

Innovative DIY Robot kit with Motion File Shared on the Internet



ROBOBUILDER

The Robot Builder's DIY Kit

USER'S GUIDE



RoboBuilder Co., Ltd.

[Age 14 and up]

Build & Program your Robotic Creation!
Upload & Download your Robotic File !



The Robot Builder's DIY Kit

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Safety Instructions

Be cautious when assembling and using ROBOBUILDER kit for safety reasons. This is especially important as ROBOBUILDER is a DIY assembly kit which users will frequently build and disassemble, some of these components cause harm to the user. The user should assume all responsibility for any accident caused by their careless handling of the product. Attention must be paid to the following safety instructions. Please read through this user's guide and make sure you fully understand all the instructions before assembling and operating this product.



If this instruction is not properly followed, a serious injury, harm, or death may occur to the user



If this instruction is not properly followed, an injury to user or physical damage may arise.

Handling Electric Power



- Do not use any damaged power cord, plug, or loose outlet. It may cause an electric shock or fire.
- Make sure that the power plug is inserted firmly into the outlet so that the power cord can't get loose. A loose connection may cause a fire.
- Do not forcibly bend or pull the power cord or place it under a heavy object. It may cause an electric shock or fire.
- Do not handle the power cord with wet hands. It may cause an electric shock.
- Do not connect multiple electric devices to one outlet. It may cause an abnormal heat or fire.



- This product is not waterproof. Never operate the product in a wet place.
- Do not keep or operate the product in direct sunlight.

Handling RoboBuilder Kit



Warning

- Do not assemble the product when you are tired or in a bad physical condition, particularly whilst intoxicated.
- Do not place your face too close to the robot.
- Do not use dangerous tools such as a knife or a drill but only recommended tool.
- Keep the remote control that contains batteries away from children's reach. Should your child swallow a battery, consult with a doctor immediately.
- Do not keep or operate the robot in a place of high temperature or humidity.
- Keep small parts such as bolts, nuts, and joints away from children's reach. Should your child swallow any product part, consult with a doctor immediately.



Caution

- This product is available only for users aged 14 and up.
- Use the product only in an indoor environment.
- Do not arbitrarily disassemble, repair, and modify the product parts.
- Do not connect or disconnect cables while the robot product is in operation. It may cause a damage or failure to the product.
- Make sure that only designated devices be connected to connectors or connection ports of the product. It may cause a damage or failure to the product.
- When cleaning the product, do not use water or solvent such as benzene, and alcohol but use a soft and dry cloth only. It may cause a failure to the product.
- Keep the robot or parts away from children's reach.
- Do not leave the product with power on. Battery damage may cause a product failure.
- Accumulated gear backlash may cause abnormal robot actions if the product is operated for a long time or executes repeatedly excessive motions, which can transmit mechanical overload stress to wCK actuator modules.
- Do not give excessive force while a torque is applied to the wCK actuators of the robot. A gear damage may cause a product failure.
- In some cases wCK actuator module can vibrate a little under operation. This is not a product failure but a phenomenon that is caused by improper settings of gains and torque values of the wCK modules. When you set proper values for them, this phenomenon disappears.
- When wCK actuator modules get twisted by running wrong motions while programming, turn the power off quickly to prevent excessive torque from being transmitted to the robot.
- If your finger is caught between actuator modules, turn the power off quickly and remove force applied to robot to prevent any physical injury.
- Do not operate and let the robot touch any human life or animal. It may cause injury to the life or product failure.

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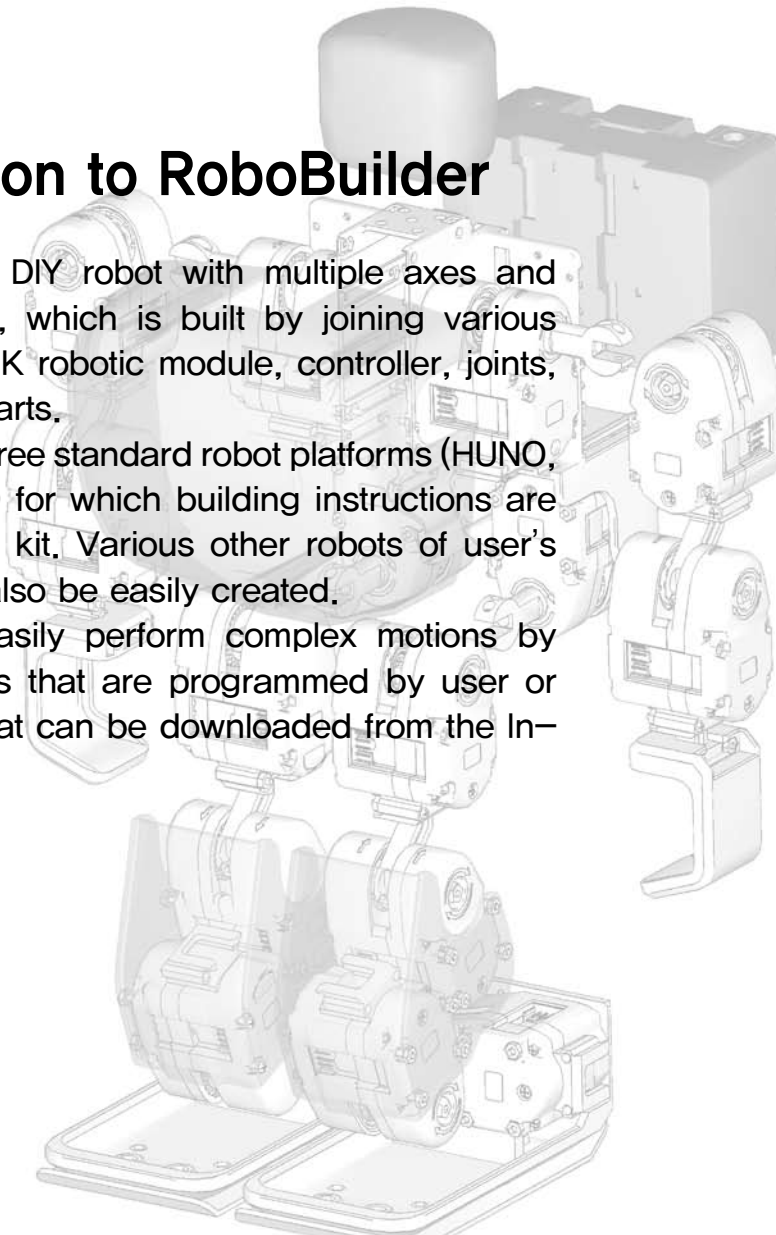
Chapter 1.

Introduction to RoboBuilder

RoboBuilder is a DIY robot with multiple axes and multiple functions, which is built by joining various parts such as wCK robotic module, controller, joints, and other body parts.

Users can build three standard robot platforms (HUNO, DINO, and DOGY) for which building instructions are provided with the kit. Various other robots of user's own design can also be easily created.

The robot can easily perform complex motions by running robot files that are programmed by user or from robot files that can be downloaded from the Internet.



Product Features

● Short Building Time

Approximately 1 hour building is required to create a robot that is ready to run with advanced functions and 16 degrees of freedom.

● Robot File Sharing

The robot files that define a robot's motions and actions can be shared over Internet. (Realized for the first time in the world through precise motion control technology)

● Quick & Simple Joint Assembly

Various types of joints enable the user to quickly build new articulated robotic creatures.

● Precise Motion Control

Smooth and Natural motions realized through precise motion control both in wheel mode (360°) and position control mode(0 to 332°).

● Distributed Controls

Quick and Easy troubleshooting and upgrading are ensured as the main control(control box) and remote control(wCK joint actuators)are separated.

● Built-in Connector

You can easily connect signal line and power line by using two built-in connectors installed on the wCK module.

● Attractive Design

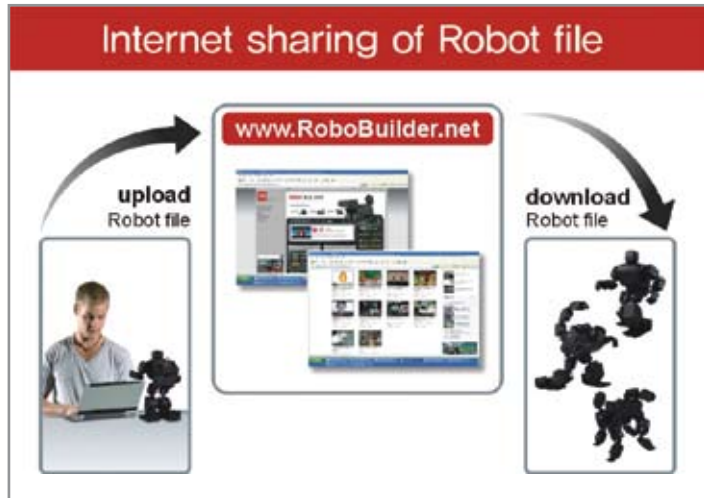
RoboBuilder has an attractive design with curved body lines.
The user can customize their unique robots with various optional accessories.

● Creative Robot Building

You can make any desired robot with your own ideas and designs as well as three standard robot platforms.

Robot File Sharing on Internet

RoboBuilder has adopted the technology of sharing robot files on internet for the first time in the world. A robot file uploaded on internet by a user can be downloaded and run by another user. This new technology enables multiple robots with the same hardware structure to share motions through the Internet.



To upload and download robot files, access the RoboBuilder homepage (<http://www.RoboBuilder.net>) and go to COMMUNITY page.



- Motion files created by a user with MotionBuilder can be shared online as well as offline. However, any motion files that are modified after being downloaded must be uploaded back to the RoboBuilder homepage if the user wishes to share these with other users.
- All downloaded motion files from the homepage may not work perfectly when executed in a different user's robot.
- In order to modify downloaded motion files, the user should first add the file to a project in MotionBuilder.

KIT Part List

The Parts included in a RoboBuilder kit are as follows:

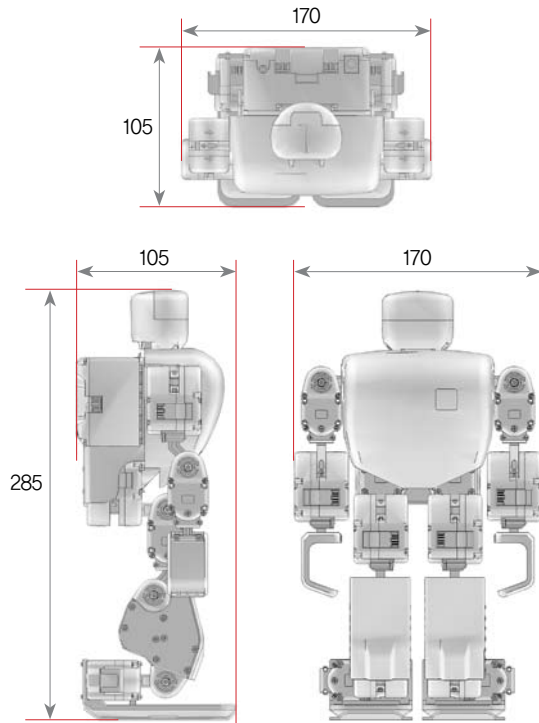
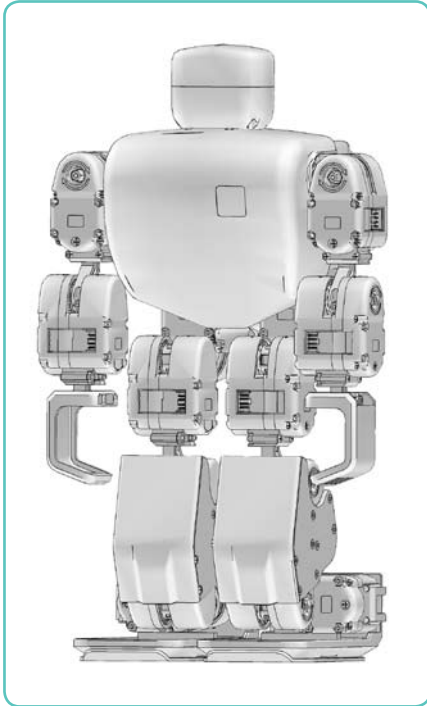


※ The parts within this product are subject to change without notice, this may occur if the design of the product changes or is improved.

Standard Robot Platforms

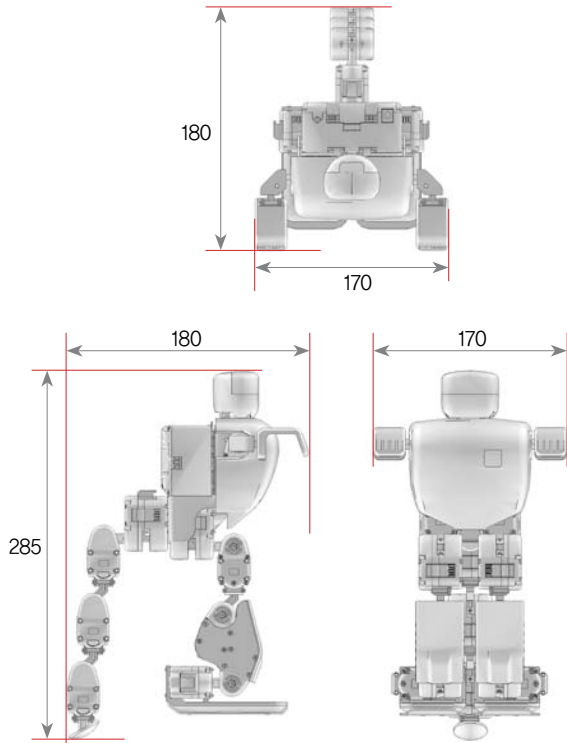
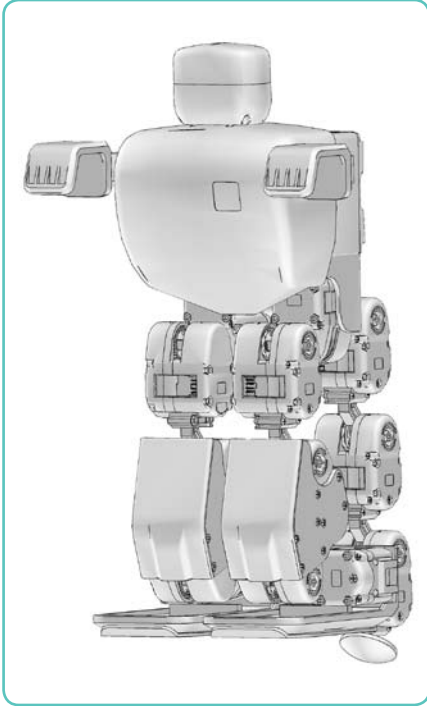
The specifications of three standard robot platforms(HUNO, DINO, and DOGY) are as follows:

HUNO



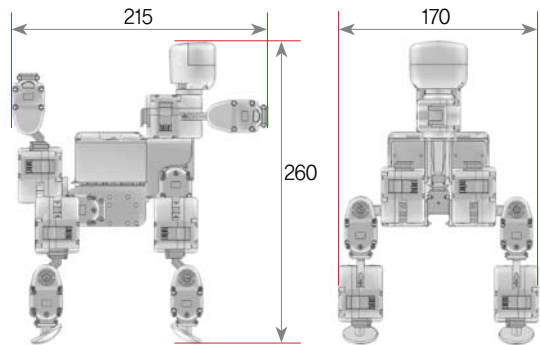
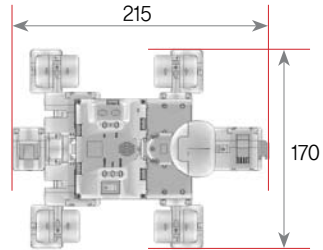
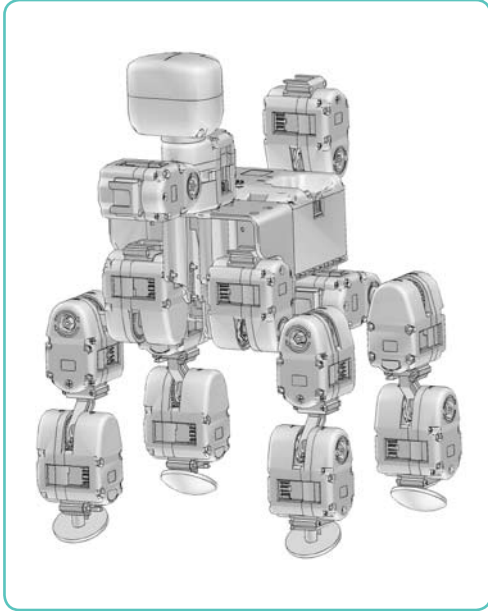
Item	Specifications
Size (mm)	Approx. 285 (H) x 170 (W) x 105 (D)
Weight (kg)	1.25
Degree of freedom	16
Power	Battery: 8.4V Ni-MH Power adapter: 12V
Controller	Atmega 128
External case	Engineering plastic
Battery operating time	Approx. 10 – 30 minutes
Introduction	HUNO is a humanoid walking robot designed to resemble a human being. This robot is one of the best robots that can be built with RoboBuilder kit. A simple remote control can be used to initiate basic motions such as walking, running, kicking, and a hand stand. The user can also enjoy more complex motions such as dancing, performing Taekwon-do, responding to sounds, and detecting objects by programming new robot files.

DINO



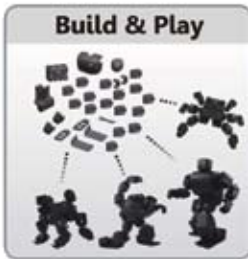
Item	Specifications
Size (mm)	Approx. 285 (H) x 170 (W) x 180 (D)
Weight (kg)	1.25
Degree of freedom	16
Power	Battery: 8.4V Ni-MH Power adapter: 12V
Controller	Atmega 128
External case	Engineering plastic
Battery operating time	Approx. 10 – 30 minutes
Introduction	DINO is a three-legged robot designed to resemble a dinosaur. This robot can perform fun motions using its tail. It can move faster than the HUNO and can use its tail to demonstrate various motions. The user can enjoy entertaining motions such as dancing, tail show, tail attacks, responding to sounds, and detecting objects by programming new robot files.

DOGY



Item	Specifications
Size (mm)	Approx. 260 (H) x 170 (W) x 215 (D)
Weight (kg)	0.9
Degree of freedom	16
Power	Battery: 8.4V Ni-MH Power adapter: 12V
Controller	Atmega 128
External case	Engineering plastic
Battery operating time	Approx. 10 – 30 minutes
Introduction	DOGY is a four-legged walking robot designed to resemble a dog. This robot can move the fastest amongst the three standard robots. The user can enjoy entertaining motions such as push-ups, handstands, standing on two legs, rolling, etc. The user can also program motions so that the robot responds to sounds and object detection.

Play Guide



KIT Models

Below are the RoboBuilder kit models available for order :

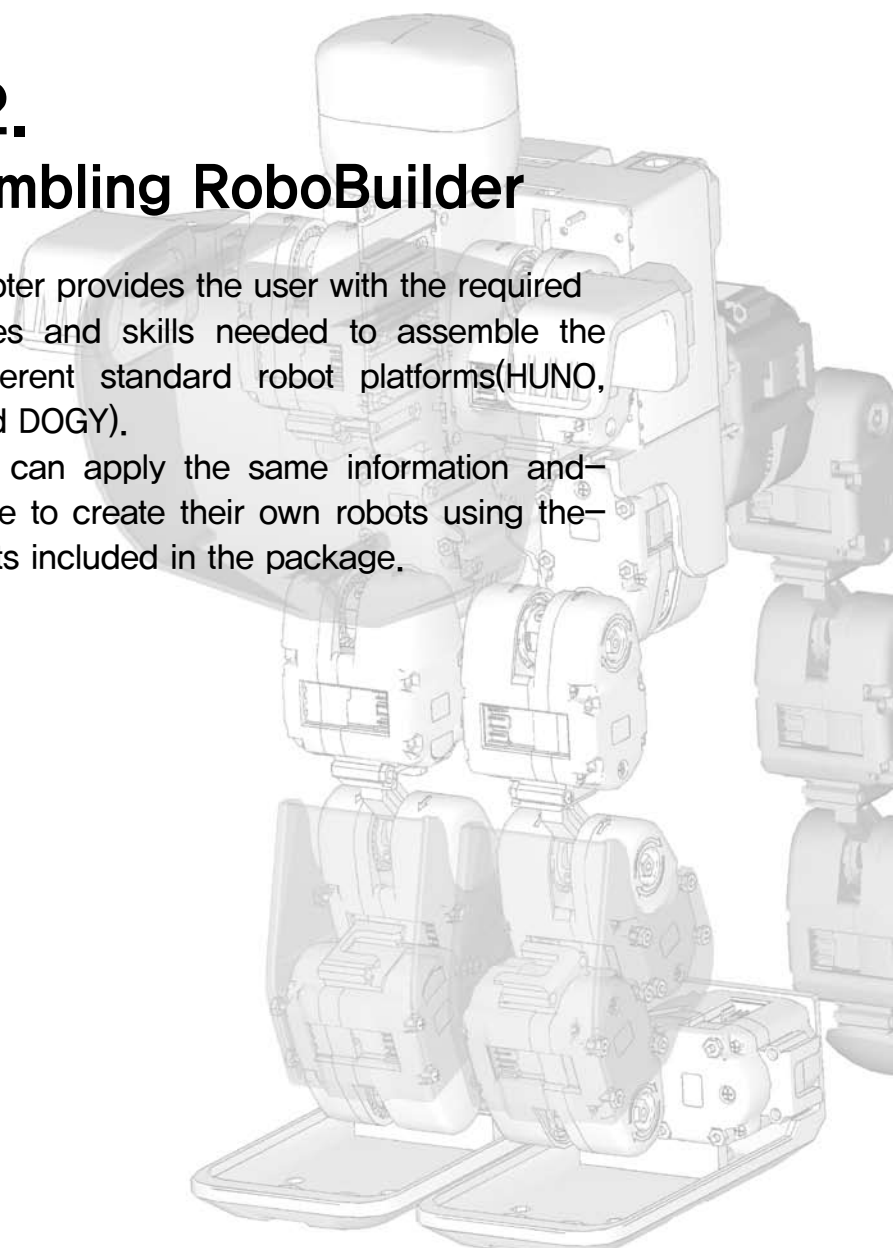
Model	wCK Module Color	Sound Recognition	Speaker	Degree of Freedom	Actuator Torque	Distance Sensor	LED on Actuator
CREATOR 5710K	Black	Y	N	16	8kg · cm—12 EA 11kg · cm—4 EA	N	N
CREATOR 5720T—S02	Transparent	Y	Y	16	8kg · cm—12 EA 11kg · cm—4 EA	Y	Y
EXPERT 5730K	Black	Y	Y			Y	N




Chapter 2.

Assembling RoboBuilder

This Chapter provides the user with the required procedures and skills needed to assemble the three different standard robot platforms(HUNO, DINO, and DOGY).

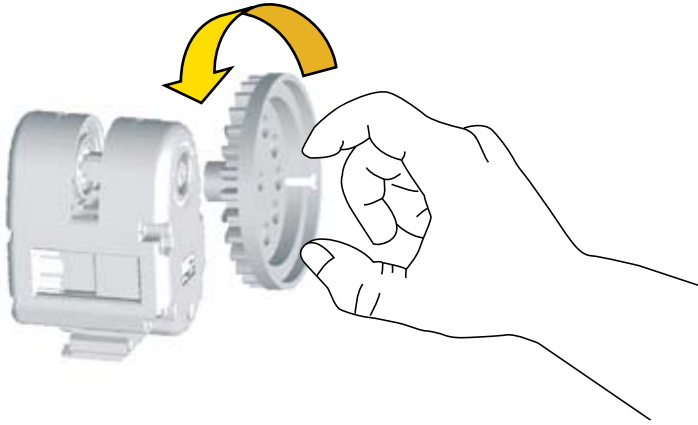
The user can apply the same information and-knowledge to create their own robots using the-same parts included in the package.



-  In the process of building a robot the user may encounter a situation where the rotating axis of a wCK module is stiff and won't move smoothly. This is not a product fault but a situation caused by the tight arrangement of the internal gears. Tight gear arrangement is designed for precise motion control. In this case, please refer to troubleshooting material available on the product CD and information from our homepage to help fix the problem.
-  1 hour of assembly time is the average time that is required for a user who has average building skill to build one of the three standard robot platforms. Thus the building time may vary depending on the level of the user and work environment.
-  Be careful not have a nut or a bolt slip inside the control box or wCK module, this may cause a product fault or a failure.

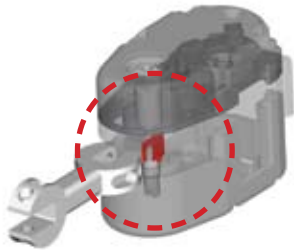
Adjusting the rotating axis of wCK module

When assembling wCK modules, there are cases where it is required to adjust the rotating axis of the wCK module. In this case, rotate the axis using the joint part as shown in figure below:

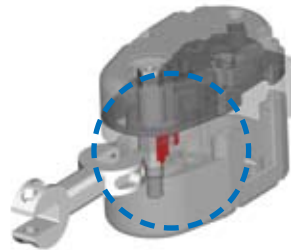


Putting wCK module and joint together

When putting a wCK module and a joint together, be careful to set the direction of the rotating axis of the wCK module as shown in below:



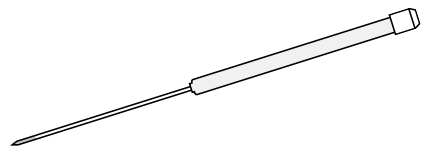
Wrong assembly (X)



Correct assembly (O)

Recommended tool

EDISON EDM 100 [precision screwdriver (+ type)]
Blade thickness 3mm, Blade length 100mm



How to read the building instructions

Each step of the building instructions contains the assembly sequence, parts to be used, cautions, etc. The following is an example STEP from the building instructions.

STEP 01 ①

Left ①②③④ : B40, ⑤ : B8 ③
ⓐ : J2

Connect both wCK cables first before attaching it to body frame.

Caution The adjustment of connecting angle is critically important.

① displays the STEP number.
 ② displays the position of assembly.
 (Left or right from the robot's view point)
 ③ displays the information on bolts and joints required for the step.(B40: 40mm Bolt, J2: Joint 2)
 ④ displays the ID number of the wCK module.

⑤ displays the caution area in which user should pay more attention.
 ⑥ The joint part information.
 ⑦ displays the position of the inserted nut.
 ⑧ displays the assembly sequence.
 ⑨ illustrate the caution area (⑤) to help clear understanding.

- 1) Prepare the parts required for the corresponding assembly step.
(Body Frame, wCK ID 10, J2, B8, B40, Nut)
- 2) Connect both cables to wCK(ID10) first before attaching it to body frame.
- 3) Attach ID 10 to the body frame using B40(4 EA) and nuts(4 EA). (①②③④)
- 4) Attach J2(ⓐ) to wCK(ID 10) using B8(1 EA). Follow caution to correctly set the axis angle. (⑤)
- 5) Arrange cables as shown in the picture.

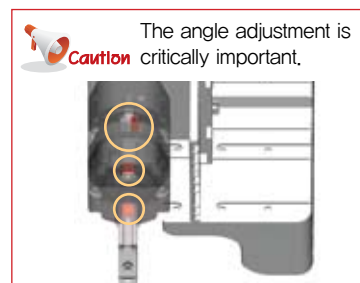
Caution area requires special attention

When putting some wCK modules and joints together, adjusting the alignment angle is important.

In this case, adjust the axis angle of the wCK module correctly by following the illustration shown in the CAUTION picture.

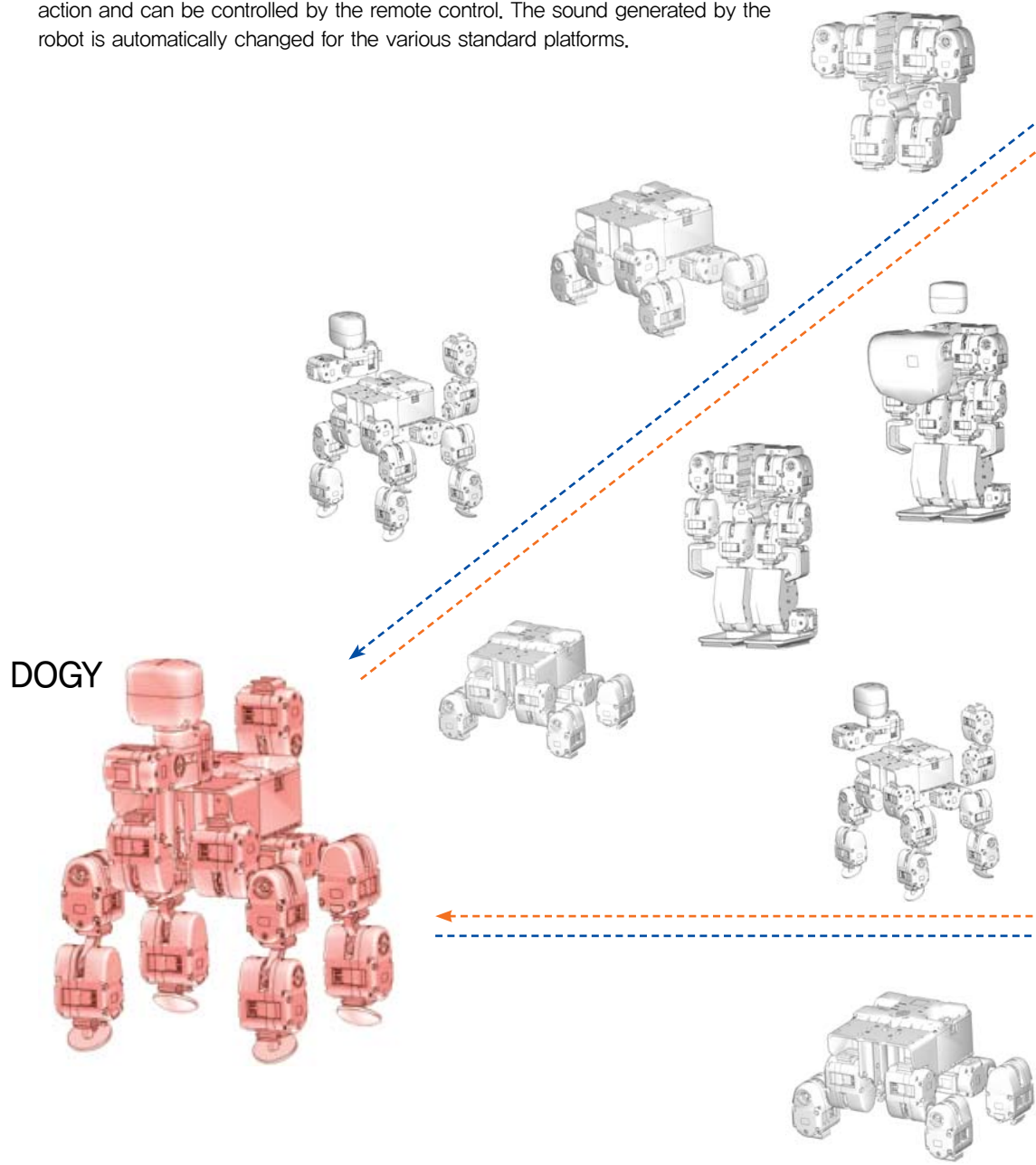
A red highlight is added to help highlight this.

