

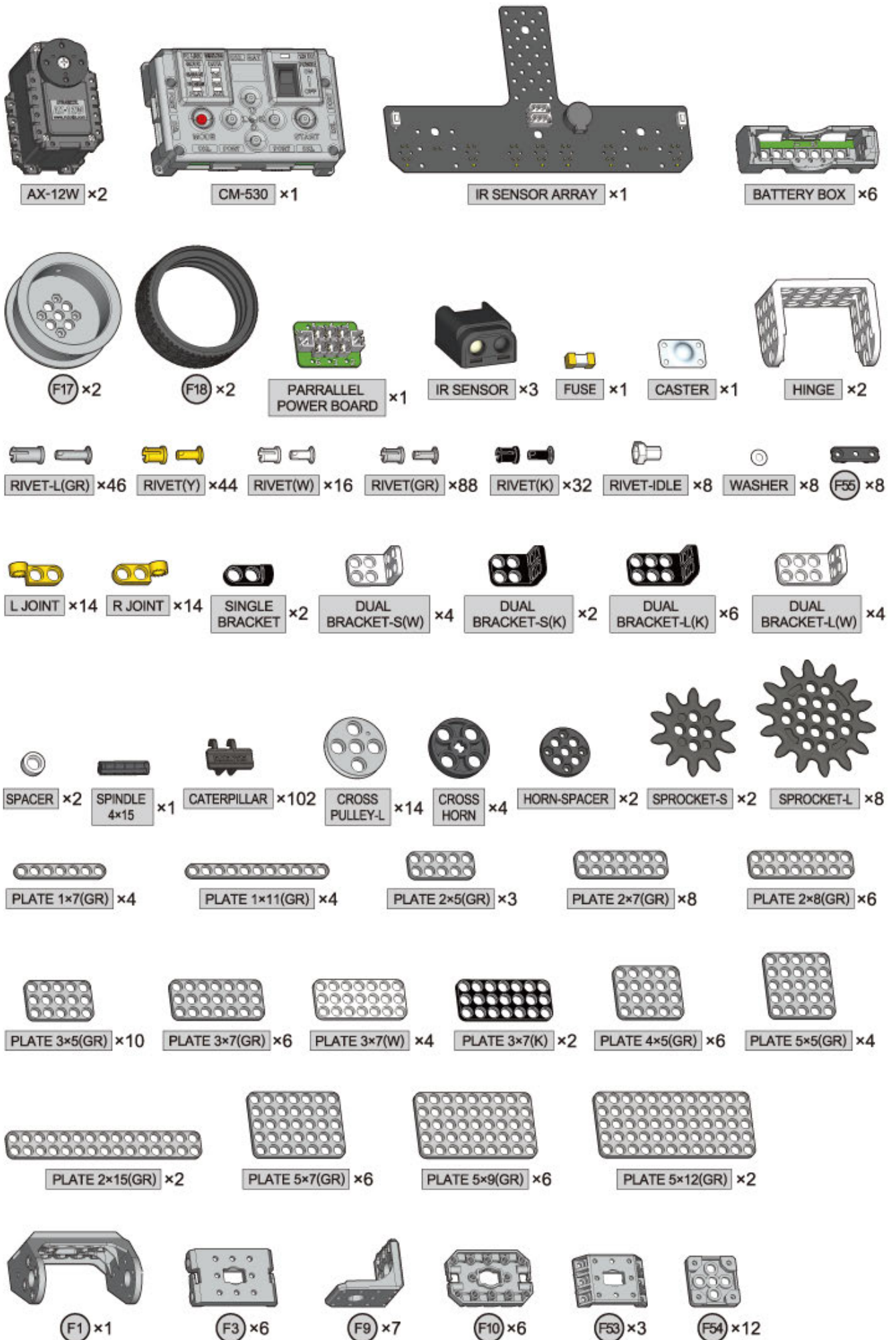
1. Introduction









- Educational kit for science, technology, engineering, and mathematics
- Curricula of 16 sample robots with a total of 48 different types of lessons.
- Robots optimized for competition with high-speed DYNAMIXEL and IR array.
- Robot kits aimed at solving problems creatively.

