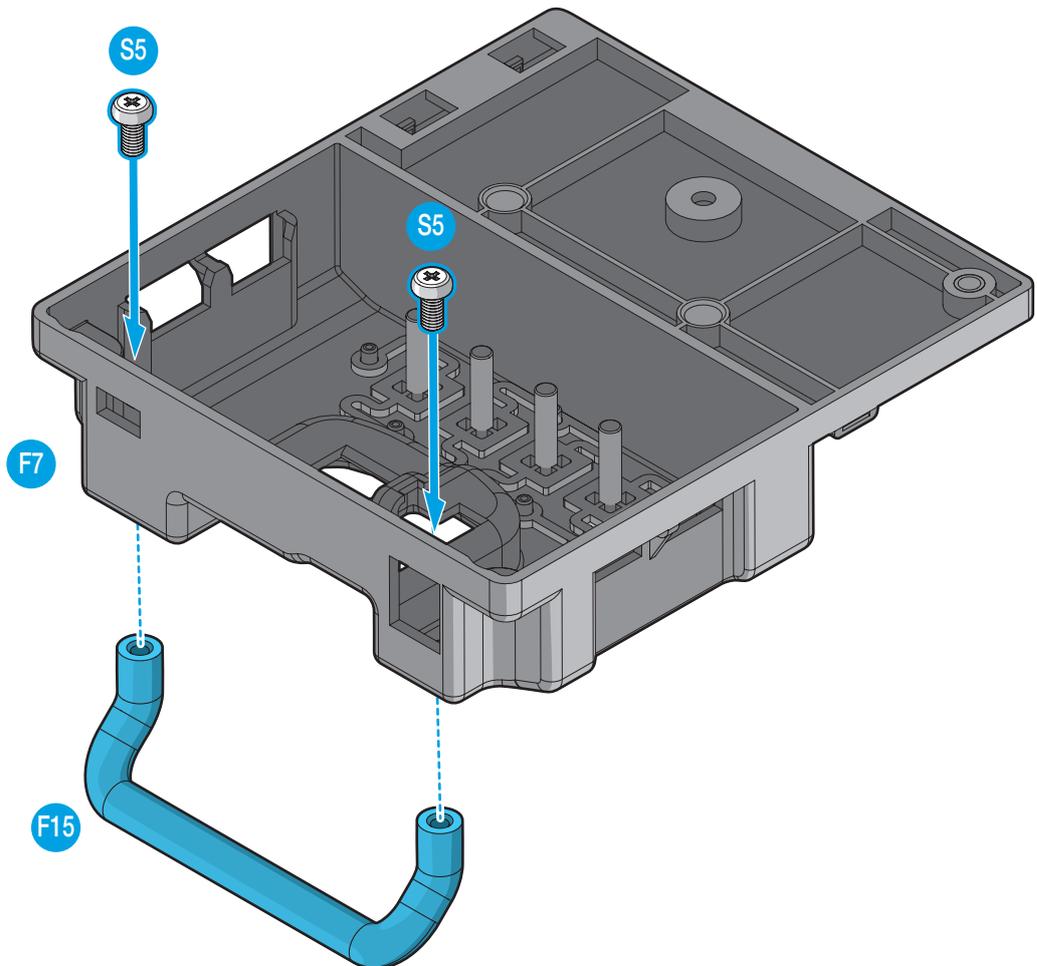


x1



x2

19. Align the bar (F15) with the PCB cover (F7).
20. Secure the bar (F15) to the PCB cover (F7) with screws (S5).



# Hardware Assembly

03 >

## Base Assembly (without Wheels)

### Required Parts



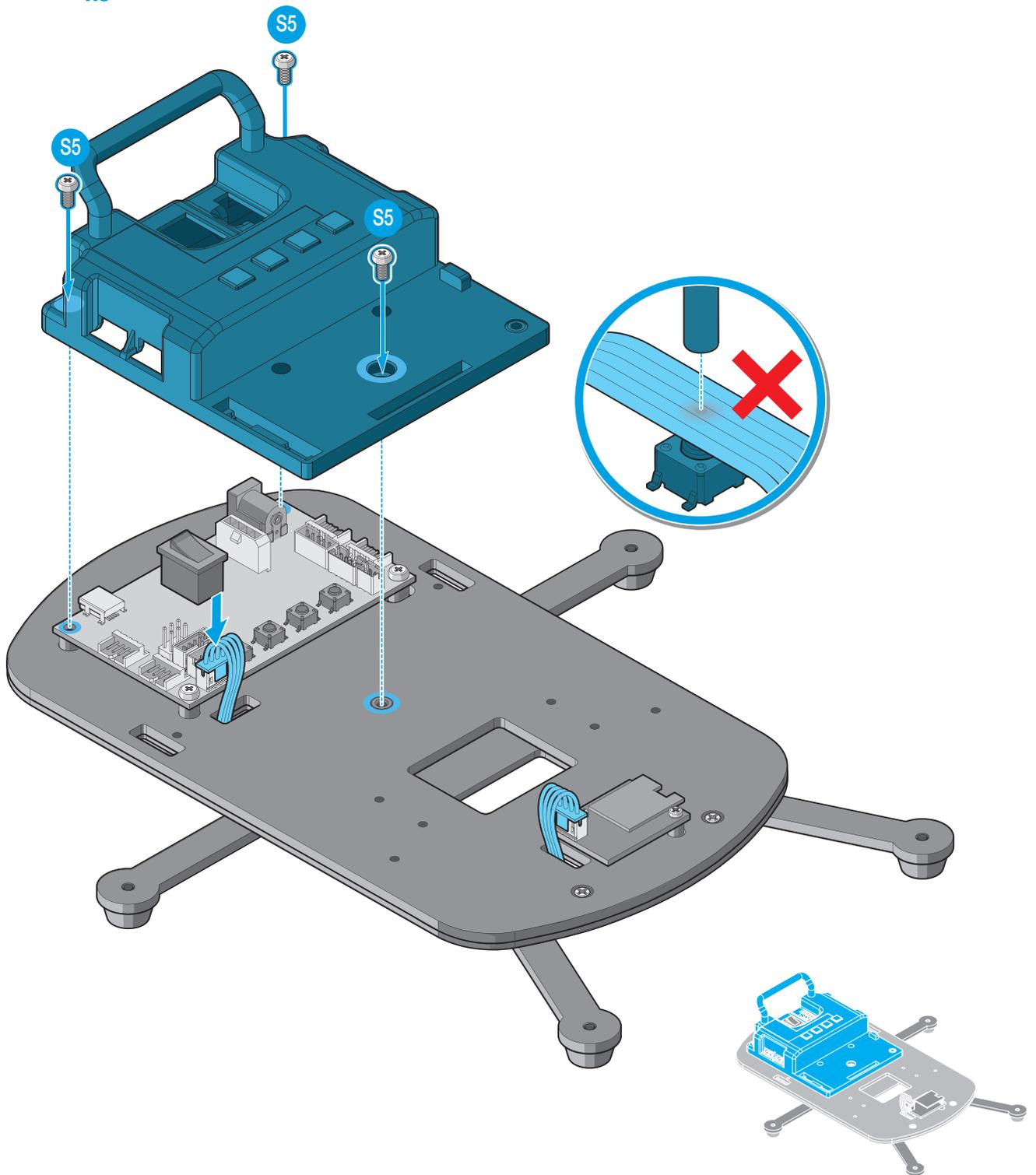
x3

21. Connect the Bluetooth cable to the MCU board (M5).
22. Align the PCB cover (F7) with the base assembly.
23. Secure the PCB cover (F7) to the base assembly with screws (S5).



### CAUTION:

Make sure the cable does not cover the function buttons.

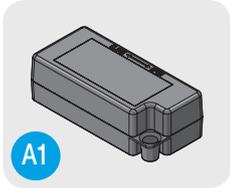


# <03

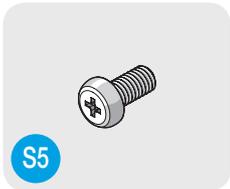
## Hardware Assembly

### Base Assembly (without Wheels)

#### Required Parts

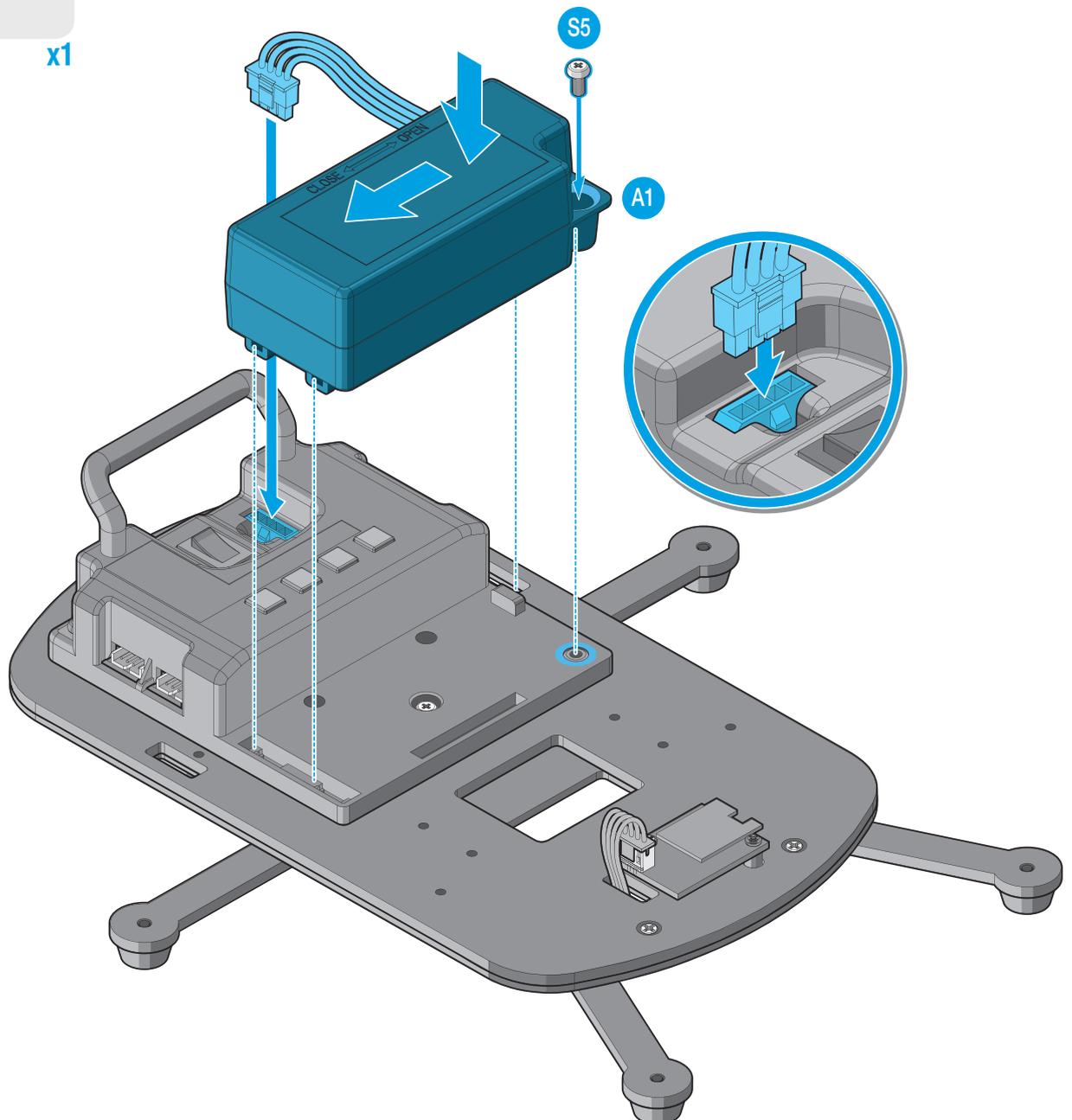


x1



x1

24. Align the battery (A1) with the PCB cover (F7).
25. Slide the battery (A1) to lock on the PCB cover (F7), make sure the hole on the battery (A1) is aligned with the opening on the PCB cover (F7).
26. Secure the battery (A1) to the PCB cover (F7) with a screw (S5).
27. Connect the battery cable to the connector on the PCB cover (F7).