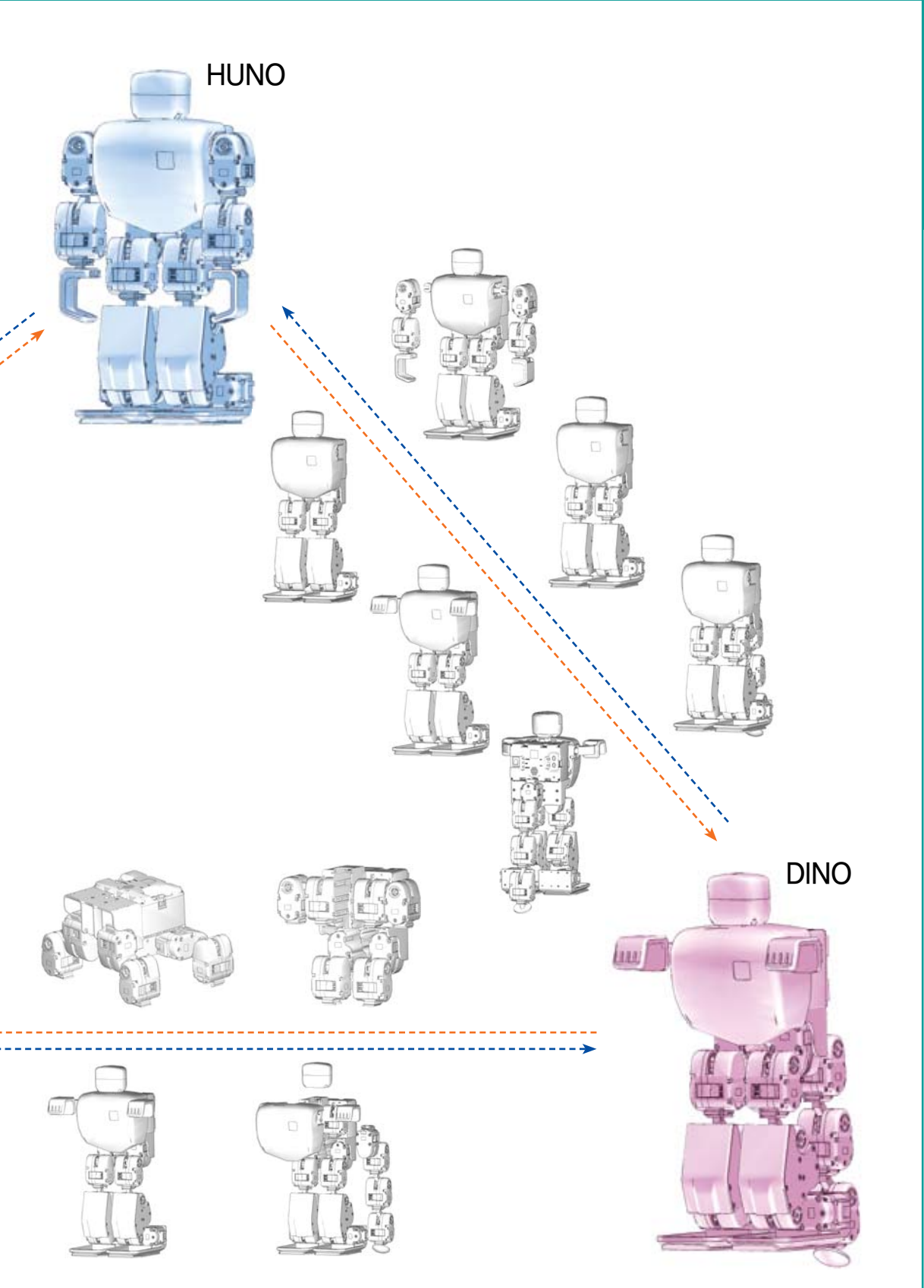
Caution If not assembled as shown in the picture, it may cause abnormal operation or a failure.



Transformation of RoboBuilder

The RoboBuilder kit has been designed for users to easily transform a robot to another standard platform robot. For example, by reassembling some parts of a HUNO the user can transform it into a DOGY in approximately 30 minutes. When the robot transformed from the HUNO to DOGY, the PF LED on the control box must be set to change the platform type – then the DOGY is ready for action and can be controlled by the remote control. The sound generated by the robot is automatically changed for the various standard platforms.







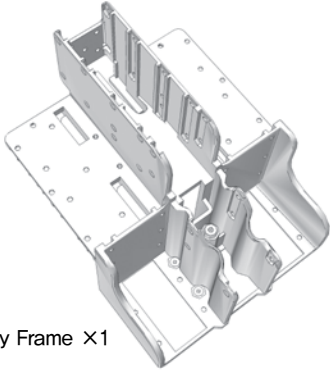
HUNO

HUNO's name comes from Humanoid as it resembles the appearance of a human being. The assembly of HUNO consists of total 20 steps. The required parts for each step and the related assembly instructions are provided here.

Completed HUNO



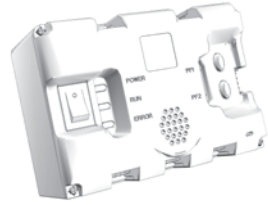
HUNO Part List



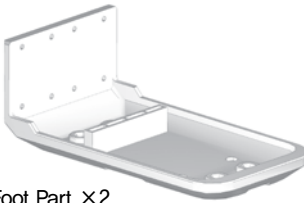
Body Frame X1



Chest Cover X1



Control Box X1



Foot Part X2



Shoe Plate X2



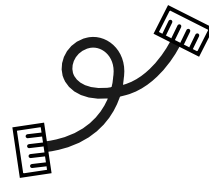
Leg Cover X2

Head Part X1
(Sensor Module)

wCK module X16



Hand Part X2



wCK module Cable X16



Nut X56



B5 X8



B6 X7



B8 X9



B12 X10



B16 X16



B40 X40



B Gold X3



J2 X6



J4 X2



J6 X4

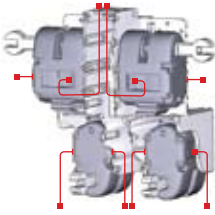
※ The components within this product are subject to change without notice, this may occur if the design of the product changes or is improved.

Assembly Sequence

All building instructions for HUNO are exactly the same as the ones for DINO except for the arms and the tail.

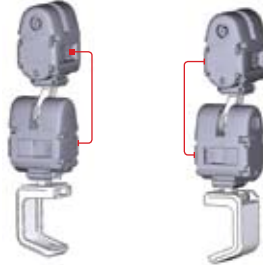
01

STEP 01, 02, 03, 04



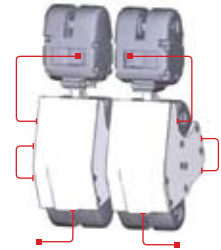
02

STEP 05, 06



03

STEP 07, 08



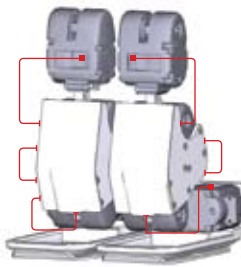
04

STEP 09, 10



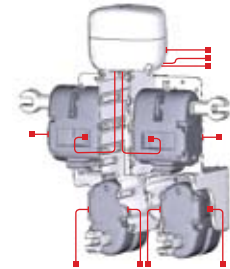
05

STEP 11, 12



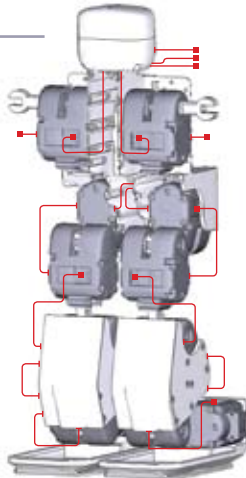
06

STEP 13



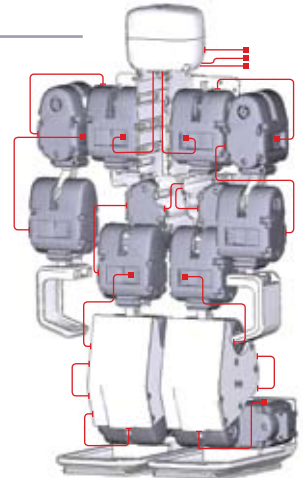
07

STEP 14



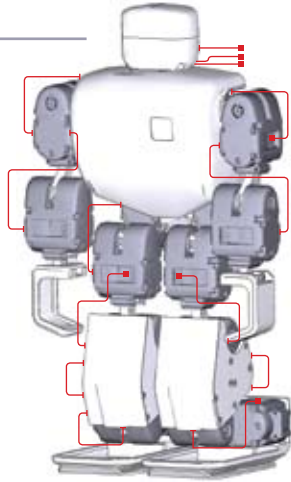
08

STEP 15, 16



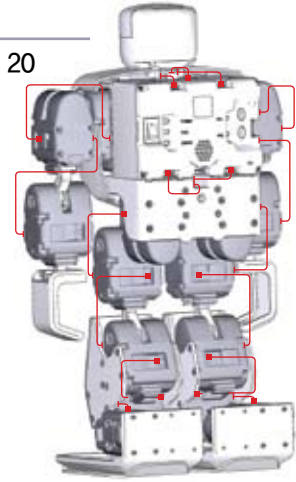
09

STEP 17



10

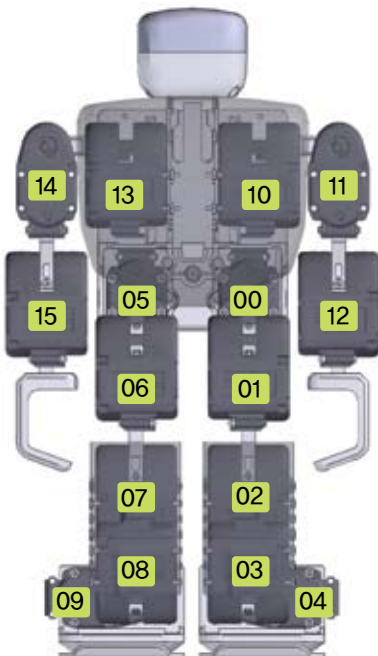
STEP 18, 19, 20



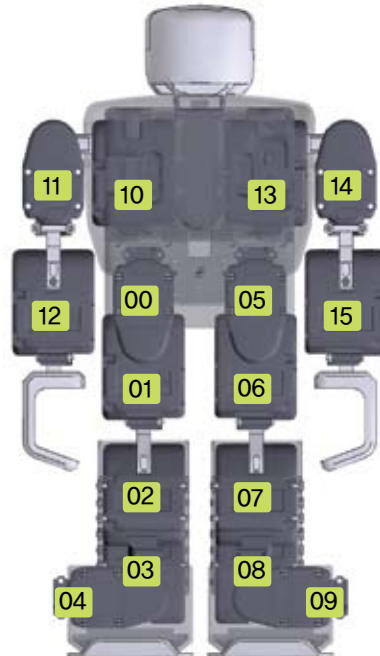
ID MAP

The ID map of the wCK robot modules for HUNO are as follows:

Front View



Rear View



STEP 01

Left ①②③④ : B40, ⑤ : B8
 Ⓐ : J2 40mm Bolt 8mm Bolt

Connect both wCK cables first before attaching it to body frame.

Caution The adjustment of the connecting angle is critically important.

STEP 02

①②③④ : B40, ⑤ : B8 **Right**
 Ⓐ : J2

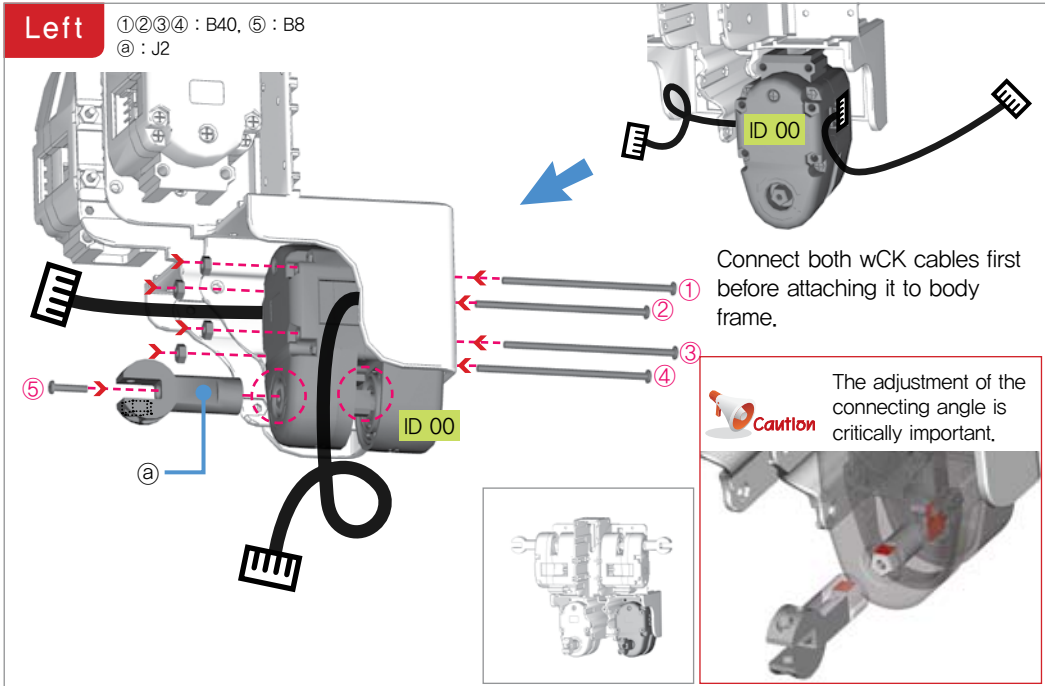
Connect both wCK cables first before attaching it to body frame.

Caution The adjustment of the connecting angle is critically important.

STEP 03

Left

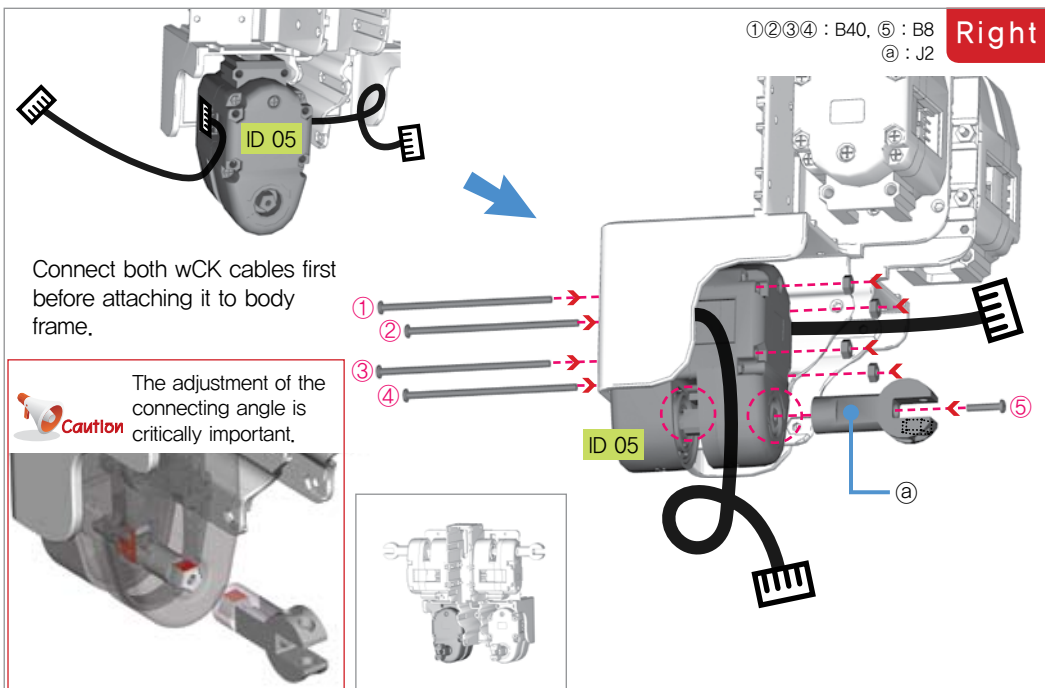
①②③④ : B40, ⑤ : B8
 Ⓐ : J2



STEP 04

Right

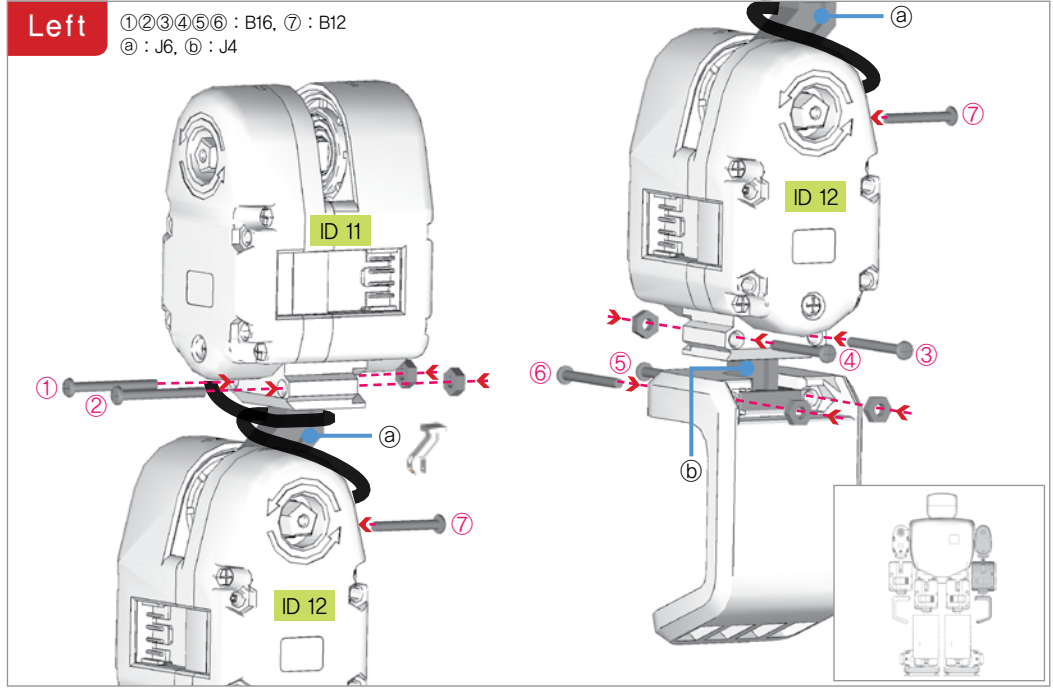
①②③④ : B40, ⑤ : B8
 Ⓐ : J2



ICZO

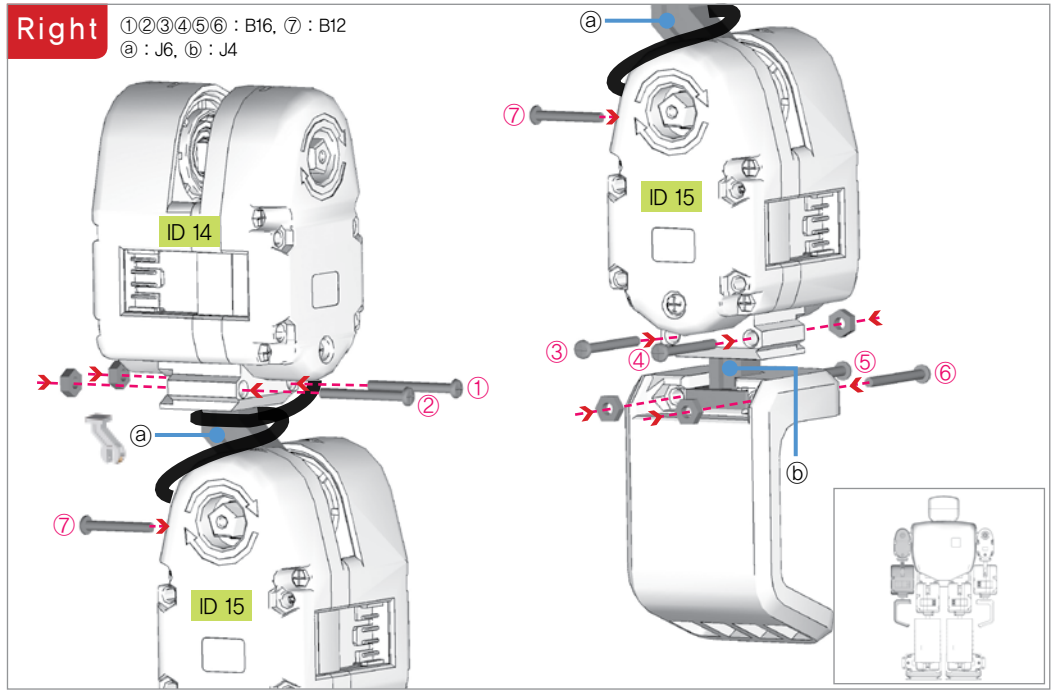
STEP 05

Left ①②③④⑤⑥ : B16, ⑦ : B12
ⓐ : J6, ⓑ : J4



STEP 06

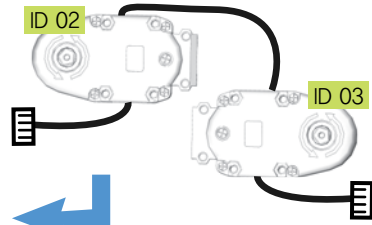
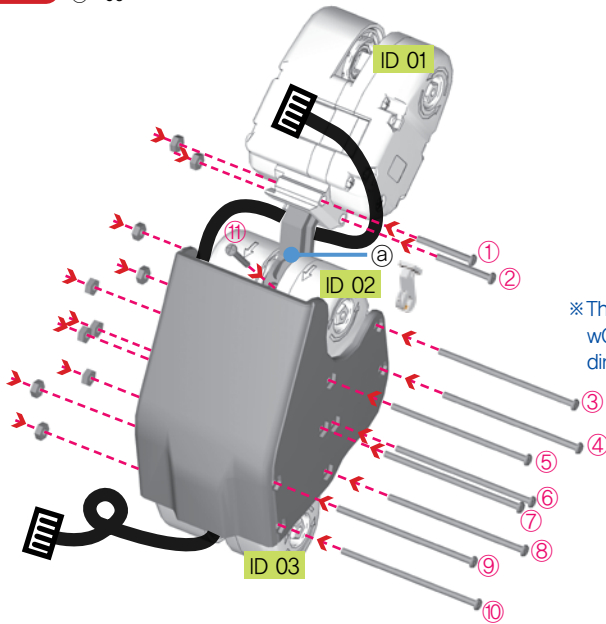
Right ①②③④⑤⑥ : B16, ⑦ : B12
ⓐ : J6, ⓑ : J4



STEP 07

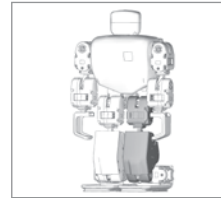
Left

①② : B16, ③④⑤⑥⑦⑧⑨⑩ : B40, ⑪ : B12
 Ⓐ : J6



Connect wCK cables as above before attaching leg cover.

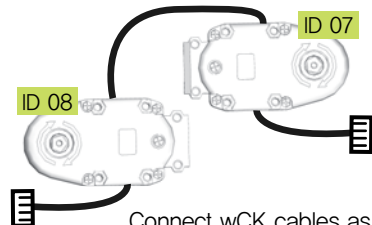
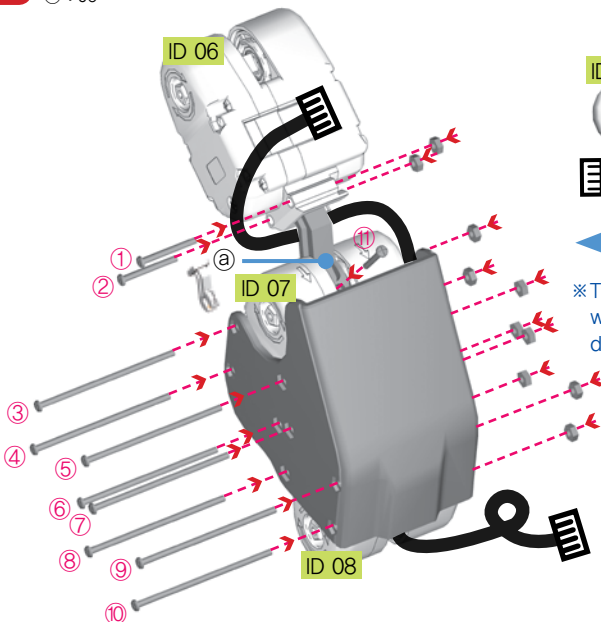
※ The pentagon-shaped rotation axes of wCK ID01,02,03 should all face to same direction(outwards)



STEP 08

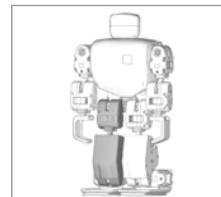
Right

①② : B16, ③④⑤⑥⑦⑧⑨⑩ : B40, ⑪ : B12
 Ⓐ : J6



Connect wCK cables as above before attaching leg cover.

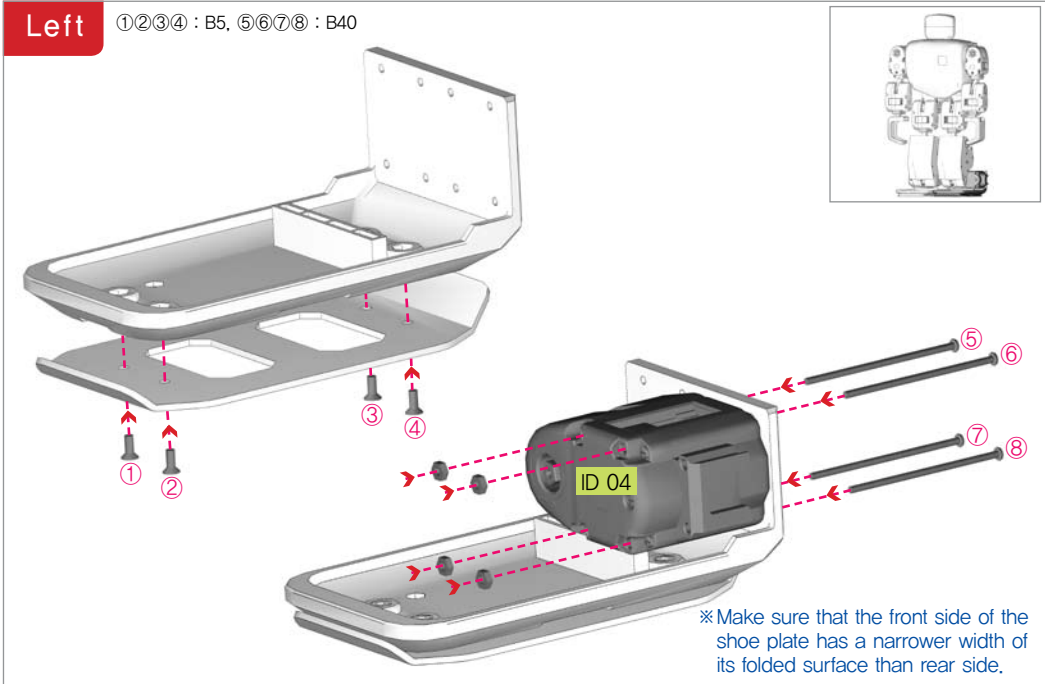
※ The pentagon-shaped rotation axes of wCK ID06,07,08 should all face to same direction(outwards)