2. Getting Started

2. 1. Standard Part List



-  S1 x76
-  S2 x24
-  S3 x10
-  S4 x7
-  S5 x4
-  S6 x8

-  S12 x2
-  S13 x2
-  N1 x98

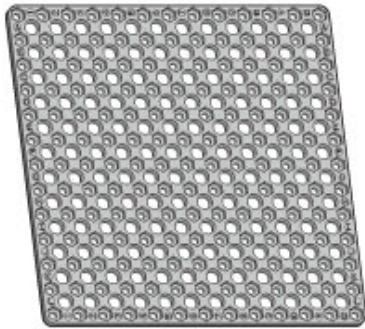


PLATE 12x12 x1

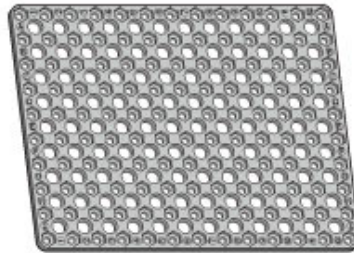


PLATE 12x9 x2

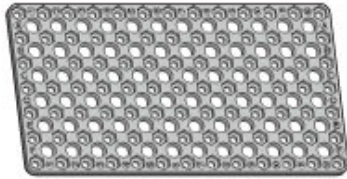


PLATE 12x6 x2

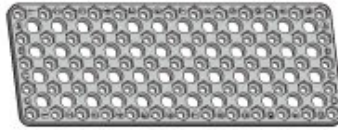


PLATE 12x4 x1

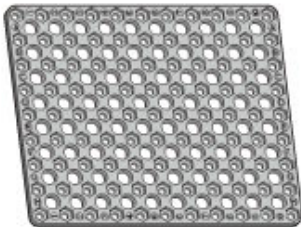


PLATE 10x8 x2



5P-CABLE 15 x3



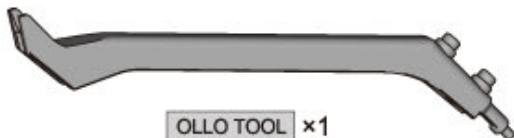
BAT-CABLE x1



DRIVER x1



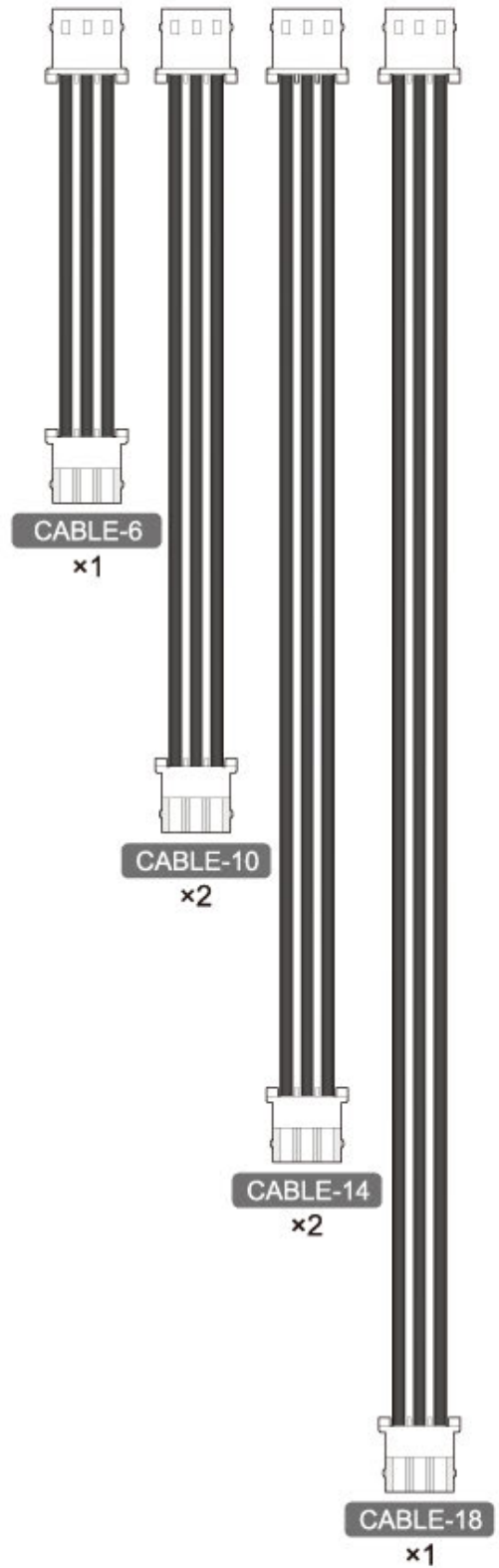
MINI USB CABLE x1



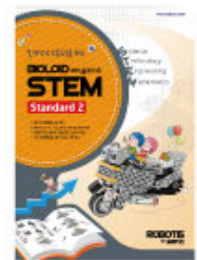
OLLO TOOL x1



RIVET CASE x1



STANDARD 1 x1



STANDARD 2 x1

• 제품에 포함된 부품 및 색깔은 상기 이미지와 일부 차이가 있을 수 있습니다.