# Hardware Assembly

## Base Assembly (without Wheels)



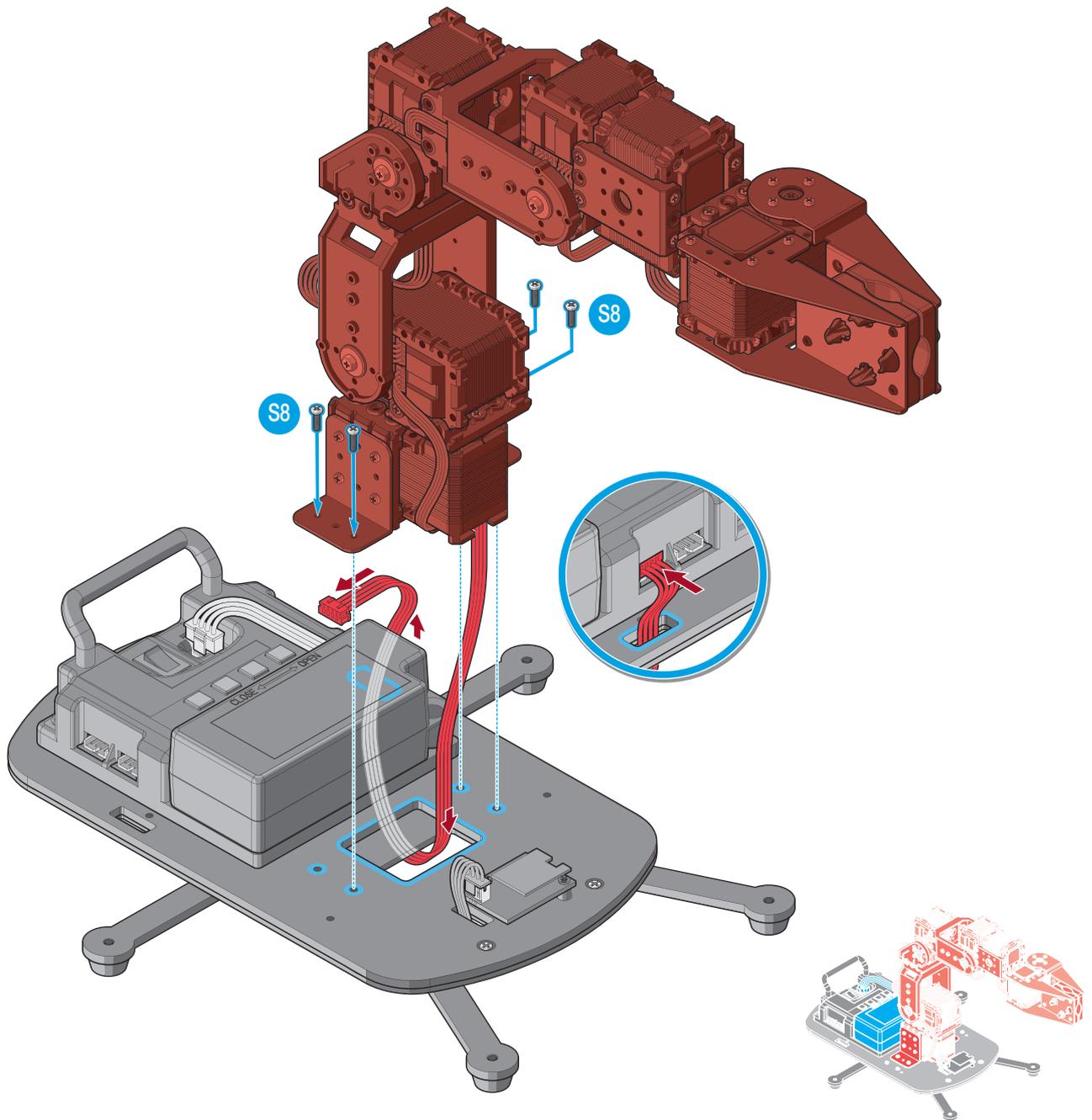
### Required Parts



x4

- 28. Route the cable (L5) following the illustration and connect to the PCB cover (F7).
- 29. Align the arm assembly with the base assembly.
- 30. Secure the arm assembly to the base assembly with screws (S8).

**NOTE:** The Robotics Arm 6D model was used for the following procedure. Other models may be different.

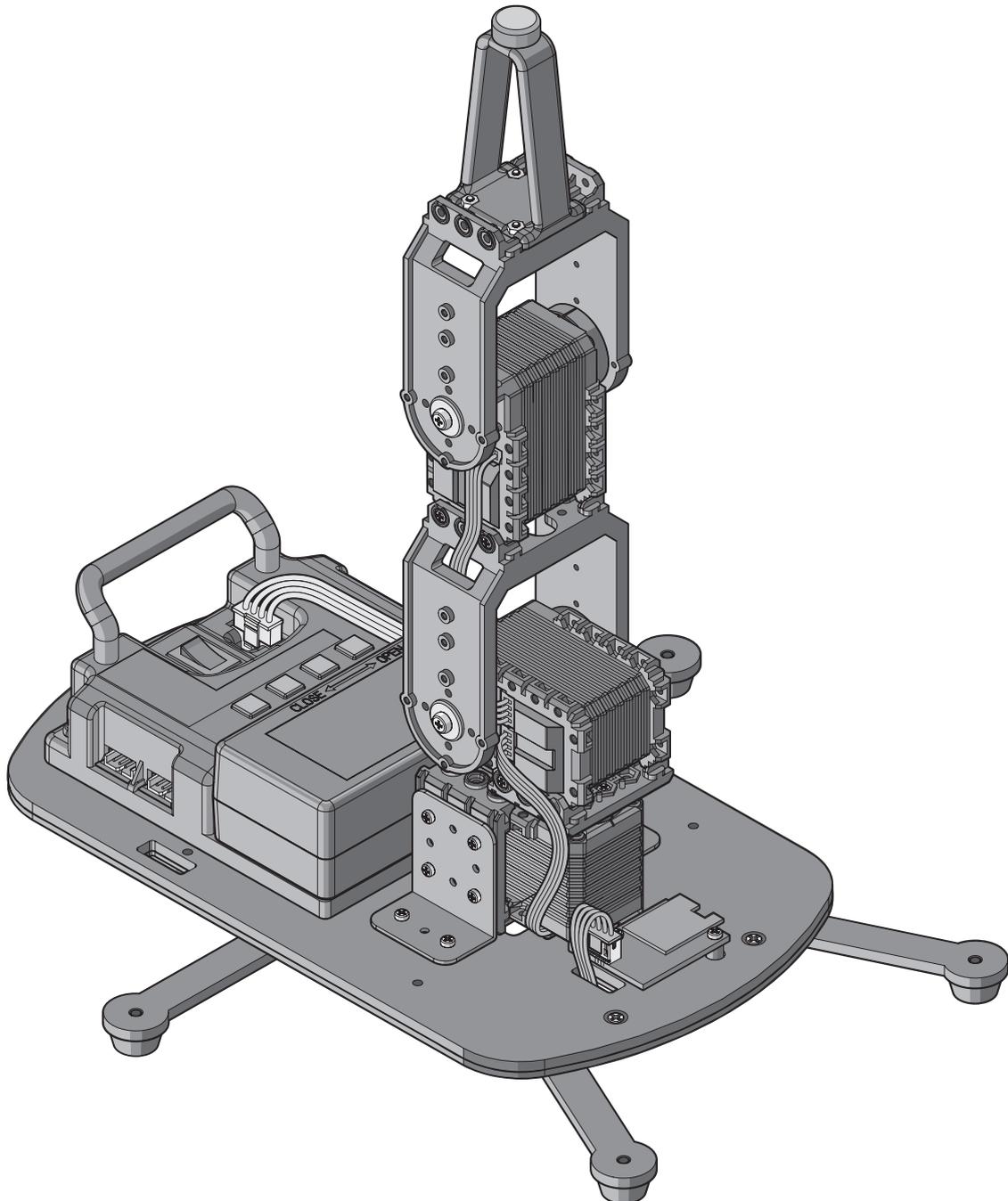


# <03

## Hardware Assembly

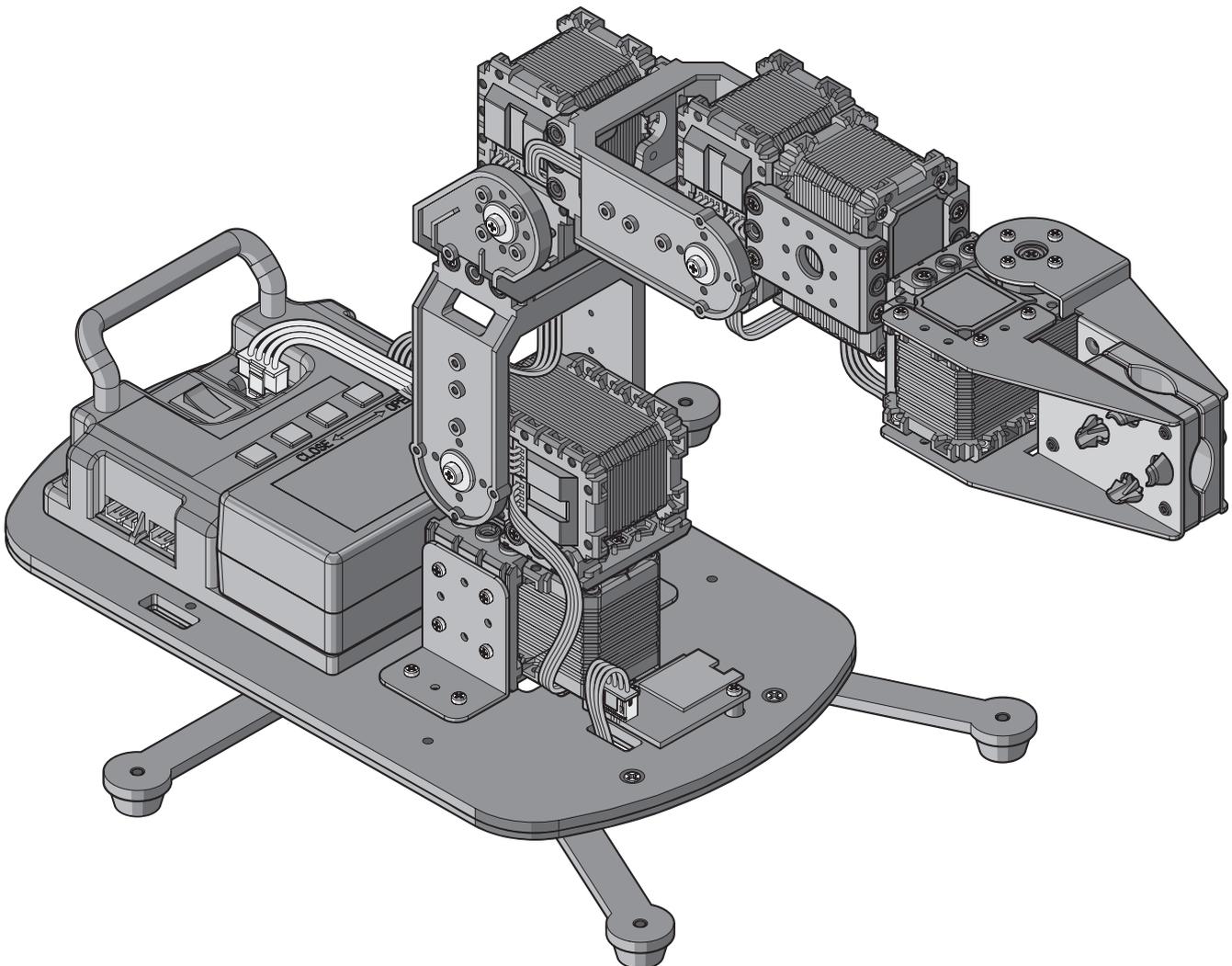
### Base Assembly (without Wheels)

Congratulations, your Robotics Arm 3D or Robotics Arm 6D model is finished.



# Hardware Assembly

## Base Assembly (without Wheels)

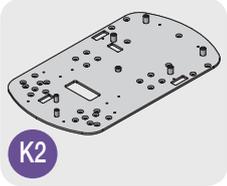


# <03

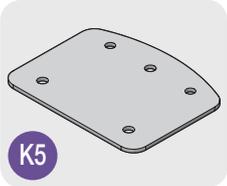
## Hardware Assembly

### Base Assembly (with Wheels)

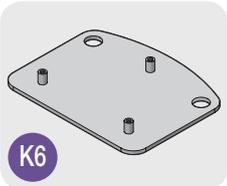
#### Required Parts



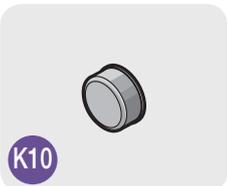
x1



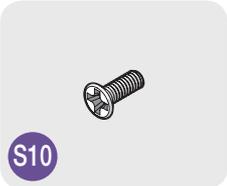
x3



x1

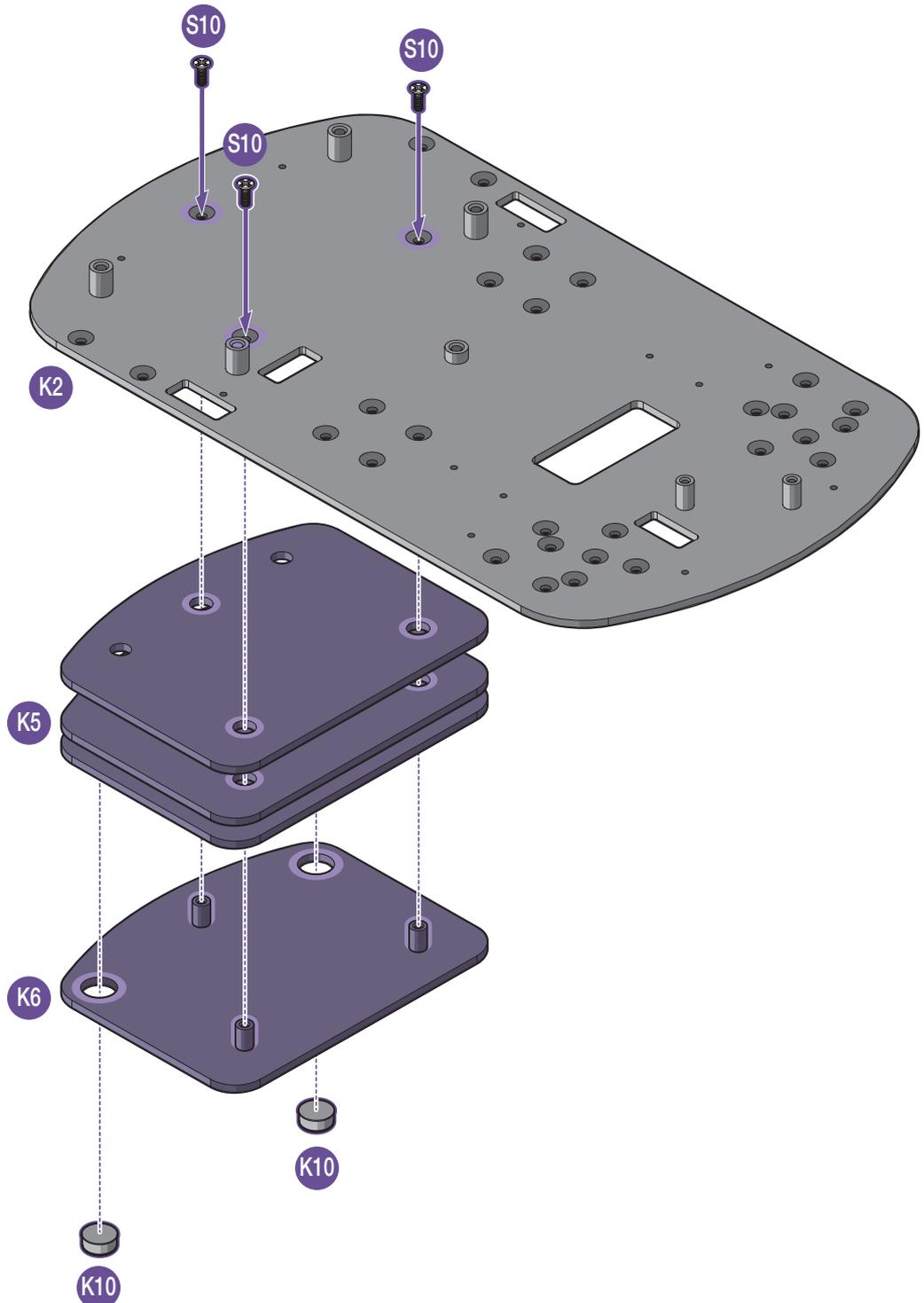


x2



x3

1. Install the rubber foot (K10) on the counterweight-2 (K6).
2. Align the counterweight-1 (K5) on the counterweight-2 (K6).
3. Align the counterweights (K5 and K6) with the base sheet (K2).
4. Secure the base sheet (K2) to the counterweights (K5 and K6) with screws (S10).