STEP 09

Left

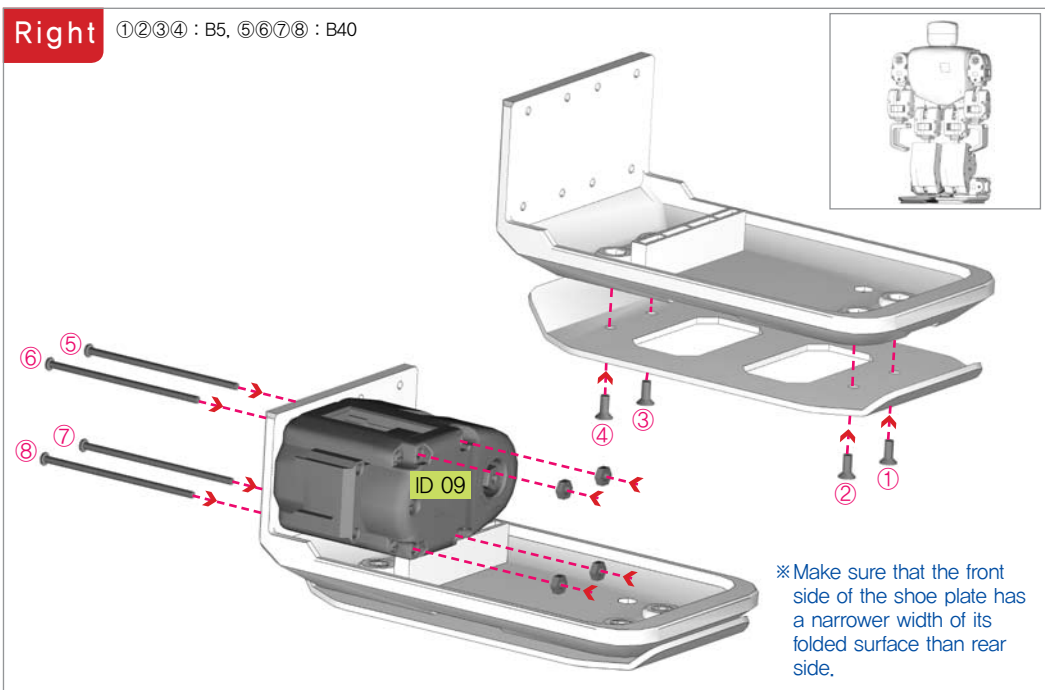
①②③④ : B5, ⑤⑥⑦⑧ : B40



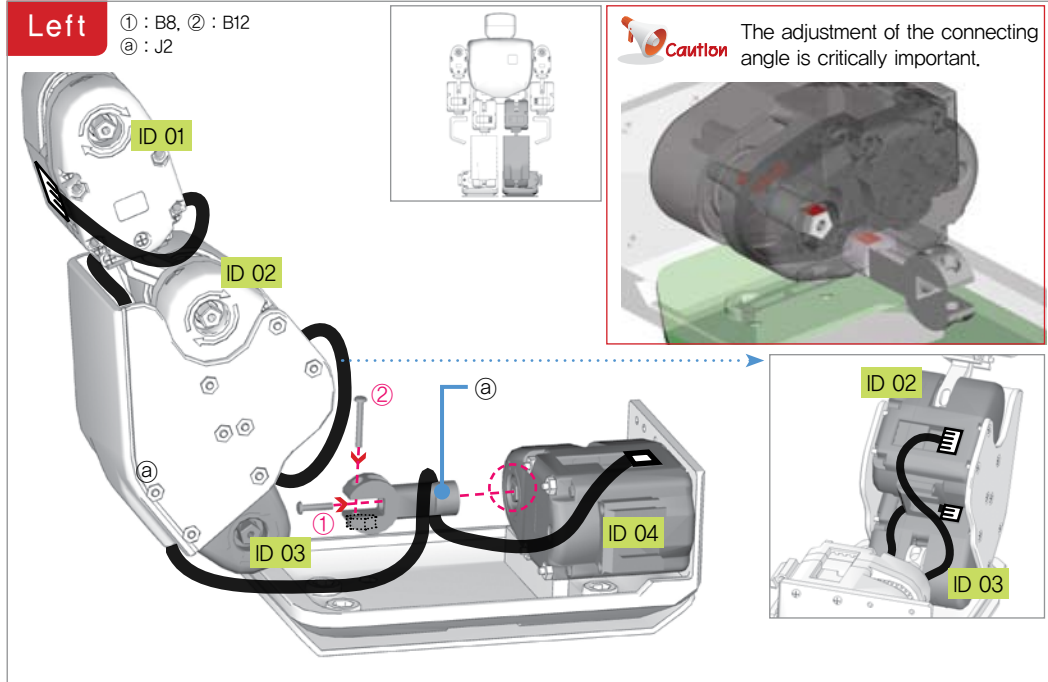
STEP 10

Right

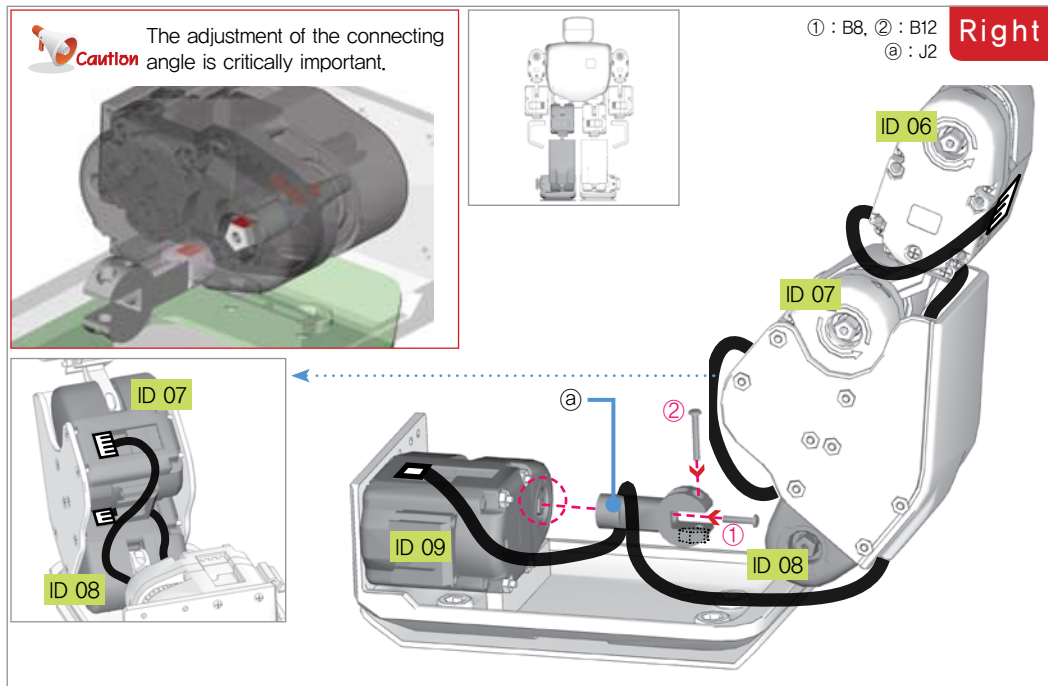
①②③④ : B5, ⑤⑥⑦⑧ : B40



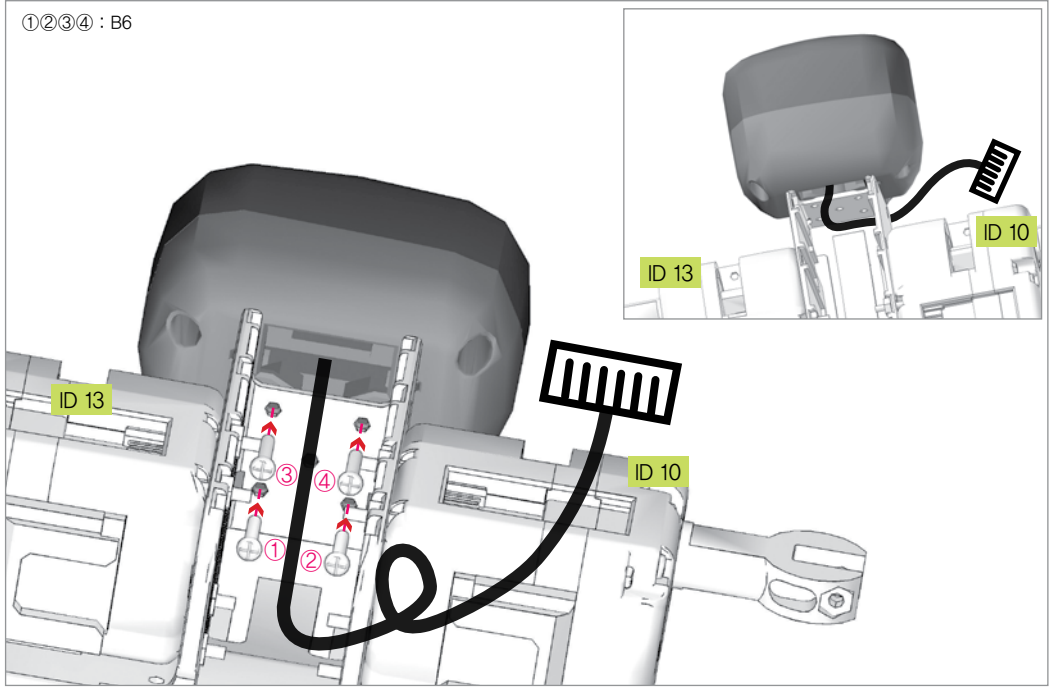
STEP 11



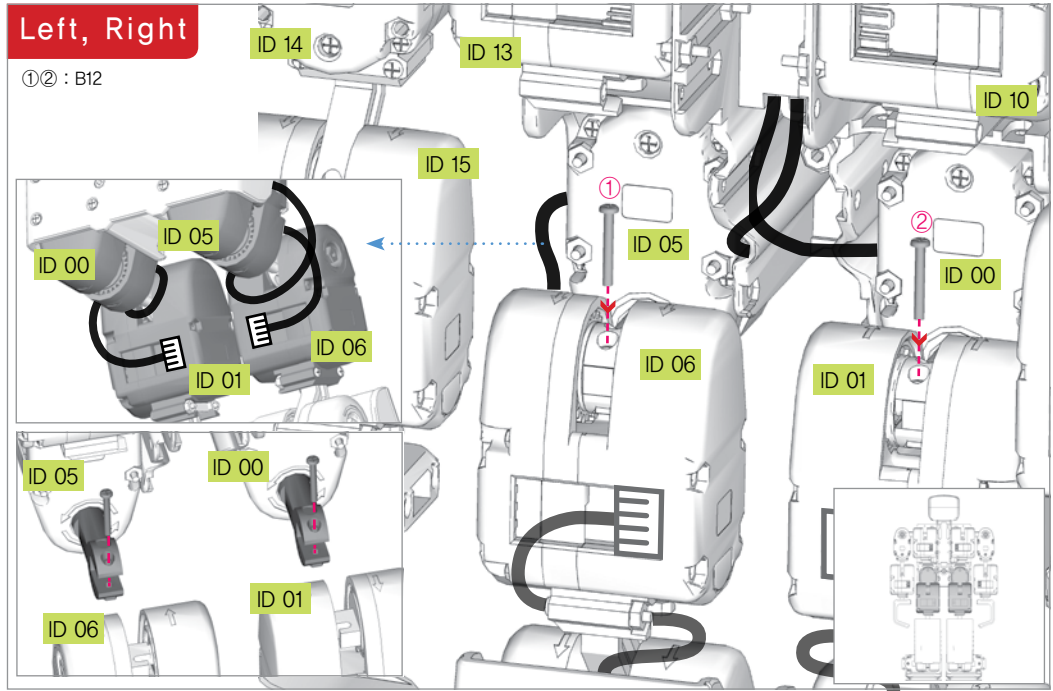
STEP 12



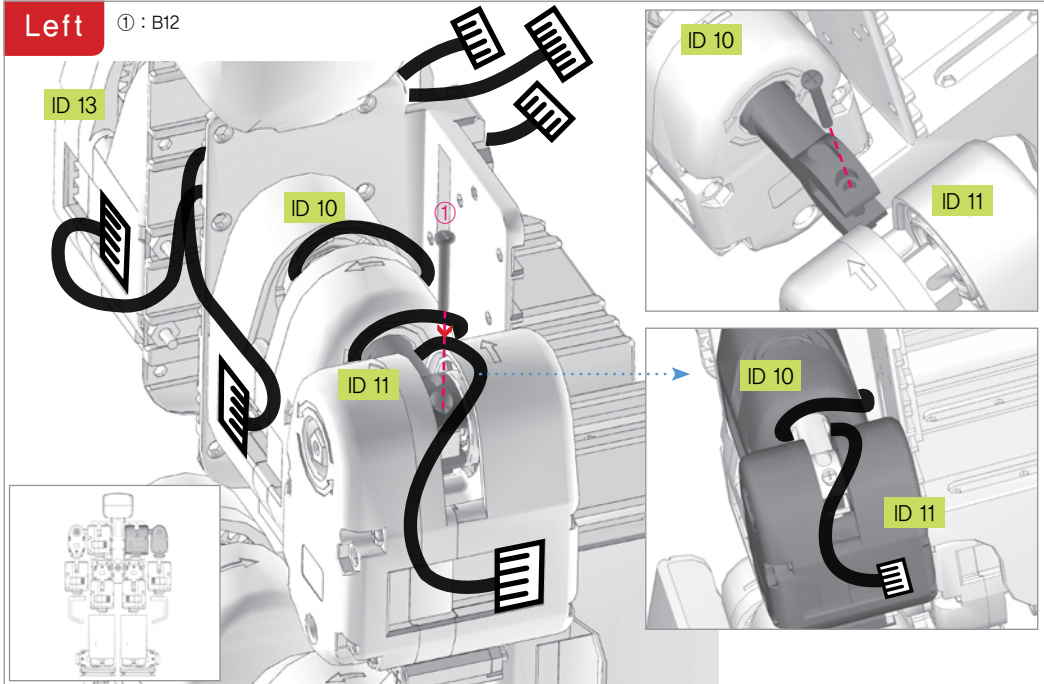
STEP 13



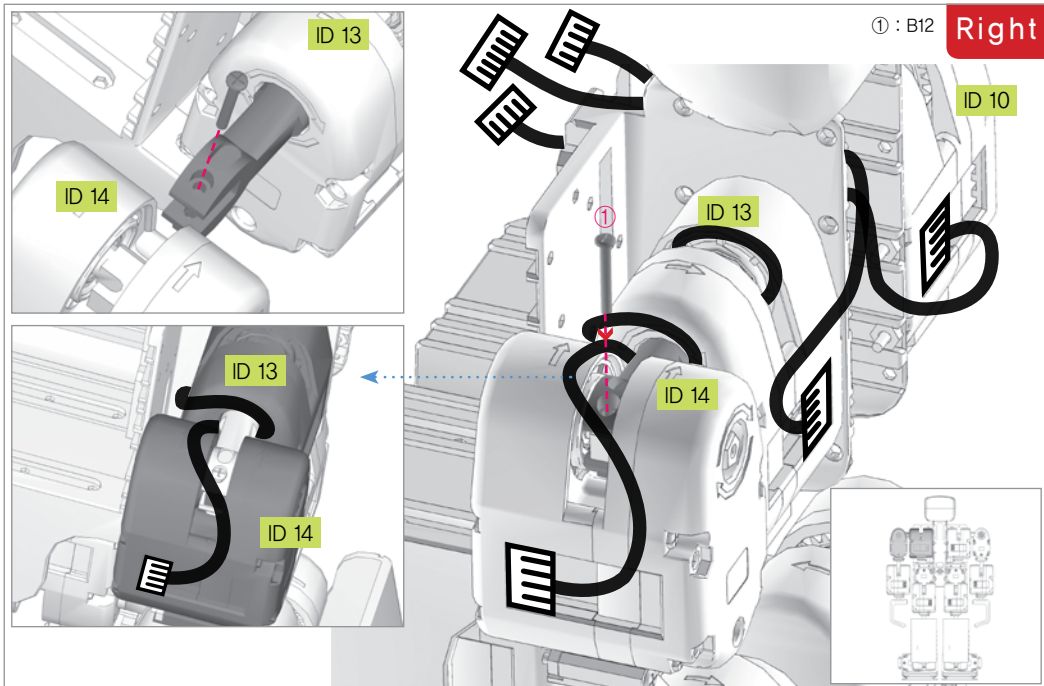
STEP 14



STEP 15

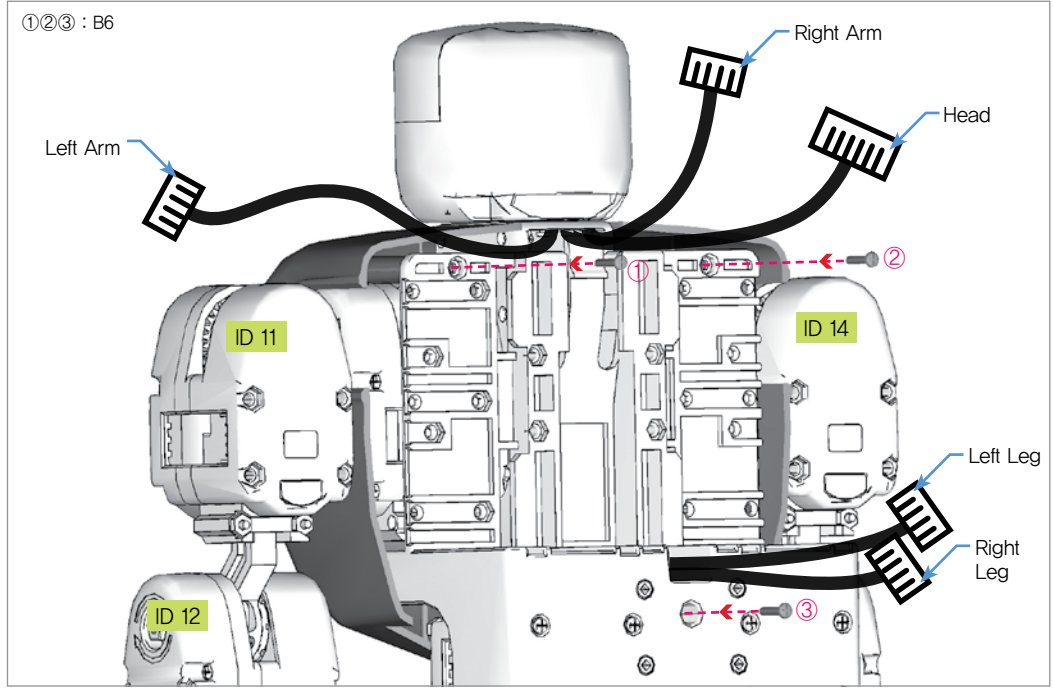


STEP 16

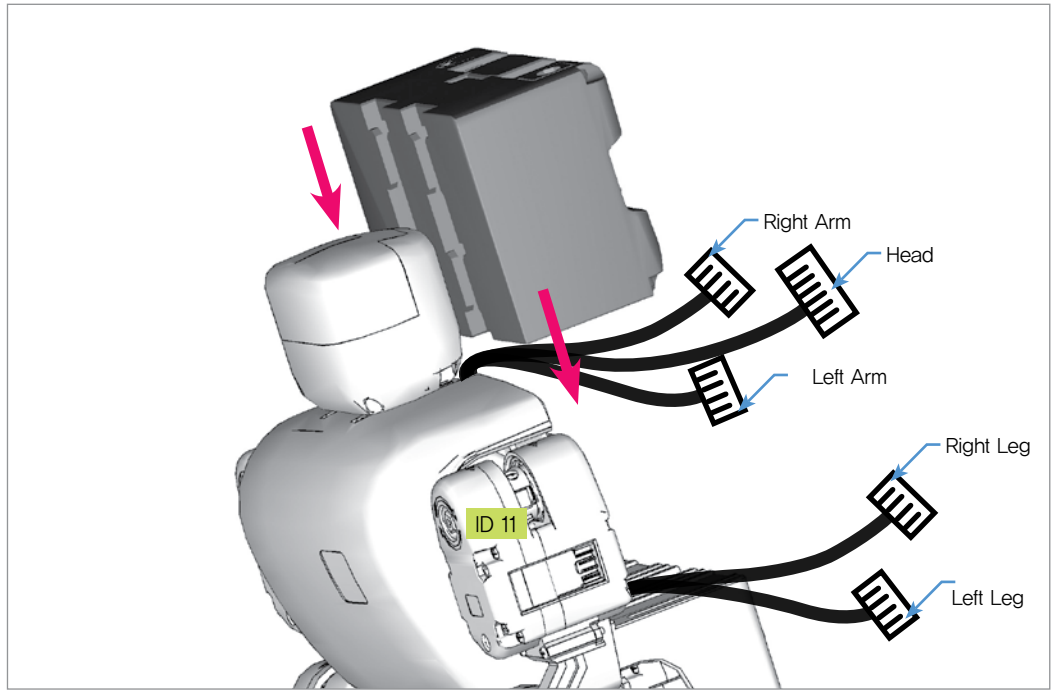


ICZO

STEP 17

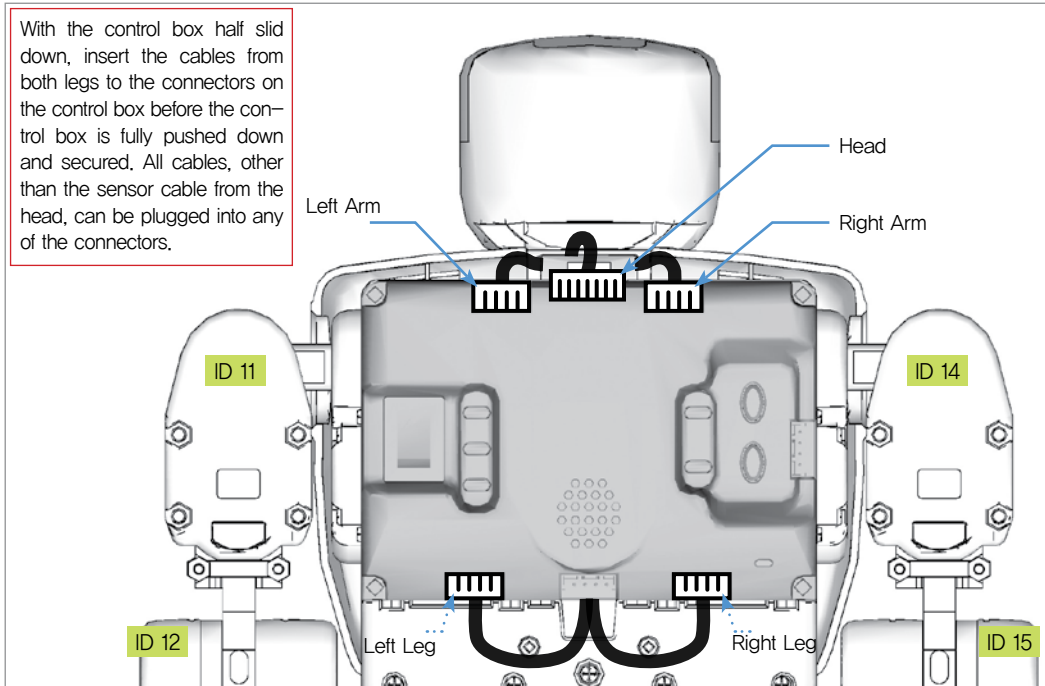


STEP 18



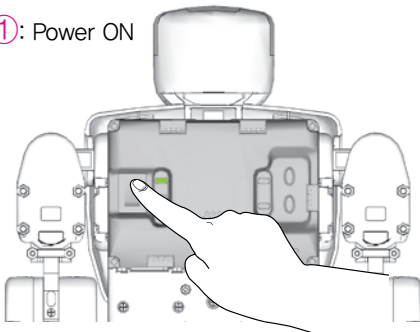
STEP 19

With the control box half slid down, insert the cables from both legs to the connectors on the control box before the control box is fully pushed down and secured. All cables, other than the sensor cable from the head, can be plugged into any of the connectors.

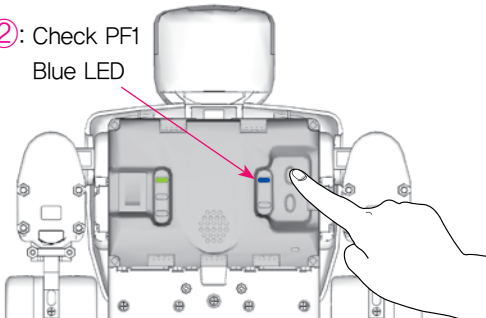


STEP 20

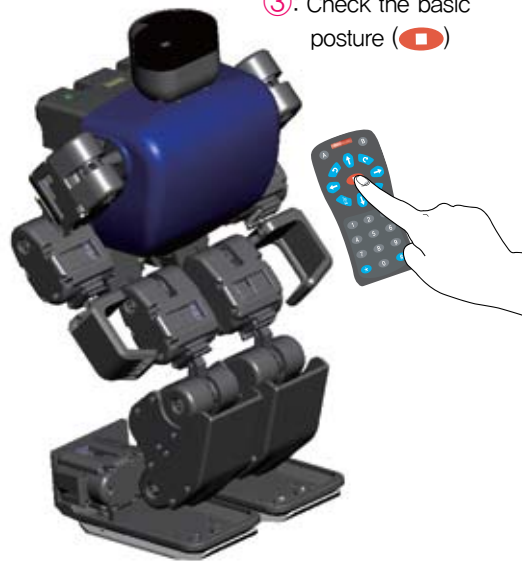
①: Power ON



②: Check PF1
Blue LED



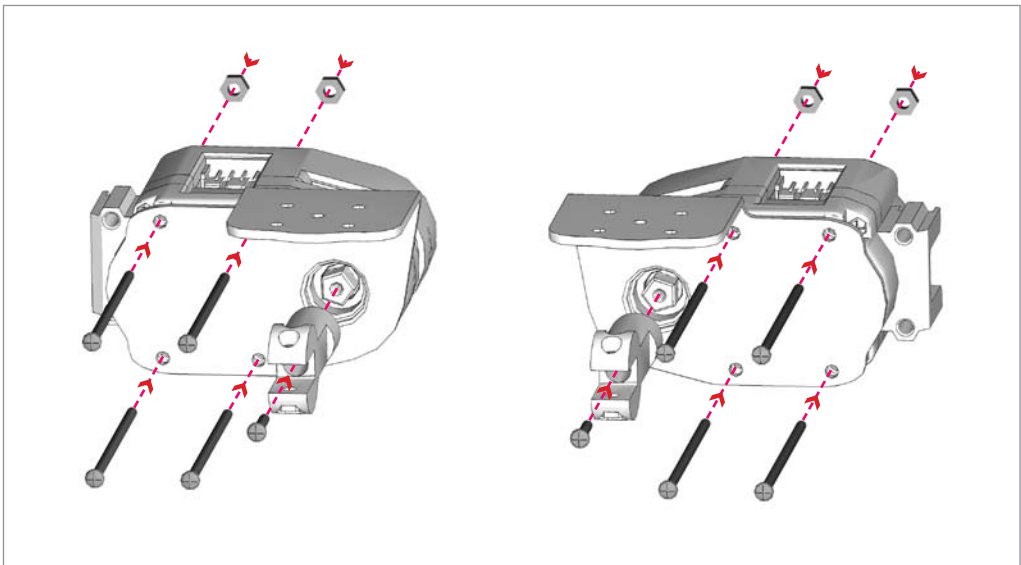
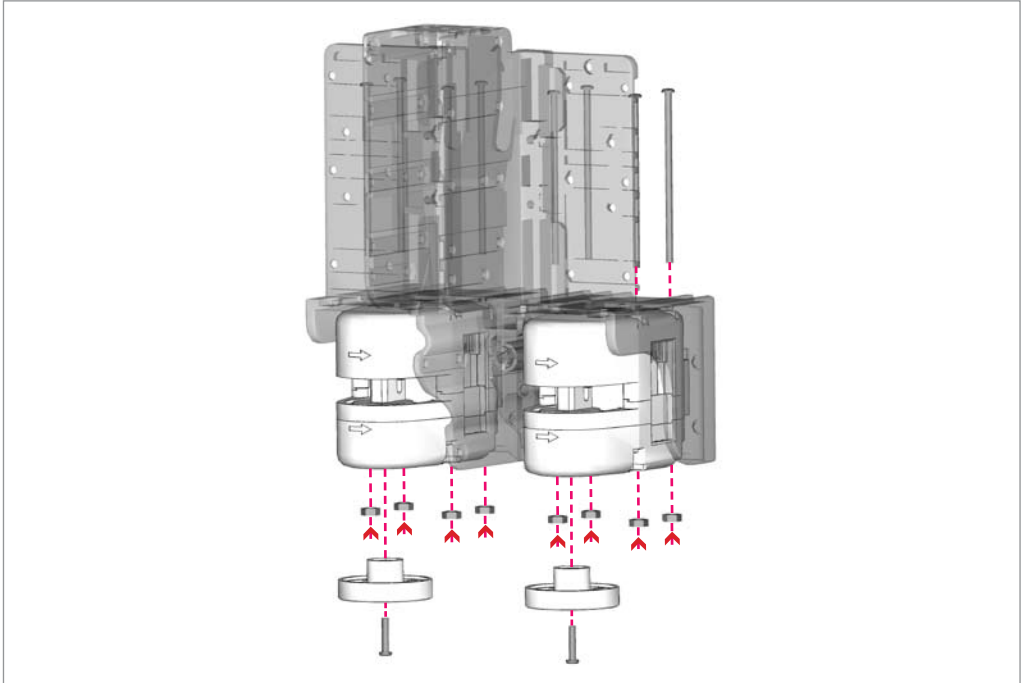
③: Check the basic posture (▶)

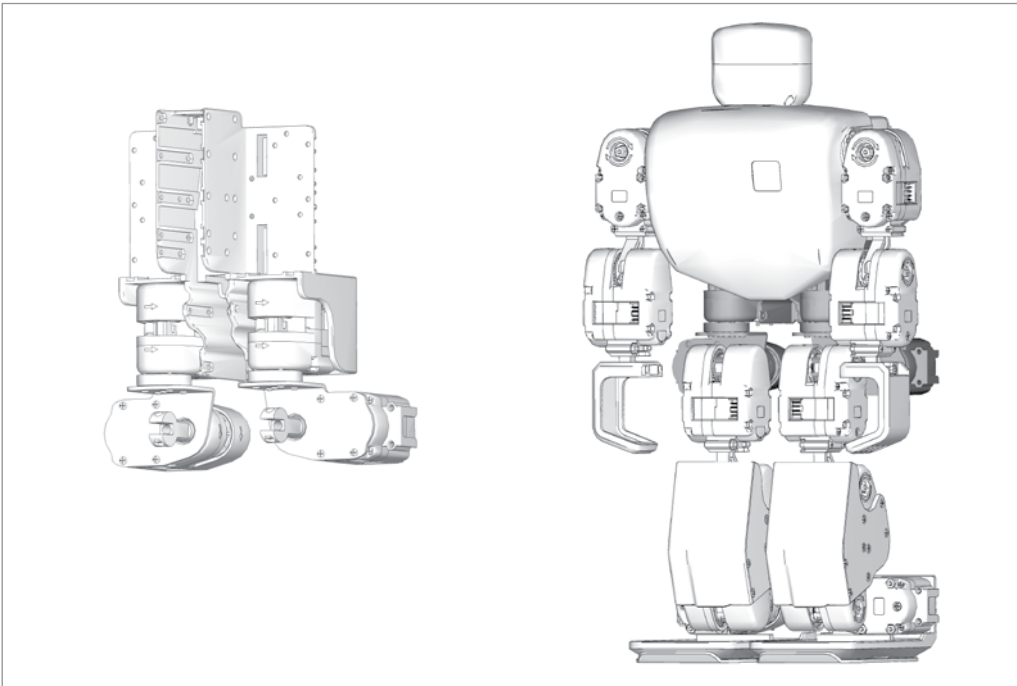
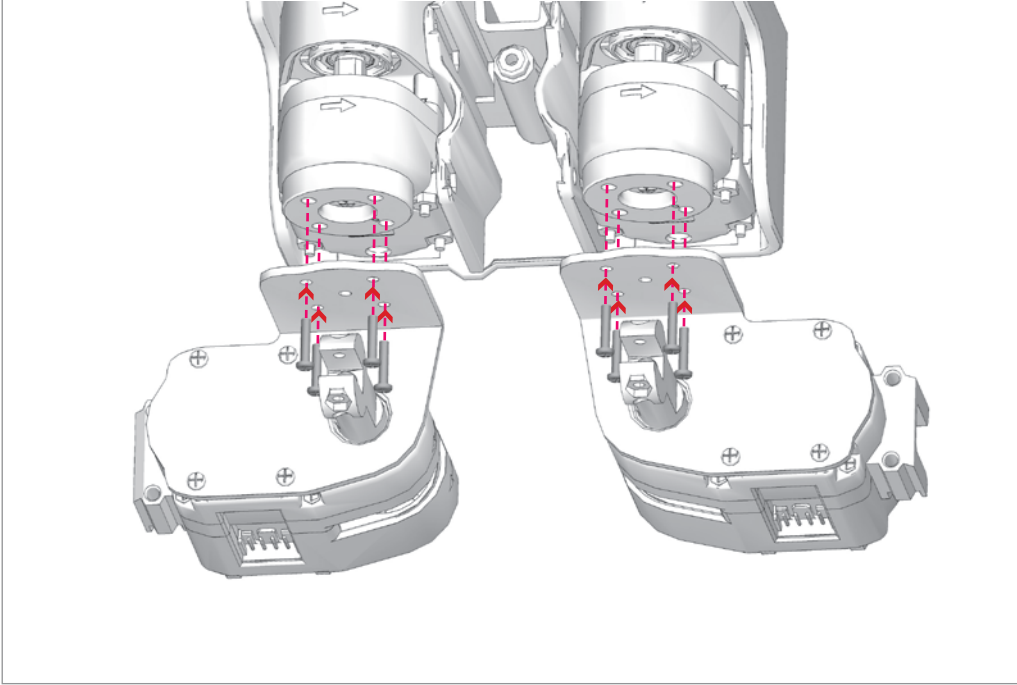


※ If battery is not sufficiently charged, connect the power adapter to run the robot.

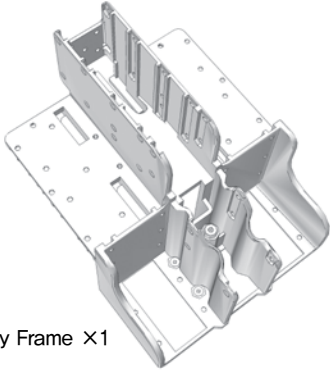
Upgrade HUNO

Upgraded HUNO is a modified platform of HUNO enhanced by adding two more degrees of freedom(2 more wCK module). With its waist twisting freely, the various motions that can be programmed are much more natural and human like.





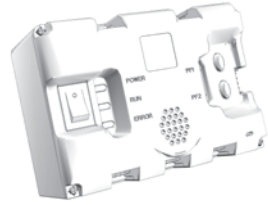
DINO Part List



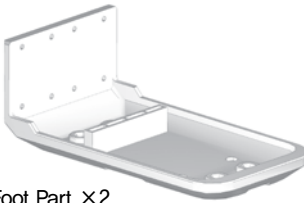
Body Frame X1



Chest Cover X1



Control Box X1



Foot Part X2



Shoe Plate X2



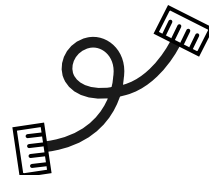
Leg Cover X2

Head Part X1
(Sensor Module)

wCK module X16



Hand Part X2



wCK module Cable X16



Nut X56



B5 X8



B6 X7



B8 X9



B12 X11



B16 X16



B40 X44



B Gold X3



J2 X5



J3 X2



J4 X2



J6 X4



J7 X2



J11 X1

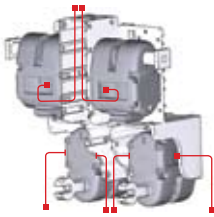
※ The components within the product are subject to change without notice, this may occur if the design of the product changes or is improved.

Assembly sequence

All building instructions for DINO are exactly the same as the ones for HUNO except for the arms and the tail.

01

STEP 01, 02, 03, 04



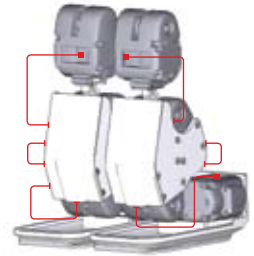
02

STEP 05



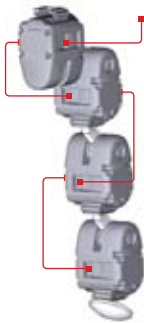
03

STEP 06, 07, 08, 09, 10, 11



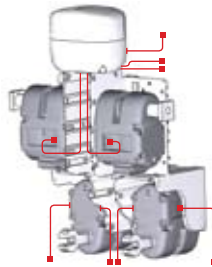
04

STEP 12



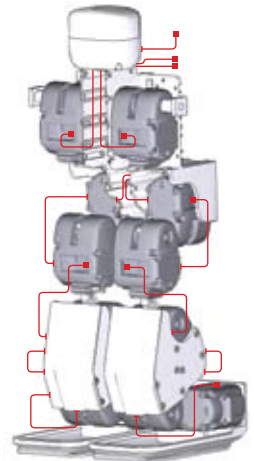
05

STEP 13



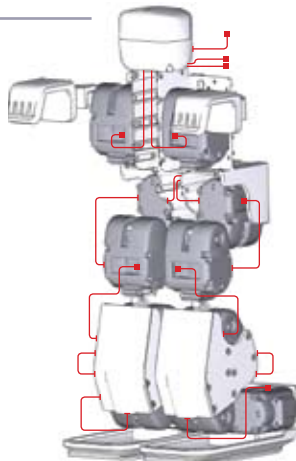
06

STEP 14



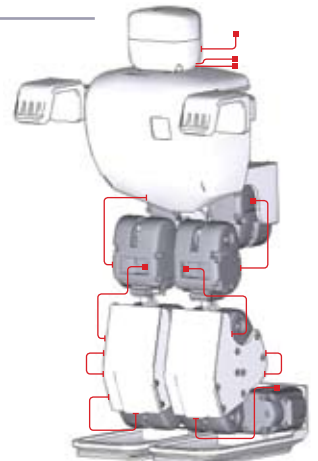
07

STEP 15



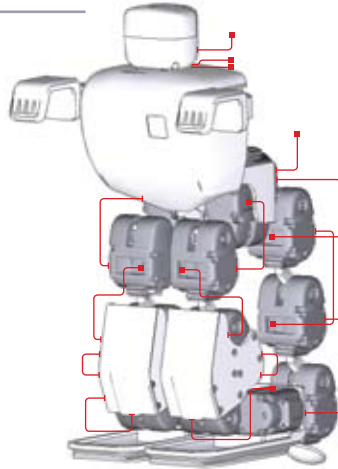
08

STEP 16



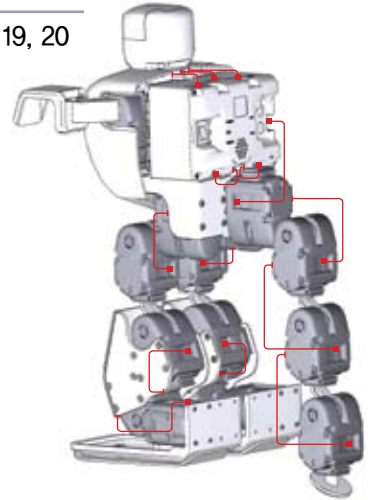
09

STEP 17



10

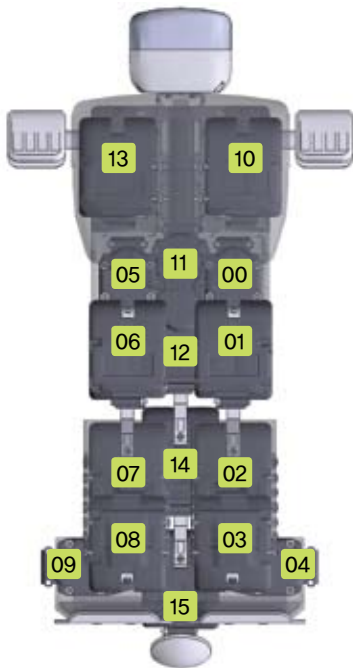
STEP 18, 19, 20



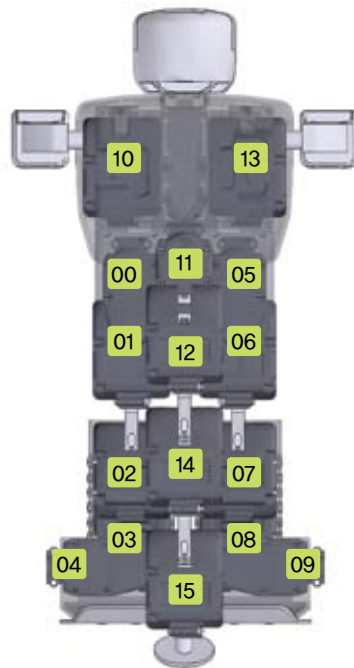
ID MAP

The ID map of the wCK robot modules for DINO are as follows:

Front View



Rear View



DINO

STEP 01

Left ①②③④ : B40, ⑤ : B8
 Ⓐ : J3
 40mm Bolt
 Joint 3
 8mm Bolt

Connect one wCK cable first as above before attaching it to body frame.