2. 2. Expansion Part List



AX-12A x4



RC-100A x1



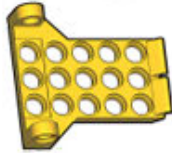
IR RECEIVER x1



BELT-L x1



SIDE ADAPTOR x1



SIDE ADAPTOR-W x1



DUAL BRACKET-S(K) x2



S JOINT x4



P JOINT x2



RIVET-L(GR) x30



PLATE 1x6(GR) x2



PLATE 1x7(K) x4



PLATE 1x11(K) x4



PLATE 3x7(GR) x21



PLATE 5x9(GR) x2

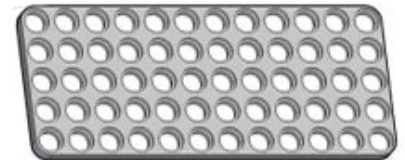


PLATE 5x12(GR) x8

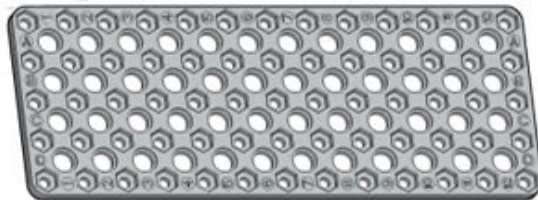


PLATE 12x4 x1

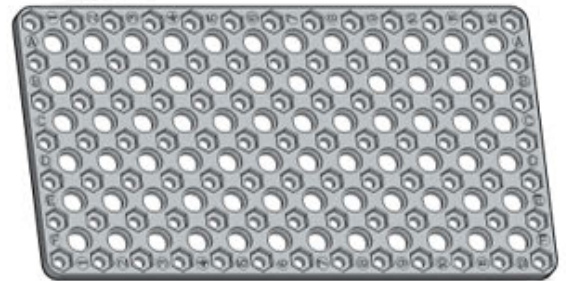


PLATE 12x6 x2

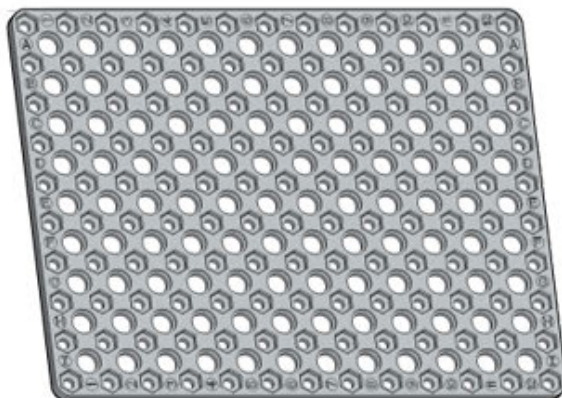


PLATE 12x9 x2

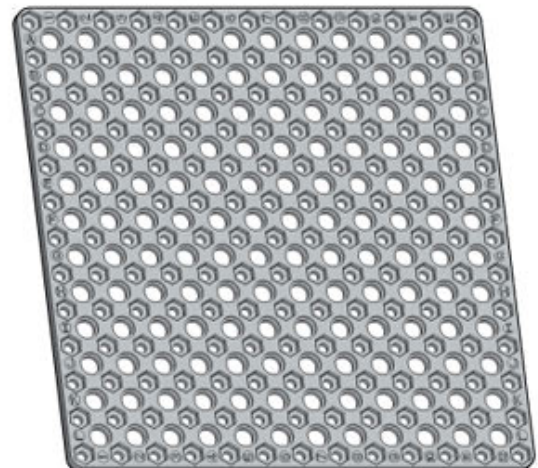


PLATE 12x12 x2

S13 x8

S3 x10

S4 x5

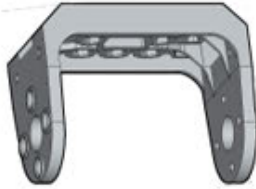
S7 x8

S-B x6

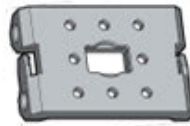
N2 x4



F1 x1



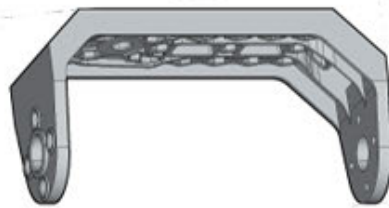
F2 x4



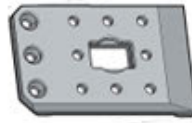
F3 x5



F4 x2



F5 x4



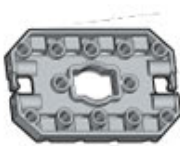
F6 x3



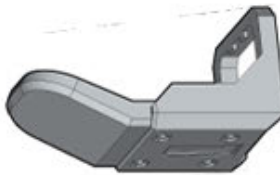
F7 x4



F9 x1



F10 x12



F11 x2



F12 x2



F55 x6



WA x4



BU x6



RIVET CASE x1



EXPANSION 1 x1



EXPANSION 2 x1



• 제품에 포함된 부품 및 색깔은 상기 이미지와 일부 차이가 있을 수 있습니다.

- [CM-530](#)
- [AX-12W](#)
- [AX-12A](#)
- [IR Sensor Array](#)
- [IR Sensor](#)

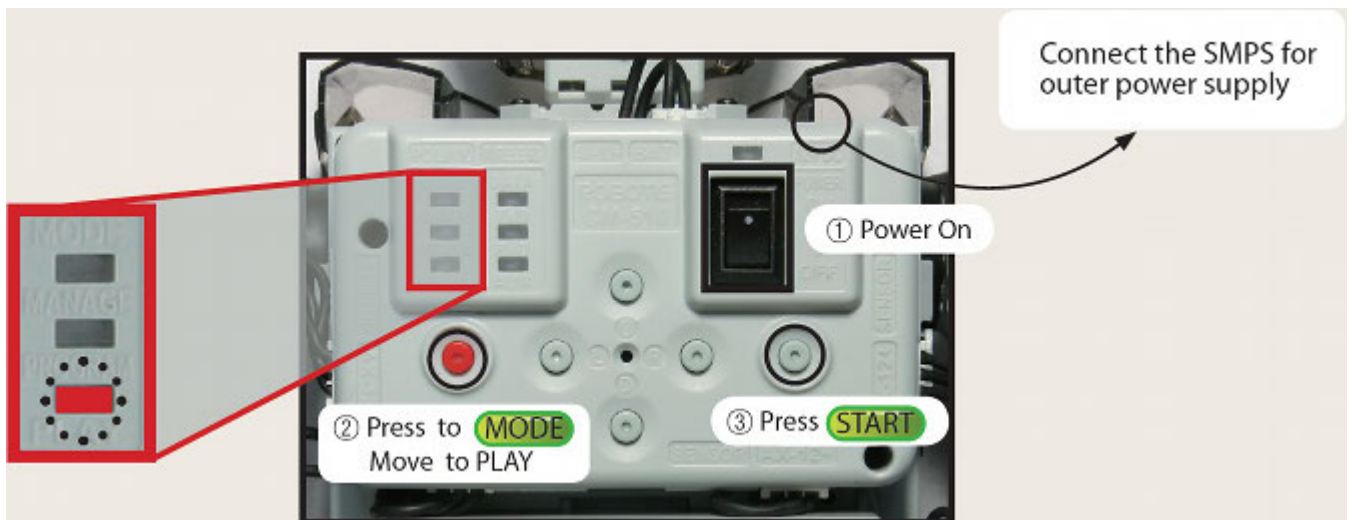
2. 3. Operating

2. 3. 1. Download the Program

You can find task codes and motion files for other actions on the [Standard](#), [Expansion](#) page.
[How to download Task Code to controller](#)

2. 3. 2. Turning the Robot on

1. Turn the power switch on and the LED will start blinking.
2. Use the MODE button to move the LED to “PLAY”. (The LED will move each time you press the MODE button)
3. Press the START button. (Check whether the LED on “PLAY” is blinking)
 - If the LED does not turn on, check the power cable/connection.
 - If there are no problems with cable, recharge your battery. (Please refer to [Charging](#) for more information)

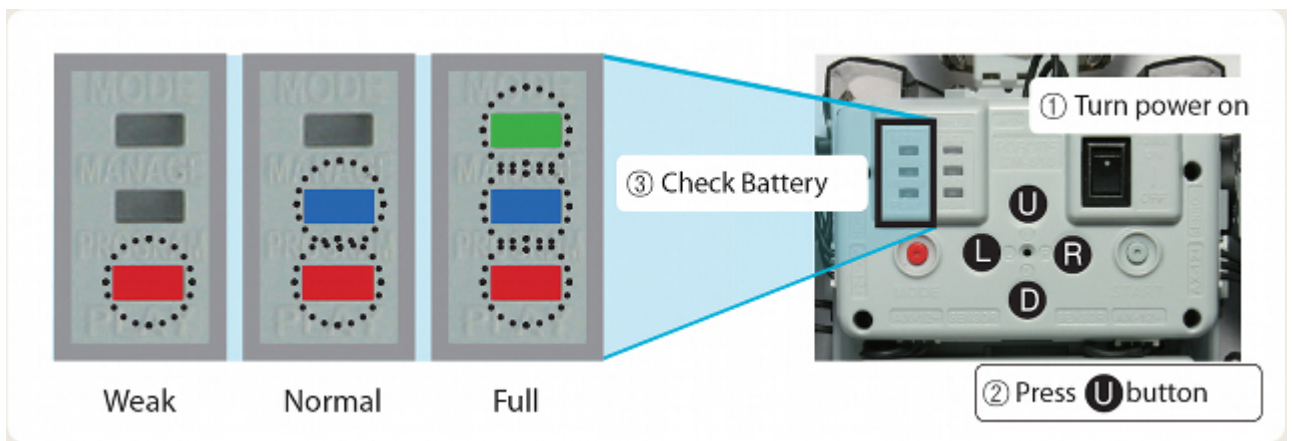


2. 3. 2. 1. The power does not turn on.