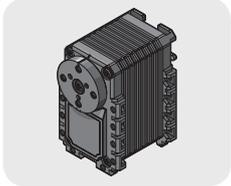


# Hardware Assembly

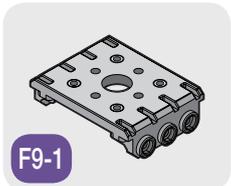
## Base Assembly (with Wheels)



### Required Parts



x2



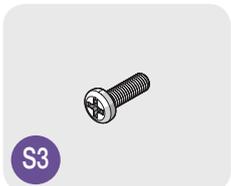
F9-1

x2



L5

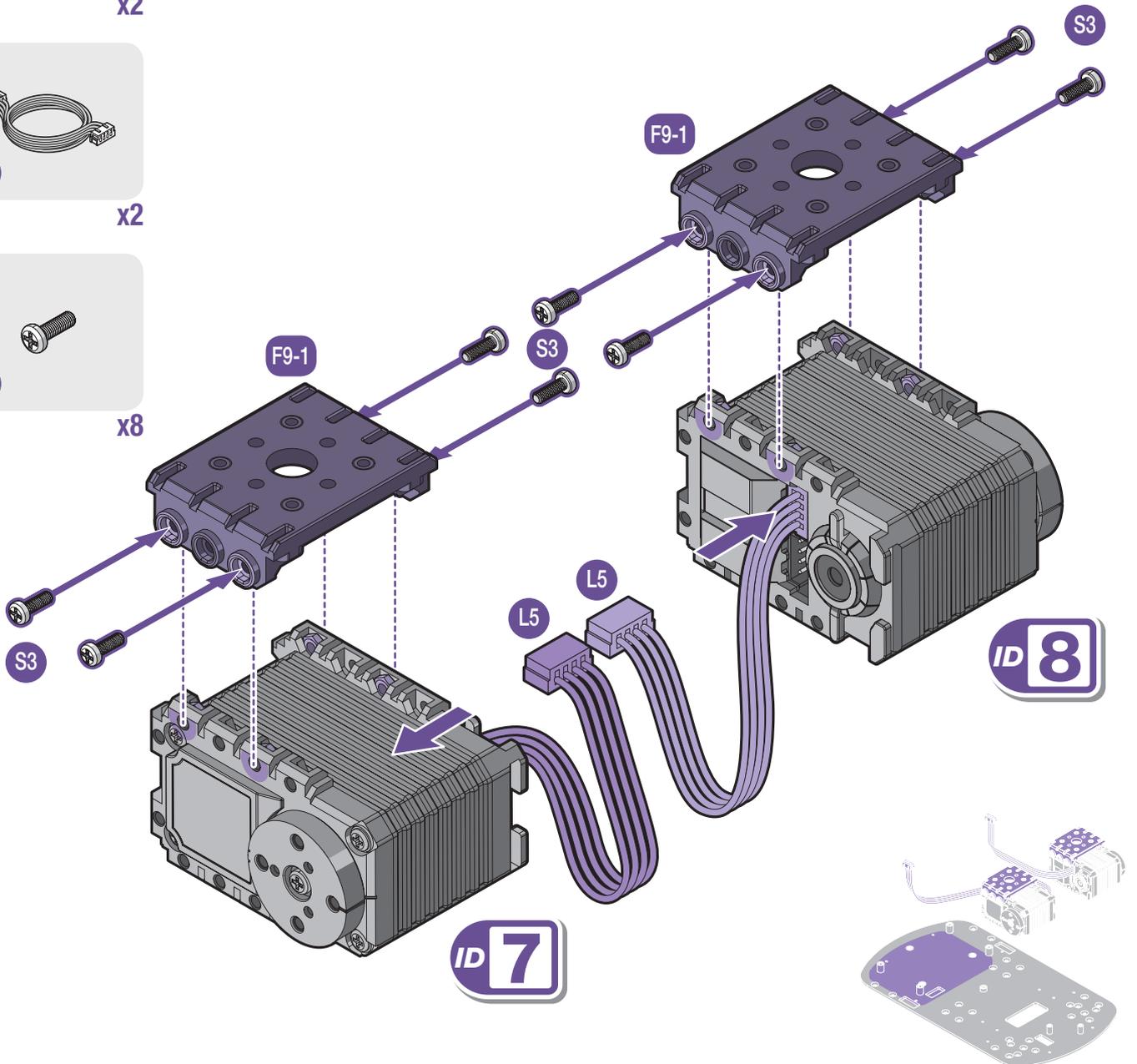
x2



S3

x8

5. Connect the cables (L5) to the actuator (ID7 and ID8).
6. Align the bracket (F9-1) with the actuator (ID7 and ID8).
7. Secure the bracket (F9-1) to the actuator (ID7 and ID8) with screws (S3).

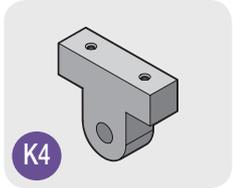


# <03

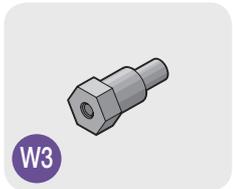
## Hardware Assembly

### Base Assembly (with Wheels)

#### Required Parts



x2

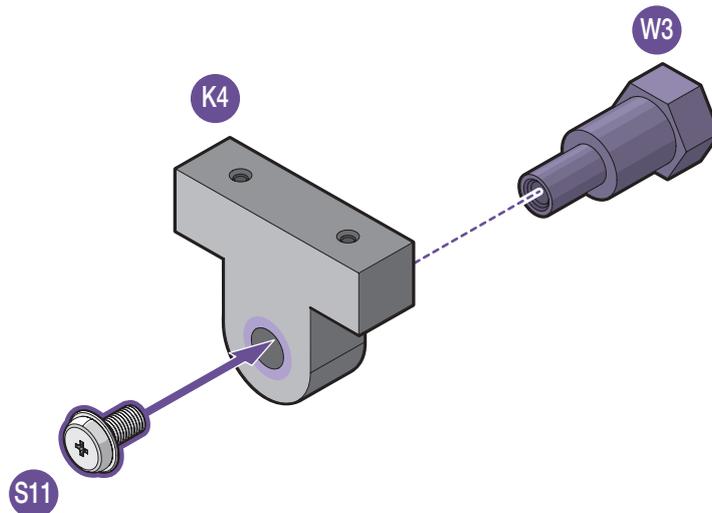


x2



x2

8. Install the wheel connector (W3) through bracket (K4).
9. Secure the bracket (K4) to the wheel connector (W3) with screws (S11).

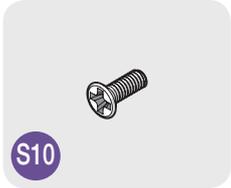


# Hardware Assembly

## Base Assembly (with Wheels)

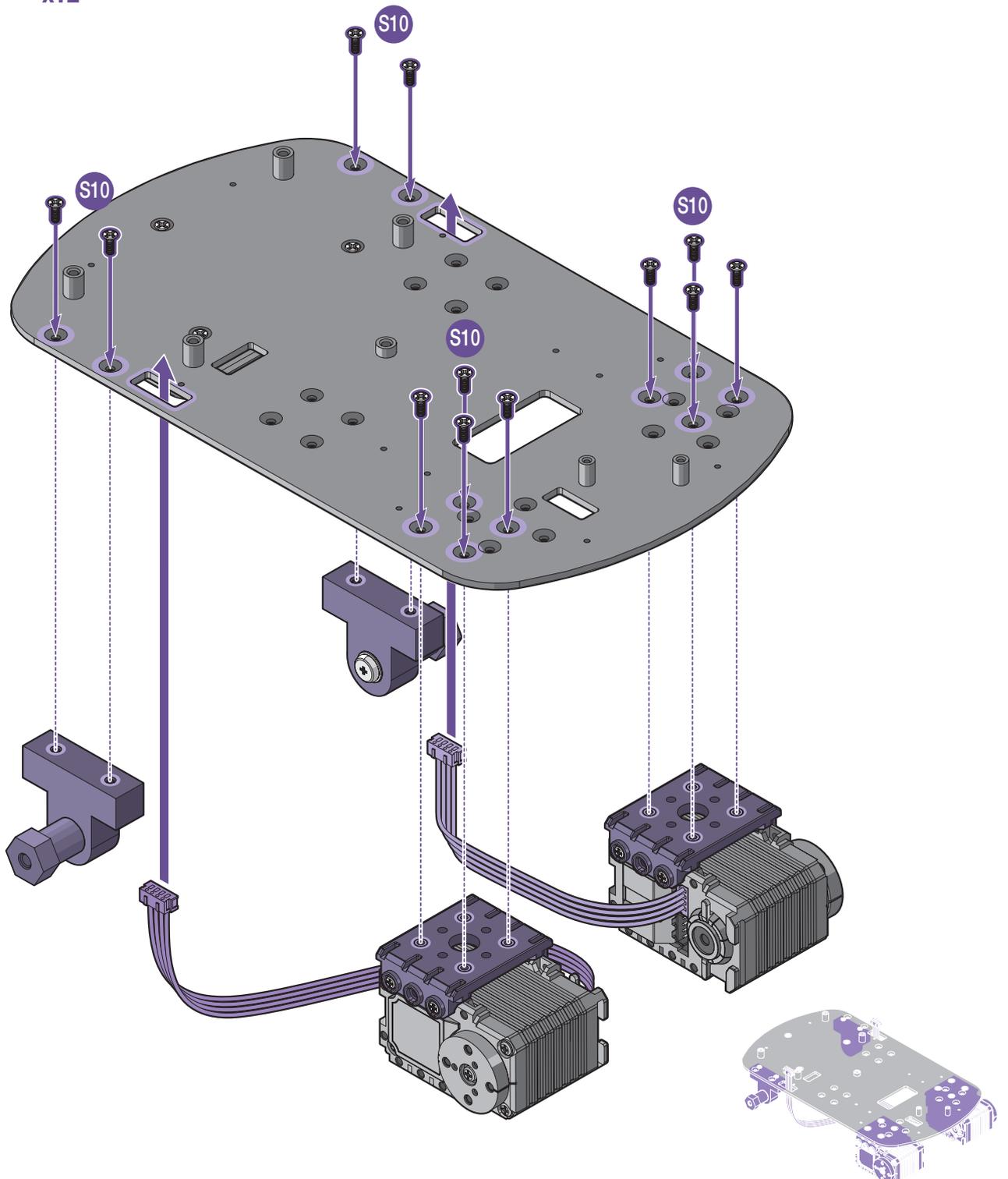


### Required Parts



x12

10. Route the cables (L5) following the illustration.
11. Align the actuator assembly with the base sheet assembly.
12. Secure the actuator assembly to the base sheet assembly with screws (S10).
13. Align the bracket (K4) with the base sheet assembly.
14. Secure the bracket (K4) to the base sheet assembly with screws (S10).