Caution The adjustment of the connecting angle is critically important.

STEP 02

①②③④ : B40, ⑤ : B8
 Ⓐ : J3 **Right**

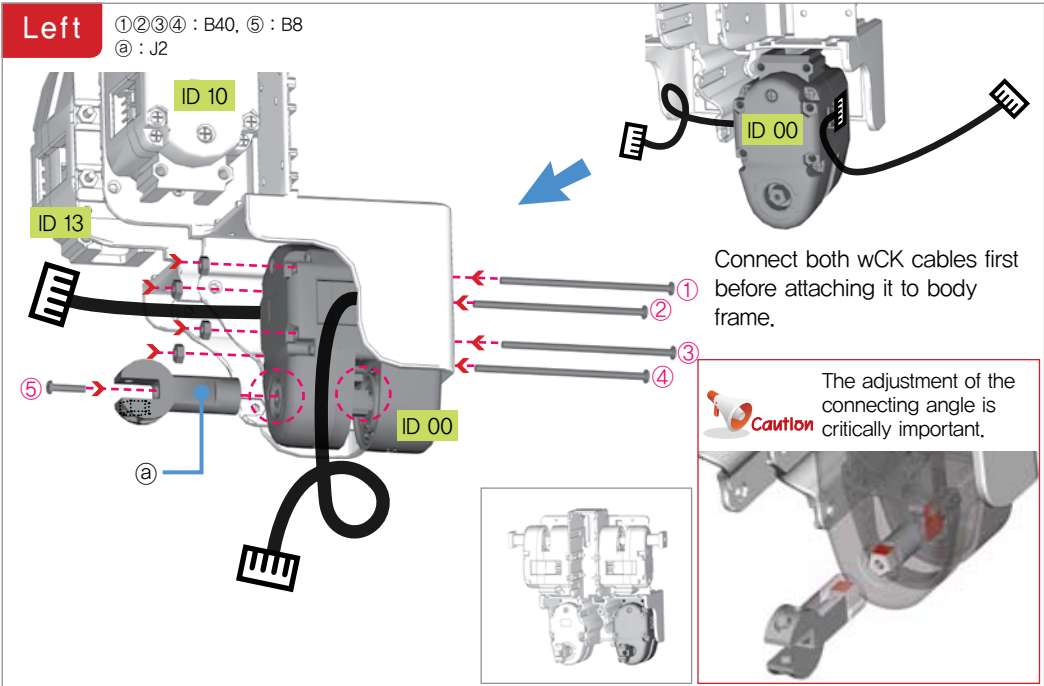
Connect one wCK cable first as above before attaching it to body frame.

Caution The adjustment of the connecting angle is critically important.

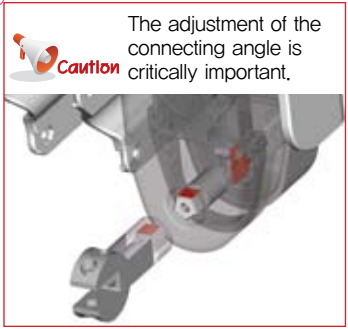
STEP 03

Left

①②③④ : B40, ⑤ : B8
 Ⓐ : J2



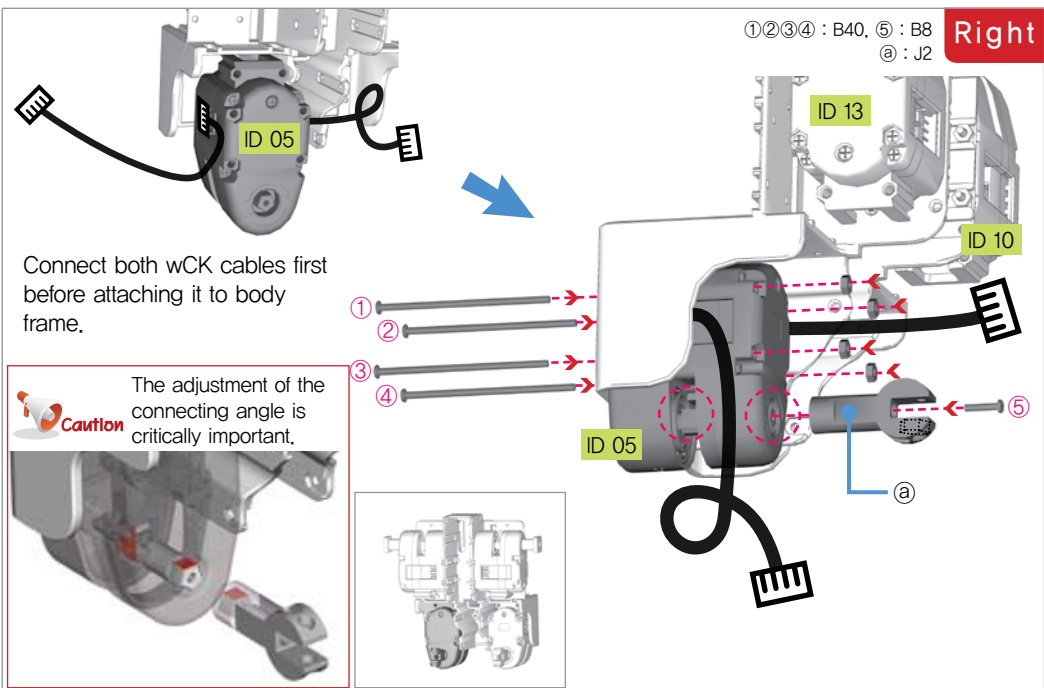
Connect both wCK cables first before attaching it to body frame.



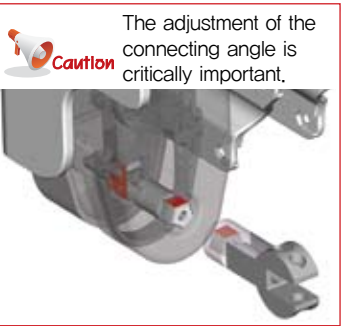
STEP 04

①②③④ : B40, ⑤ : B8
 Ⓐ : J2

Right



Connect both wCK cables first before attaching it to body frame.



D-NO

STEP 05

Left ①② : B16
Ⓐ : J7, Ⓑ : J4

①② : B16
Ⓐ : J7, Ⓑ : J4 **Right**

STEP 06

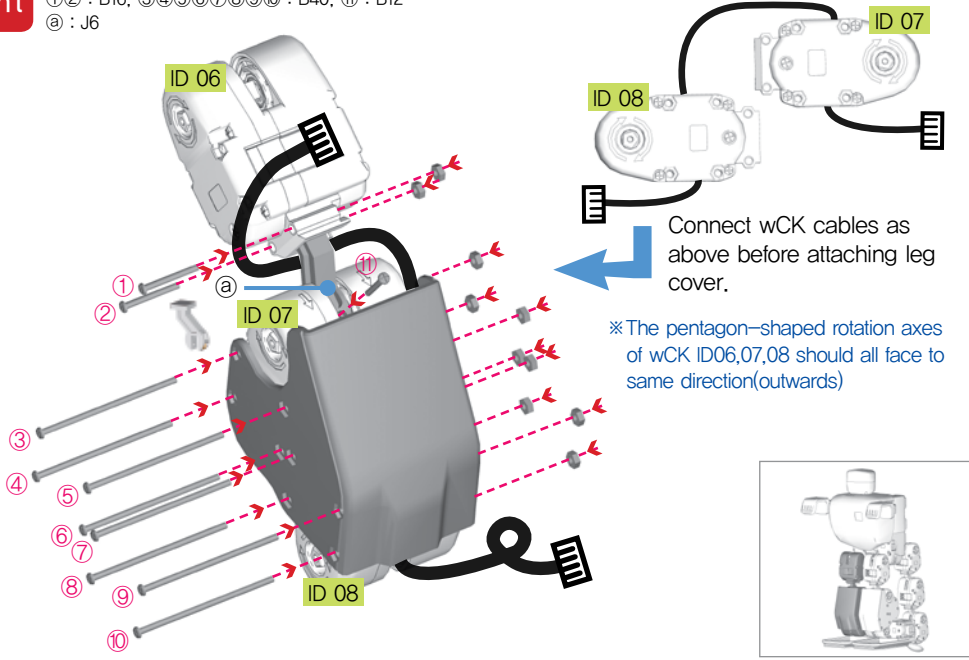
Left ①② : B16, ③④⑤⑥⑦⑧⑨⑩ : B40, ⑪ : B12
Ⓐ : J6

Connect wCK cables as above before attaching leg cover.

※The pentagon-shaped rotation axes of wCK ID01,02,03 should all face to same direction(outwards)

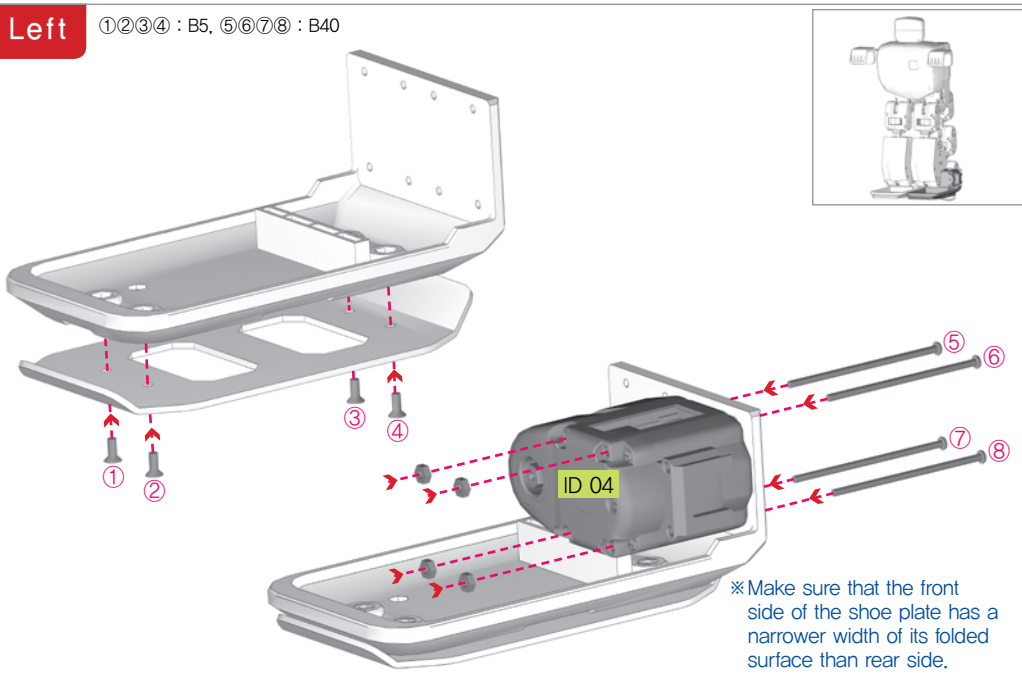
STEP 07

Right ①② : B16, ③④⑤⑥⑦⑧⑨⑩ : B40, ⑪ : B12
 ⑬ : J6



STEP 08

Left ①②③④ : B5, ⑤⑥⑦⑧ : B40

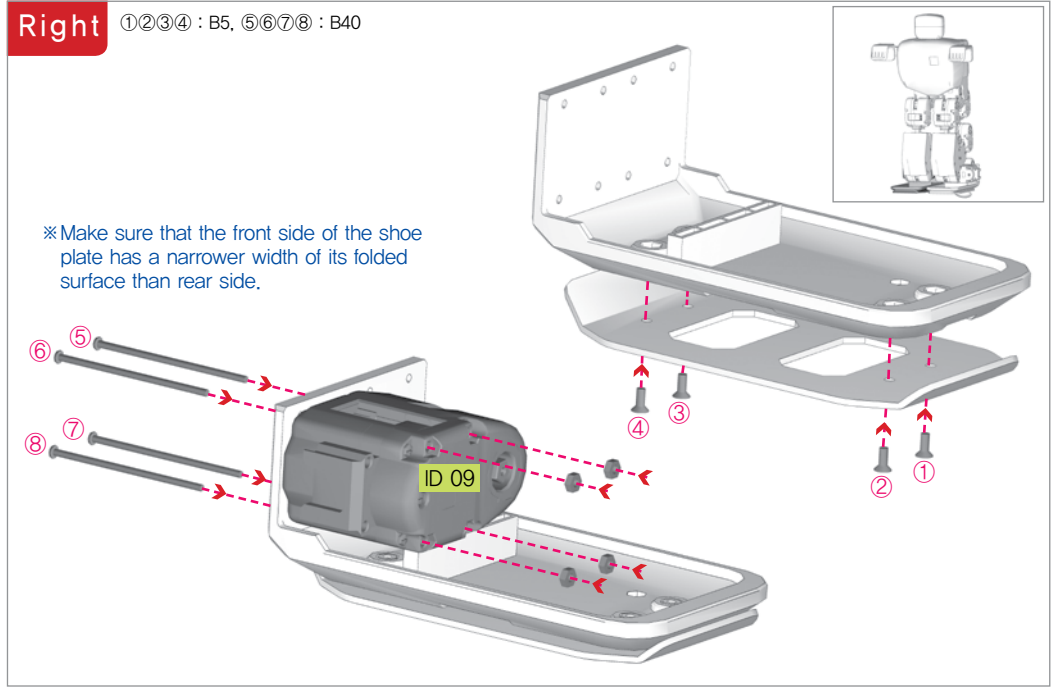


D-NO

STEP 09

Right ①②③④ : B5, ⑤⑥⑦⑧ : B40

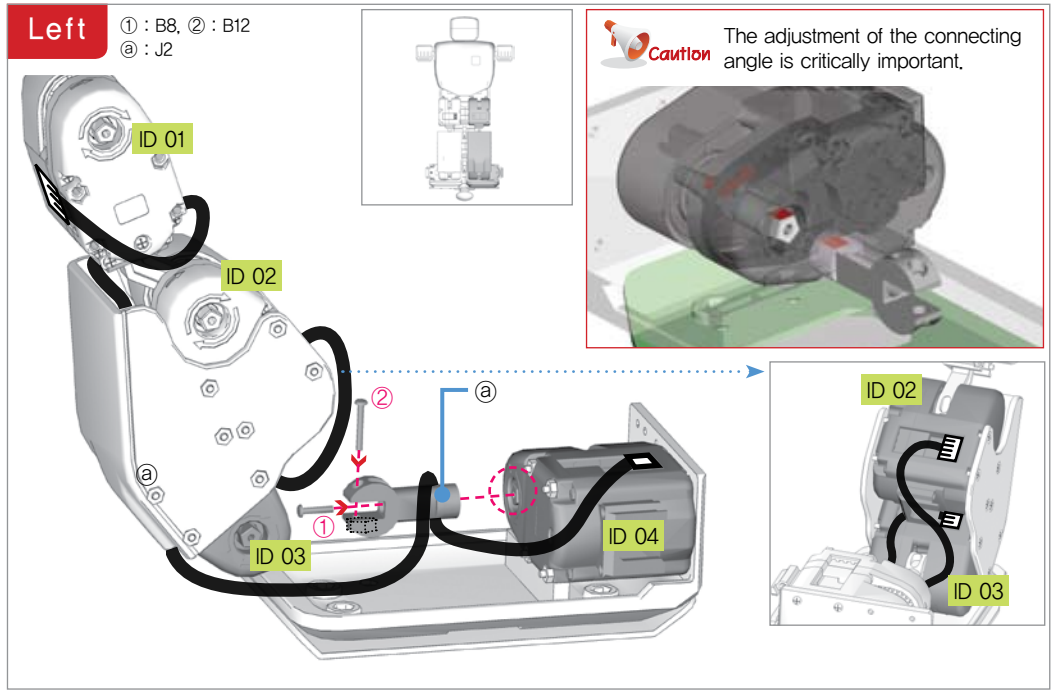
※ Make sure that the front side of the shoe plate has a narrower width of its folded surface than rear side.



STEP 10

Left ① : B8, ② : B12
Ⓐ : J2

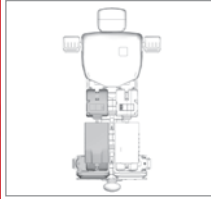
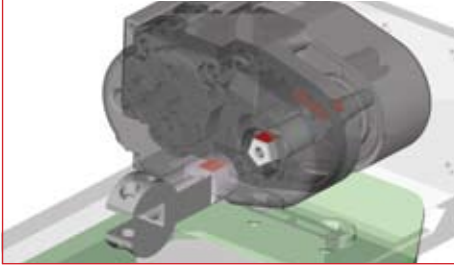
Caution The adjustment of the connecting angle is critically important.



STEP 11

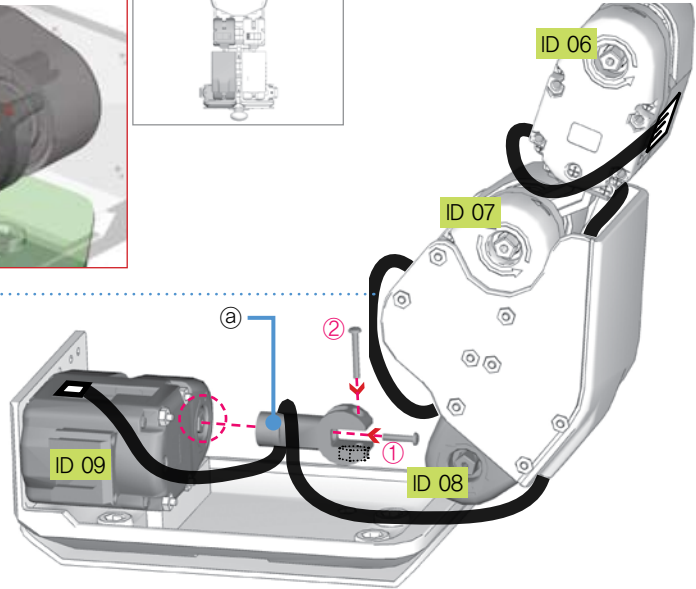
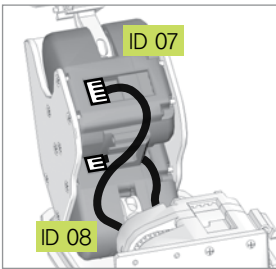


Caution The adjustment of the connecting angle is critically important.



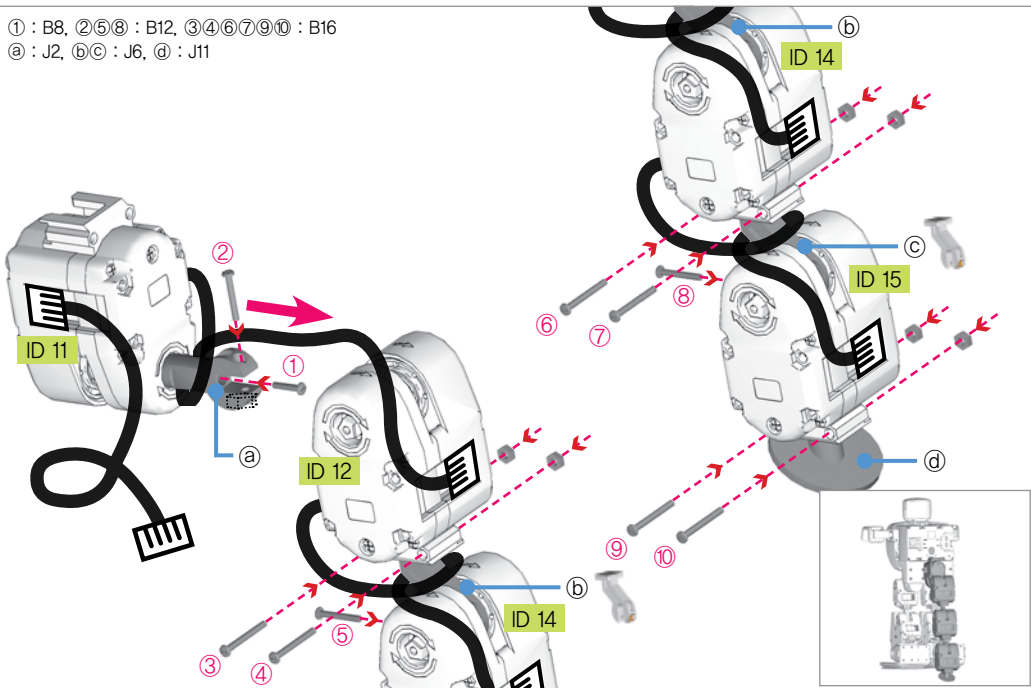
① : B8, ② : B12
Ⓐ : J2

Right



STEP 12

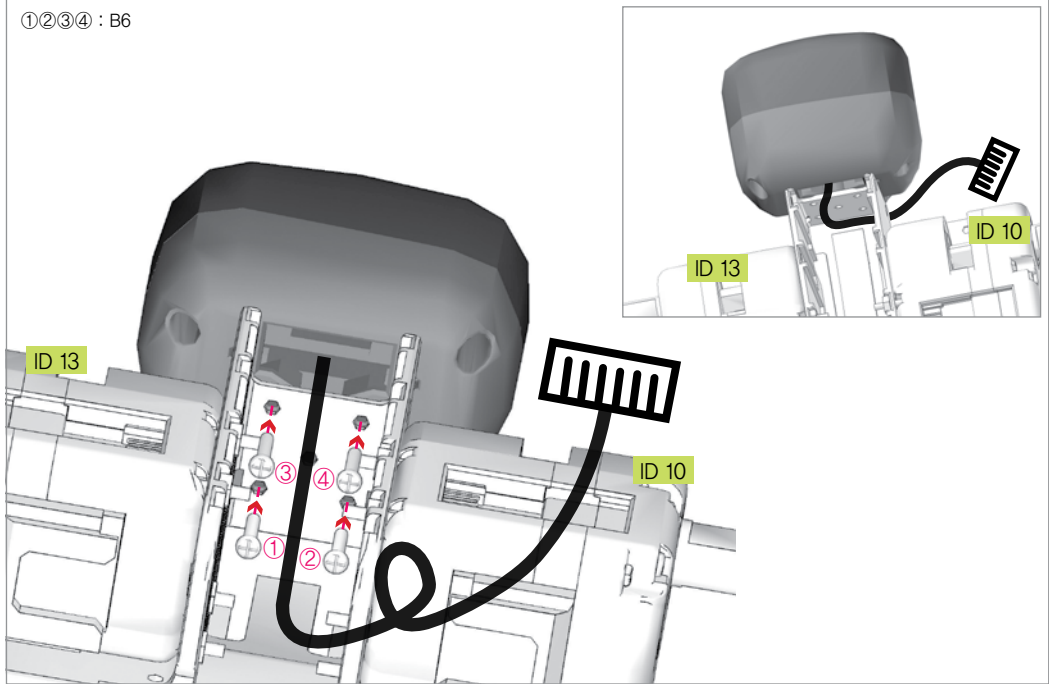
① : B8, ②⑤⑧ : B12, ③④⑥⑦⑨⑩ : B16
Ⓐ : J2, ⒷⒸ : J6, Ⓓ : J11