1. Is the battery properly connected?
2. Is the battery fully charged?
3. Is the battery fuse intact?
 - Please refer [Fuse Replacement](#) for information on how to replace the fuse.

2. 3. 2. 2. I want to check how much battery I have left.

Turn the CM-530 on and press the U button. The LED will turn on to show how much battery you have left as seen in the figure below.



2. 3. 2. 3. The robot makes a continuous warning sound while moving.

- The alarm indicates that the robot is low on batteries. Immediately recharge your battery(Refer to [Charge](#)).
- If you do not replace the battery right away, the robot may turn off without warning and fall, which can cause severe damage.

2. 3. 3. Assembly Check

- In Assembly Check mode you can verify whether your robot has been properly assembled. Compare the initial position of the motors.
 1. To run Assembly Check mode select 'Manage', hold the 'D' button followed by 'START'.
 - Keep holding until melody finished playing.
 2. Select the motor with either 'U' or 'D' buttons. The selected motor with turn its LED on and position itself into its initial position.
 - 'U' ups ID order while 'D' downs ID order.
 3. Compare the ID against the assembly check guide.
 - If the motor is not detected by the controller then it will beep.
 4. Compare whether the motor "froze" or it goes to its initial position.
 - Although the LED may be on the motor may be loose; check its wiring.
 5. Check the port for the IR array.
 - The IR array connected to its pre-assigned will blink when detecting an object.

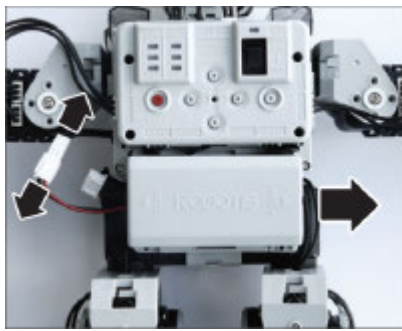
2. 4. Battery Charge

You may obtain Lithium polymer batteries from www.robotis-shop-en.com.

If the robot alarm sounds off during operations then recharge the battery.

During charging the charger's red LED turns on. When complete the green LED turns on.

1. Take the battery out



2. Connect the charger

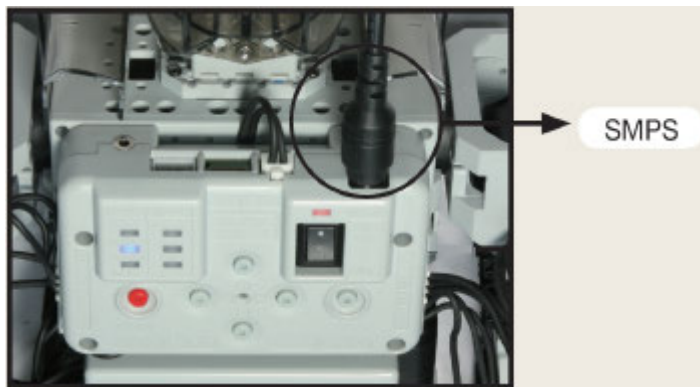


3. Charge

Charging(Red LED), Complete(Green LED)



- You can connect the robot to an external power source through SMPS.



- The battery is equipped with a connector to charge the battery and another to move the robot



2. 4. 1. Charging Time and Battery Life/Operating

2. 4. 1. 1. Charging Time

- When fully discharged : 1~1.5 hour
- Leaving the battery fully discharged for too long may reduce its lifespan drastically.
- Time to charge the battery depends on the status of the battery(If the charging time or battery life becomes too short, you may need to replace your battery).

Caution

1. Do NOT keep the battery connected with a robot or a charger.
2. If you will not use the battery for a long time from now on, please keep it HALF-CHARGED.
3. Do NOT put the battery with an environment with high temperature or humidity.

[ROBOTIS] FAQ-Battery Charging (NiMH,LIPO)








3. Download



中文用户 (DREAM, STEM, MINI等产品) 请参考中文手册.

[下载示例文件](#)



3. 1. Standard Examples





Robot	Description
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Robot	Description
<p>1. Sequence Racer</p> 	<p>Download Basic Phase Download Application Phase Download Practical Phase Download Video</p> <p>DYNAMIXEL Setting</p> <p>AX-12W ID[1, 2]: Wheel Mode</p> <p>Algorithm</p> <p>Control the robot's moving direction with the controller's directional buttons.</p> <p>Operation Guide</p> <p>if you press the forward 'U', turn left 'L', turn right 'R', and reverse 'D' sequentially pressing 'START' the robot will move in the order the directional buttons were pressed.</p>
<p>2. Bug Fighter</p> 	<p>Download Basic Phase Download Application Phase Download Practical Phase Download Video</p> <p>DYNAMIXEL Setting</p> <p>AX-12W ID[1, 2]: Wheel Mode</p> <p>Algorithm</p> <p>Robot follows the black line by following said line.</p> <p>Operation Guide</p> <p>The robot remains inbounds and push others out if found in the same area.</p>
<p>3. Tumbler</p> 	<p>Download Basic Phase Download Application Phase Download Practical Phase Download Video</p> <p>DYNAMIXEL Setting</p> <p>AX-12W ID[1, 2]: Wheel Mode</p> <p>Algorithm</p> <p>The IR sensors detect obstacles and control the robot's direction.</p> <p>Operation Guide</p> <p>The robot can go over large or small obstacles; with large obstacles it can change directions or react accordingly if flipped over.</p>
<p>4. Line Follower</p> 	<p>Download Basic Phase Download Application Phase Download Practical Phase Download Video</p> <p>DYNAMIXEL Setting</p> <p>AX-12W ID[1, 2]: Wheel Mode</p> <p>Algorithm</p> <p>The robot can move on a determined in a criss-cross grid.</p> <p>Operation Guide</p> <p>The robot can move forward, reverse, turn left or right along its determined path via its IR array.</p>
<p>5. Digital Piano</p> 	<p>Download Basic Phase Download Application Phase Download Practical Phase Download Video</p> <p>Algorithm</p> <p>Plays a different tune based IR sensor reading.</p> <p>Operation Guide</p> <p>The robot can output a musical note from the active sensors from the IR array.</p>