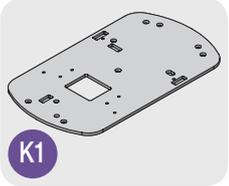


# <03

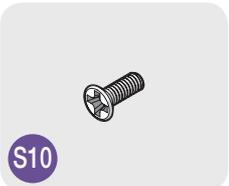
## Hardware Assembly

### Base Assembly (with Wheels)

#### Required Parts



x1

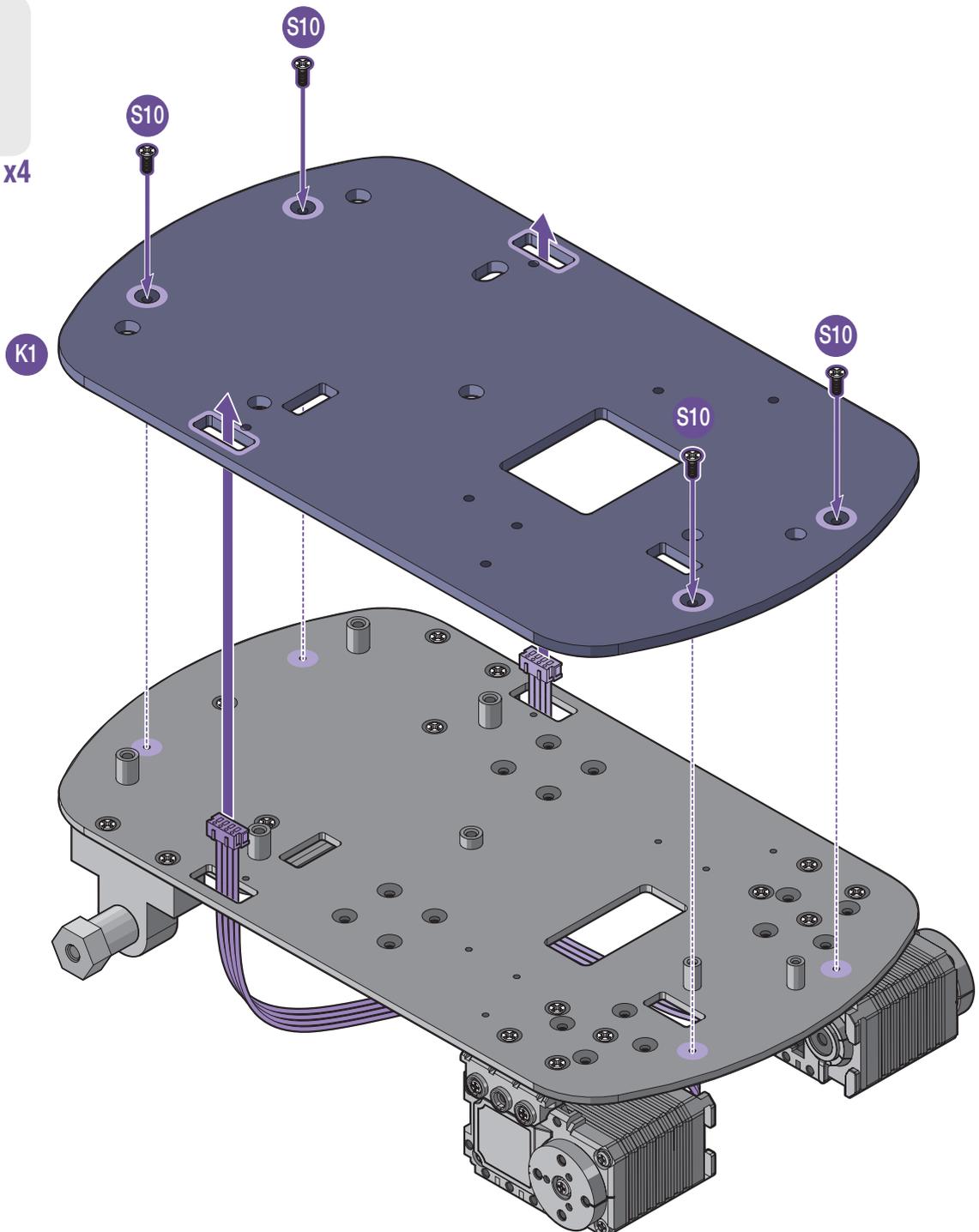


x4

15. Route the cables (L5) following the illustration.

16. Align the base (K1) on the base sheet assembly.

17. Secure the base (K1) to the base sheet assembly with screws (S10).

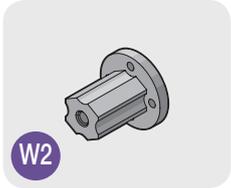


# Hardware Assembly

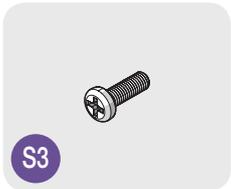
## Base Assembly (with Wheels)



### Required Parts



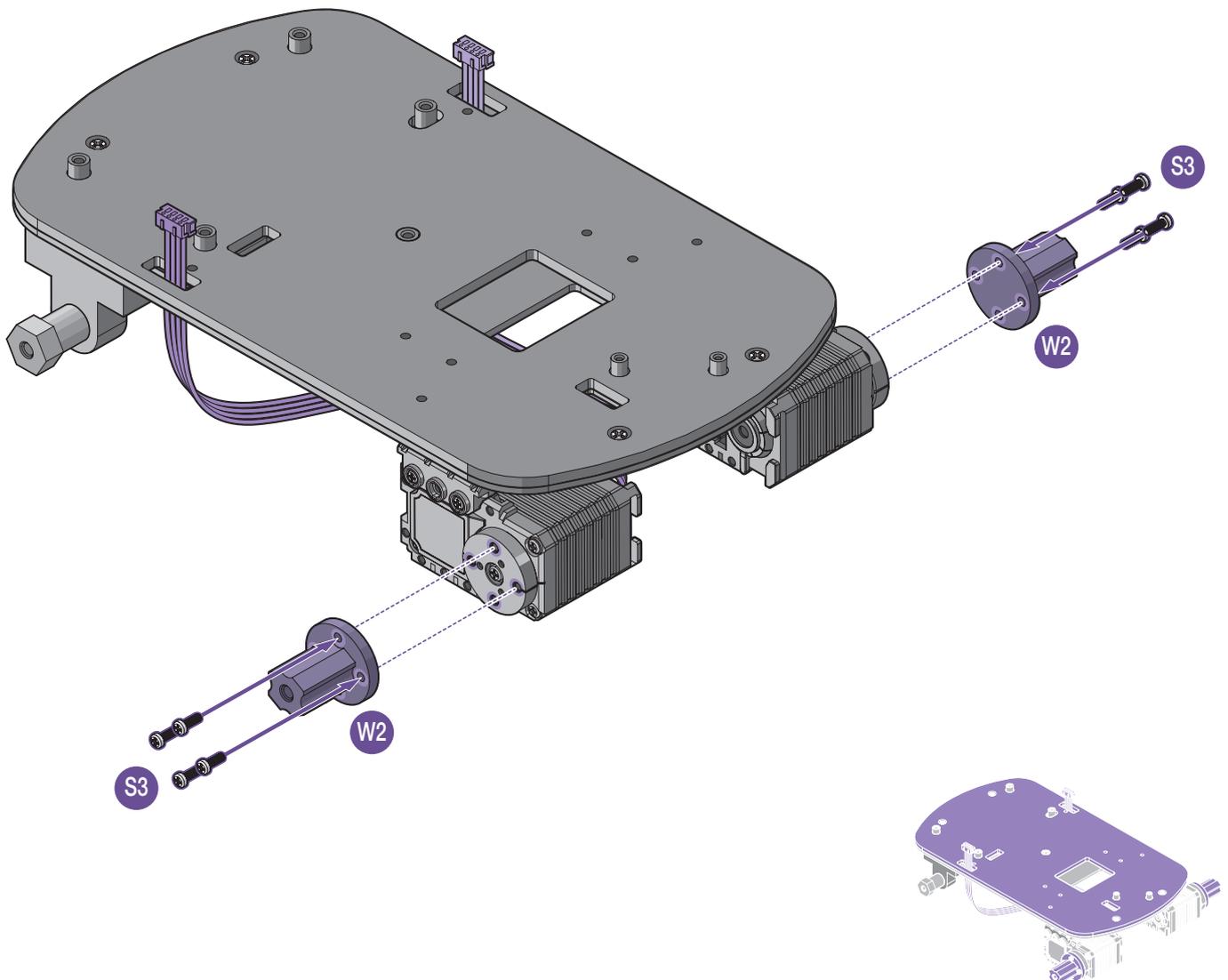
x2



x8

18. Align the wheel connector (W2) on the actuator (ID7 and ID8).

19. Secure the wheel connector (W2) to the actuator (ID7 and ID8) with screws (S3).

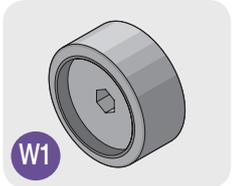


# <03

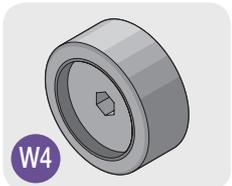
## Hardware Assembly

### Base Assembly (with Wheels)

#### Required Parts



x2



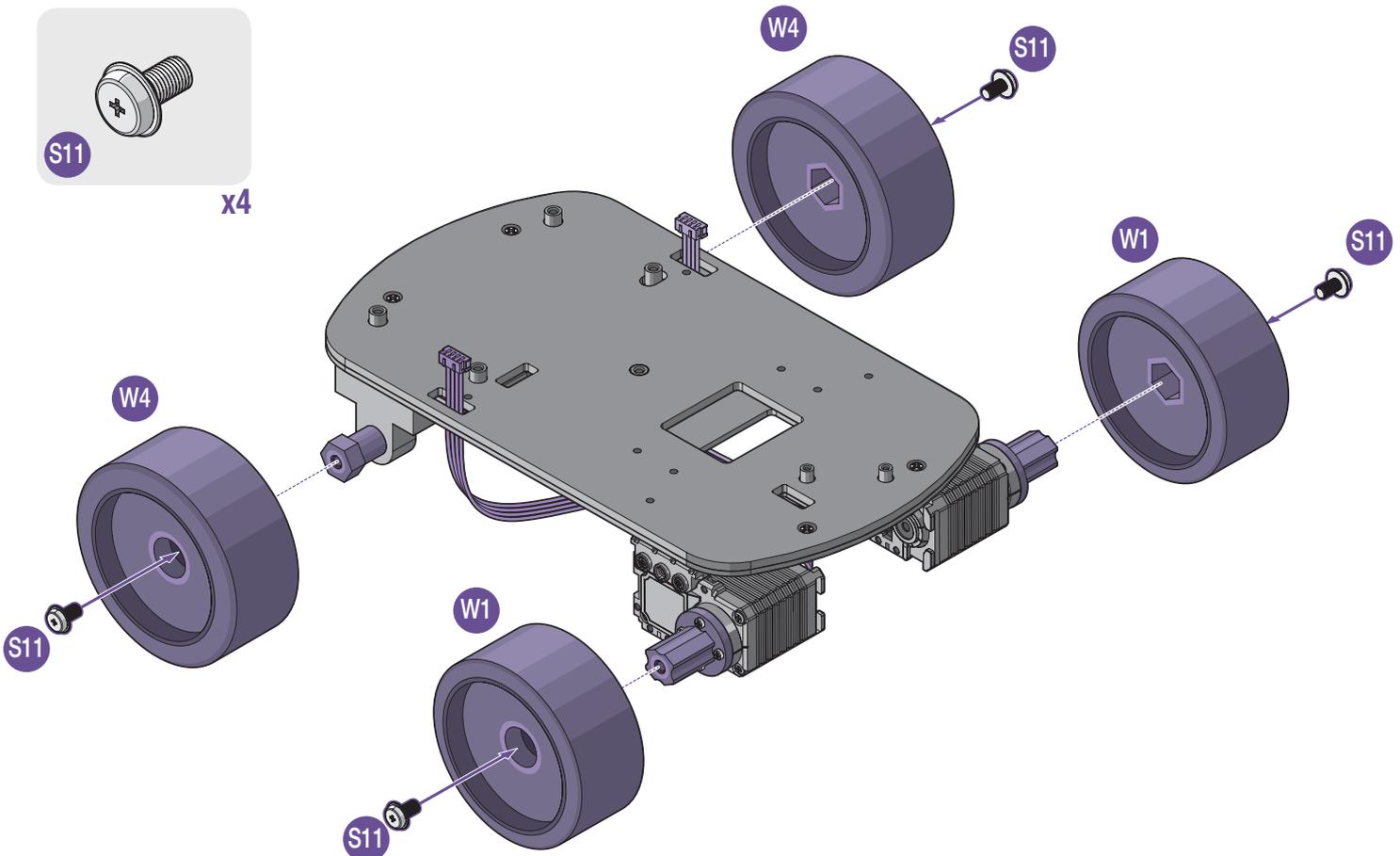
x2



x4

**20.** Install the wheel front (W1) and wheel back (W4) through wheel connector (W2 and W3).

**21.** Secure the wheel front (W1) and wheel back (W4) to the wheel connector (W2 and W3) with screws (S11).

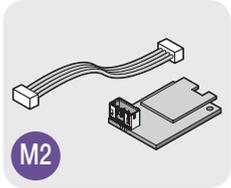


# Hardware Assembly

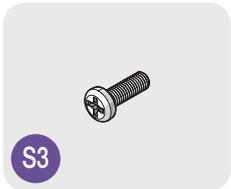
## Base Assembly (with Wheels)



### Required Parts

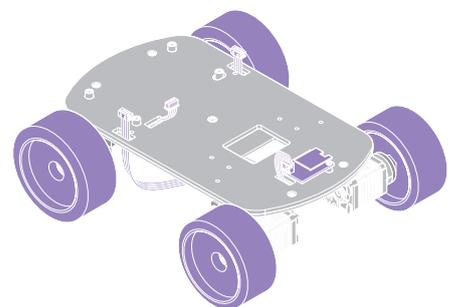
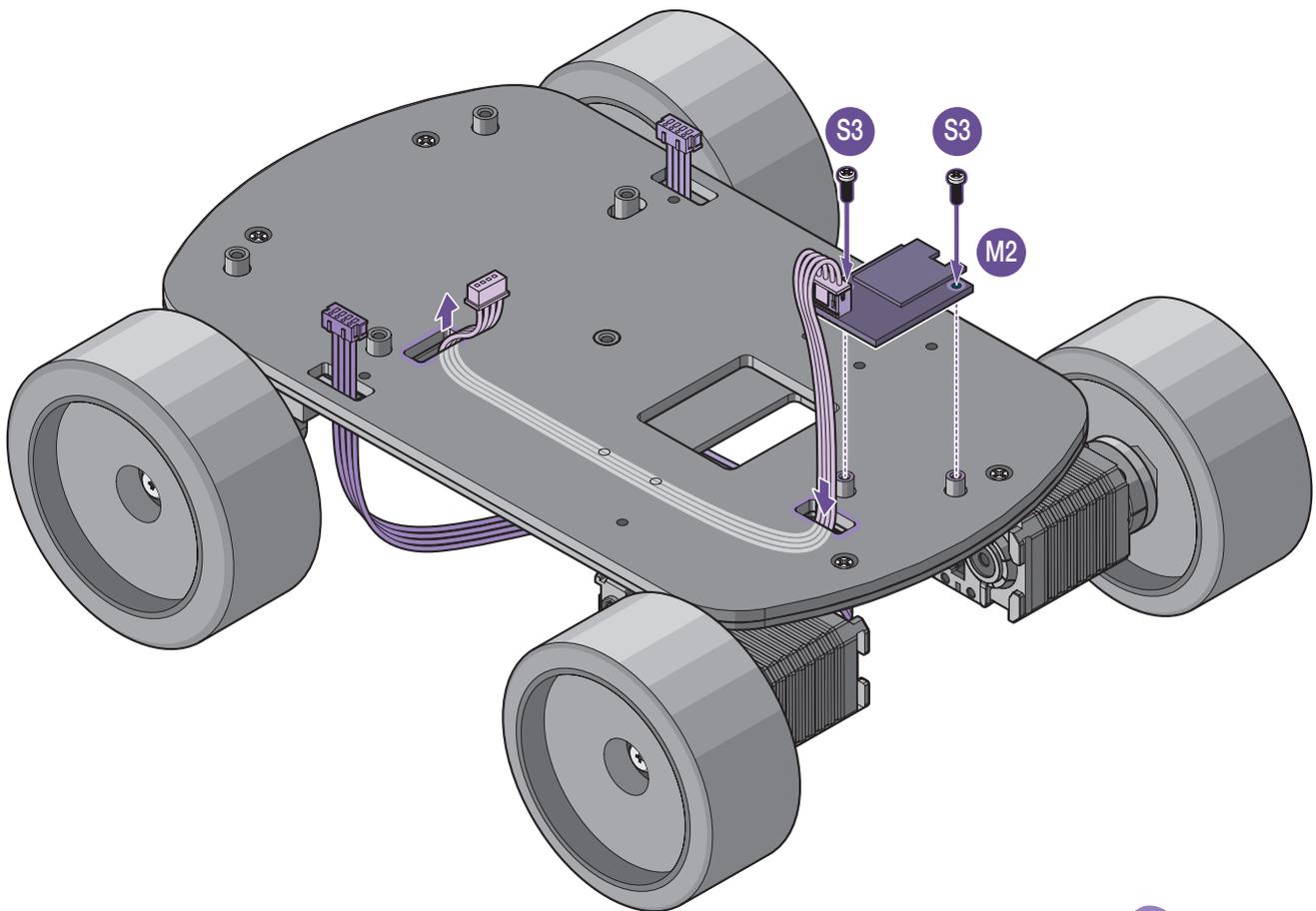


x1



x2

- 22. Connect the cable to the connector on the Bluetooth module (M2).
- 23. Route the Bluetooth cable following the illustration.
- 24. Align the Bluetooth module (M2) with the base assembly.
- 25. Secure the Bluetooth module (M2) to the base assembly with screws (S3).