D-NO

STEP 13

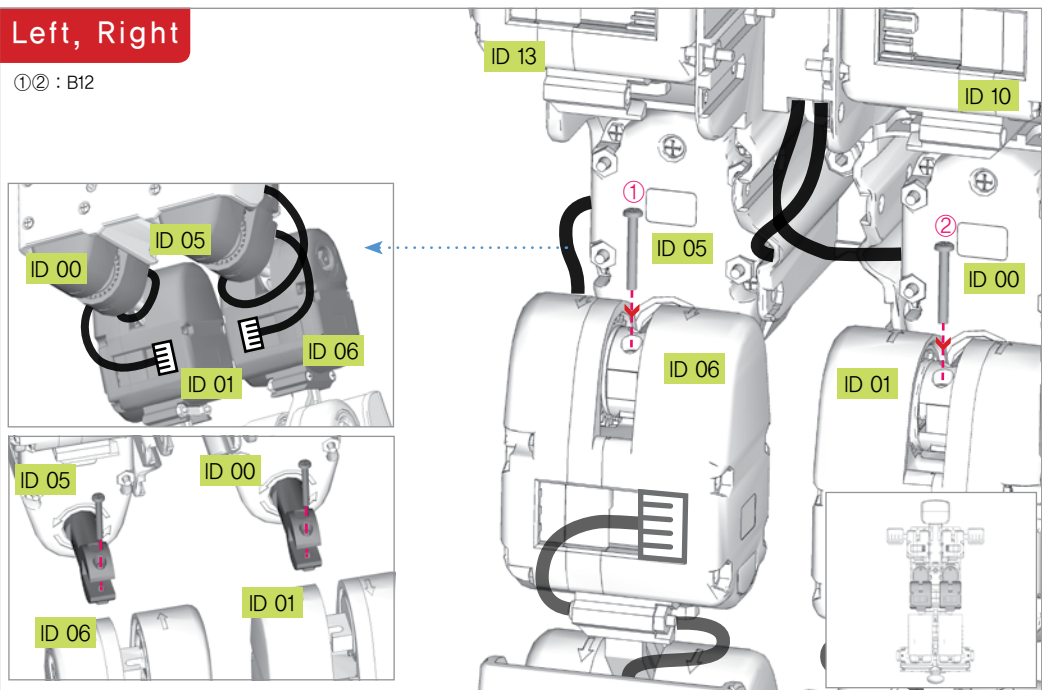
①②③④ : B6



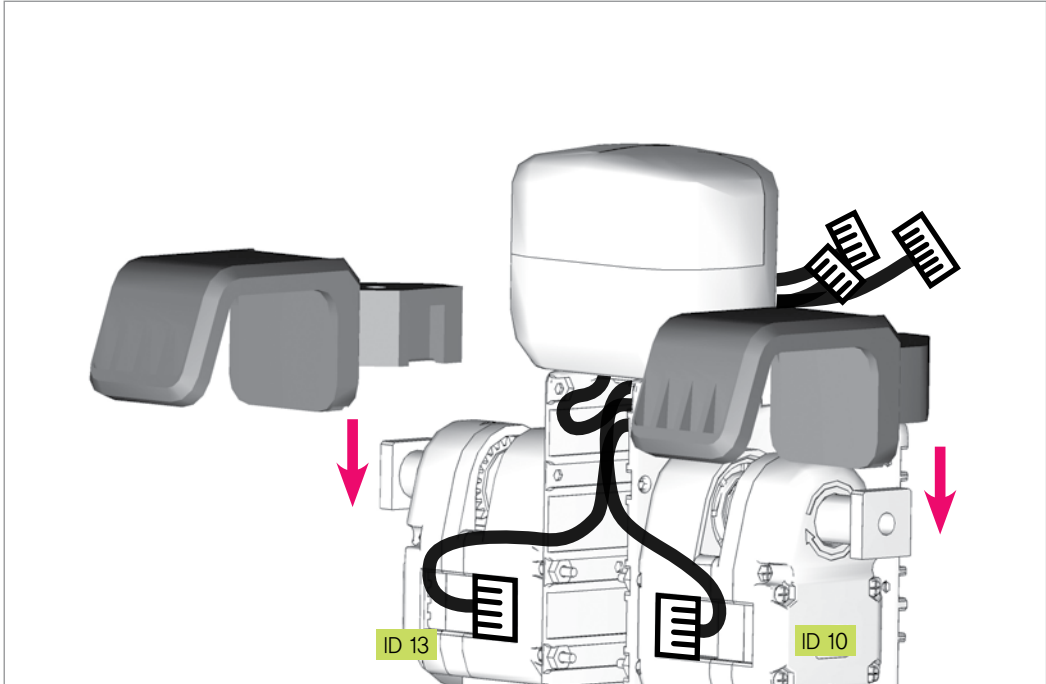
STEP 14

Left, Right

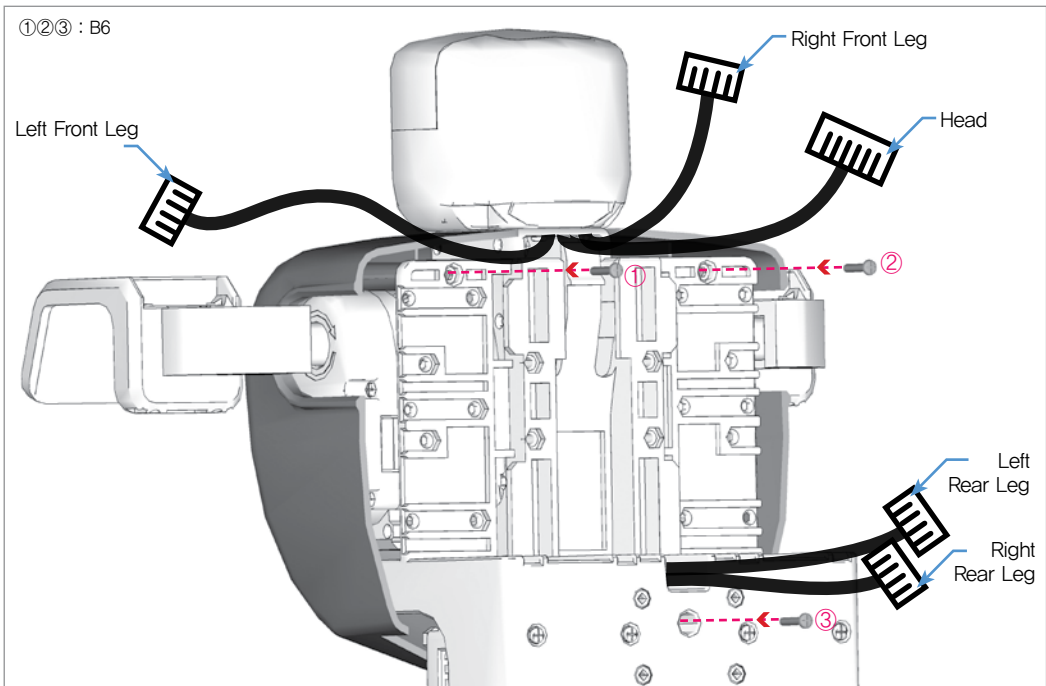
①② : B12



STEP 15

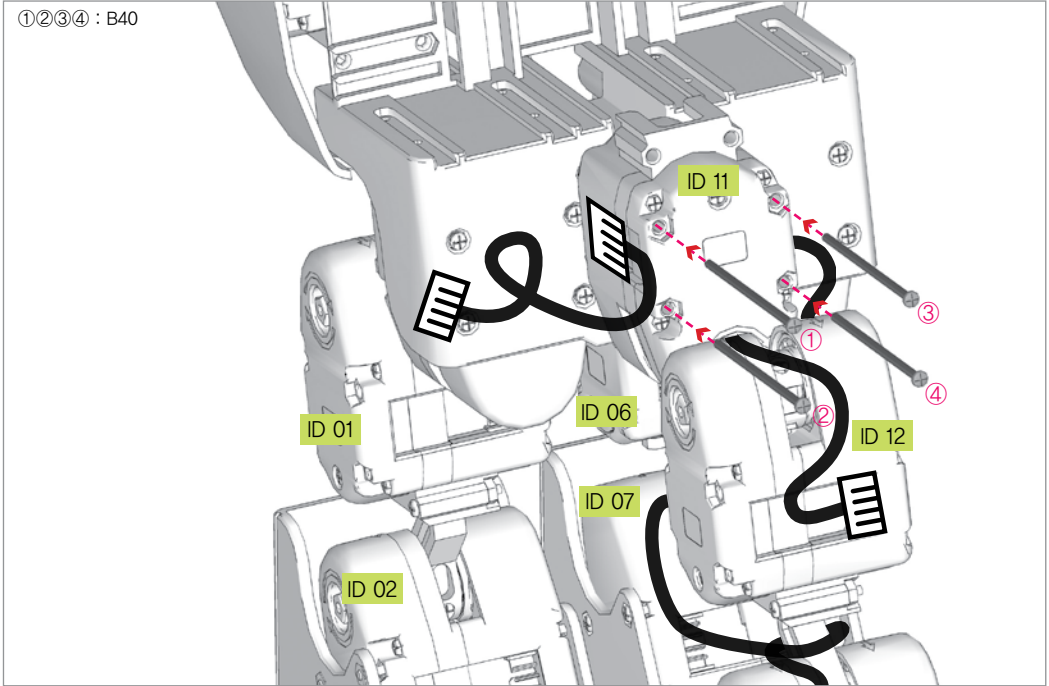


STEP 16

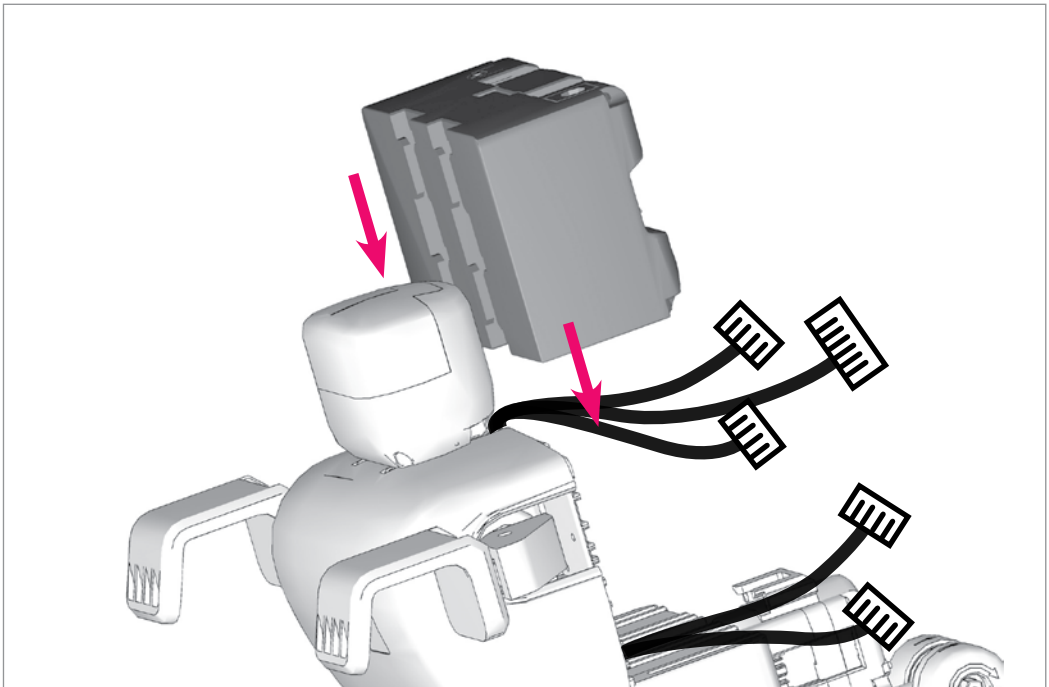


STEP 17

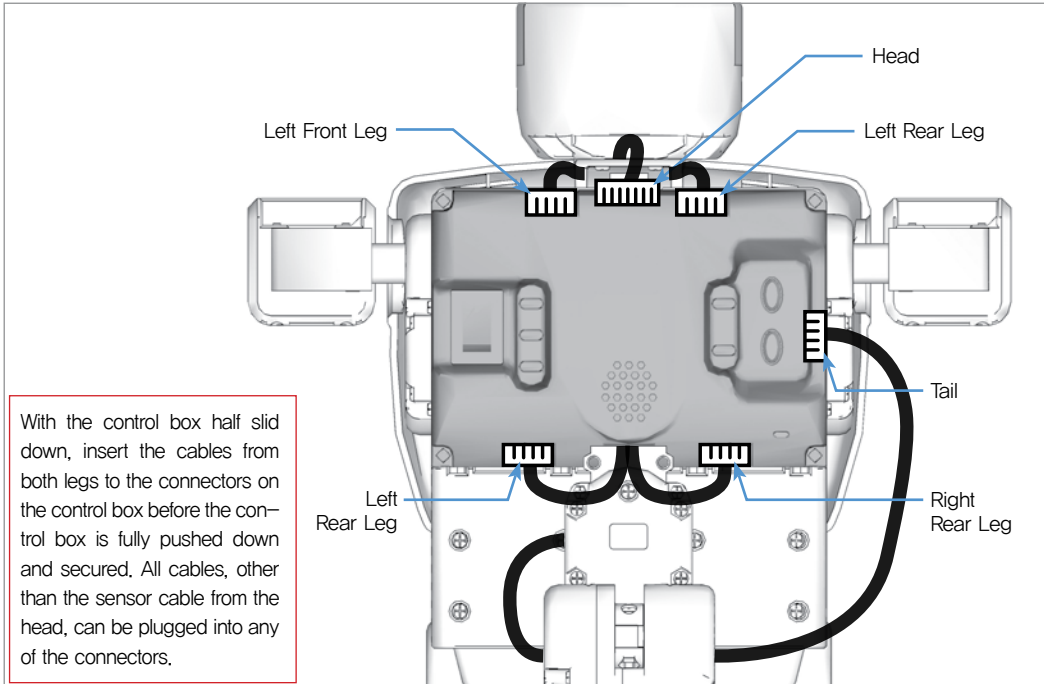
①②③④ : B40



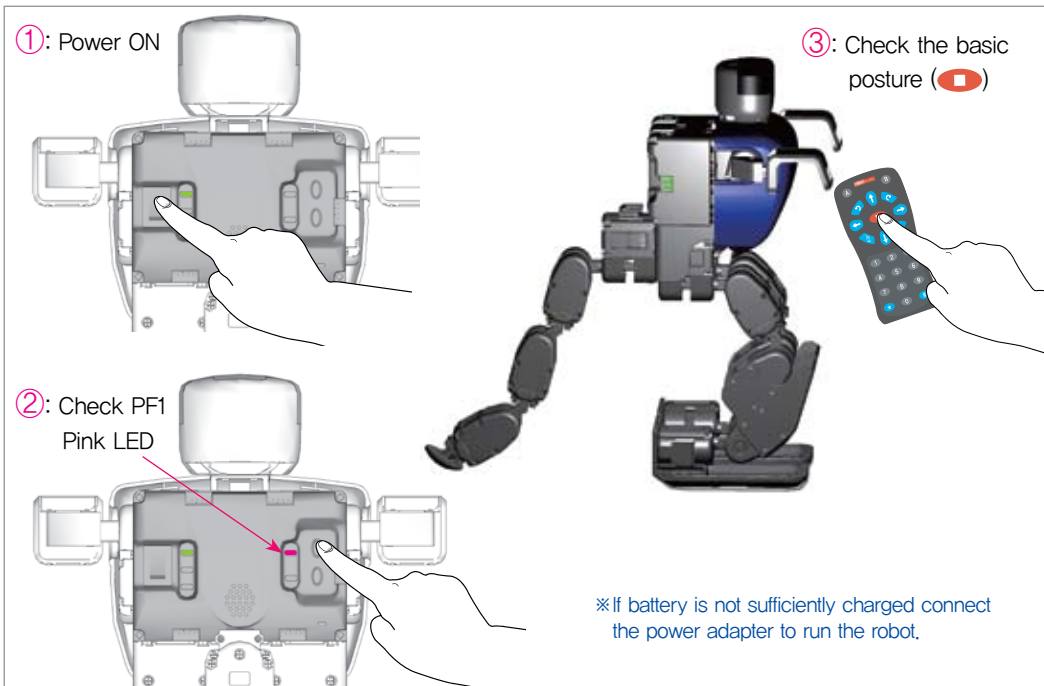
STEP 18



STEP 19



STEP 20





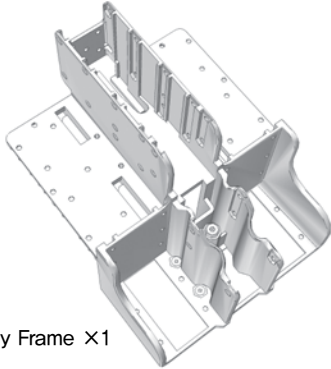
DOGY

DOGY's appearance resembles that of a dog. The assembly of DOGY consists of 18 steps. The required parts for each step and the related assembly instructions are provided here.

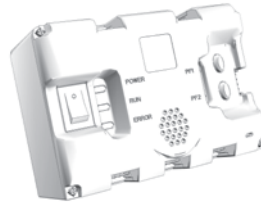
Completed DOGY



DOGY Part List



Body Frame ×1



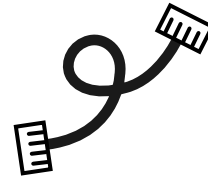
Control Box ×1



Sensor Module ×1



wCK module ×16



wCK module Cable ×16



Nut ×32



B6 ×2



B8 ×9



B12 ×11



B16 ×18



B40 ×16



B Gold ×5



J2 ×4



J6 ×5



J10 ×1



J11 ×4



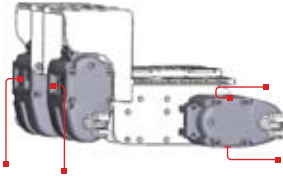
J12 ×2

※ The components within the product are subject to change without notice, this may occur if the design of the product changes or is improved.

Assembly Sequence

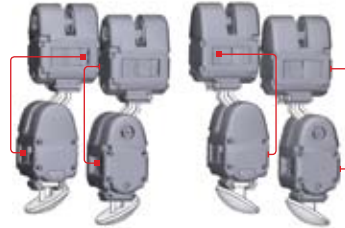
01

STEP 01, 02, 03, 04



02

STEP 05, 06



03

STEP 07



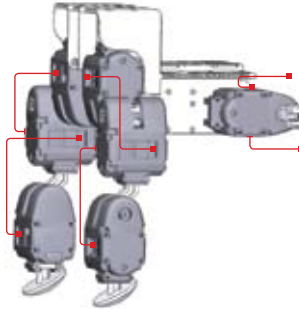
04

STEP 08



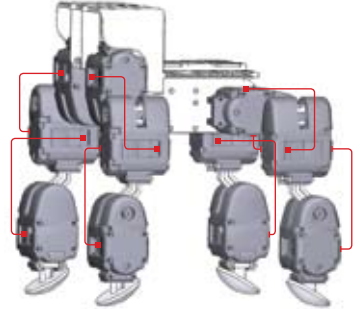
05

STEP 09, 10



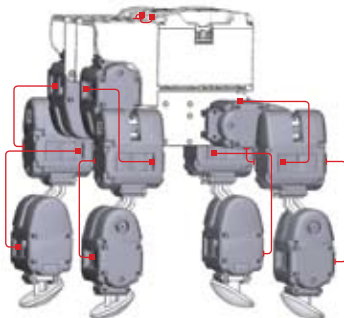
06

STEP 11, 12



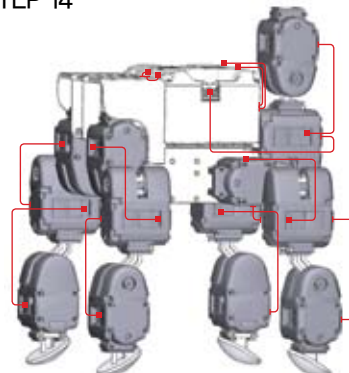
07

STEP 13



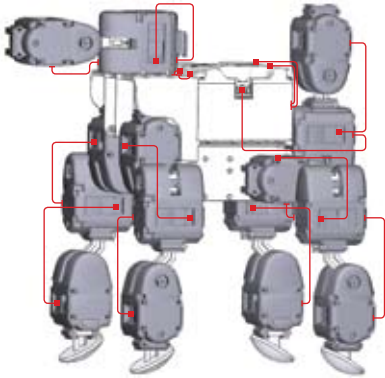
08

STEP 14



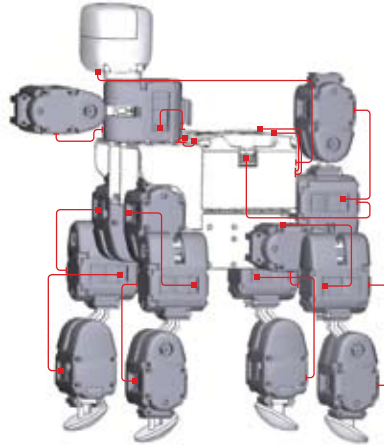
09

STEP 15



10

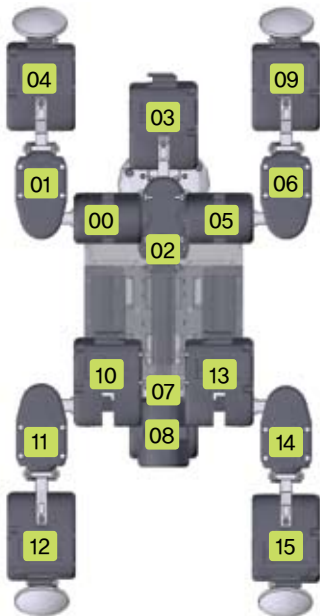
STEP 16, 17, 18



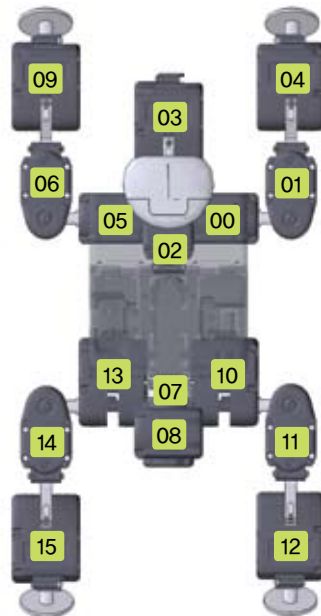
ID MAP

The ID map of the wCK robot modules for DOGY are as follows:

Bottom View



Back View



DOGY

STEP 01

Left ①②③ : B40, ④ : B8
 ⓐ : J2
 40mm Bolt
 Joint 2
 8mm Bolt

Connect both wCK cables first before attaching it to body frame.

Caution The adjustment of the connecting angle is critically important.

STEP 02

①②③ : B40, ④ : B8
 ⓐ : J2 **Right**

Connect both wCK cables first before attaching it to body frame.

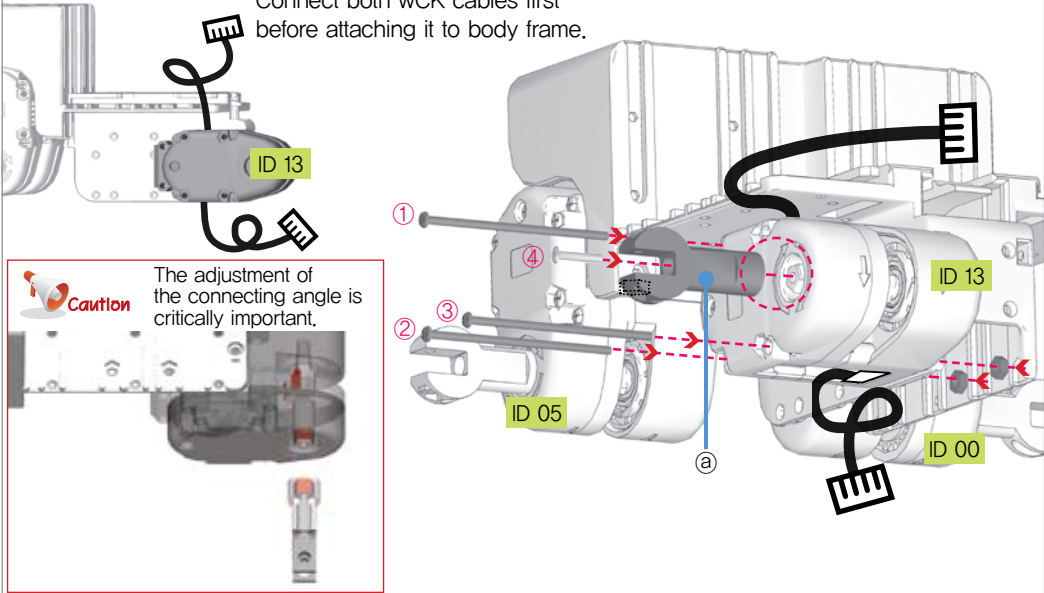
Caution The adjustment of the connecting angle is critically important.

STEP 03

Left

①②③ : B40, ④ : B8
Ⓐ : J2

Connect both wCK cables first before attaching it to body frame.

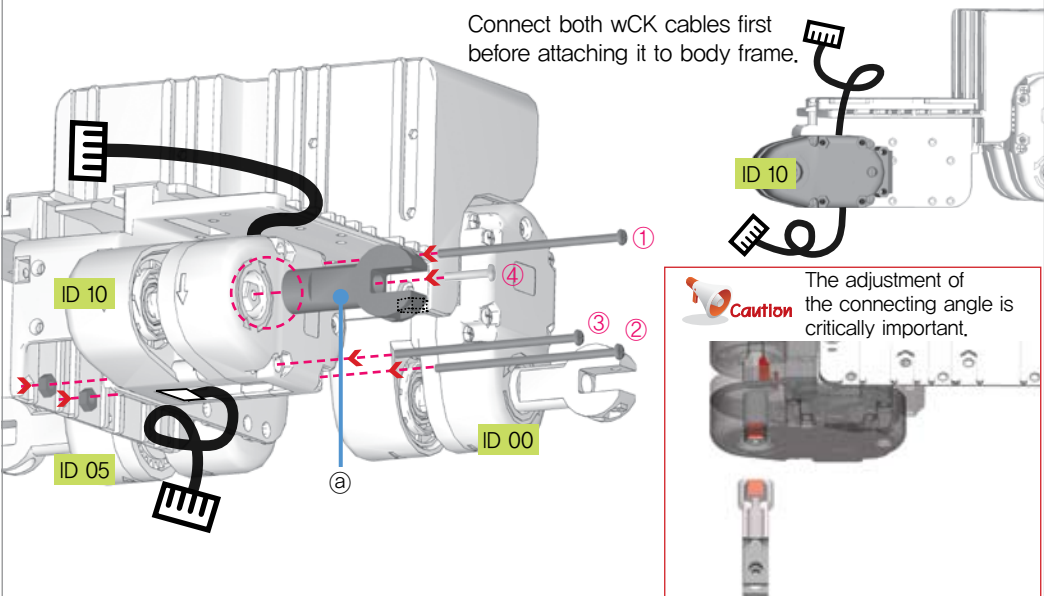


STEP 04

①②③ : B40, ④ : B8 Right

Ⓐ : J2

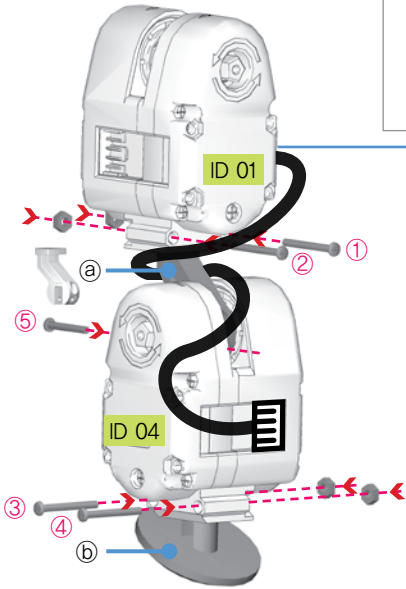
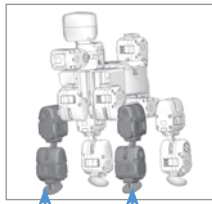
Connect both wCK cables first before attaching it to body frame.



STEP 05

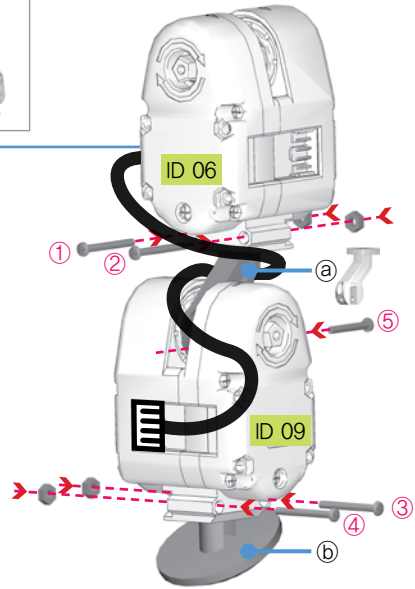
Right

①②③④ : B16, ⑤ : B12
ⓐ : J6, ⓑ : J11



①②③④ : B16, ⑤ : B12
ⓐ : J6, ⓑ : J11

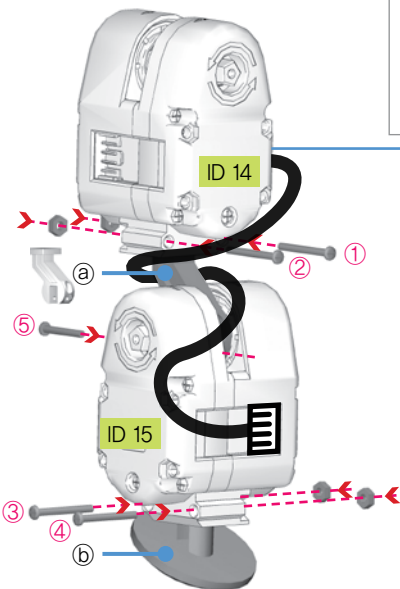
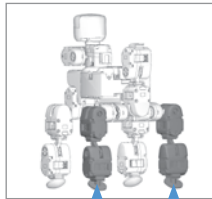
Left



STEP 06

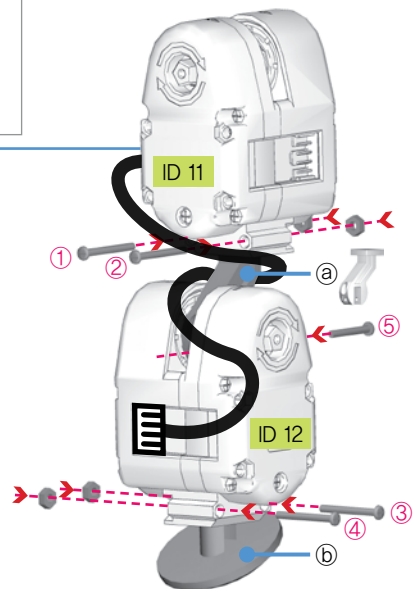
Left

①②③④ : B16, ⑤ : B12
ⓐ : J6, ⓑ : J11



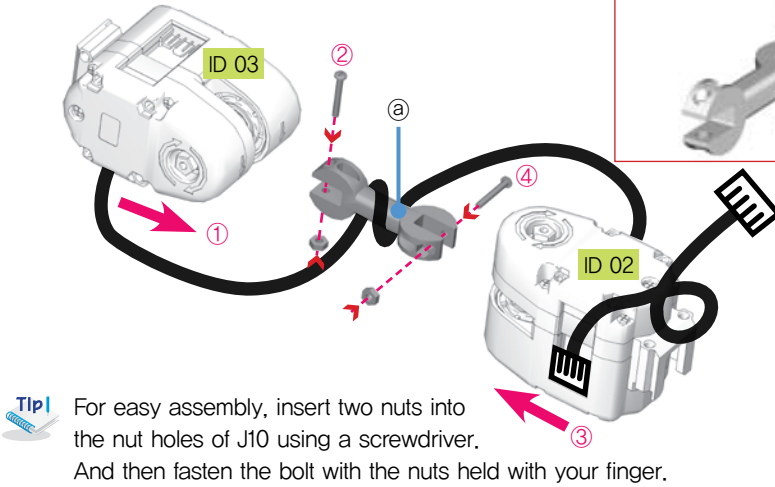
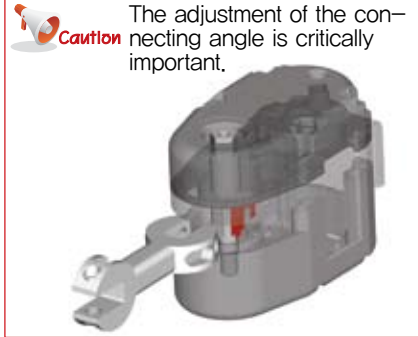
①②③④ : B16, ⑤ : B12
ⓐ : J6, ⓑ : J11

Right



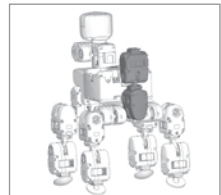
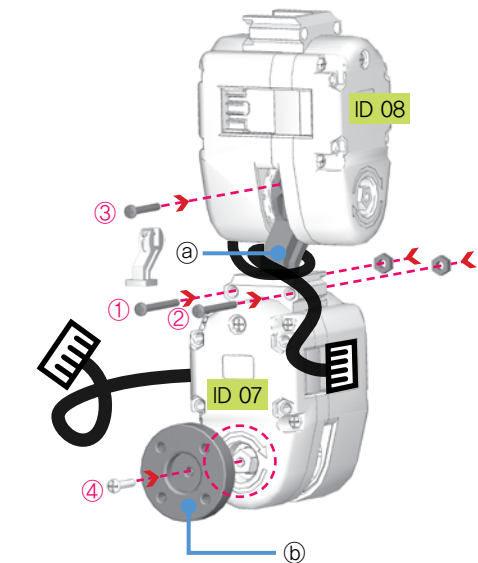
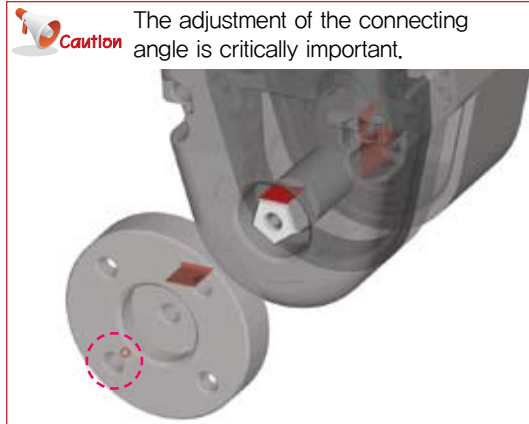
STEP 07

- ②④ : B12
- Ⓐ : J10



STEP 08

- ①② : B16, ③ : B12, ④ : B Gold
- Ⓐ : J6, Ⓑ : J12

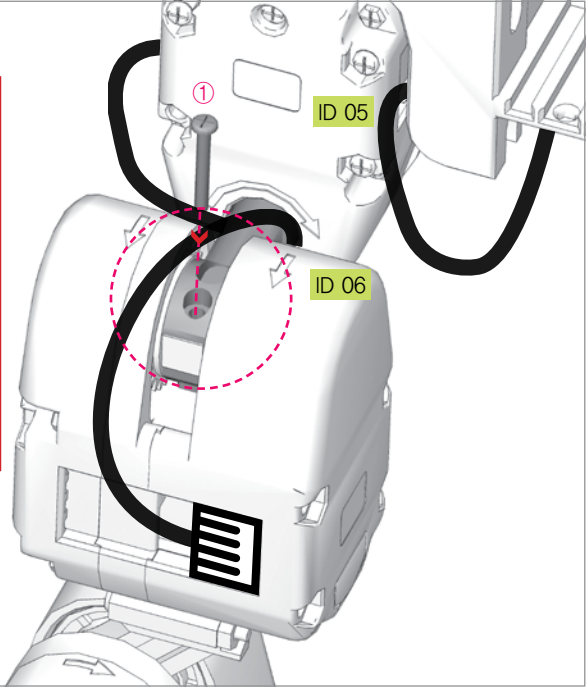
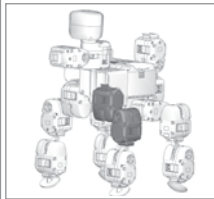
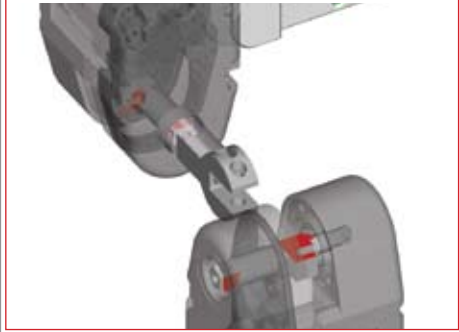


DOGGY

STEP 09

Left ① : B12

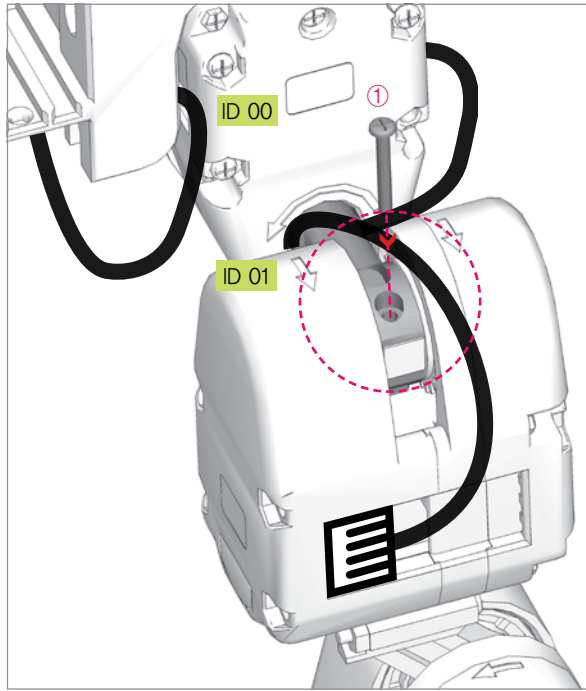
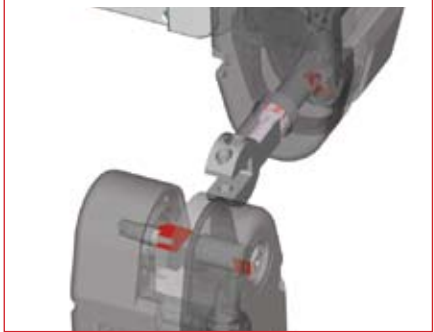
Caution The adjustment of the connecting angle is critically important.



STEP 10

① : B12 Right

Caution The adjustment of the connecting angle is critically important.

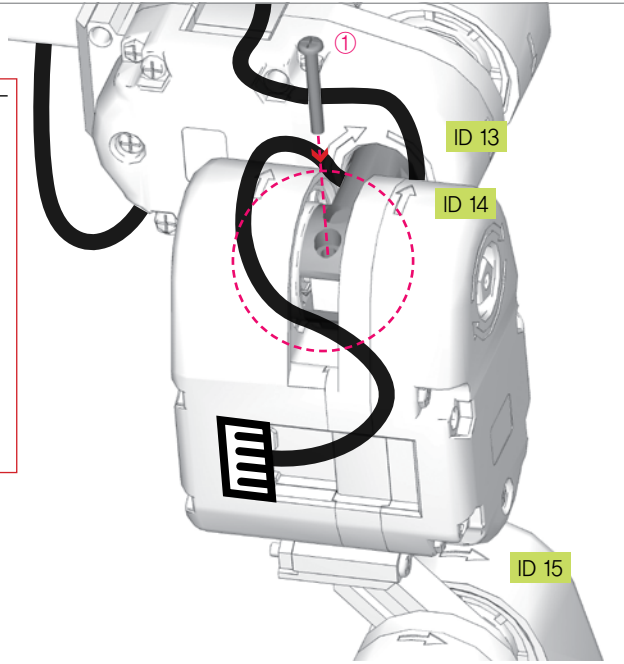
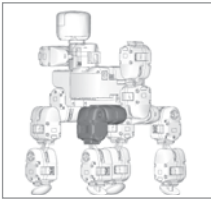
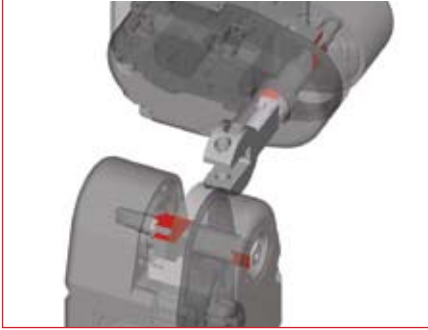


STEP 11

Left ① : B12



Caution The adjustment of the connecting angle is critically important.