Robot	Description
<p>6. Motorcycle</p> 	<p>Download Basic Phase Download Application Phase Download Practical Phase Download Video</p> <p>DYNAMIXEL Setting</p> <p>AX-12W ID[1]: Wheel Mode, AX-12W ID[2]: Joint Mode</p> <p>Algorithm</p> <p>Control action by following the black line and avoiding obstacles</p> <p>Operation Guide</p> <p>Follows the line while avoiding obstacles by steering itself away from such obstacle.</p>
<p>7. Avider</p> 	<p>Download Basic Phase Download Application Phase Download Practical Phase Download Video</p> <p>DYNAMIXEL Setting</p> <p>AX-12W ID[1, 2]: Wheel Mode</p> <p>Algorithm</p> <p>maintains distance by its right sensor.</p> <p>Operation Guide</p> <p>The robot can escape a maze by using its left, right and center IR sensors.</p>

3. 2. Expansion Examples

Robot	Description
<p>8. Scribbler</p> 	<p>Download Basic Phase Download Application Phase Download Practical Phase Download Video</p> <p>DYNAMIXEL Setting</p> <p>AX-12W ID[1]: Wheel Mode, AX-12A ID[3, 4]: Wheel Mode</p> <p>Algorithm</p> <p>Robot follows the order of sequentially inputted commands.</p> <p>Operation Guide</p> <p>Write '가' and '아' when augmented with a pen.</p>
<p>9. Transporter</p> 	<p>Download Basic Phase Download Application Phase Download Practical Phase Download Video</p> <p>DYNAMIXEL Setting</p> <p>AX-12W ID[1, 2]: Wheel Mode, AX-12A ID[3 ~ 5]: Joint Mode</p> <p>Algorithm</p> <p>The robot follows a pre-determined path and completes a mission.</p> <p>Operation Guide</p> <p>Obstacles at certain locations the robot moves them at 2 specific locations from start the robot follows a determined path until finishing.</p>

Robot	Description
<p>10. Probe Car</p> 	<p> Download Basic Phase Download Application Phase Download Practical Phase Download Video DYNAMIXEL Setting AX-12W ID[1, 2]: Wheel Mode, AX-12A ID[3, 4]: Joint Mode Algorithm While following a path if the robot encounters an obstacle it will move it. Operation Guide If the robot detects obstacles over boxes via its IR sensors it moves them to specified locations. </p>
<p>11. Beetle Gripper</p> 	<p> Download Basic Phase Download Application Phase Download Practical Phase Download Video DYNAMIXEL Setting AX-12W ID[1, 2]: Wheel Mode, AX-12A ID[3 ~ 5]: Joint Mode Algorithm Clamp robot follows button input Operation Guide The remote control can control forward, reverse, left and right turns, left and right pivots, grab, lift and lower objects. </p>
<p>12. Robot Arm</p> 	<p> Download Basic Phase Download Application Phase Download Practical Phase Download Video DYNAMIXEL Setting AX-12A ID[3 ~ 6]: Joint Mode Algorithm Detects a cup with the IR sensors and move it to a specified location. Operation Guide An example robot that moves 2 small cups and 2 big cups to the designated position regardless of the order of dection. </p>
<p>13. Walking Droid</p> 	<p> Download Basic Phase Download Application Phase Download Practical Phase Download Motion File Download Video DYNAMIXEL Setting AX-12A ID[3 ~ 6]: Joint Mode Algorithm Robot detects obstacles and avoids it with its IR sensors. Operation Guide The robot moves forwards and turns left; it shifts to the right if the left sensors detects an obstacle; shifts to the left if the right sensor detects an obstacle; reverses if the center sensor detects an obstacle. </p>

Robot	Description
<p>14. Hexapod</p> 	<p> Download Basic Phase Download Application Phase Download Practical Phase Download Motion File Download Video DYNAMIXEL Setting AX-12A ID[3 ~ 5]: Joint Mode Algorithm Robot detects obstacles and avoids it with its IR sensors. Operation Guide The robot shifts to the right if the left sensors detects an obstacle; shifts to the left if the right sensor detects an obstacle; it speeds up when the upper sensor detects a hand. </p>
<p>15. Greeting Penguin</p> 	<p> Download Basic Phase Download Application Phase Download Practical Phase Download Motion File Download Video DYNAMIXEL Setting AX-12W ID[1, 2]: Joint Mode, AX-12A ID[3 ~ 6]: Joint Mode Algorithm Robot remembers the order of input commands and performs in the same input order. Operation Guide Robot remembers lifting of left and right arms and clapping and repeats the motions in the same order. </p>
<p>16. Cannon Shooter</p> 	<p> Download Basic Phase Download Application Phase Download Practical Phase Download Video DYNAMIXEL Setting AX-12W ID[1, 2]: Wheel Mode, AX-12A ID[3 ~ 6]: Joint Mode Algorithm Slingshot robot follows input commands for clamping and launching. Operation Guide The remote control can control forward, reverse, left and right turns, left and right pivots, grab, lift and lower objects. </p>

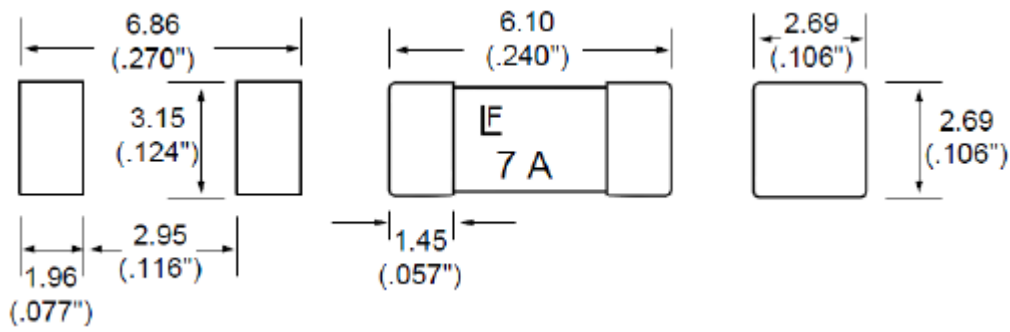
4. References

4. 1. Replacing Fuse

The fuse in the CM-510/CM-530 prevents it from overloading, which can damage the circuit.