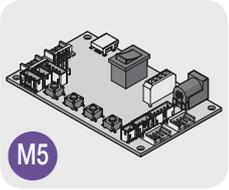


# <03

## Hardware Assembly

### Base Assembly (with Wheels)

#### Required Parts



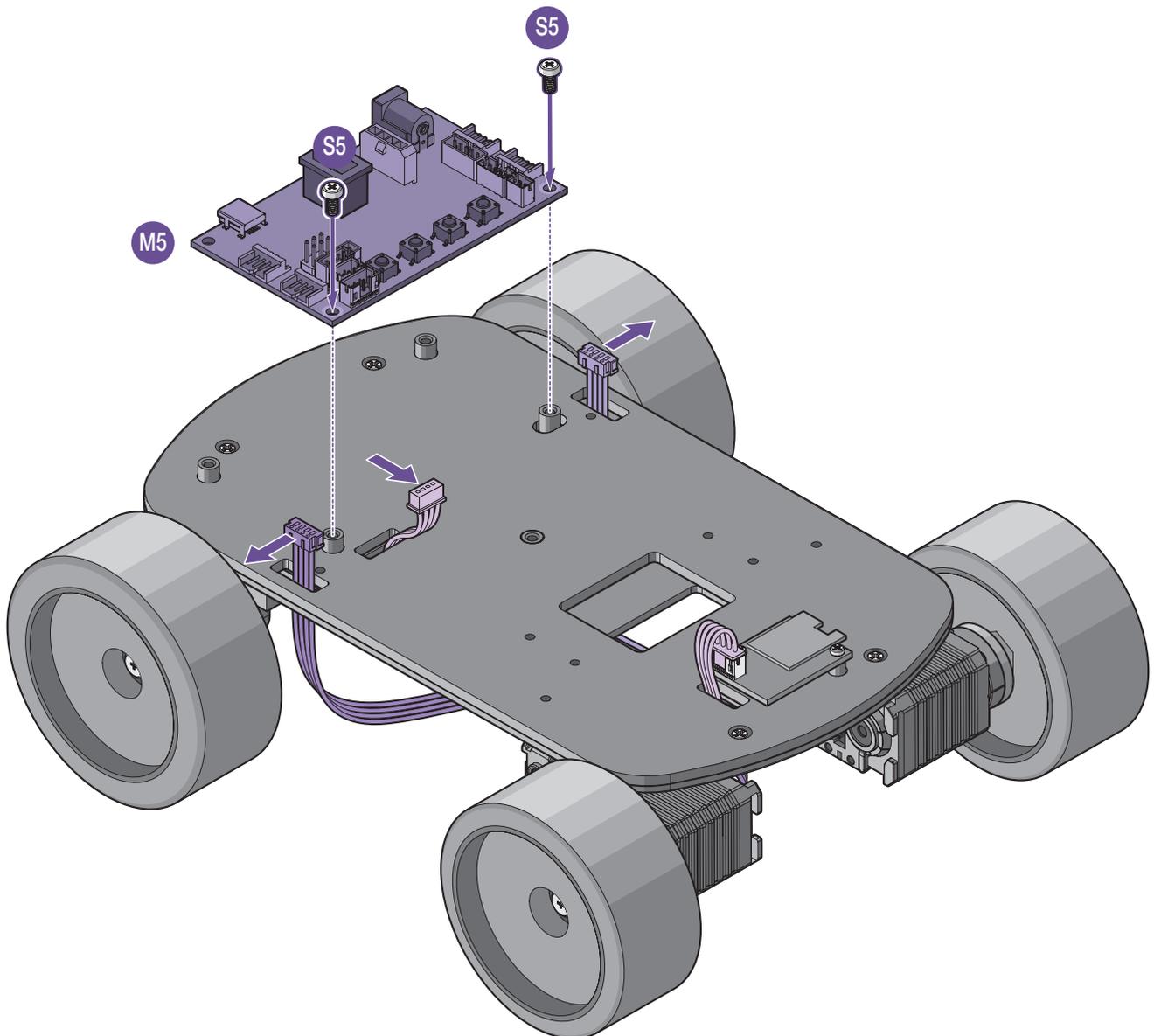
x1



x2

**26.** Align the MCU board (M5) with the base assembly. Ensure the MCU board (M5) does not cover the cables.

**27.** Secure the MCU board (M5) to the base assembly with screws (S5).

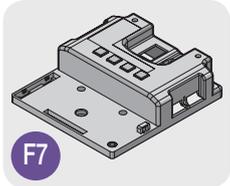


# Hardware Assembly

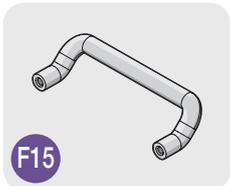
## Base Assembly (with Wheels)



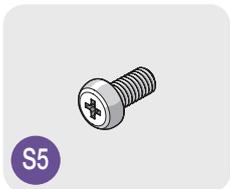
### Required Parts



x1



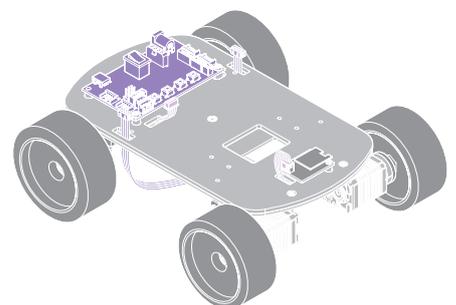
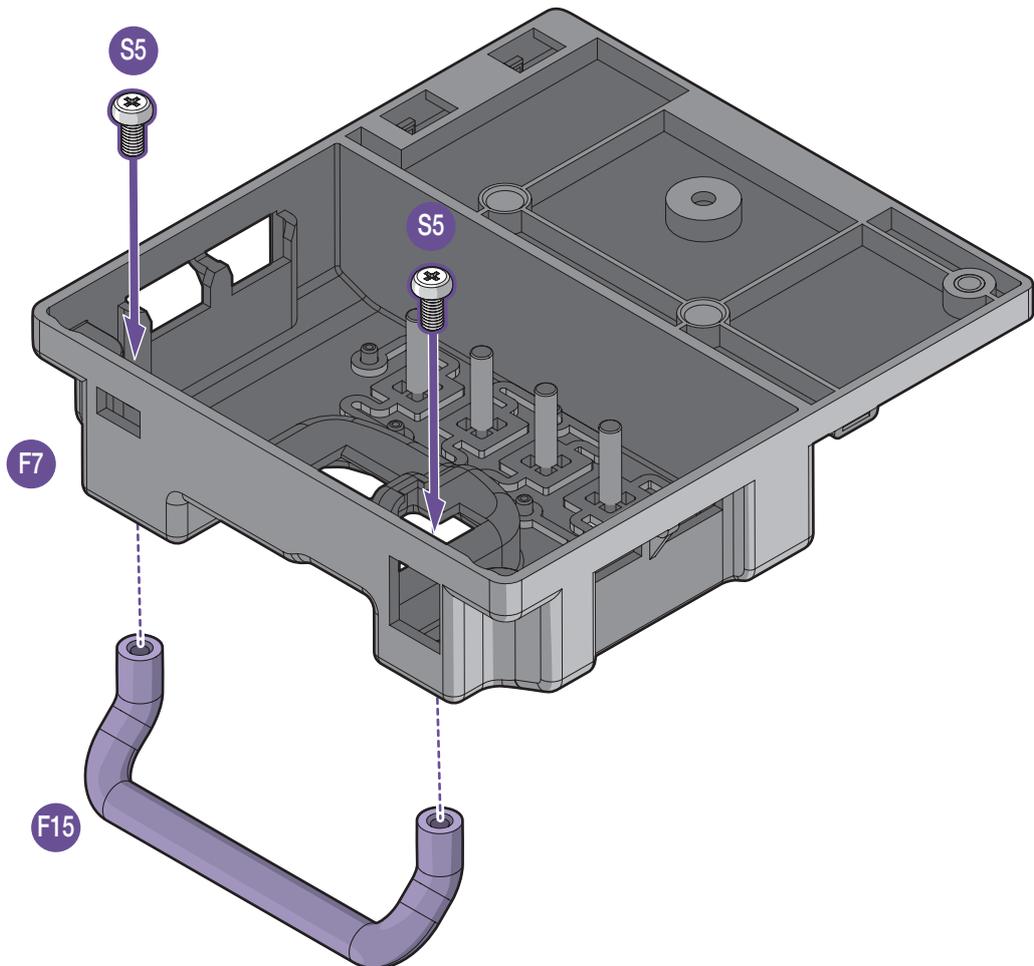
x1



x2

28. Align the bar (F15) with the PCB cover (F7).

29. Secure the bar (F15) to the PCB cover (F7) with screws (S5).



# <03

## Hardware Assembly

### Base Assembly (with Wheels)

#### Required Parts



S5

x3

30. Connect the Bluetooth cable to the MCU board (M5).

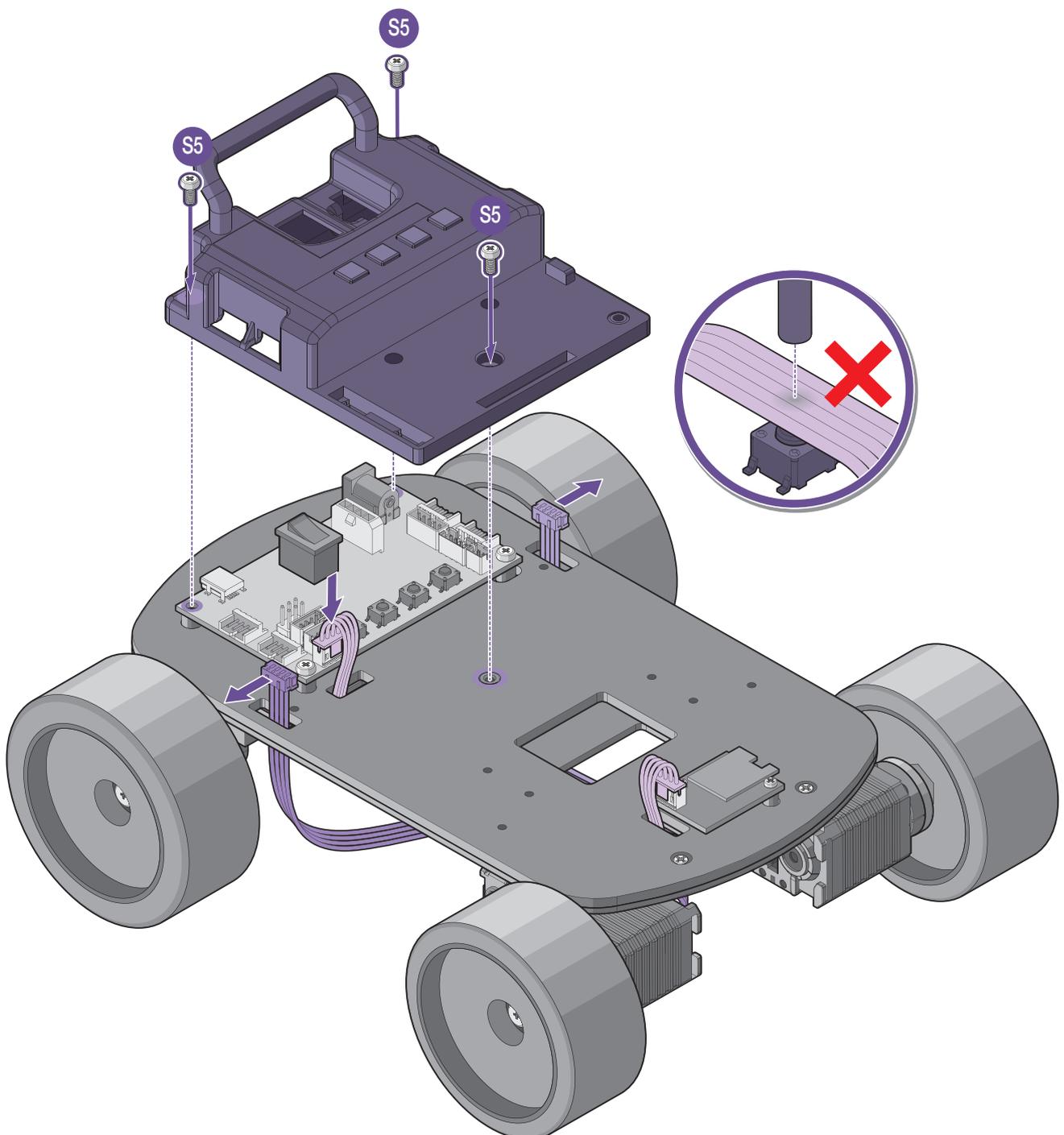
31. Align the PCB cover (F7) with the base assembly. Make sure the PCB cover (F7) does not cover the cables.