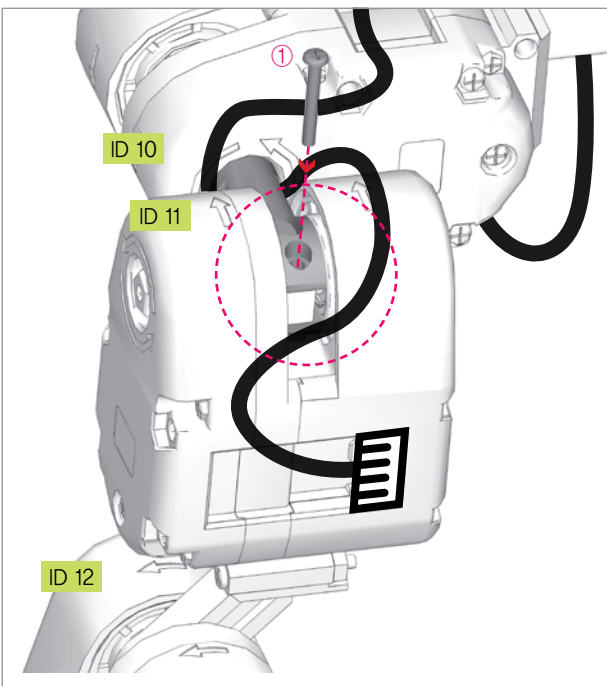
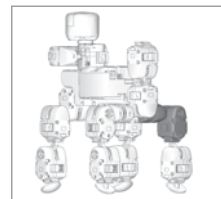
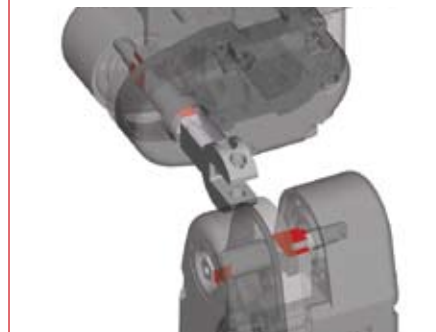


STEP 12

① : B12 Right



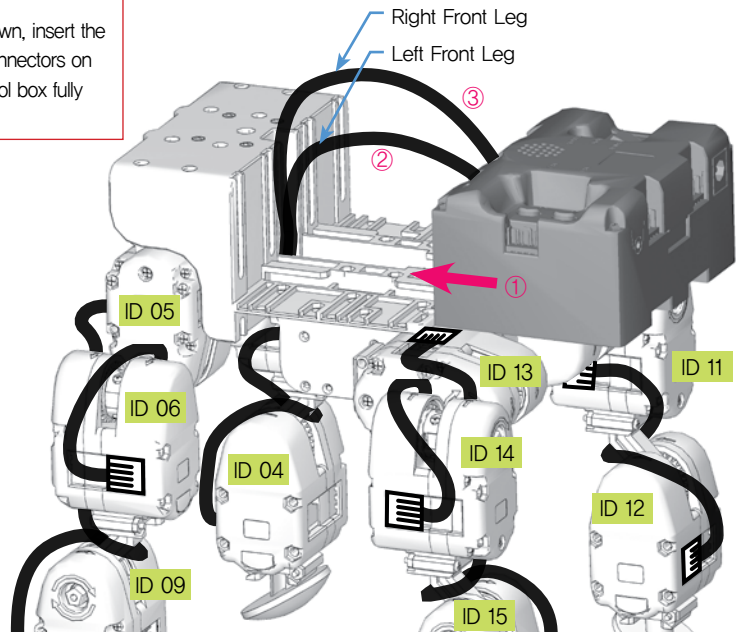
Caution The adjustment of the connecting angle is critically important.



STEP 13



Caution
With the control box half slid down, insert the cables from both legs to the connectors on the control box before the control box fully pushed down and secured.

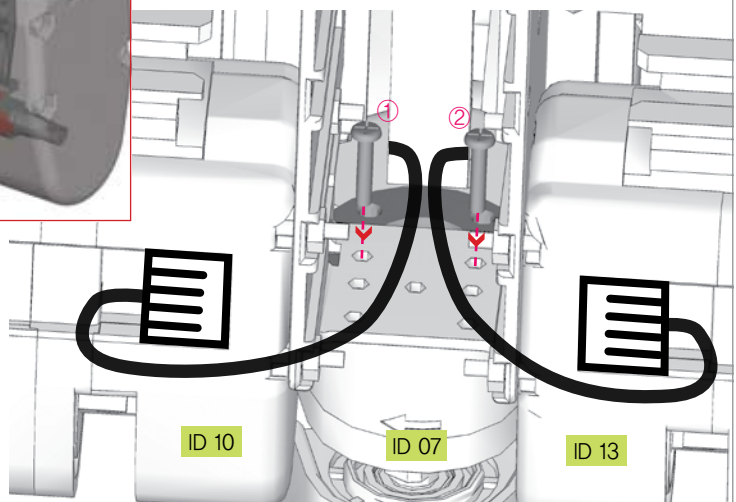
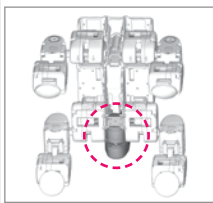
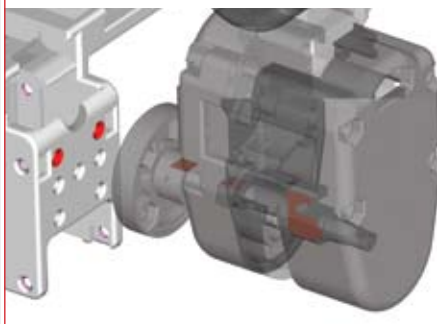


STEP 14



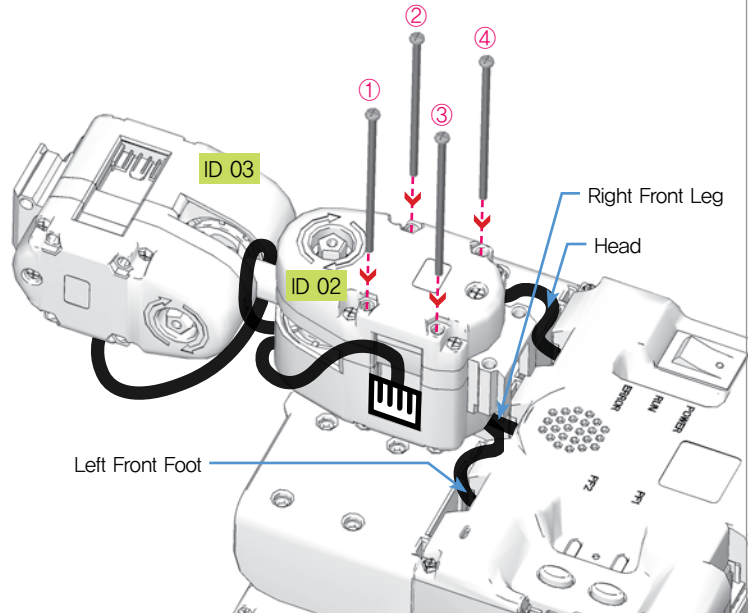
The adjustment of the connecting angle is critically important.

①② : B6



STEP 15

①②③④ : B40

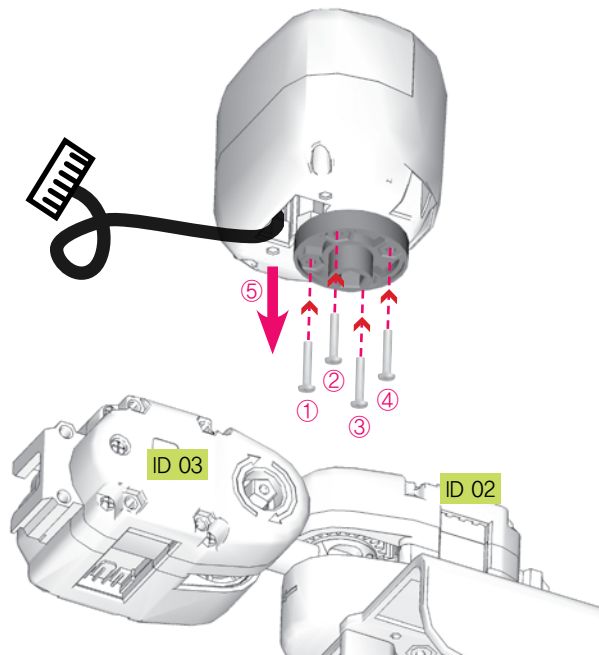
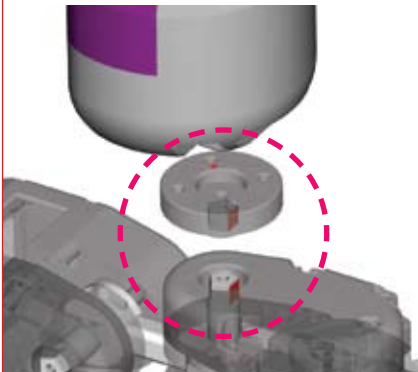


After the head part is fixed to the body frame, release the control box half way to insert the wCK cable from wCK module ID02 into the connector on the control box.

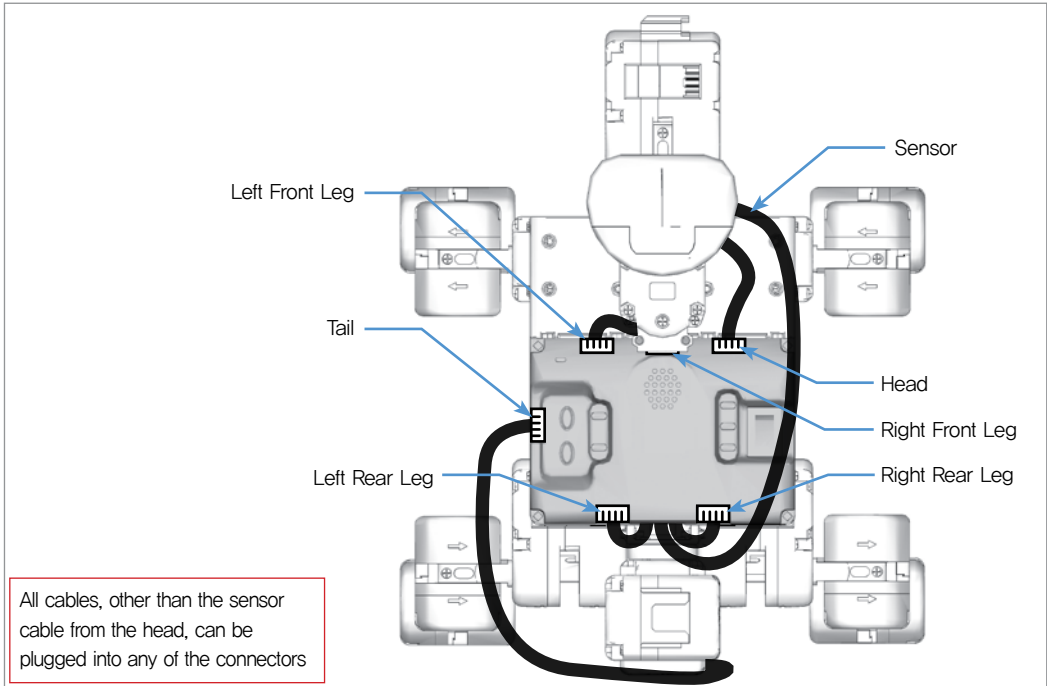
STEP 16

①②③④ : B Gold

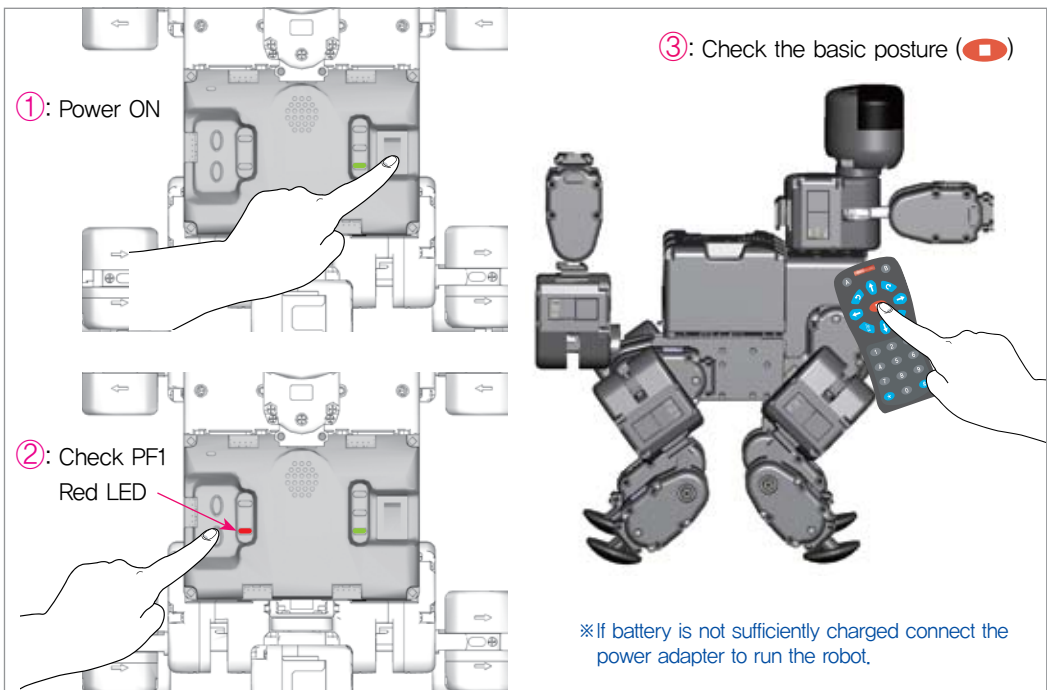
Caution The adjustment of the connecting angle is critically important.



STEP 17



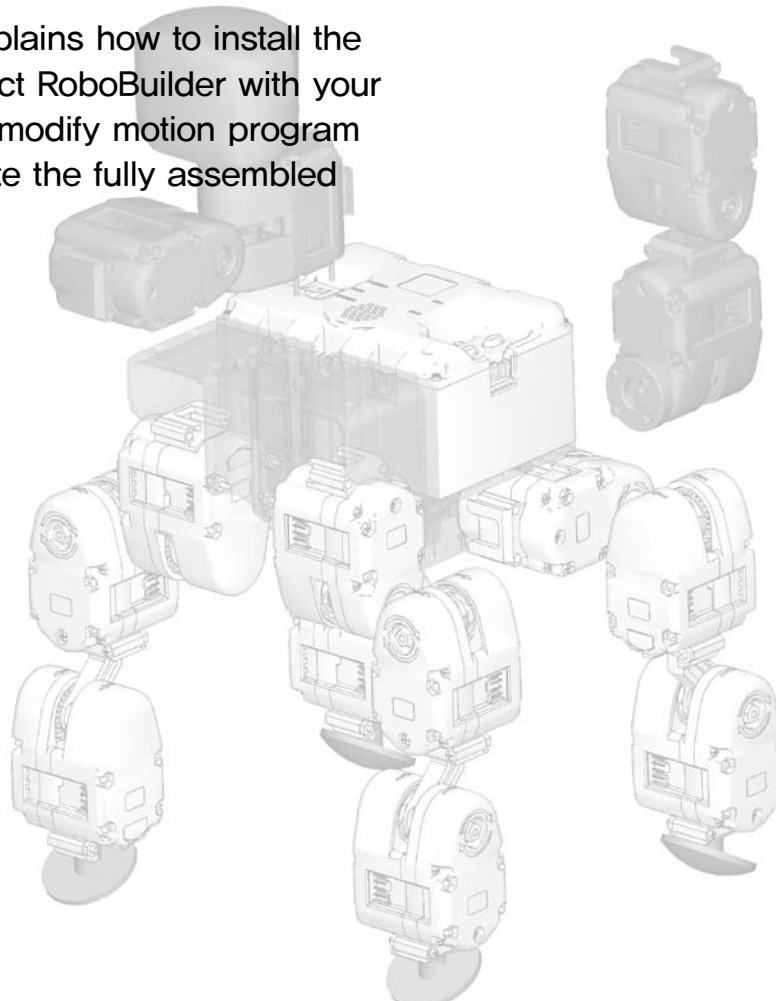
STEP 18



Chapter 3.

Operating RoboBuilder

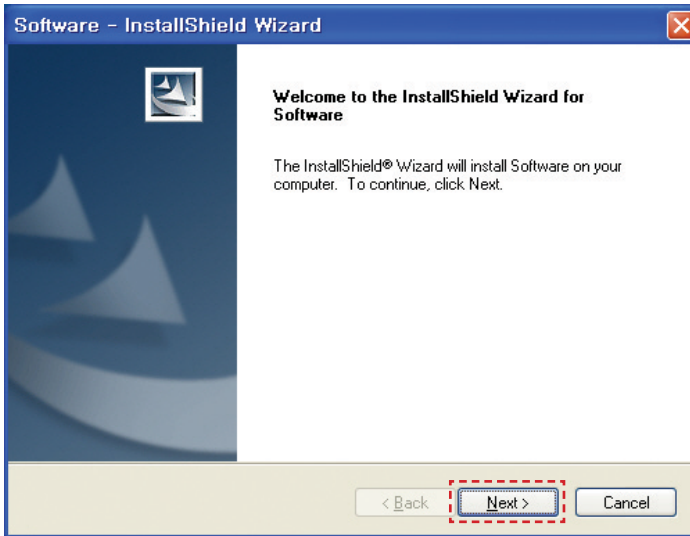
This chapter explains how to install the software, connect RoboBuilder with your PC, create and modify motion program files, and operate the fully assembled RoboBuilder.



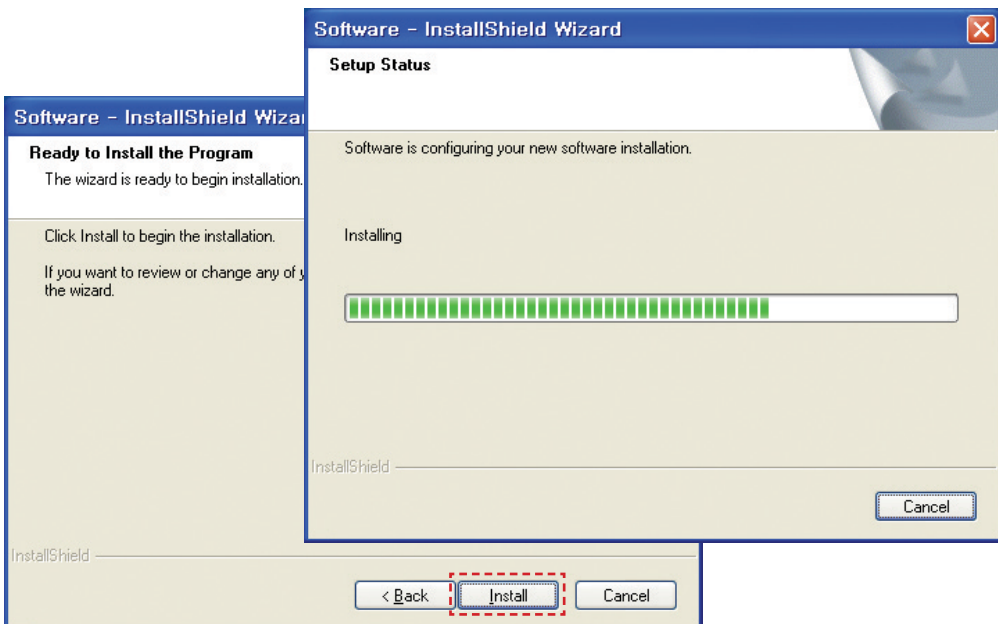
Installing the Software

Before programming and operating your assembled robot you will need to install the software from the installation CD provided with product package. Insert the CD into CD-ROM and run Setup.exe.

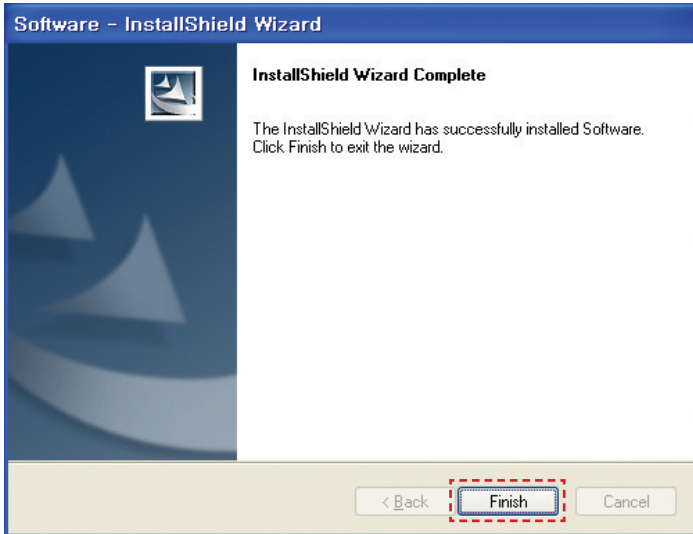
- 01 Click [Next] when Installation Wizard window pops up.



- 02 Click [Install] to start the program installation.



- 03 When the Installation Wizard Complete window appears, click [Finish] to end the installation procedure.

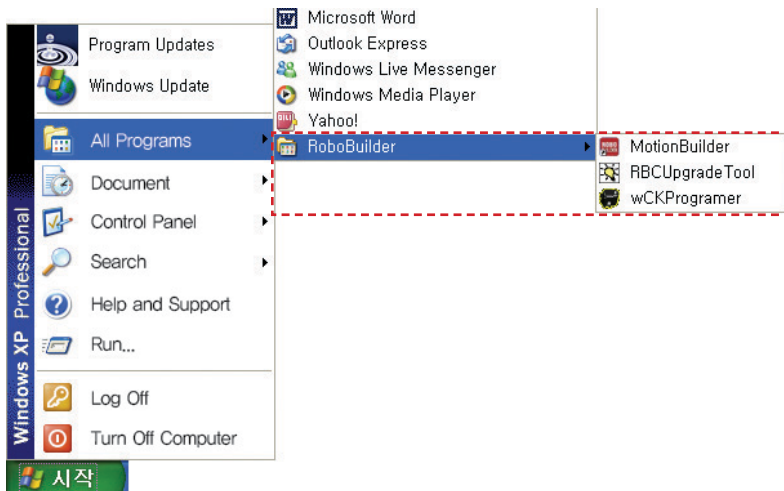


- 04 The shortcut icons of the software programs are registered on Desktop and Start Menu.

[Desktop]



[Start]

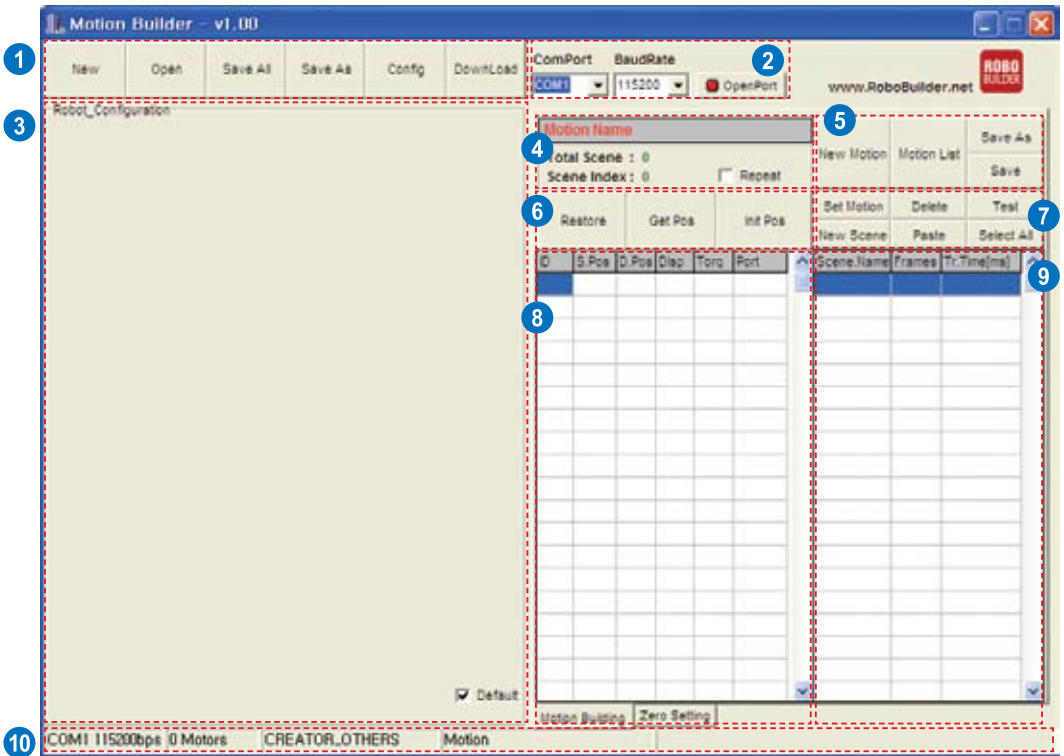


Software Components

The RoboBuilder software consists of MotionBuilder and the RBC Upgrade tool. MotionBuilder is used to create and modify robot files, transfer robot files to RoboBuilder, and adjust the home posture. RBC Upgrade tool is used to upgrade the firmware of the main control board inside the control box.

MotionBuilder

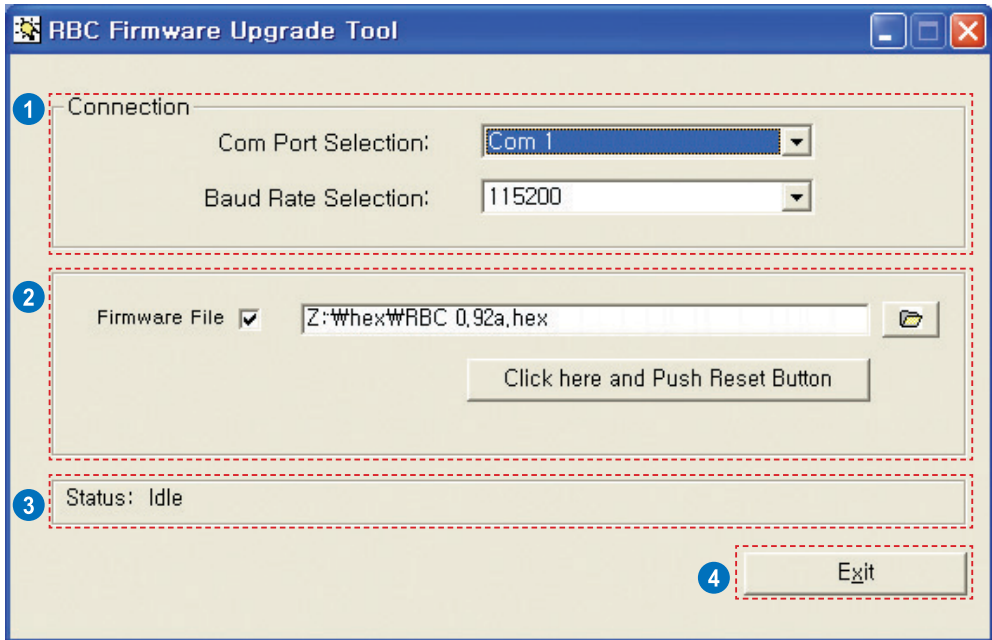
The MotionBuilder screen layout is as below.



No.	Area Name	Functions & Descriptions
①	Menu Bar	<ul style="list-style-type: none"> · New: creates a new project by defining project name, file path, robot type etc. · Open: opens an existing project file. (*.pri) · Save All: stores the running project file and all data related to the project. · Save As: saves the running project file as a different name. · Config: configures and sets the wCK module. · Download: transfers robot files to control box.
②	PC Port connection	<ul style="list-style-type: none"> · ComPort: sets the port on PC to connect RoboBuilder with. · BaudRate: sets the data communication speed, (default: 115,200kbps) · OpenPort: opens the set PC port to connect RoboBuilder with.
③	Robot Configuration	<ul style="list-style-type: none"> · This area illustrates the mechanical construction of the wCK modules. Using the jog dial pad, you can control the movement of each wCK module. <i>* If the [Default] button is not checked, you can freely relocate the jog dial pads of the wCK modules by dragging them with your mouse(right-click).</i> <i>When [Default] is selected, they return to their original default position.</i>
④	Motion File Information	<ul style="list-style-type: none"> · Motion Name: displays the name of the motion file running. · Total Scene: displays the total number of scenes that constitutes the motion file running. · Scene Index: displays the number of the selected scene in the running motion file. · Repeat: is used to repeat and test the selected one or more scenes.
⑤	Motion File Management	<ul style="list-style-type: none"> · New Motion: creates a new motion file. · Motion List: add, open, modify, or remove motion files. · Save As: saves the running motion file as a different name. · Save: saves the running motion file.
⑥	Position Control	<ul style="list-style-type: none"> · Restore: sets all modules' displacement angles of the selected scene to "0". · Get Pos: captures the desired posture of a robot after adjusting the posture manually with user's hands. Captured posture is saved as in a scene. · Init Pos: sets the initial torque and angle of the selected wCK module.
⑦	Scene Management	<ul style="list-style-type: none"> · Set Motion: sets the name and saved path of the motion file, configures PID gains of wCK modules. · Delete: deletes the selected scene. · Test: run the selected scene.(multiple scene selection available) · New Scene: adds a new scene. · Paste: pastes the copied scene in the selected position. · Select All: selects all scenes in a motion file.
⑧	wCK module Control Detail	<ul style="list-style-type: none"> · ID: displays the ID number of the wCK module. · S,Pos: stands for Start Position and it displays the start position of the wCK module in unit of control angle. · D,Pos: stands for Destination Position and it displays the destination position of the wCK module in unit of control angle. · Disp: stands for Displacement and it displays the control angle difference between S,Pos and D,Pos. · Torq: It displays the speed of the wCK module.(0: Very fast, -4: Very slow) · Port: displays the status of the LED installed on the I/O port of the wCK module.
⑨	Scene Editing	<ul style="list-style-type: none"> · Scene Name: displays the scene name. · Frames: displays the number of frames, into which a scene is divided. · Tr,Time[ms]: displays the transition time that is used for operating the corresponding scene.
⑩	Task Info	<ul style="list-style-type: none"> · displays the task related information such as the PC port connected, communication speed, number of wCK modules connected, robot type, etc.

RBC Upgrade Tool

The screen layout of the RBC Upgrade Tool is as below.



No.	Area Name	Descriptions
①	Connection	It selects the port connected between PC and RoboBuilder and the transfer speed
②	File Selection	It selects the firmware file to upgrade. Click [Click here and Push Button] for upgrade. (Press the Reset button that is located between PF1 and PF2 LEDs on the control box)
③	Upgrade	It displays the upgrade status of the status display line.
④	Exit	It ends the firmware upgrade program.

Connecting RoboBuilder with PC

RoboBuilder robot connects to a PC via an RS232 serial cable. First check the PC's com port number assignment and connect the RS232 cable to the RoboBuilder.

The appropriate platform type(HUNO, DINO, DOGY) should be set on the control box (use PF1 or PF2 button) as instructed on page 72.

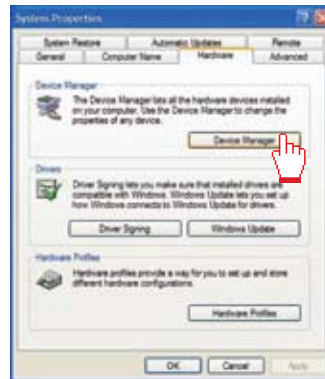
Checking PC serial Port

Check the com port number assigned to the port into which the RS232 communication cable will be plugged.

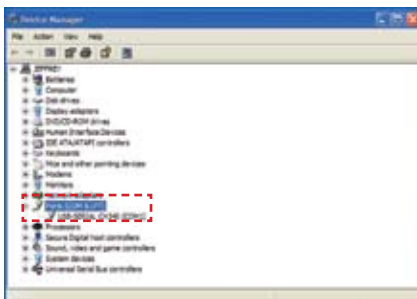
- 01** Right-click [My Computer] icon on Desktop and select the [property(R)] button.



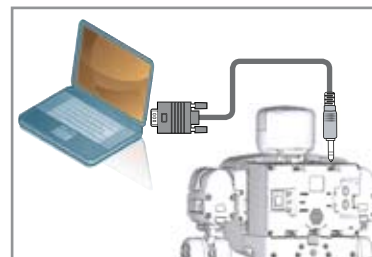
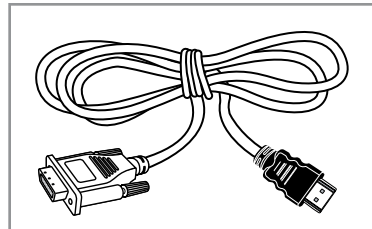
- 02** Select the [Hardware] tab in the [System Registration Information] window and click [Device Manager].



- 03** Select [Port] in the [Device Manager] window and check the serial port number assigned from PC.(COM1, COM2, etc.)