If the CM-510/CM-530 does not turn on with the battery but turns on when connected to the SMPS, replace your fuse.

※ The size of the fuse is shown below. Use a 125V/5A~10A fuse.



※ How to replace the fuse

1. Find the fuse on the back of the CM-510/CM-530.



2. Use a pincette to replace the fuse with a new one.



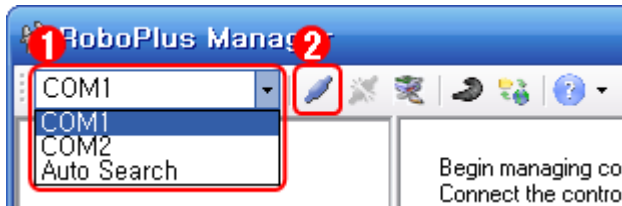
[ROBOTIS] FAQ-Replace the fuse of controller



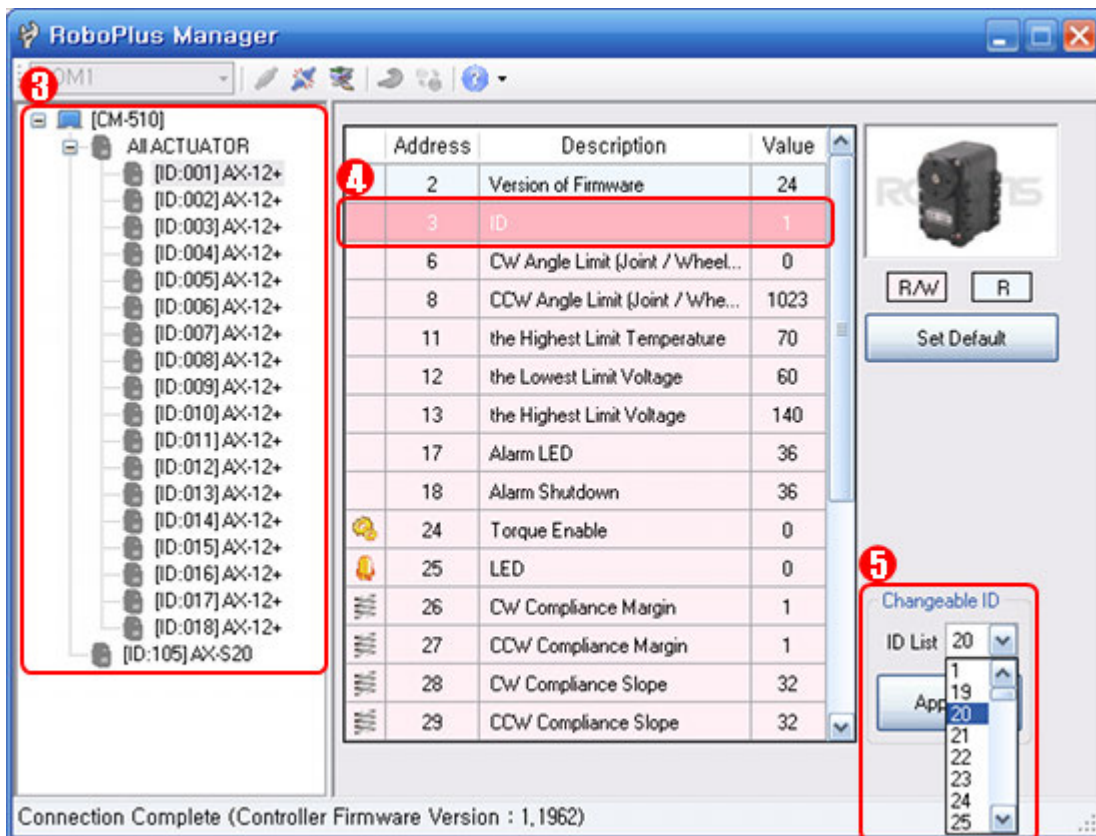
DYNAMIXEL used as robot actuators possess many functions. This section explains how to change the dynamixel's settings.

4. 2. 1. Changing the ID

1. Select the port the controller is connected to.
2. Click "Connect".



3. A list of connected dynamixels is shown on the left. Click on the dynamixel you wish to change the ID of.
4. Click on the ID row in the Control Table.
5. Click on the ID List combo box to see a list of possible ID's. Select the ID, then click Apply.



- To use in RoboPlus Motion and RoboPlus Task, the ID must be within the following ranges.
 - The DYNAMIXEL's ID must be between 0 and 25.
 - The ID for AX-S1 should be set between 100 and 109.

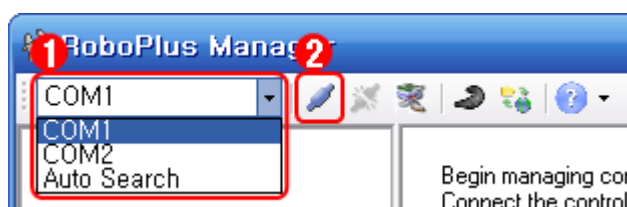
4. 2. 2. Changing the Movement Mode

The dynamixel can operate in 2 different modes.