32. Secure the PCB cover (F7) to the base assembly with screws (S5).



#### CAUTION:

Make sure the cable does not cover the function buttons.

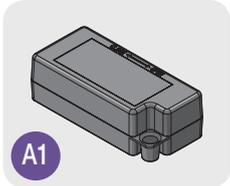


# Hardware Assembly

## Base Assembly (with Wheels)



### Required Parts

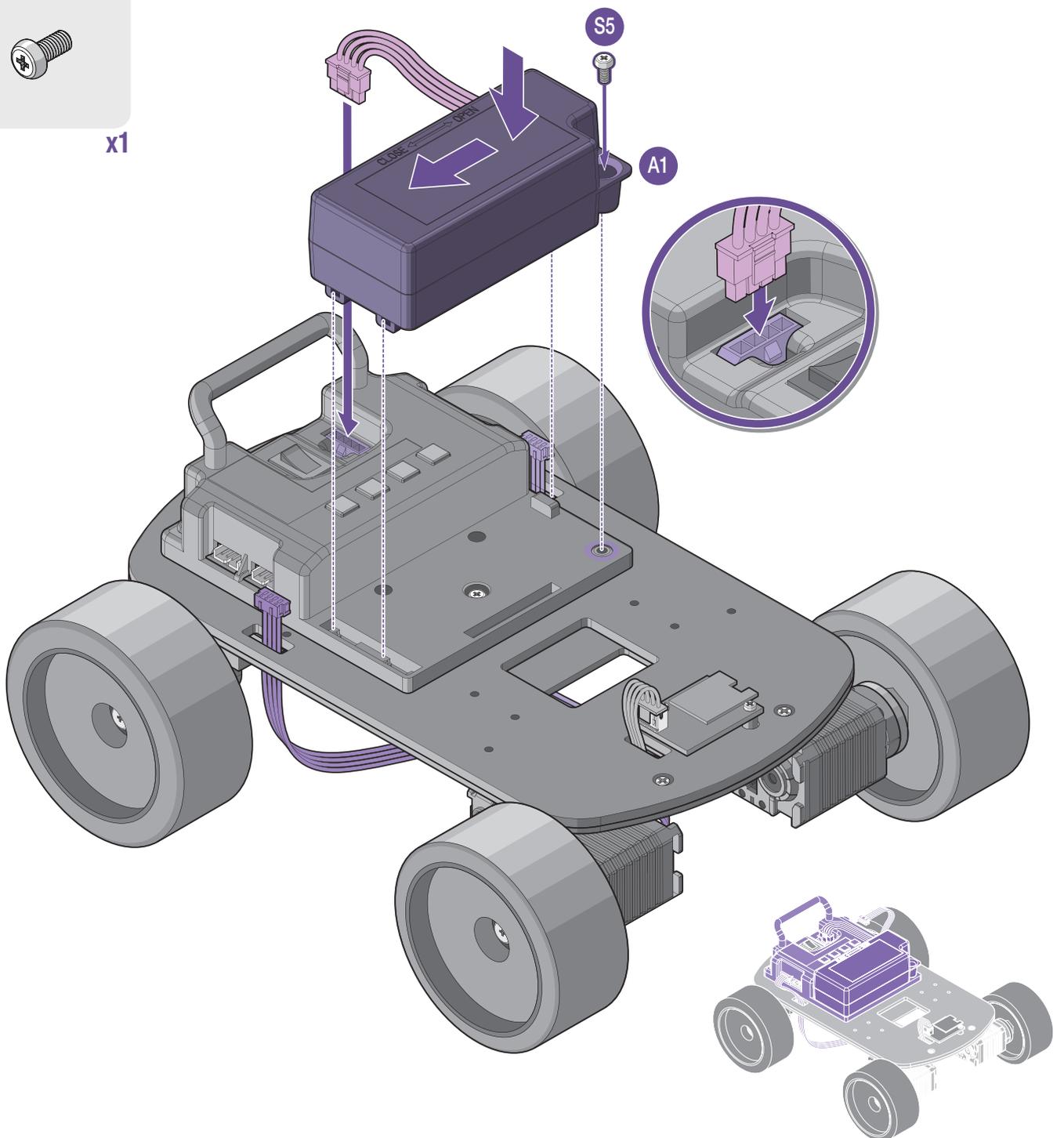


x1



x1

- 33. Align the battery (A1) with the PCB cover (F7).
- 34. Slide the battery (A1) to lock on the PCB cover (F7), make sure the hole on the battery (A1) is aligned with the opening on the PCB cover (F7).
- 35. Secure the battery (A1) to the PCB cover (F7) with a screw (S5).
- 36. Connect the battery cable to the connector on the PCB cover (F7).

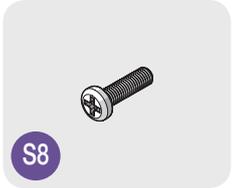


# <03

## Hardware Assembly

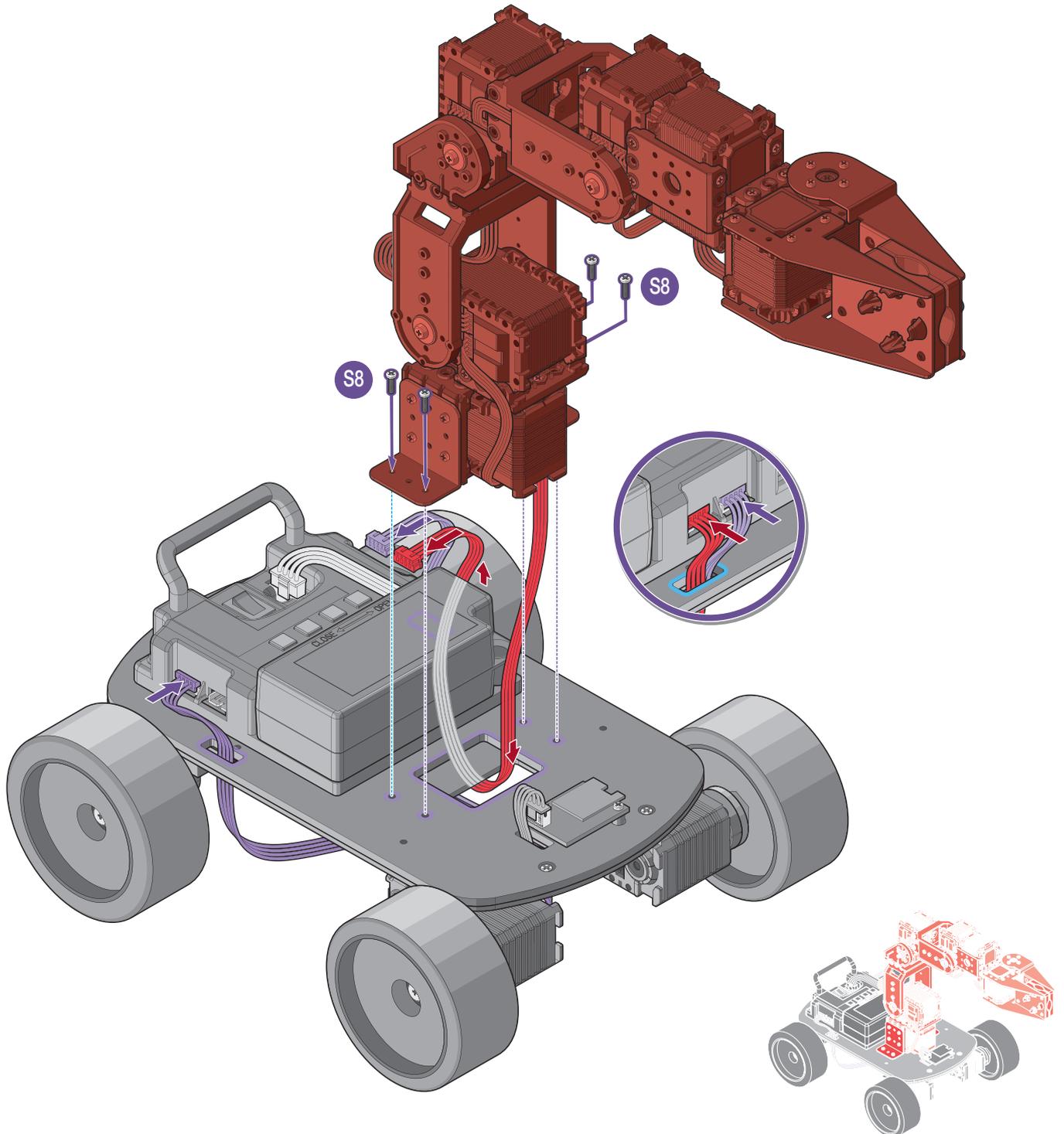
### Base Assembly (with Wheels)

#### Required Parts



x4

- 37. Route the cable (L5) following the illustration and connect to the PCB cover (F7).
- 38. Align the arm assembly with the base assembly.
- 39. Secure the arm assembly to the base assembly with screws (S8).

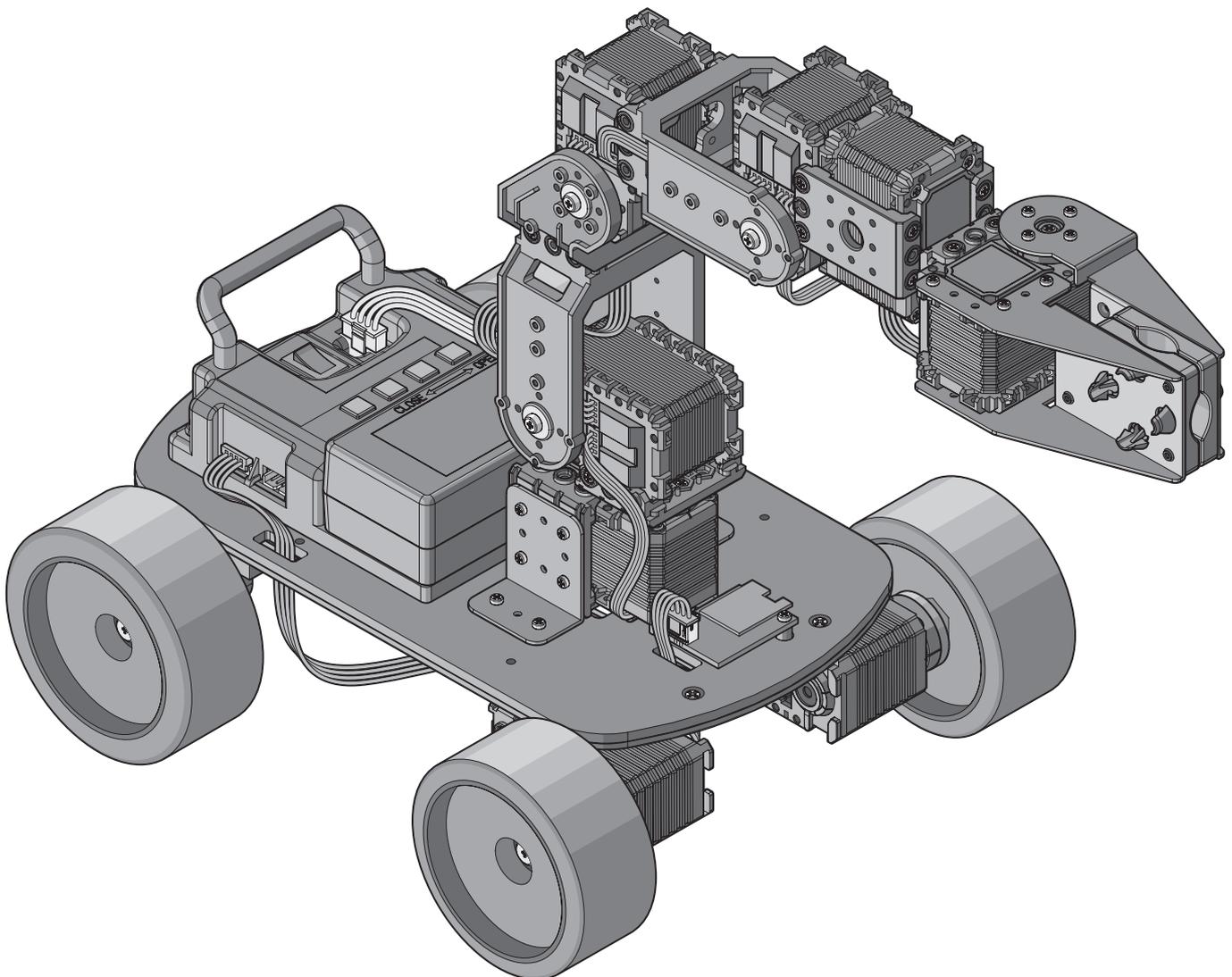


# Hardware Assembly

## Base Assembly (with Wheels)



Congratulations, your Robotics Arm 6DW model is finished.