Tip! When the PC has no serial port, separately purchase and use a USB to Serial converter to connect RoboBuilder with PC.(refrain from using a converter of poor quality)

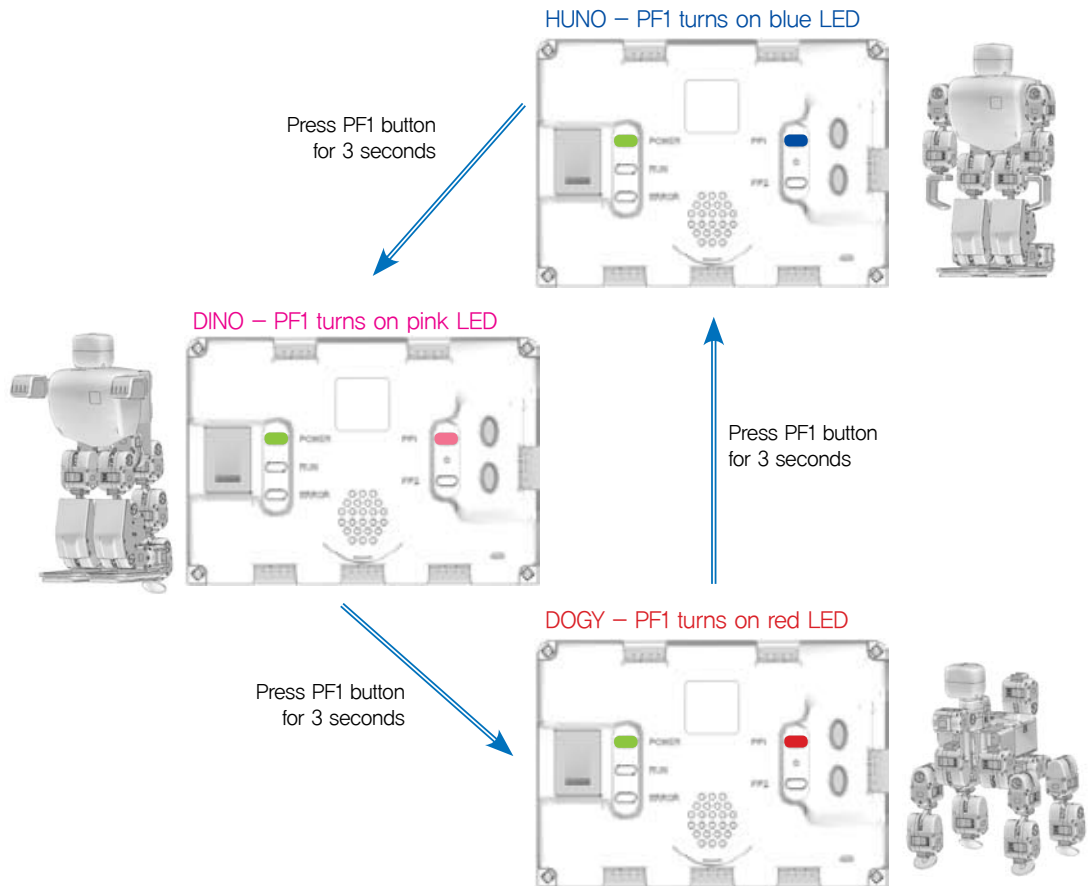


Connecting the Serial Cable

After checking the port assigned from PC, plug the RS232 cable that is provided in the product package to connect the RoboBuilder and PC.

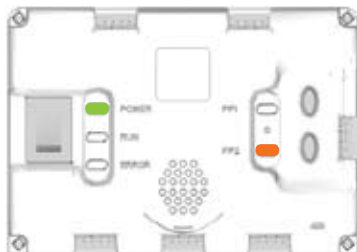
Setting Robot Platform

Appropriate platform type(HUNO, DINO, DOGY) should be set on the control box before connecting RoboBuilder with a PC. For example, if your robot is a HUNO but control box is set as DOGY platform, the robot won't operate properly. Robobuilder will think the robot is in the form of the configured platform. Below is how to set and check the correct robot platform type on control box.



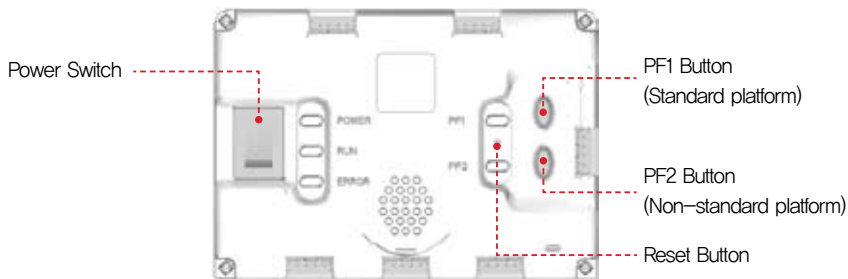
In case your robot is a non-standard platform(other than HUNO, DINO, and DOGY), press PF2 button for 3 seconds until PF2 LED turns on orange.

Non-standard platform – PF2 turns on orange LED



Operating Control Box

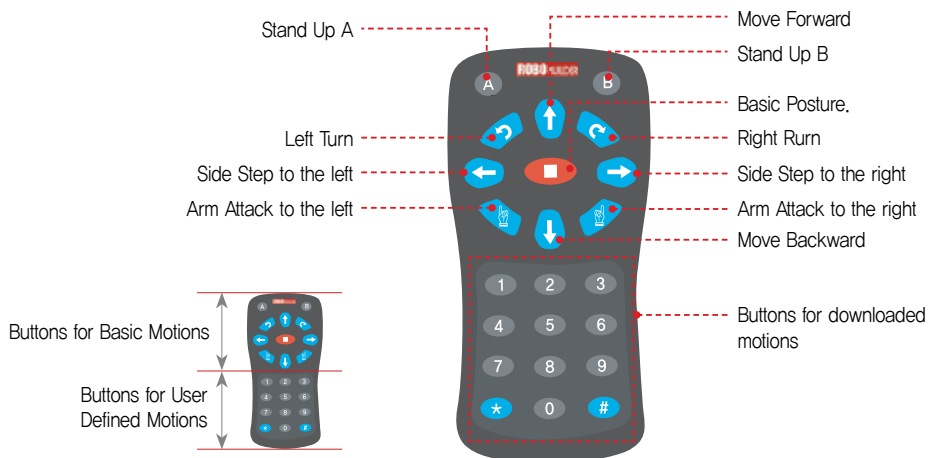
By manipulating the control box, you can turn on the robot, select the platform type as well as change to different modes such as PC control mode, battery recharge mode, firmware upgrade mode.



Function	Manipulation	Descriptions
Power ON	Turn on the power switch.	It performs self-test(LEDs sequentially turns on and off) and set as the most recently used platform. <ul style="list-style-type: none"> · HUNO: PF1 LED turns blue · DINO: PF1 LED turns pink · DOGY: PF1 LED turns red · Non-standard mode: PF2 LED turns orange
Power OFF	Turn off the power switch.	All LEDs turned off.
Power Status	LED display	Different Power LED indicates different status of battery charge level. <ul style="list-style-type: none"> · POWER LED Green: Battery charge is sufficient · POWER LED Red: Battery charge insufficient · POWER LED Red turns on and off: Immediate charge required · POWER LED Green turns on and off: In Charging mode
Home Posture	Turn on the power with PF1 button pressed and release the button after 2 seconds.	Robot slowly takes the home posture. (Only applicable for HUNO)
PC Control Mode	Turn on the power with PF2 button pressed and release the button after 2 seconds.	The control box is changed to PC control mode. <ul style="list-style-type: none"> · PF1 LED: Blue LED turns off · PF2 LED: Orange LED turns off
Platform Setting	Press PF1 or PF2 button for 3 seconds.	Each time PF1 button pressed for 3 seconds, the platform is changed in sequence (HUNO ⇒ DINO ⇒ DOGY) <ul style="list-style-type: none"> · HUNO: PF1 LED turns blue · DINO: PF1 LED turns pink · DOGY: PF1 LED turns red <p><i>* When PF2 button is pressed for 3 seconds, it is changed to non-standard platform. (Orange LED turns on)</i></p>
Remote Controller Registration	Turn on the power switch with both PF1 and PF2 buttons pressed and release the buttons after 2 seconds. When the blue Run LED blinks, use remote control and press the red button (◻) in the middle towards robot.	Press the red button (◻) of the remote control within 10 seconds for successful registration. If registration is successfully completed, all LEDs of control box blink together three times and the robot turns into standby mode. <p><i>* When firmware of control box is upgraded, user should register the remote controller again.</i></p>

Using Remote Control

The best way to use the remote control is to have remote controller point to the top of robot's head. Because the IR sensor unit is installed inside the top cover of head. Whenever a robot is turned on, press red button in the middle to have your robot take basic posture before playing with other buttons. Otherwise the buttons won't work properly. (This is a setting to prevent users from being injured by robot's unexpected sudden action)



Button	Motion	Button	Motion
1	Perform motion number 1	* 1	Perform motion number 11
2	Perform motion number 2	* 2	Perform motion number 12
3	Perform motion number 3	* 3	Perform motion number 13
4	Perform motion number 4	* 4	Perform motion number 14
5	Perform motion number 5	* 5	Perform motion number 15
6	Perform motion number 6	* 6	Perform motion number 16
7	Perform motion number 7	* 7	Perform motion number 17
8	Perform motion number 8	* 8	Perform motion number 18
9	Perform motion number 9	* 9	Perform motion number 19
0	Perform motion number 10	* 0	Perform motion number 20

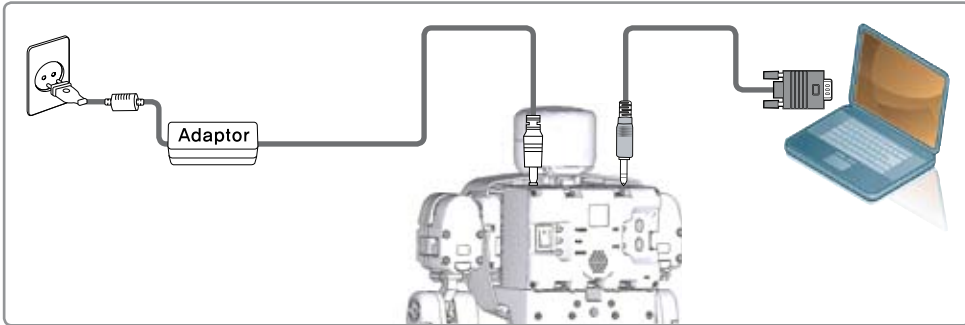
(press a numeric button with * button pressed)



- Do not use the remote control under a strong fluorescent lamp light. The IR sensor unit inside the top cover of head may be affected by the fluorescent light.
- Maximum 5 remote controls can be registered to one control box, which means 5 different users can control a robot together. If a user registers a 6th remote control, the 1st remote control information is deleted, so the control box only remembers the most recently registered 5 remote controls.

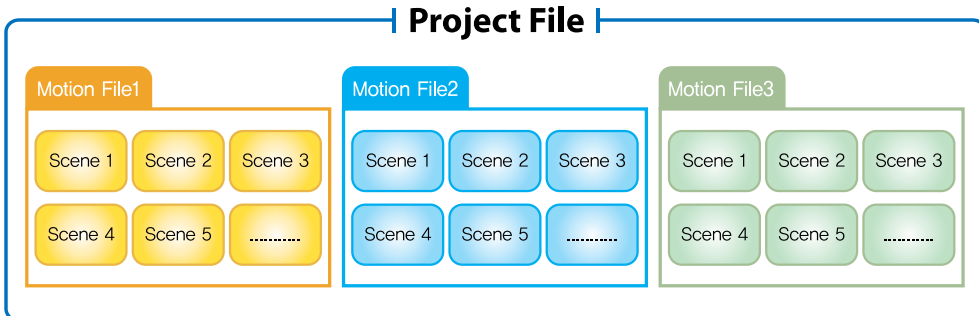
Programming

Before starting programming, turn on your PC, run the MotionBuilder program, and then connect RoboBuilder with your PC through the PC cable. Set RoboBuilder to “PC Control Mode” before it is connected with PC. If you are planning on programming for long time connect the power adaptor too.



A motion file is what defines the RoboBuilder’s movements(file extension is .rbm).



If RoboBuilder can display a motion, then this motion file is played in the control box. A project file includes more than one motion file and is used to manage multiple motion files efficiently. A motion file consists of more than one scene.

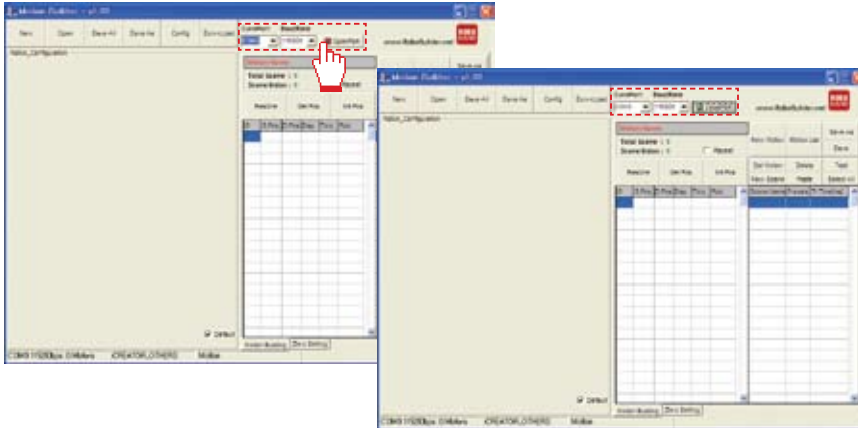


Tip

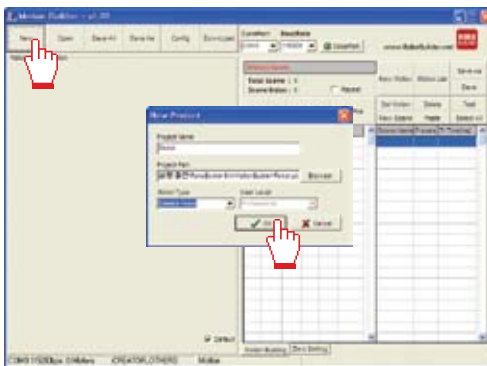
- Project file: It consists of multiple motion files that are created or edited by a user.
- Motion file: It consists of multiple scenes and executes a complete motion.
- Scene: It is a smaller motion unit that constitutes a complete motion file, which contains the information such as frames, Tr. Time, movement of wCK modules, LED lighting, etc.
- Frame: It is a smaller motion unit that constitutes a scene.
The greater the number of frames, the smoother the robot’s motion will tend to be.

Creating New Robot File(example, HUNO)

- 01 Set ComPort and BaudRate, and click OpenPort(). If the connection between PC and RoboBuilder is normal, the button changed to ClosePort().



- 02 Select [New] on the menu bar. In the [New Project] window, assign project name, select the location to save the project file, and robot platform type. Then click [OK].

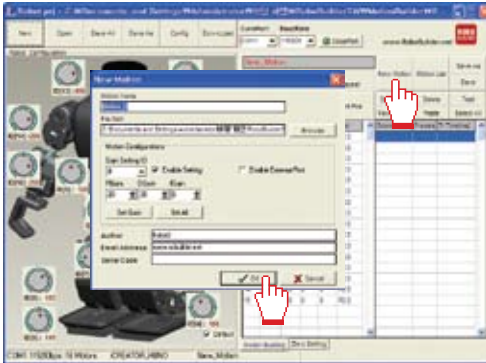


- 03 new project for HUNO is created and HUNO image shows up and the basic information of the wCK modules appear on the [Robot Configuration] area.



Do not be surprised because the robot can move suddenly at this moment.

- 04 Select [New Motion] to add a new motion file into the project. Select the motion file name and save path etc, and click [OK]



- 05 Register the first scene in the created motion file. Set the name of the scene, the number of frames, and Tr.Time, and click [OK].



Tip Tr.Time/Frame = 20~50 recommended,
Do not set this value less than 20.

- 06 The new scene is now registered and the total scene is changed to "1."





1	2	3	4	5	6	7	8	9
ID	S.Pos	D.Pos	Disp	Torq	Port	Scene.Name	Frames	Tr.Time[ms]
0	125	125	0	2	P0:0	Scene_0	10	500
1	179	179	0	2	P0:0			
2	199	199	0	2	P0:0			

No.	Name	Description
①	ID	It displays the ID number of the wCK module.
②	S.Pos	It displays the start position of the wCK module as in control angle.
③	D.Pos	It displays the destination position of the wCK module as in control angle.
④	Disp	It displays the displacement between D.Pos and S.Pos as in control angle.
⑤	Torq	It displays the motion speed of the wCK module.
⑥	Port	It displays the LED status of the wCK module. (only available for transparent wCK module)
⑦	Scene.Name	It displays the name of the scene.
⑧	Frames	It displays the number of frames.
⑨	Tr.Time[ms]	It displays the transition time of the corresponding scene. (Unit: ms)

The control angle 1 means the physical angle 1.05° (degree).

07 When you press [Test] button, the robot moves to the destination position of the selected scene and the [Test] button get changed to [Return] button. In this state, set the posture of the robot by adjusting the angles of wCK modules. You can drag the red point in the jog buttons for wCK modules on the [Robot Configuration] area.

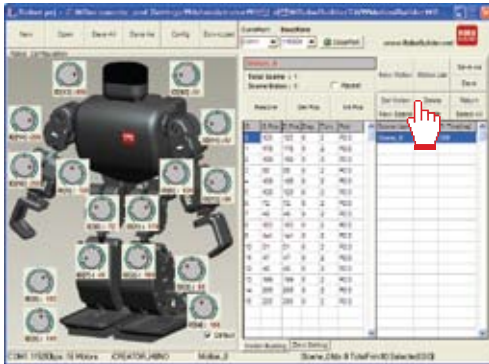


The angle setting is available within the range of the minimum and maximum value stored in the [Config] menu.



When you adjust the angle by using the red point on the wCK module jog button, slowly rotate the red point because a sudden movement of robot may cause the robot to fall or an injury to user.

- 08** When the desired posture with required destination positions are set, click [Return].
The changed settings are saved in the scene and the [Return] button is changed back to [Test].

**Tip**

If a scene is clicked, the robot moves to start position of the corresponding scene.

If you click on a scene click [Test], the robot shows the motion saved in the scene by moving to the destination position. More than one scene can be selected and tested by dragging multiple scenes. If the [Repeat] check box is selected in the Motion File Information area, the robot repeatedly performs the selected scenes.

Tip

For more precise control of the wCK module angle when setting the destination position, the user can follow the three different methods instructed below:

1. Adjusting by changing D.Pos value

- ① Select the scene to change and click [Test].
- ② When the button is changed to [Return], double-click the D.Pos value of the wCK module to change.
- ③ Type in the numeric D.Pos value and press ENTER.
- ④ Click [Return] to save the changed value.



2. Adjusting by changing Disp value

- ① Select the scene to change and click [Test].
- ② When the button is changed to [Return], double-click the Disp value of the wCK module to change.
- ③ Type in the numeric Disp value and press ENTER.
- ④ Click [Return] to save the changed value.



3. Teaching Method(Posture Capture using [Get Pos] button)

➔ Refer to P84 for details about Motion-Teaching method

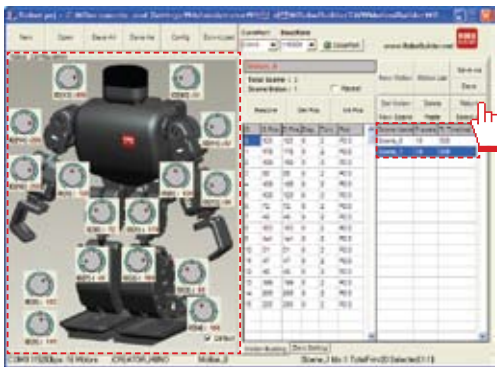
- ① Select the scene to change and click [Test].
- ② When the button is changed to [Return], click [Get Pos].
- ③ Select the wCK modules to adjust and click [Close].
- ④ Now the selected wCK modules are in Teaching Mode so manually adjust posture of the robot using hands.
- ⑤ Click [Capture].
- ⑥ Click [Return] to save the changed settings.



- 09 Click [New Scene] to add another scene. Give the new scene a name, the required number of frames, and the Tr.time. Then click [OK]. A new scene is added.



- 10 Select added scene, click [Test] (it is changed to [Return] button), and adjust the posture for the destination position.





Repeat the process of adding scenes as shown above until you finish a complete motion file.

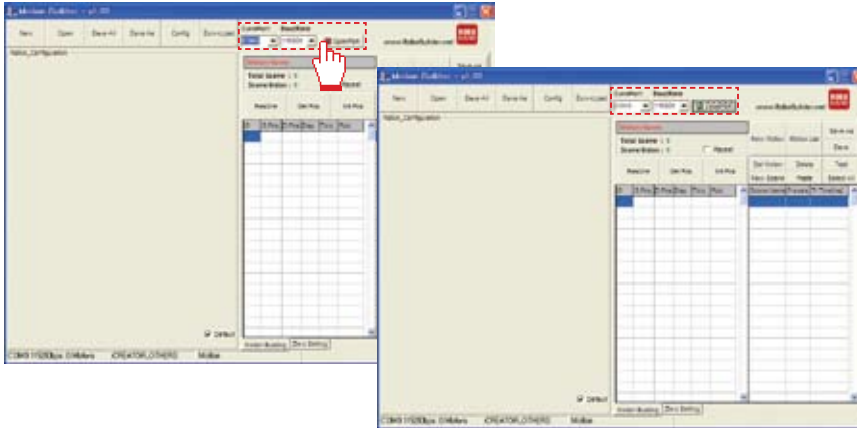
- 11 When programming is completed, click [Save All] to save the project and motion file information.



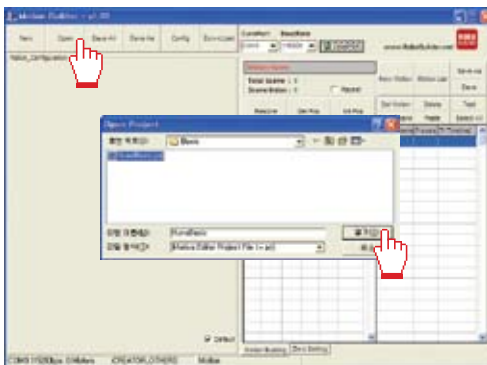
Modifying Robot File(example, HUNO)

To modify an existing motion file, follow the instructions below:

- 01** Set ComPort and BaudRate, and click OpenPort(). If the connection between PC and RoboBuilder is normal, the button changed to ClosePort().



- 02** Select [Open] on the menu bar. Select the desired project in the [Open Project] window and click [Open]. (e.g. HunoBasic.prj)



Tip! In order to modify a motion file that you downloaded from Internet, add the motion file to a desired project first.

- 03** The settings of the wCK modules appear in the [Robot Configuration] window. At the same time, the first motion file that is saved in the project opens.



Tip! In case of HunoBasic.prj, the HunoBasic_PunchLeft motion opens.

- 04 Open [Motion List] menu. Choose a motion file to modify and click [Open to Edit]. The selected file opens.



- 05 When the scene to modify is selected, the robot moves to the start position of the corresponding scene and the wCK module angle appears in the [Robot Configuration] window. Detailed control information is shown on the [wCK Module Control Detail] area in the middle of the screen.



- 06 When the selected scene is double-clicked, the detail information of the scene will appear in a pop-up window. Change the scene name, number of frames, and Tr.Time if needed.

Set Motion	Delete	Test
New Scene	Paste	Select All
Scene Name	Frames	Tr.Time[ms]
Data_0	1	70
Scene_1	8	310
Scene_2	1	420
Scene_4	5	200
Data_0	15	300



Set Scene ✖

Scene Name

Number of Frame Transition Time [ms]

- 07** To change a scene, select the scene and click [Test]. The robot moves to destination position and stops. Use the jog buttons of wCK modules in the [Robot Configuration] area to adjust the angles of required wCK modules. When the angle adjustment is completed, click [Return] to save the change.



Scene.Name	Frames	Tr.Time[ms]
Data_0	1	70
Scene_1	8	310
Scene_2	1	420
Scene_4	5	200
Data_0	15	300

**Tip!**

For more precise control of the wCK module angle when setting destination position, user can follow the three different methods instructed below:

1. Adjusting by changing D.Pos value

- ① Select the scene to change and click [Test].
- ② When the button is changed to [Return], double-click the D.Pos value of the wCK module to change.
- ③ Type in the numeric D.Pos value and press ENTER.
- ④ Click [Return] to save the changed value.

2. Adjusting by changing Disp value

- ① Select the scene to change and click [Test].
- ② When the button is changed to [Return], double-click the Disp value of the wCK module to change.
- ③ Type in the numeric Disp value and press ENTER.
- ④ Click [Return] to save the changed value.

3. Teaching Method(Posture Capture using [Get Pos] button)

➔ Refer to P84 for details about Motion-Teaching method

- ① Select the scene to change and click [Test].
- ② When the button is changed to [Return], click [Get Pos].
- ③ Select the wCK modules to adjust and click [Close].
- ④ Now the selected wCK modules are in Teaching Mode so manually adjust posture of the robot using hands.
- ⑤ Click [Capture].
- ⑥ Click [Return] to save the changed settings.



- 08** When the required scene modification is completed, click [Save All] to save the project and motion file.



Quick & Easy Motion–Teaching Programming Method

What is the Motion–Teaching Programming Method?

The motion–Teaching Programming Method is a quick & easy way of creating robot’s motions. When editing a scene, click the [Get Pos] button in the middle of screen and use your hands to adjust the angles of desired wCK modules freely.

The captured posture is saved as the destination position of the selected scene. The destination position is automatically saved as the start position of the next scene.

- 01 Select a scene to edit and click [Test].
Robot moves to destination position of the scene and the [Test] button is changed to [Return].



Tip! You can either add a new scene or select an existing scene.

- 02 Click [Get Pos] in the middle of screen.
A wCK module selection window appears and the button is changed to [Capture].

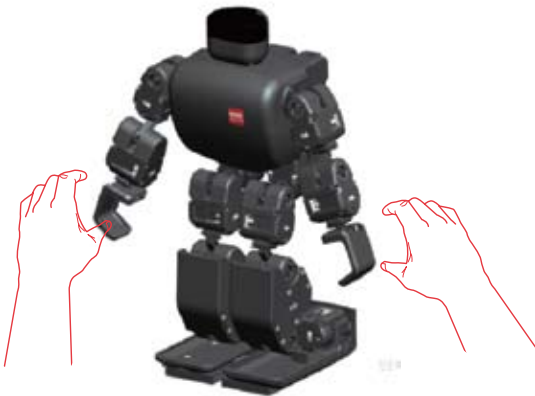


- 03** Check the desired IDs of wCK modules to be adjusted and click [Close].
If you touch and handle the wCK modules with your hands, you can feel the selected modules are now free of Torque and freely movable.



Tip Now the selected wCK modules are in “Teaching Mode”. The unselected wCK modules are powered with torque and difficult to rotate, which is set to help the robot stand still.

- 04** Use your hands to freely adjust the desired posture of the robot.



Tip Be careful not to forcefully rotate the unselected wCK modules.

- 05** When finished with manual posture adjusting, click [Capture] to load in the change.





Tip The [Capture] button returns to [Get Pos] button.

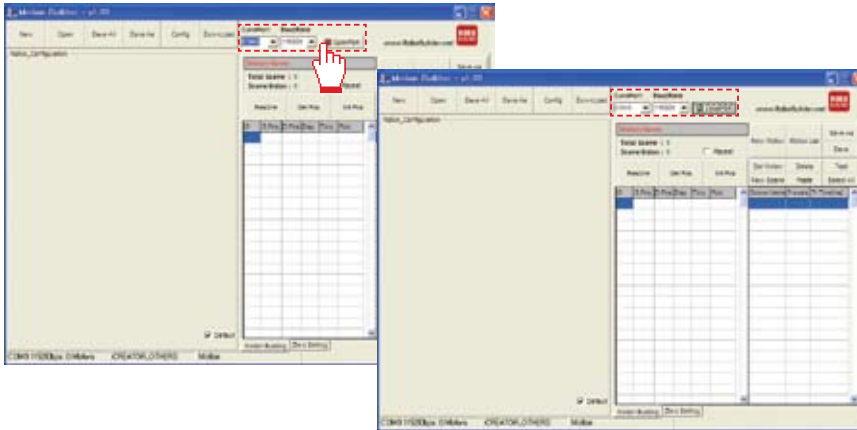
- 06** Click [Return] to save the change and close.

- 07** If the adjusted posture is not perfect, repeat the step 01 to 06.

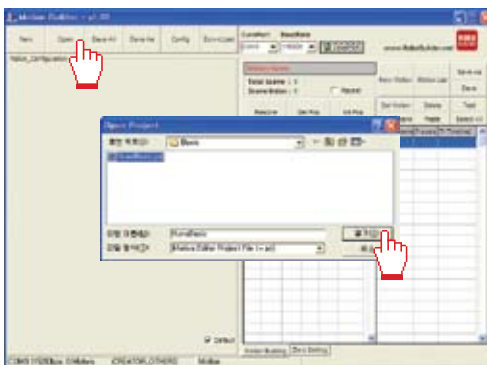
Modifying Downloaded Robot File

The following section explains how to modify robot files that a user has downloaded from the Internet.

- 01 Set ComPort and BaudRate, and click OpenPort(). If the connection between PC and RoboBuilder is normal, the button changed to ClosePort().



- 02 Select [Open] on the menu bar. Select the desired project in the [Open Project] window and click [Open]. (e.g. HunoBasic.prj)





- 03** Choose [Motion List] menu and click [Add to Project] to select the file that you downloaded from Internet and saved in your hard disk.
Click [Open to Edit] button to open the motion file.

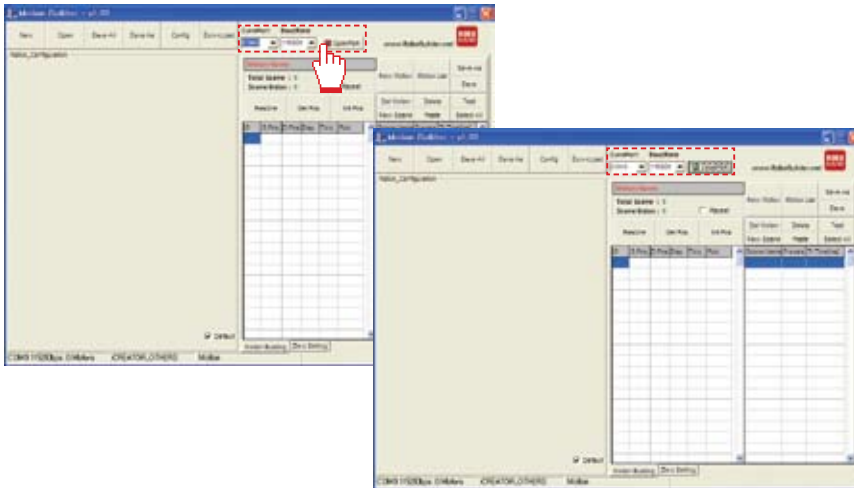


- 04** Follow the steps of 05~08 of [Modifying Existing Robot File] section in page 82~83.

Transferring Robot File to Control Box

You should first transfer and save robot files to control box before playing the robot using remote control. Any robot file that you created with Motion Builder or downloaded from the Internet can be used. The file transfer is done as per the instructions below.

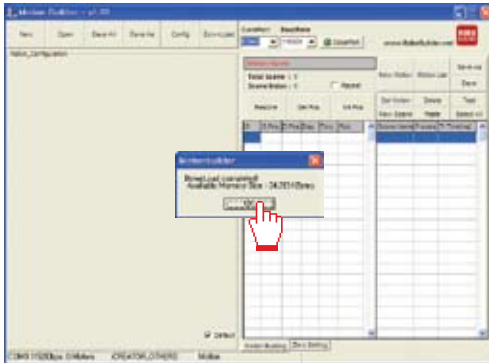
- 01 Set ComPort and BaudRate, and click OpenPort(). If the connection between PC and RoboBuilder is normal, the button changed to ClosePort().



- 02 Click [Download] on the menu bar.
Select the robot file to transfer to control box, and click [Open].



- 03** The selected [motion file] is transferred to control box. When download completed, success message appears. Click [OK] to finish.
Repeat step 02 and step 03 until you transfer all required files.




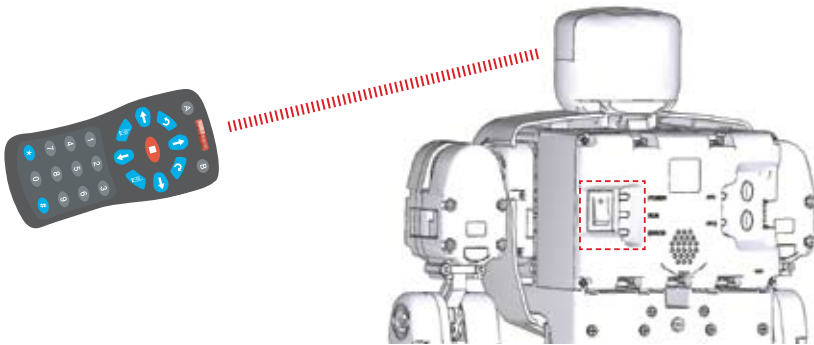
Caution

- Once file transfer starts, all robot files already existing in control box are deleted and new files saved from the beginning. So the first file transferred is assigned to button 1 of remote control, the second file transferred is assigned to button 2, and the third file to button 3 and so on. So you have to plan and decide which robot file to be assigned to which button of remote control before you actually start the file transfer.
- If the size of a certain robot file is too large, the control box may not be able to save up to 20 files.
- The motion performed with MotionBuilder can be a little bit different from the motion actually performed with the transferred motion file.

Playing with Robot

When building and programming are completed, you can play the RoboBuilder and have it play the motions saved in control box by using remote control.

- 01 Turn on the control box and press the basic posture button () on the remote control. (Unless the basic posture button is pressed, other buttons do not work.)



- 02 According to platform type, the Robot takes its basic posture.
- 03 Perform motions by pressing the basic motion buttons or user defined motion buttons on the remote control.
- 04 RoboBuilder performs best when the robot is located on a flat, horizontal, and hard floor. A robot may lose balance, fall down, or show an awkward movement on a floor which is uneven, or made from rough material such as carpet, rug etc.
- 05 The basic motions of the standard platform robots(HUNO,DINO,DOGY) are available and playable immediately after building is completed. Use the buttons for basic motions.