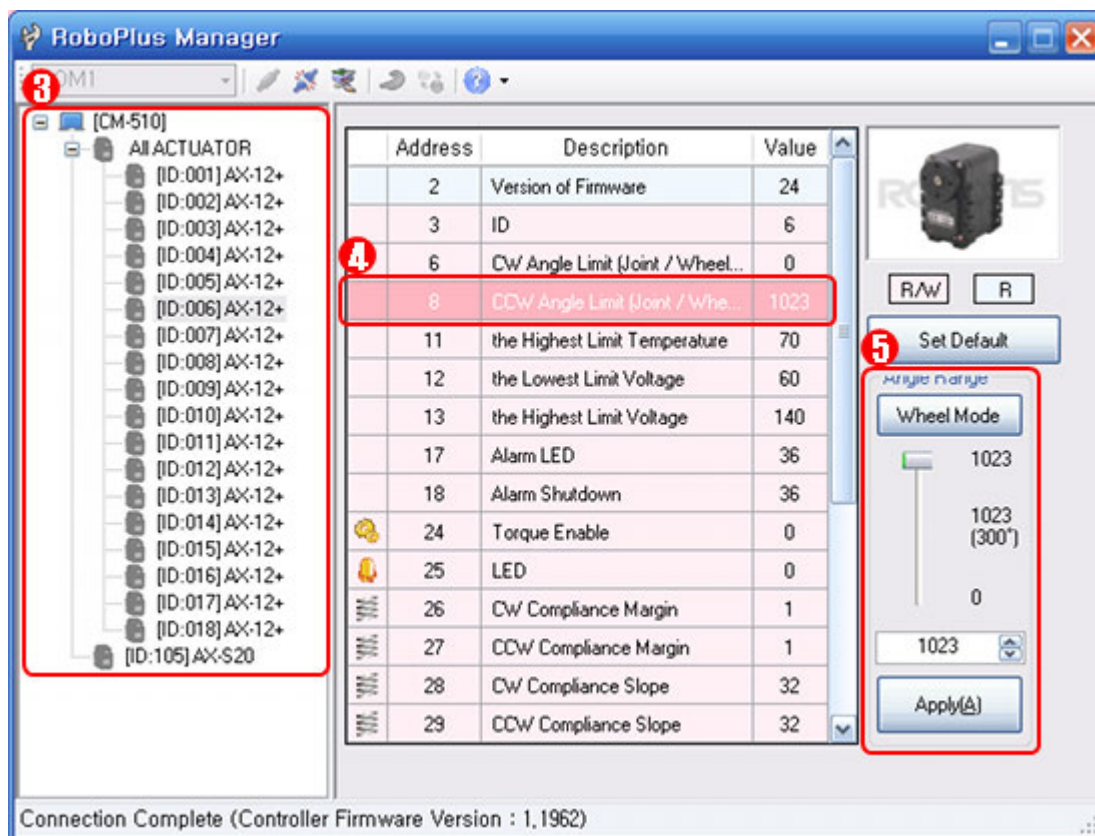
- Wheel Mode : Rotates 360 degrees like a regular motor.
- Joint Mode : Moves at a set angle with normal servo motors.

The mode can be changed using RoboPlus Manager. Once the mode is set, it will be maintained, even when turned off.

1. Select the port the controller is connected to.
2. Click “Connect”.



3. A list of connected DYNAMIXEL is shown on the left. Click on the DYNAMIXEL you wish to change the mode of. Then, click on the CW/CCW Angle Limit line in the Control Table.
4. To set to Wheel Mode, change the CW/CCW Angle Limit value to “0.” Or, simply click on the “Wheel Mode” button.

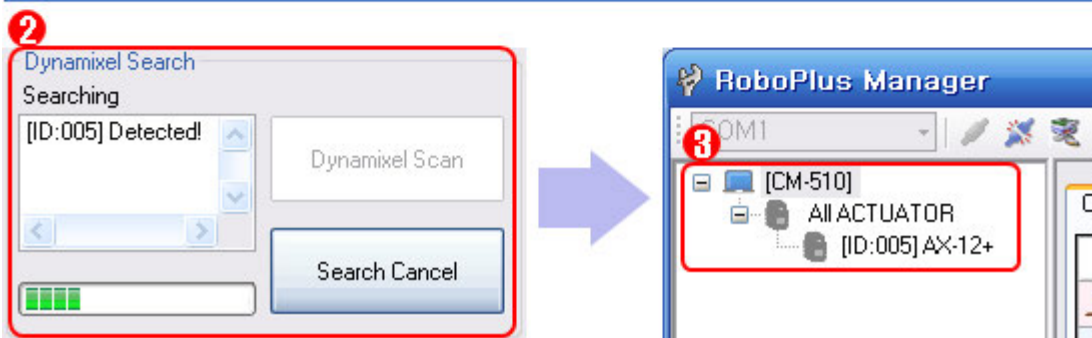
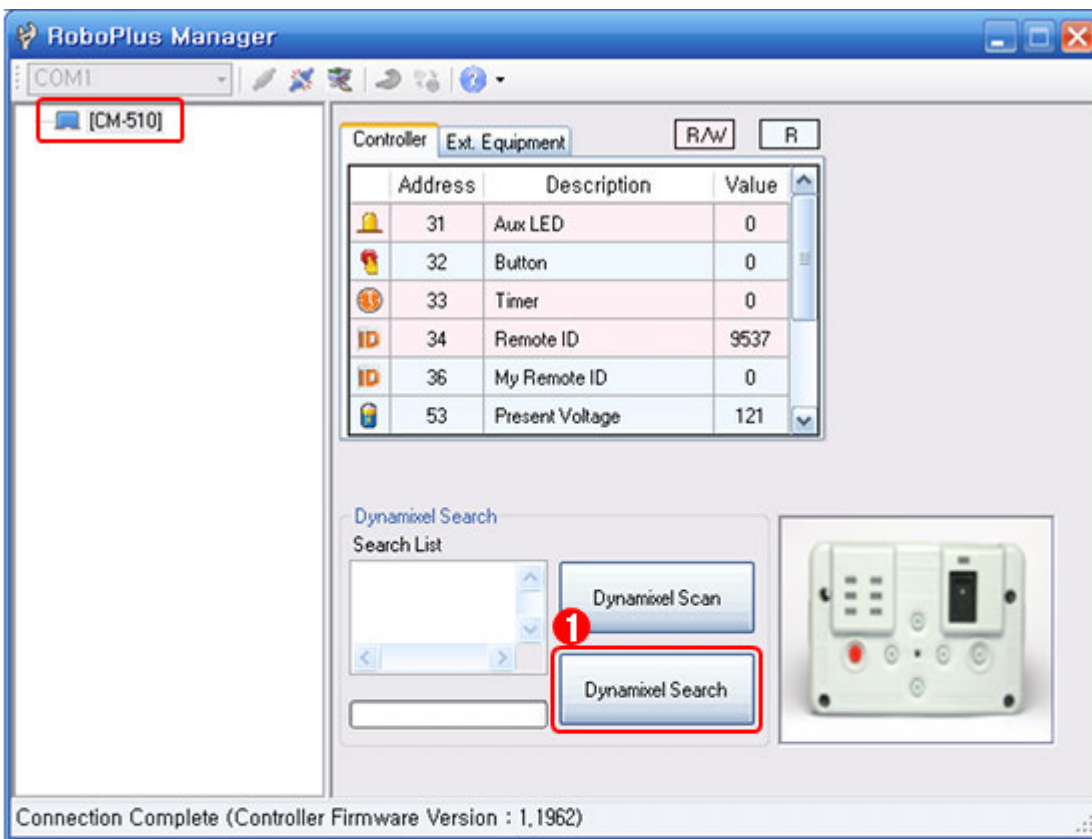


5. To set to Joint Mode again, set the CW/CCW Angle Limit value to any number other than “0”. The initial values for Joint Mode are “0” for CW Angle Limit, and “1023” for CCW Angle Limit.