# <04

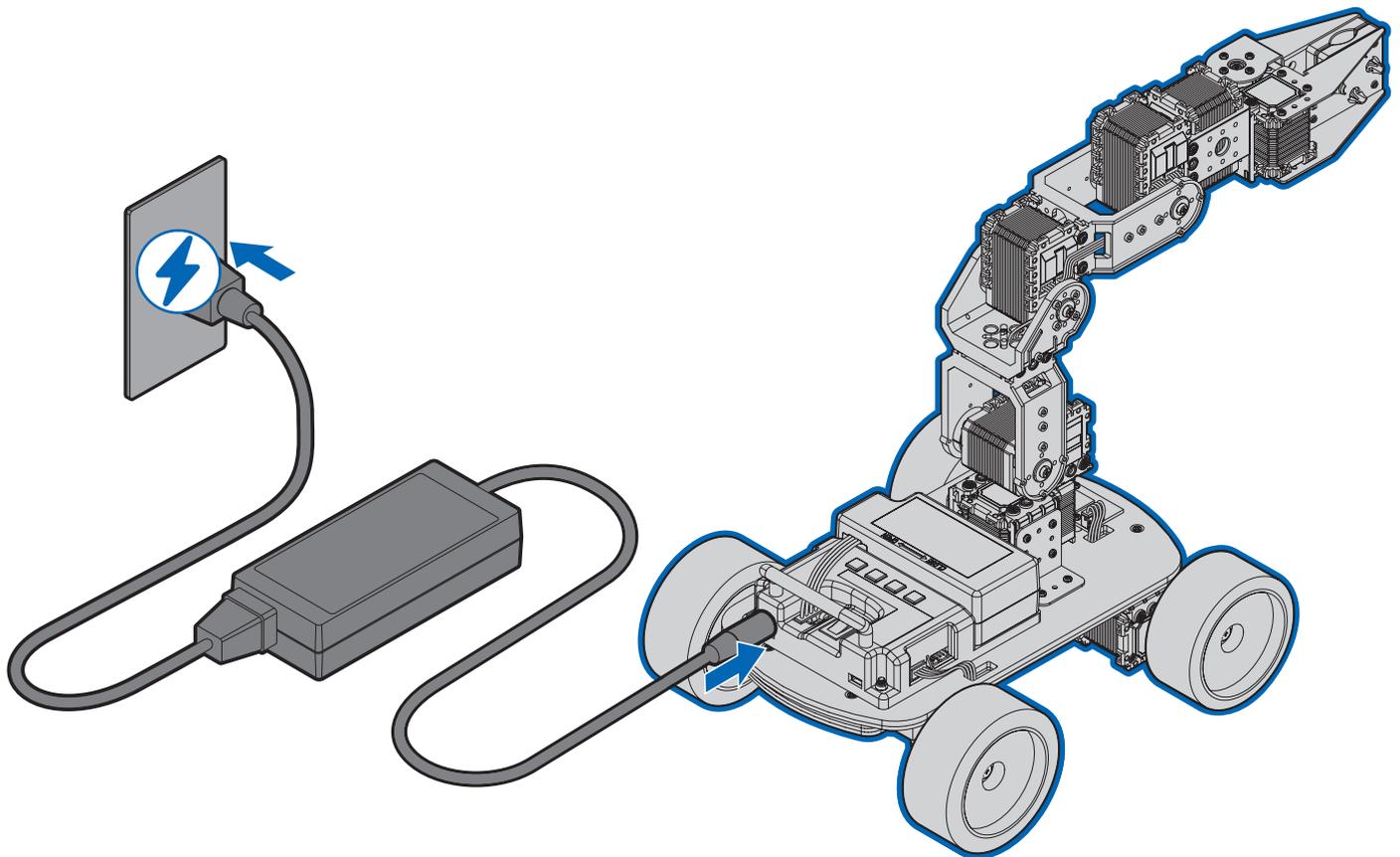
## Getting Started

### Using the Robotics Arm and the AC Adapter

**NOTE:** The Robotics Arm 6DW model was used for the following procedure. Other models may be different.

Once the battery is low power, connect the AC adapter to use.

1. Connect the AC adapter to the socket on the wall outlet.
2. Locate the power port on the back of the Robotics Arm.
3. Plug the charger cable to the Robotics Arm power socket.
4. Press the power switch to turn on the Robotics Arm.



# Getting Started

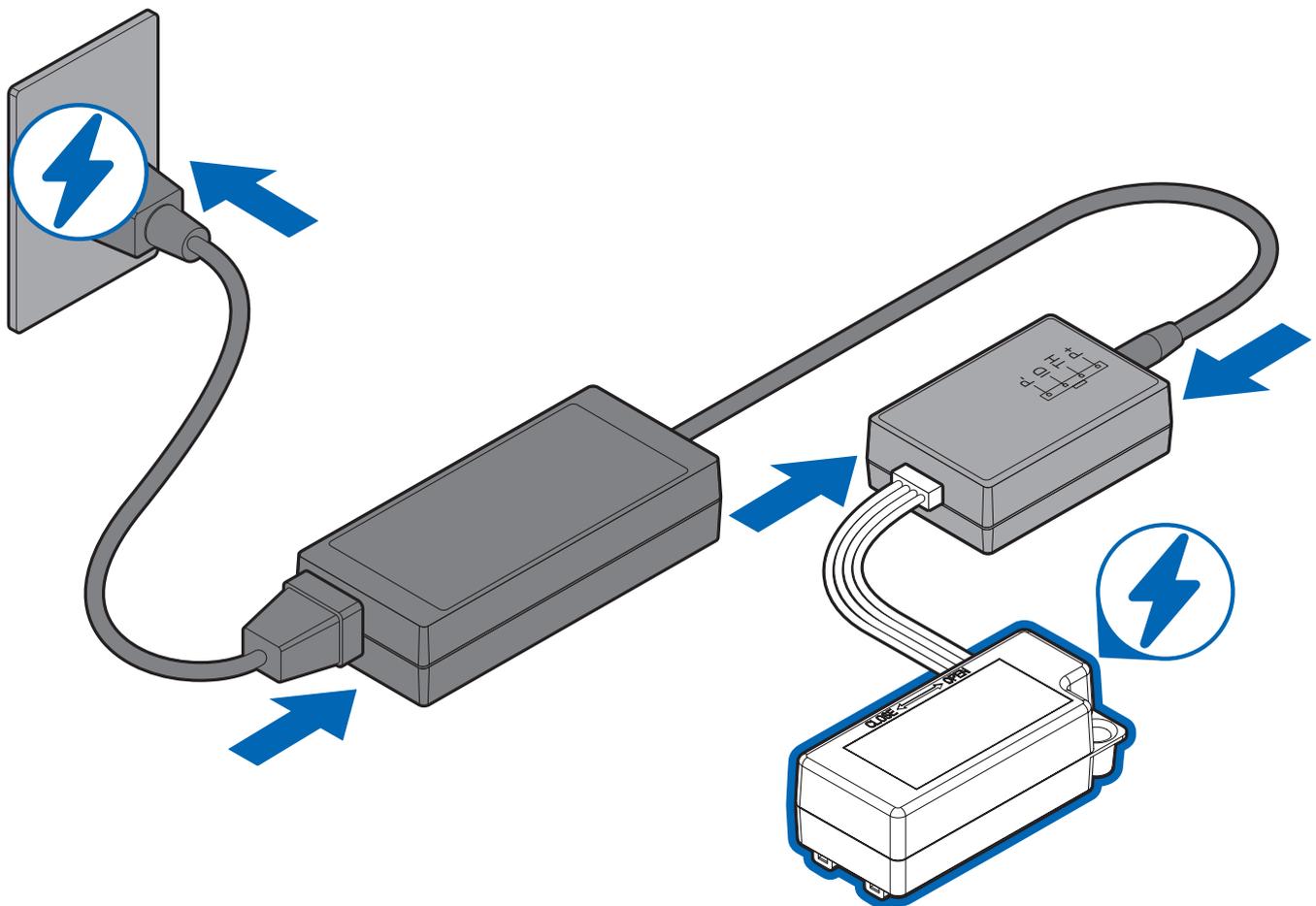
## Charging the Battery

Prior to use, the battery requires charging.

1. Connect the AC adapter to the socket on the wall outlet.
2. Locate the battery cable on the battery.
3. Connect the battery cable to the slot on the battery charger.
4. Allow time to fully charge the battery before installing the battery into the Robotics Arm.

 **CAUTION:**

- Fully charge the battery prior to first use.
- Do not fully discharge your battery — if you store the robot when its battery is fully discharged, the battery could fall into a deep discharge state, which renders it incapable of holding a charge.





## Getting Started

### Charging Time and Battery Life

#### Battery Specifications

Item	Specifications
Cell Type	3S1P
Weight	120g
Nominal Capacity	1000mAh
Nominal Voltage	11.10 V
Maximum Charge Voltage	12.6 V
Charge Current	1000mA
Continuous Maximum Discharge Current	5500mA
Charge Time	2 hours

# Getting Started

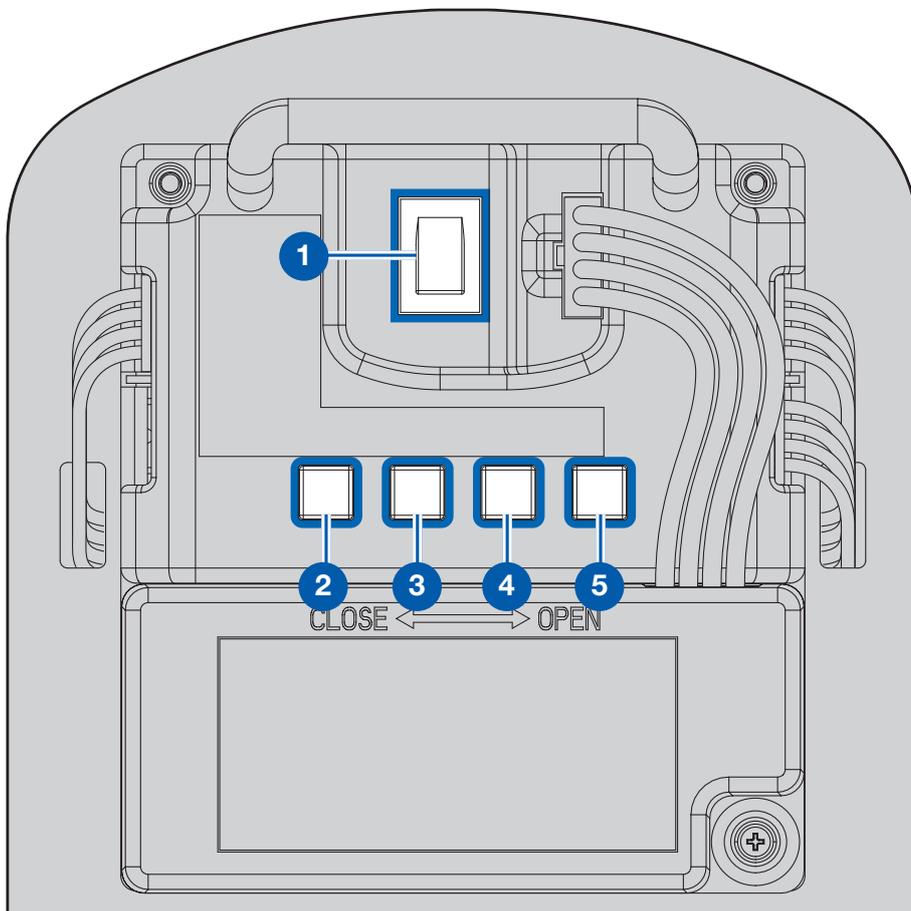
## Control Panel



**NOTE:** The Robotics Arm 6DW model was used for the following procedure. Differences may be present with other models.

1. Power switch
2. Programmable button 1
3. Programmable button 2
4. Programmable button 3
5. Programmable button 4

**NOTE:** For detailed information, please see the user manual.



# <04

## Getting Started

### Testing the Robotics Arm

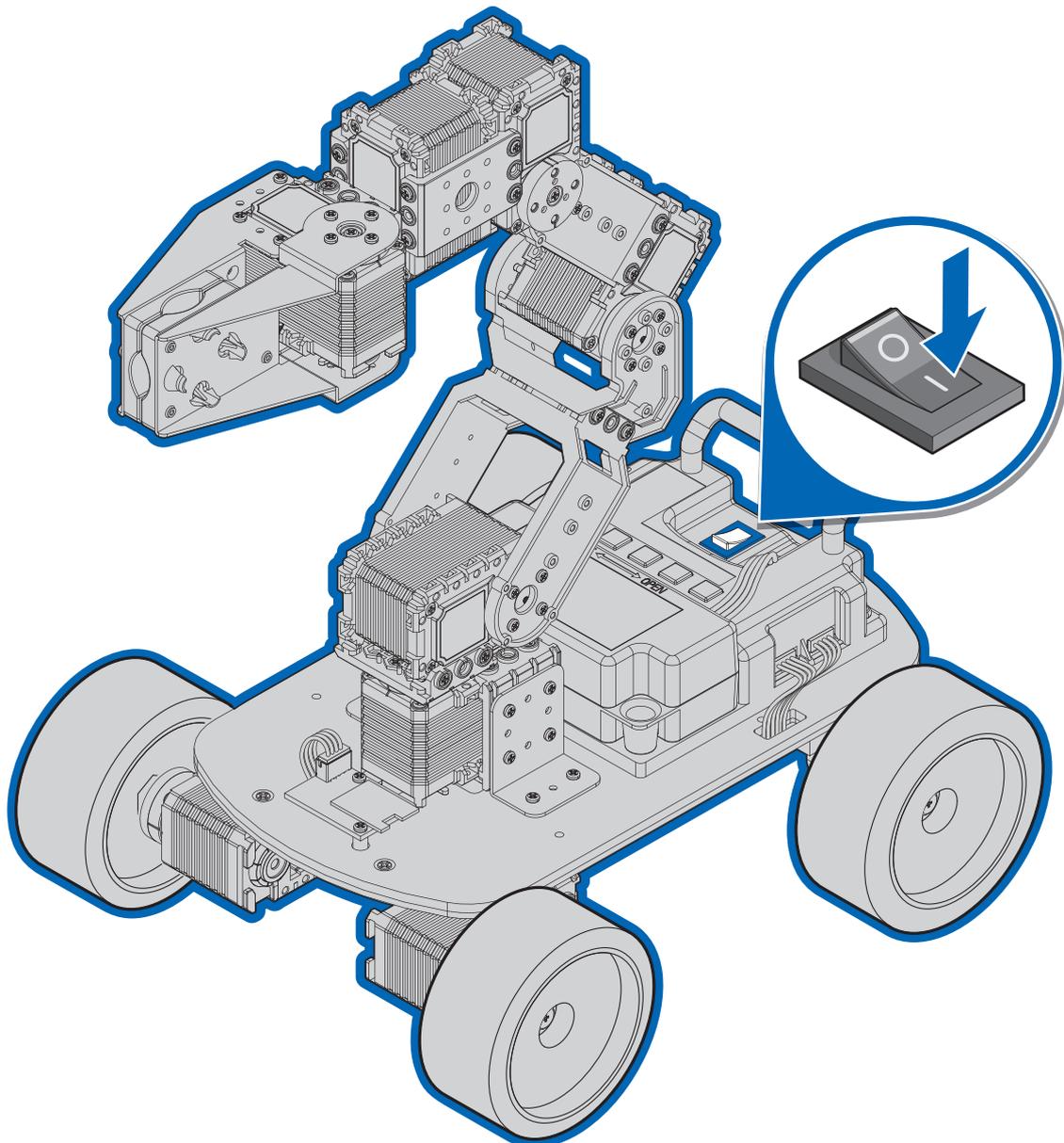
**NOTE:** The Robotics Arm 6DW model was used for the following procedure. Differences may be present with other models.