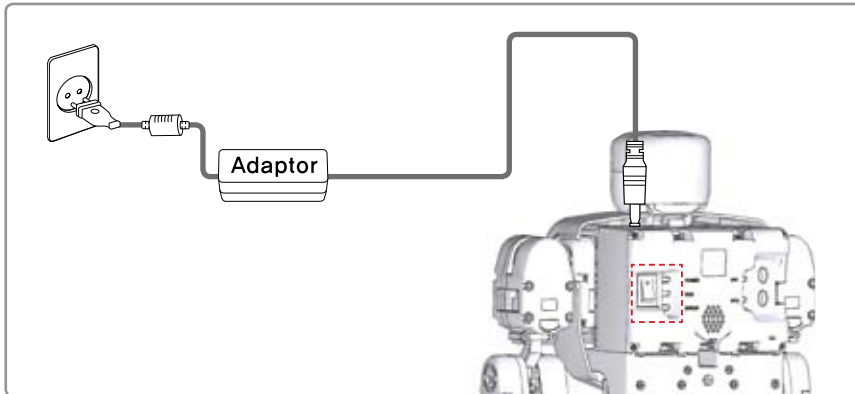


For more information on the remote control, refer to the "Using Remote Control" section on page 74.

Recharging Battery

To charge the battery enclosed in the control box, connect the adaptor to the control box as shown in below picture and turn on the power to prepare for charging.

The battery charging takes one and a half hour and automatically stops when finished.



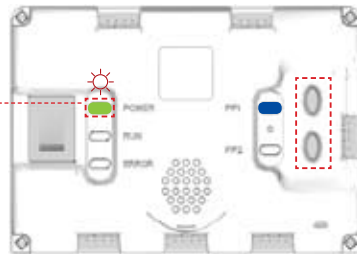
● How to Start Battery Charging

Press the **#** button and **A** button on the remote control at the same time,



Or

Press the PF1 button and PF2 button at the same time for more than 3 seconds.



When charging begins, the green LED starts blinking. Blinking stops when charging finished.

Tip

- If you choose to press PF1 and PF2 buttons on the control box, make sure the two buttons are pressed simultaneously. Otherwise robot may execute another function.
- When shipped from the factory the battery pack are not charged. So please use power adaptor to operate the robot the first time.
- The enclosed power supply is used not only for recharging the battery but also for supplying direct power to the robot. So it can be used as an alternative to the battery and be used to operate the robot continuously (This function is not supported when recharging battery).



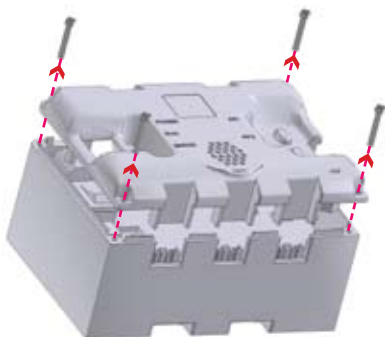
Caution

- If battery is fully charged, the robot can operate continuously approximately for 10 minutes to 30 minutes. The operation time varies depending on the characteristics of a robot file, i.e. the types of motions performed.
- If you leave the controller on for long time with power on, it may cause a failure or a damage to battery.
- When you recharge the battery more than twice consecutively, it may cause a failure or a damage to the battery.

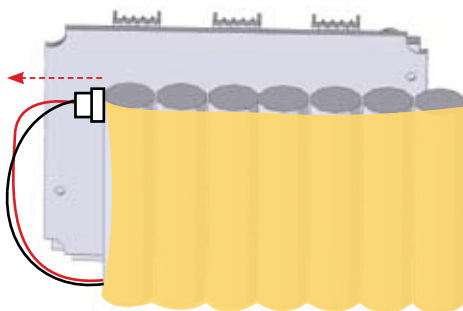
Replacing Battery

The battery replacement procedure is as follows:

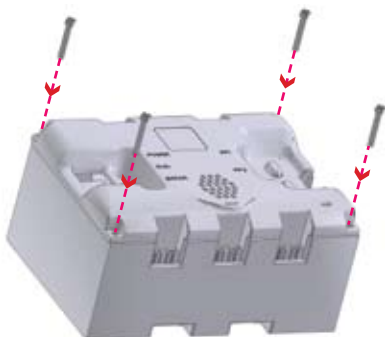
- 01 Remove the four bolts from the cover of control box.



- 02 Replace the batteries after disconnecting the connector. (Battery Type: 8.4V Ni-MH)



- 03 Close the cover of the control box and screw in the four bolts.



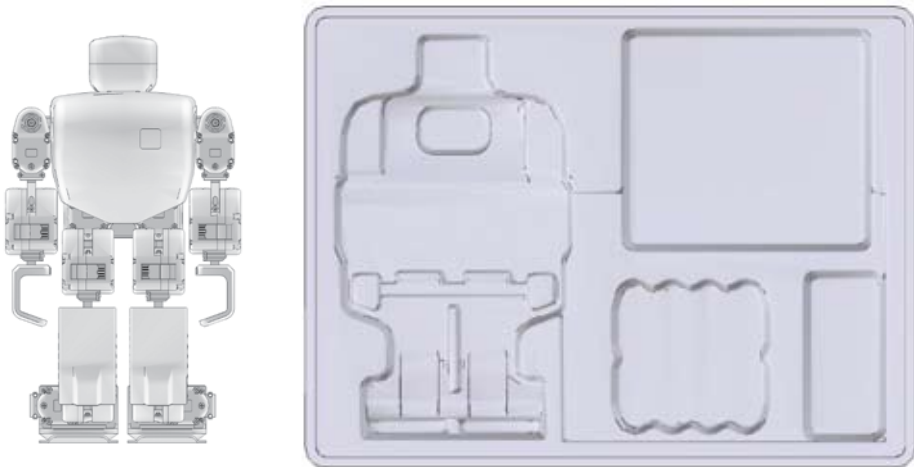
Setting Home Posture

In case of HUNO, if RoboBuilder's motion is unstable or abnormal, you can choose to adjust the Home Posture. For example, if robot's movement is different from what it is supposed to be and it doesn't move as the way the robot file defines, you can correct the problem by adjusting the Home Posture. The Home Posture adjustment is done as follows:

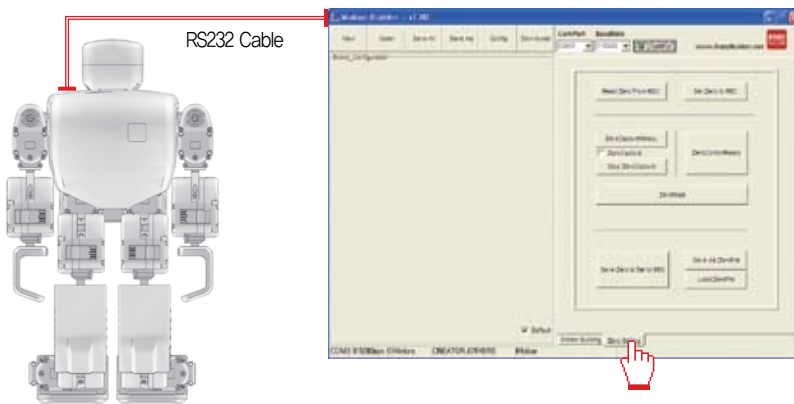
Using the Package Tray

You can adjust the home posture by using the plastic tray provided with the product package.

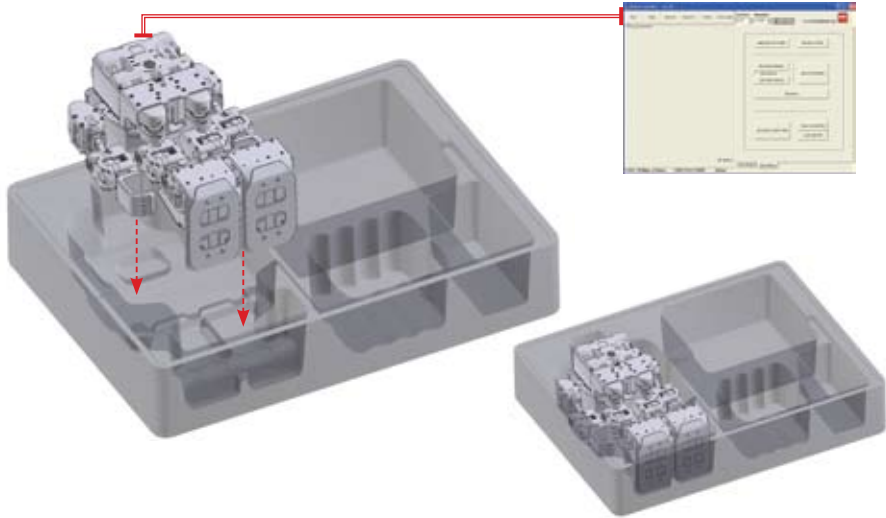
- 01 Prepare fully assembled HUNO and tray.



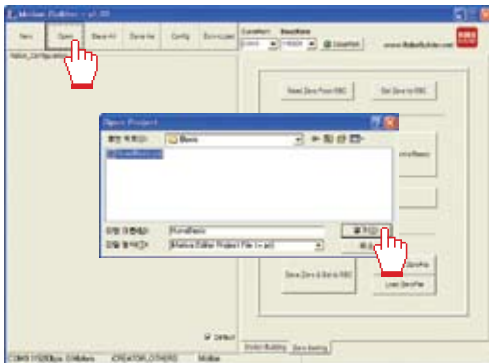
- 02 Run MotionBuilder software and connect RoboBuilder with PC using PC cable. Set Com port and BaudRate and click `OpenPort()`. If the connection between PC and RoboBuilder is normal, the button will change to `ClosePort()`. When the connection is ready, select the [ZERO Setting] tab.



- 03** Lay down HUNO into the tray as shown in the picture.
Turn on the control box as in PC Control Mode.



- 04** Click [Open] on the menu bar to open a HUNO project. Any HUNO project will work.

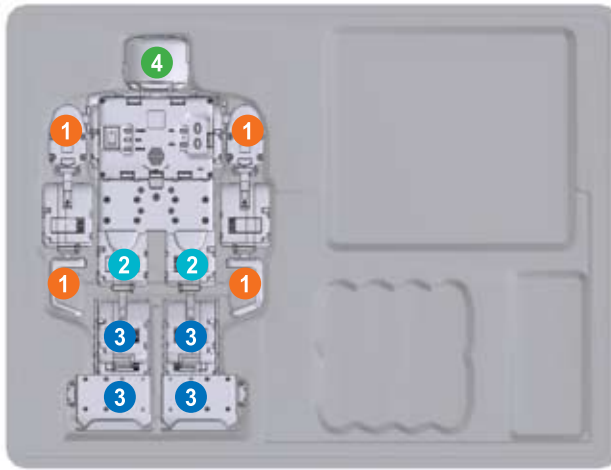


- 05** Click [ZeroCaptureReady] and use hands to make sure that HUNO is correctly inserted into the tray. The front HUNO should be tightly touching the hollow surface of tray.





Make sure that HUNO is laid down tightly into the tray by pressing some points of robot's back side. Follow the sequence as shown below.

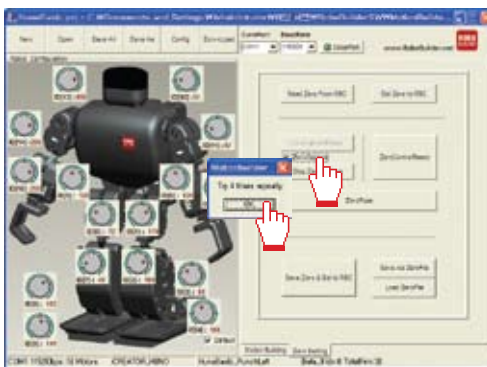


- ① Press position 1(1), vertically together by using thumbs and index fingers of two hands.
- ② Use one hand to vertically press position 4(4) and use the other hand to press position 2(2).
- ③ Press position 3(3) vertically with two hands.
- ④ Repeat step ② to press position 4(4) and position 2(2) together.

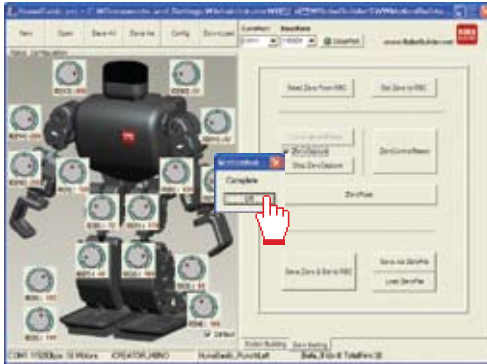


Correct Home Posture can be secured only when the front of the robot is tightly attached to the hollow surface of tray.

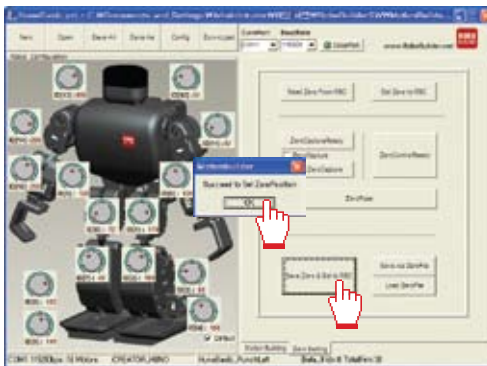
- 06 If robot is laid correctly, click [ZeroCapture]. The current posture is copied in as one of the five sampling postures and pop-up windows appears saying "4 times left". Click [OK].



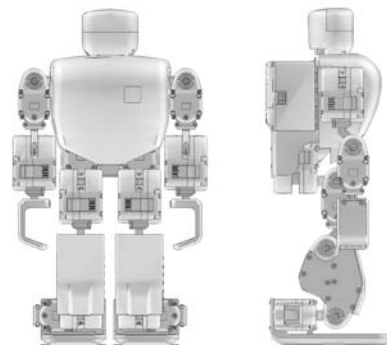
- 07** Pull out HUNO from tray and release wCK modules.
 Follow step 05 and 06 to complete the required 5 of posture captures.
 When the adjustment is completed, a pop-up window appears saying "Complete!". Click [OK].



- 08** Click [Save Zero & Set to RBC] to save the home posture and apply it to control box. click [OK].





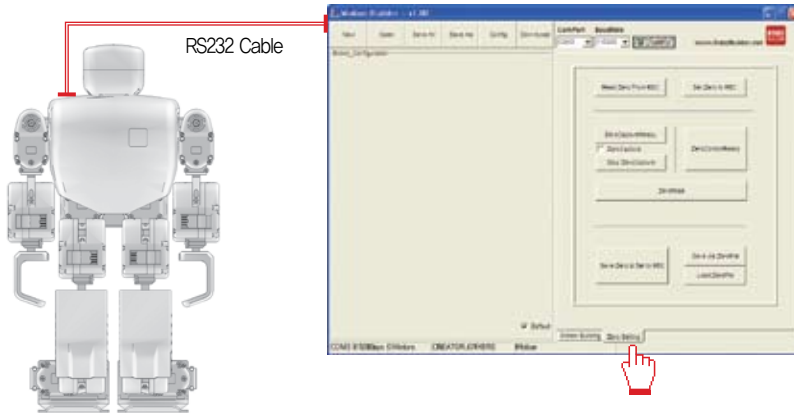
- 09** Remove HUNO from the tray and click [ZeroPose] to check if new home posture is correctly configured or not.



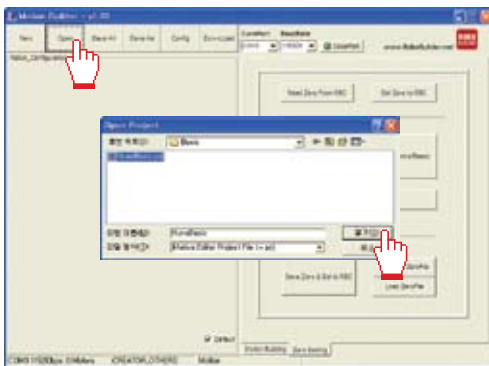
Adjusting Home Posture Manually

Without using the tray, you can also adjust robot's home posture manually.

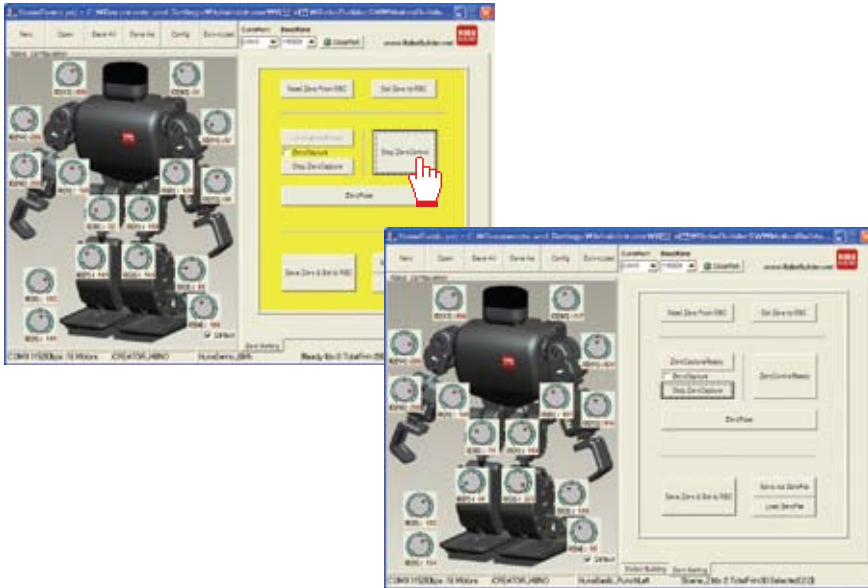
- Run MotionBuilder software and connect RoboBuilder with PC using PC cable. Set Com port and BaudRate and click OpenPort( OpenPort). If the connection between PC and RoboBuilder is normal, the button will change to ClosePort( ClosePort). When connection is ready, select the [ZERO Setting] tab.



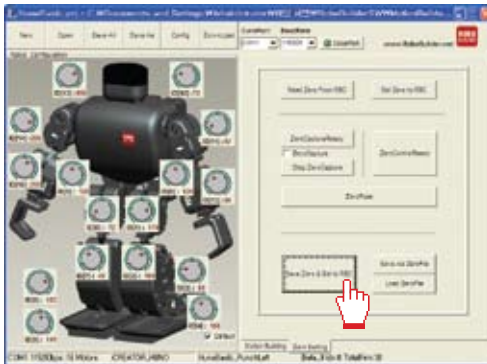
- Click [Open] on the menu bar to open a HUNO project. Any HUNO project will work.



05 When adjustment is completed, click [StopZeroControl].



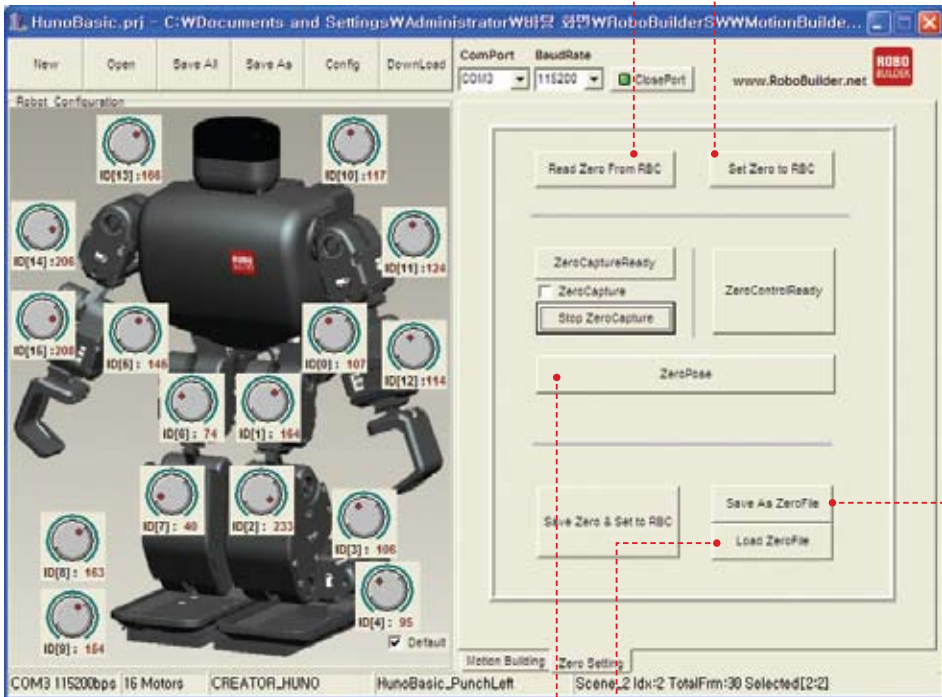
06 Click [Save Zero & Set to RBC] to save the home posture and apply it to control box.



Manipulating Home Posture File

This button fetches the zero point file saved in control box.

This button applies the changed home posture values to control box.



This button makes the robot take the corresponding home posture.

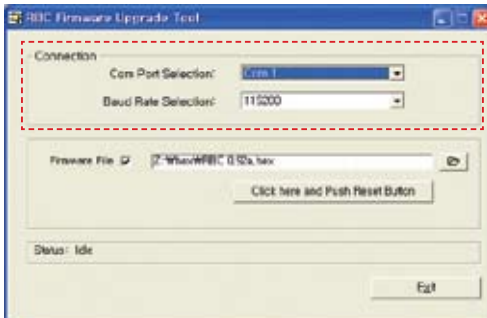
This button saves a copy the home posture file as a different name.

This button loads up any home posture file separately saved elsewhere.

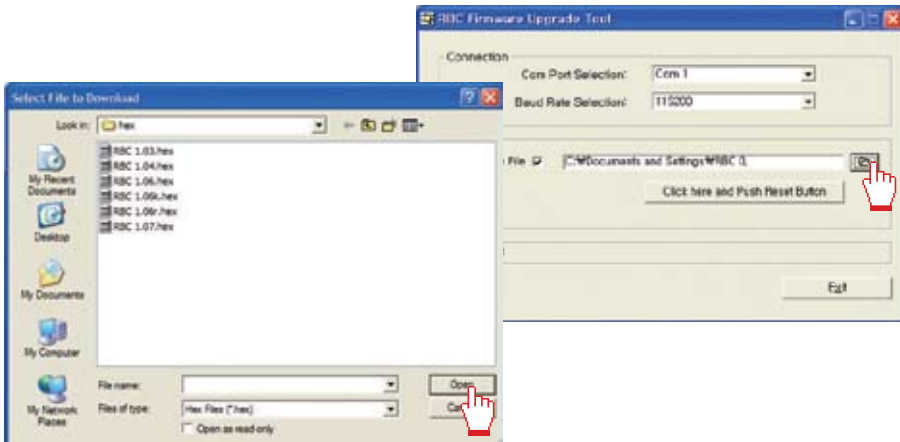
Upgrading Firmware

The procedure to upgrade control box with up-to-date firmware is as follows.

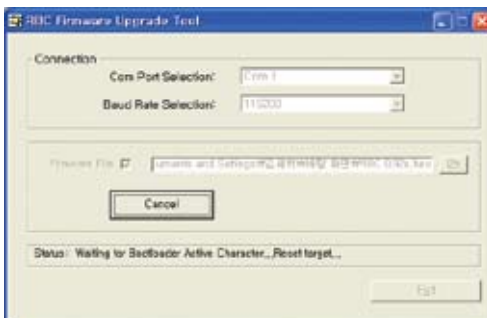
- 01 Run “RBC Upgrade Tool” software and turn on the control box.
- 02 Connect control box with PC using RS-232 cable. Set Com Port and Baud Rate.



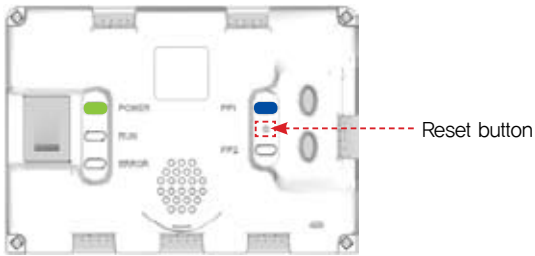
- 03 Select the firmware file to use for upgrade by clicking the folder icon, click [Open] when firmware hex file is selected.



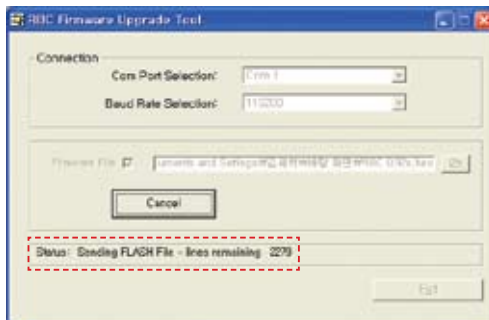
- 04 Click [Click here and Push Button] to enter “upgrade ready state”.



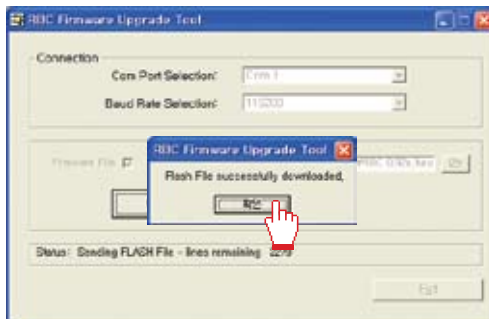
05 Press the Reset button by using a pointed pen or a pin.



06 Selected firmware file is transferred to control box.



07 When upgrade is completed, control box is automatically reset. Then a complete message appears. Click [OK].



The firmware upgrade procedure is finished. Click [Exit] to terminate the program.



After upgrading firmware, be sure to perform the following three steps.

- ① Register remote control again.
- ② Set robot's platform type again. (use PF1 or PF2 button.)
- ③ Reset home posture.

Chapter 4.

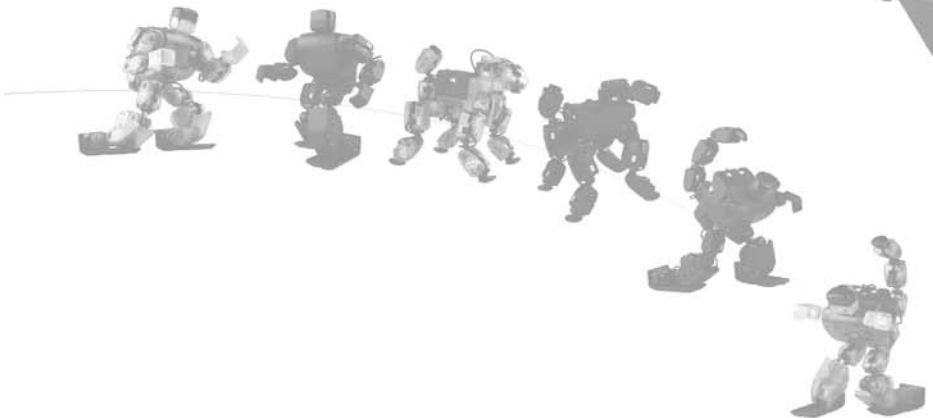
Troubleshooting

This chapter explains how to solve problems that you may encounter in the process of building a robot, programming a robot file, or operating a robot platform.



ROBOBUILDER

The Robot Builder's DIY Kit



When wCK module's rotation axis doesn't move smoothly

[Cause]

In some cases, the wCK module's rotation axis may get stiff and won't rotate smoothly when you try to move it with your hands. This is not a product failure but a situation caused by the tight arrangement of the internal gears.

Tight gear arrangement is designed for precise motion control. So you can see the robot moves smoothly without a problem when building is finished and power is supplied to each of wCK modules.

[Troubleshooting]

Solution 01

Turn the joint slightly in the opposite direction first and try again to turn in the desired direction.

Solution 02

If you can't provide enough force, use J5(Joint 5) to rotate the wCK module. Much greater torque can be leveraged and it's easier to rotate the axis.

Solution 03


Connect the wCK module and sensor module to control box.

Turn on the control box and have it take Basic Posture by pressing the red button on remote control.

※ Please refer to the homepage or product CD for more information.

When Robot doesn't take correct Basic Posture.

[Cause]

The Basic Postures of the three standard robot platforms are as shown in below pictures. If a robot doesn't show the exact Basic Posture when you push the red button () on the remote controller, the robot doesn't move properly or the red Error lamp is turned on, then the robot may not be built correctly or may have another problem.

In this case, please refer to Chapter 4 [Troubleshooting] to solve the problem. Always make sure that you start the robot from the correct Basic Posture. Trying to play the robot continuously with the Error lamp on may cause a serious product failure or damage.

(When Error lamp is turned on, the robot doesn't take any command signals from the remote control for 30 seconds, which is designed to protect possible damage to product.)

[HUNO Basic Posture]



[DINO Basic Posture]



[DOGY Basic Posture]



STEP 01 Is battery charged enough?

When shipped from the factory, the battery pack enclosed in control box is not charged. So please use the power adapter to operate robot the first time. The enclosed power supply is used not only for recharging battery but also for supplying direct power to the robot. So it can be used as an alternative to the battery and can play the robot continuously (This function is not supported when recharging battery).

[Troubleshooting]

Connect the power adapter first before you start playing the robot. Or you can recharge the battery first by pressing PF1 button and PF2 button simultaneously for 3 seconds. It takes one and a half hour for the battery to be fully recharged.

STEP 02 Is the Robot's platform type correctly set on control box?

If correct robot platform type is not set on control box, the robot doesn't operate normally. Use PF buttons to change platform if needed.

[Troubleshooting]

If robot platform type is not correctly set, press PF1 button for 3 seconds to change. (HUNO–blue, DINO–pink, DOGY–red)

STEP 03 Are correct ID numbers of wCK modules used for correct positions?

Make sure that all 16 wCK modules with correct IDs are used for correct body parts according to ID map. If IDs are incorrectly used, the robot may not work properly.

[Troubleshooting]

Refer to chapter 2 [Assembling RoboBuilder] (page25 for HUNO, page41 for DINO, page55 for DOGY) to double check if wCK modules are all the correct ID numbers. If not, disassemble the required parts and correct the problem.

STEP 04 The connections of joints with wCK modules assembled with correct angles?

If a wCK module is connected with a joint with the wrong angle, robot may not operate properly. The following are the building steps where the users frequently make mistakes.

HUNO----> Shoulder Part(STEP01,02,15,16), Bottom Part(STEP03,04,14), Ankle Part(STEP11,12)

DINO----> Shoulder Part(STEP01,02), Bottom Part(STEP03,04,14), Ankle Part(STEP10,11)

DOGY----> Shoulder Part(STEP01,02,09,10), Bottom Part(STEP03,04,11,12), Tail Part(STEP08),
Sensor module Part(STEP16)

[Troubleshooting]

If needed, disassemble the required parts and correct the connection angle problem. Refer to the video version building instructions as well as the material uploaded on homepage to help fix the problem.

STEP 05 Are joints inserted with correct direction?

In some body parts, if joint part is not inserted with the correct direction, the robot may not operate properly. The following building steps are where users frequently make mistakes.

HUNO-----> Leg Part(STEP07,08)

DINO-----> Leg Part(STEP06,07)

DOGY-----> Leg Part(STEP05,06)

[Troubleshooting]

If needed, disassemble the required parts and correct the joint direction problem.

Refer to Chapter 2 and video version building instructions.

STEP 06 Are all cables connected?

If any of the 16 wCK module cables are not connected, the robot won't operate properly.

[Troubleshooting]

Check each wCK modules cable connection to make sure all cables are connected to control box.

※ If the robot still doesn't operate properly after check all the 6 STEPs above, please contact your local Customer Center for technical support.

When robot's motion is abnormal but takes correct Basic Posture.

[Cause1] In case of HUNO, if HUNO walks forward and backward without problem but has a problem side stepping.

[Troubleshooting] Check if the IDs of wCK modules are correct (especially wCK modules with ID00 and ID05)

[Cause2] When the wrong length of bolt was used.

[Troubleshooting] In some cases, users can make a mistake by screwing B8 instead of B12 or B12 instead of B8. In this case the robot may show abnormal motions. If needed, install the correct size bolt.

When the robot suddenly shows abnormal movement or gets out of control.

[Cause1] This problem may occur when that battery does not have enough charge.

[Troubleshooting] Please connect the power adapter enclosed in the product package or recharge the battery before you start playing the robot.

[Cause2] When a cable is disconnected.

[Troubleshooting] This problem may occur when one or more wCK module cables are disconnected whilst the robot is performing a dynamic or forceful motion. Check and make sure all 16 cables are tightly connected to control box. The cables from the inside of shoulder parts(ID10, ID13) of HUNO are especially prone to being pulled out occasionally.



· Always press the red button of remote control to have robot to take Basic Posture before playing other motions. Otherwise buttons may not work.

Contact your local Customer Center for technical support.
Contact information of our customer centers are available at www.RoboBuilder.net.
Or you can call 82-2-3141-5101 headquarters in Seoul, Republic of Korea.

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■ ■ ■ Customer Support

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