4. 2. 3. Troubleshooting

If you cannot find the dynamixel you are looking for using RoboPlus Manager, try the following :

1. Connect just 1 DYNAMIXEL and check if there are any duplicate IDs. If you see a DYNAMIXEL on the left even though only 1 DYNAMIXEL is connected, there is a high probability of a duplicate ID. Change the ID immediately.
2. If you are unable to find any DYNAMIXEL as in the image below, click on “DYNAMIXEL Search”. If the communication speed is not set to 1Mbps, the “DYNAMIXEL Search” function automatically resets the controller’s communication speed to 1Mbps to enable it to be recognized.



If the problem persists, your dynamixel may need repair. Please contact the service department of the company you purchased from.

4. 3. ZIGBee Wireless Control

4. 3. 1. ZIGBee



ZIG-100/110 uses ZIGBee for wireless communication. ZIGBee, like Bluetooth, is the communication technology commonly used in Personal Area Network (PAN). The

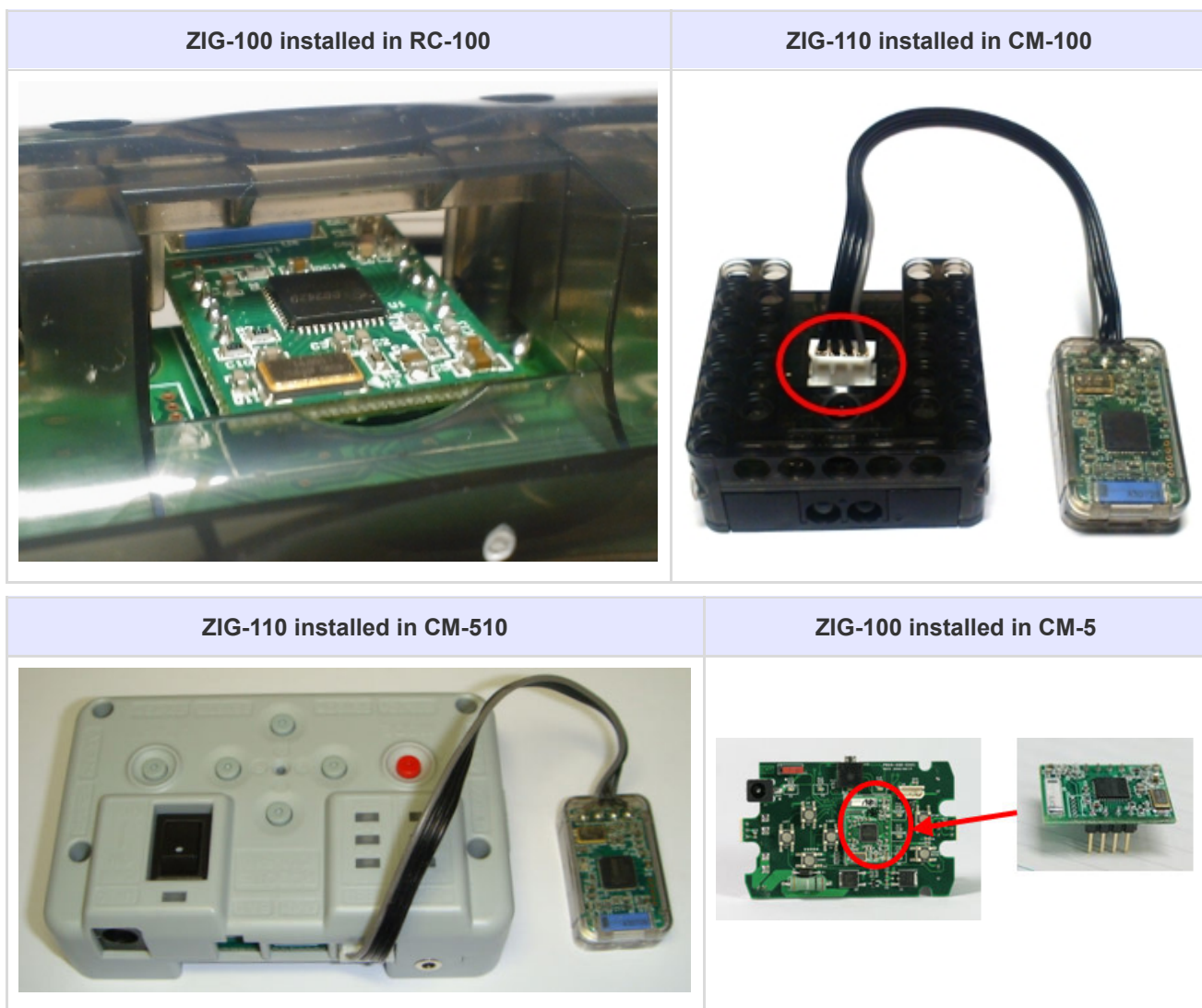
communication quality of ZIGBee is better than that of IR, so it allows many users to control their robots without interferences.

CAUTION : Please note that not all products include a zigbee module and may need to be purchased separately.

4. 3. 2. Controller & ZIGBee

OLLO and Bioloid both use the RC-100, which uses IR communication method. To upgrade to the Zigbee communication method, you must purchase the ZIG-110 set separately. The ZIG-110 set includes one Zig-100 module, which is attached to the [RC-100](#), and one Zig-110 module which is attached to the [Controller](#).

NOTE : The modules in a single Zigbee set have been preconfigured to communicate with each other. Therefore, a module from one set may not work with a module from another set. Please be careful not to mix them up.



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