Once fully assembled and the battery is charged, the Robotics Arm is ready for a functional test. The test requires the powering up of the robot to allow the actuators to set to a default standing position. By initiating a power up and allowing the Robotics Arm to set to the default posture, the assembly process can be successfully validated.

1. Place the Robotics Arm on a clean flat surface before starting.
2. Press the power switch to turn on the Robotics Arm.

Once powered up, the LEDs light up and the Robotics Arm stands in the default stance.

3. Press the function buttons on the control panel to test the servo motors. The servo motors function when the Robotics Arm is assembled properly.





This page intentionally left blank.

**I can't get the remote control or wireless communication (Bluetooth) to work.**

1. Wireless communication may not function properly if there is insufficient power supply. Please check the power supply.
2. Please check that there aren't any wires cut or snapped on the Bluetooth. If there is a problem with the cable, please purchase a new one from XYZprinting Shop.
3. In case of Bluetooth, please check that the Bluetooth module is properly mounted on the main controller.
4. If all the steps above don't work, please test the communication for Bluetooth.

**I can't connect my robot to the PC.**

1. Open Device Manager on Windows.  
When the product is connected to the PC, please check whether the connected device's port is found.
2. If the port is not found and doesn't work, please install FTDI serial driver.  
If you have problems with other products, or can't solve the problem with the instructions above, please contact your regional manager.

**What is the operational voltage (recommended voltage) for the Robot?**

The operational voltage is 12V. Please keep the battery voltage over 11.3V.

**There is no torque in the motor / There is a red light on the motor and it is not working.**

1. The battery is low.  
The power will not turn on if the battery voltage is low.  
Please fully charge the Li-ion battery and try again.
2. The torque is turned off.  
If the motor keeps rotating to a direction it can't rotate to (stuck with frame, overload), the torque will automatically turn off to prevent the motor from greater damage.  
In this case, please turn off the power, check the motor's assembly, and try again.
3. There is a problem with the cable.  
If the cable is snapped and there is a contact failure, the motor may repetitively turn on and off. (In this case, there could be a red light on the motor.)  
Please check the cable status and try again.
4. The gear is damaged.  
The gear may be damaged if you run into symptoms like;
  - The motor works, but makes ticking noises and has low torque.
  - When rotating the motor manually with your hand, it feels like there is something being stuck at a certain point.

In this case, please contact your local distributor (or us) and apply for an RMA.

## The robot keeps on falling when performing a motion.

1. The battery is low  
If the battery voltage is low, some motions that require more current may cause the robot to turn off or fall.  
Please fully charge the Li-ion battery and try again.
2. There is a problem with the assembly (ID position, hub position).  
When the App is on, the motors move to their initial position.  
If the assembly has not been done properly (ID or hub position is wrong), the robot's initial position will be out of shape, which could damage the motors.  
In this case, please turn the power off and check the assembly again.

## I built my robot, but its initial position doesn't seem to be correct.

1. Check the hub assembly  
There might be some hubs or frames assembled wrongly.  
Please check the assembly manual again and check if there weren't any misassembling.
2. Check the ID  
The ID may have been set differently from how it was instructed on the assembly manual. Please check the ID again, comparing it to the assembly manual, and check from the Manager whether the ID sticker and the actual motor's ID are the same.
3. Check the offset value  
If there is no problem with the hub's position or ID, please check the offset value.

## The LED on MCU board is on when I turn on the Robotics Arm:

- **All the servo motors are locked in place and behavior appears abnormal.**
  - **All servo motors do not offer resistance--I can move them.**
1. Check the LED to see if it is blinking repeatedly. This signifies a low battery status.
  2. Visually ensure that every cable is properly inserted into its respective connector.
  3. Check for any damage to the wiring--frayed cabling.
  4. Manually test each servo motor and its cable by connecting one end of the cable to the servo motor and the other end to the MCU board. Initiate an action to that servo motor. If the servo motor does not respond, try a different cable.  
If one limb doesn't work well means the one or some cables on the limb are broken.

**The LED on MCU board is on when the Robotics Arm is powered on, but some servo motors do not behave normally.**

1. Check the LED to see if it is blinking repeatedly. This signifies a low battery status.
2. Visually ensure that every cable is properly inserted into its respective connector.
3. Check for any damage to the wiring--frayed cabling.
4. Manually test each servo motor and its cable by connecting one end of the cable to the servo motor and the other end to the MCU board. Initiate an action to that servo motor. If the servo motor does not respond, try a different cable.
5. Check the LED on the servo motor. If the LED is blinking repeatedly, it signifies a low battery status.
6. Check the servo motor (Download the factory program from <http://www.xyzrobot.com>). Use the XYZrobot Servo Tool to test the servo. If the servo motor is damaged, replace the servo motor. See the XYZprinting Shop for further details.

**Remote control doesn't work well or LED is dimmed.**

1. Replace the batteries.  
Dimmed LEDs signify low battery status.

# Appendix

## Specifications



### Robotics Arm

Item	Specifications
Servo Motor (actuator)	<ul style="list-style-type: none"><li>• 3D: 3 x servo motors</li><li>• 6D: 6 x servo motors</li><li>• 6DW: 8 x servo motors</li></ul>
Dimension	<ul style="list-style-type: none"><li>• 3D:</li><li>• 6D:</li><li>• 6DW:</li></ul>
Weight (without battery)	<ul style="list-style-type: none"><li>• 3D:</li><li>• 6D:</li><li>• 6DW:</li></ul>
Remote Control Weight (without battery)	140 g (0.31 lbs.)
Micro Control Unit	ATmega1280
Wireless Module	Bluetooth 4.0
Battery	12V
Charger	Input: 100 ~ 240V AC, 50/60Hz
Operation Time / Charging Time	40 mins / 2 hrs
Remote Control	Analog sticks x 2 Programmable Buttons x 6
Programmable Buttons on Board	Buttons x 4
Software	XYZrobot Editor/Arduino IDE
SD Card	microSD



# Appendix

## Specifications

### AI Servo Motor A1-16

Item	Specifications
Operating Voltage	8 ~ 12V
Staff Torque	25 Kg-cm max.
No Load Speed	70 +/- 10 rpm
Weight	60 +/- 2 g
Size	50 x 32 x 40 mm (1.97 x 1.26 x 1.57 in.)
Resolution	0.323°
Reduction Ratio	254
Operating Angle	0° ~ 330°
Max. Current	3500mA
Standby Current	30mA max.
Operating Temperature	0°C to 40°C (32°F to 104°F)
Protocol	TTL Level UART (8-N-1)
Feedback	Position, Temperature, Current, Supply Voltage

# Warranty



Please register your Robotics Arm within 15 days from the date of purchase on <http://www.xyzrobot.com> and ensure the information is correct. If the product information is incorrect, XYZPrinting reserves the right to change or cancel service. Please read and understand the warranty policy clearly before you register for your product.

1. XYZprinting will provide warranty services for the product to repair any malfunction resulting from reasonable use as defined by XYZprinting for one year from the date of purchase. Separate warranty coverage is applicable for the following items:
  - PCBA module (includes MCU board, Bluetooth module): Limited warranty service provided within 90 days of purchase.
  - Rechargeable battery: Limited warranty service provided within 90 days of purchase.
  - Frame module: Limited warranty service provided within 90 days of purchase.
  - Motor module: Limited warranty services provided within 90 days of purchase.
  - Peripherals and materials (includes box, packaging, power cable, USB cable, cabling, motor hub, motor gears and Casing parts): No warranty service provided.
  - Others (adapter): Limited warranty services provided within one year of purchase.
2. At the time of purchase, request the retailer to fill out the product information, including the date of purchase, and affix the retailer's seal.
3. This warranty card will not be replaced if lost. Keep this card in a safe place so that you may present it with your service request.
4. Customers are responsible for packaging and the shipping and handling fees associated with delivering the product to the designated maintenance center. After repairing the product or replacing any parts, XYZprinting will return the product to the same originating address. Customer shall bear all shipping costs for out of warranty products.
5. The warranty does not cover the following circumstances. If you require maintenance, XYZprinting provides service maintenance at an additional cost.
  - Incidental damages: Damage caused by improper installation and/or third party software and resulting from scratching, dropping, short circuiting, deformation resulting from crushing, interface and pin damage, and any man made damage.
  - Compatibility issues: Malfunction resulting from conflicting appliances, user expectation, or frequency, speed, feel, and temperature during use.
  - Damage caused by force majeure (such as lightning strike, fire, earthquake, flood, war, or other uncontrollable events).
  - Service requests made after the warranty has expired.
6. When providing maintenance services under warranty, XYZprinting has the right to service or replace the defective part. After servicing or replacing, the serviced or replaced part retains the original warranty period; the warranty period is not extended or renewed.
7. XYZprinting is not liable for indemnification of any indirect or consequential damages (including damage due to loss of data) experienced during the use of this product or damage caused from improper use, modification, or accidents.
8. XYZprinting shall not be liable for any amount greater than the total value of the purchased price and the required costs associated with providing warranty services.



## Warranty

### **If a Manufacturer defect arises:**

Within the Warranty Period you may contact XYZprinting Inc. Customer Support to arrange for the replacement of this Product. XYZprinting Inc. reserves the right to test the returned Product in order to verify that it is indeed a Manufacturer's defect before exchanging the Product. In the event that a replacement for this Product is not available this Product will be replaced by XYZprinting Inc. with a Product of equivalent or greater retail value.

Notwithstanding the foregoing terms of this Warranty, XYZprinting Inc. reserves the right at all times, at its sole option and discretion, to refund to you the purchase price paid by you for this Product in full and final settlement of XYZprinting Inc.'s obligations under this Warranty.

If this Product is replaced, the replacement Product becomes your property and the replaced Product becomes XYZprinting Inc.'s property. If XYZprinting Inc. refunds the purchase price of this Product, this Product must be returned to XYZprinting Inc. and becomes XYZprinting Inc.'s property.

The XYZprinting Inc. Limited Manufacturer's Warranty covers the normal and intended use of this product. This Warranty does not apply:

1. to any damage resulting from abuse, accident, unreasonable use, improper handling and care or other external causes not arising out of defects in materials or workmanship;
2. to any hardware, software or other add-on components installed by the end-user;
3. to damage arising from any service performed by an individual who is not an authorized representative of XYZprinting Inc.;
4. if this Product has been disassembled or modified in any way;
5. to cosmetic damage, including but not limited to scratches, dents or broken plastic, or normal wear and tear.

XYZprinting Inc.'s responsibility for Product defects is limited to the replacement of this Product or the refund of the purchase price for this Product. All express and implied warranties, including but not limited to any implied warranties and conditions of merchantability and fitness for a particular purpose, are limited in time to the term of this limited Warranty. No warranties, whether express or implied, will apply after the expiration of the limited Warranty period.

If any term of this Warranty is held to be illegal or unenforceable, the legality or enforceability of the remaining terms shall not be affected or impaired. Except as provided in this Warranty and to the extent permitted by law, XYZprinting Inc. is not responsible for direct, special, incidental or consequential damages howsoever caused resulting from breach of Warranty or condition or under any other legal theory, including but not limited to loss of use. The foregoing limitation shall not apply to death or personal injury claims, or any statutory liability for intentional and gross negligent acts and/or omissions.

XYZprinting Inc. (and distributors) disclaims all liability, including liability for infringement of any proprietary rights, relating to use of information in any documents and files and software and no license, express or implied, by XYZprinting Inc. or otherwise, to any intellectual property rights is granted herein. XYZprinting Inc. (and distributors) assumes no responsibility or liability for any errors or inaccuracies that may appear in any documentation or files or any software that may be provided. The information in any documents or files is furnished for informational use only, is subject to change without notice, and should not be construed as a commitment by XYZprinting Inc. (and distributors).

# Warranty



## **[7 Day Return Policy]**

If you find the purchased item does not suit your needs, you may return it for a refund. (a 20% restocking fee may apply and the shipping charge to the Customer)

Shipping and handling charges, taxes paid, and any importation fees are not refundable. You are responsible for and must prepay all shipping charges and you shall assume all risk of loss or damage to the product while in transit to XYZprinting Inc. If you return product to XYZprinting Inc. without proper packaging.

XYZprinting Inc. retains the right to either refuse delivery or charge you a restocking fee.

## **[Disclaimer]**

Warranty or refund does not apply in the event of normal wear & tear, any abuse, improper modifications or accidents.(Worn out gears, cables or burnt motors are not covered under warranty).

## **[Maintenance Fee]**

If the faulty item is regarded as out of coverage or warranty period has expired, a reasonable fee may apply. All expenses will be noticed before any shipping will be done and must be paid by customer before returning goods to customer. (Round shipping charge paid by Customer)

