

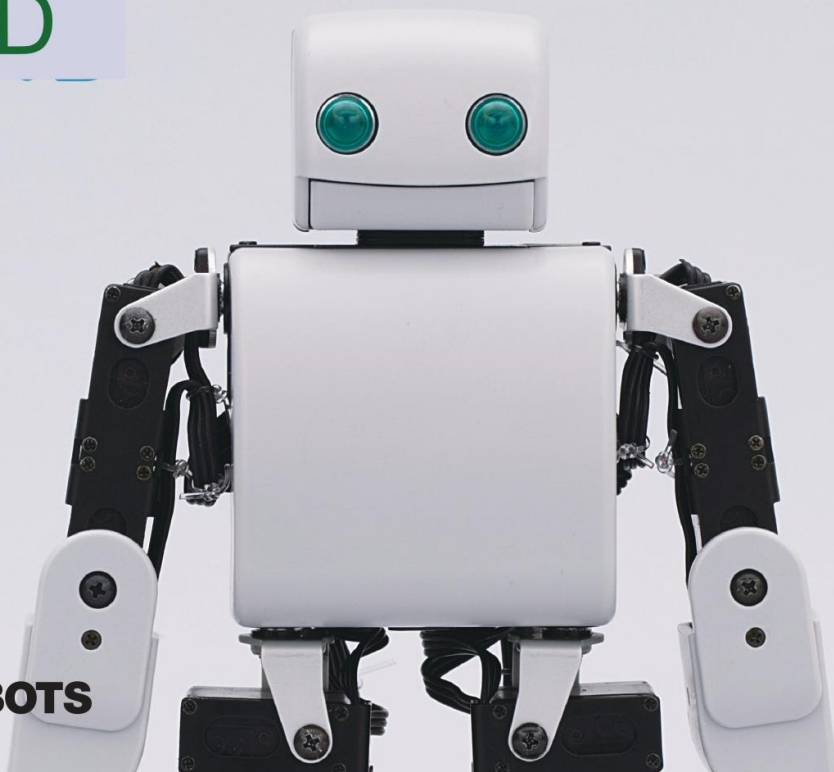
PLEN.D

desktop robot
plendy

Assembly instruction manual



DMM.make ROBOTS



Tools to prepare

■ Phillips screwdriver

• #0 (included in kit)

- #1 (useful for larger screws)

■ Scissors

■ Tweezers

■ Screwing material

A.

Precautions when using screw fixing materials

Secure the plastic sheath

The plastic may deteriorate

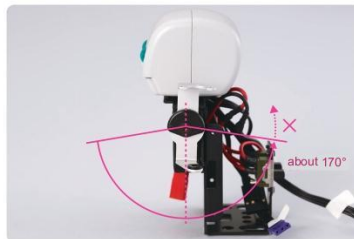
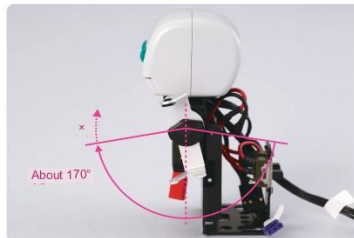
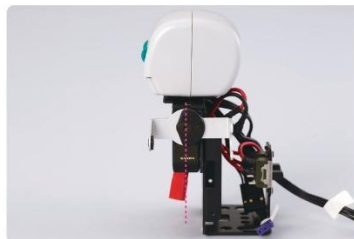
Do not use screw

or break depending

on the composition of the

non-use material.

A Notes on the operating range of the servo motor



The motion range of the servo motors used for each joint of PLEND is about 170°.

[example]

For shoulder servo unit (cable No.1, No.10)

If you rotate it while the power is off and the movable range is exceeded, the stopper will break and the servo motor will malfunction.

When moving the joints when the power is off, try to move the joints as slowly as possible so as not to exceed the range of motion.

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Parts list

1



*Cable No.17/18

Foot servo block R
(long lead wire)



*Cable No.89

Foot servo block L
(long lead wire)



*Cable No.14/15

Foot servo block R
(short lead wire)



*Cable No.5/6

Foot servo block L
(short lead wire)



*Cable No.16

Knee servo unit R



*Cable No.7

Knee servo unit L



*Cable No.12/13

arm servo unit R



*Cable No.3/4

arm servo unit L



*Cable No.11- 2

waist servo unit



Elbow frame (x2) [Common
for left and right]



*With bush

thigh frame R



*With bush

thigh frame L



* with bush

Shin frame (x2) [Common
for left and right]



*With bush

ankle frame R



*With bush

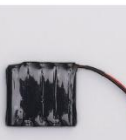
ankle frame L



Sole plate (x2) [Common
for left and right]



microcomputer board



battery pack



Battery Charger



vinyl binding wire



*Cable No.10.1

shoulder servo unit



roller skating unit

Parts list

2



Belly plastic cover



Back plastic cover



Elbow plastic cover (x2) [common to left and right]



Arm Plastic Parts R



Arm Plastic Parts L



Front shin plastic cover (x2) [Common for left and right]



Shin plastic cover R-out [R-out engraved on the back]



Shin plastic cover R-in [R-in engraved on the back]



Shin plastic cover L-in [L-in engraved on the back]



Shin plastic cover L-out [Engraved L-out on the back]



Thigh plastic cover (x2) [Common for left and right]



Instep plastic cover R [Engraved R on the back side]



Instep plastic cover L [L engraved on the back side]



Sole plastic cover (x2) [common to left and right]



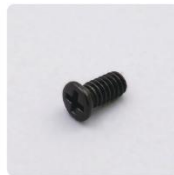
Screw case ①- ①



① Screw M1.7



② Screw M2x2.5



③ Screw M2x4



④ Screw M2.6



⑤ Screw M2x8



⑥ Steel spacer Φ3x5



Screw case ⑦-1 (spare)

*Screw cases ⑦ and ⑧ are spare screws and are not used for assembly.

⑦ Screw M3 For fixing the servo horn

⑧ Screw M2x12 For neck fixing

⑨ Tapping screw For fixing the back of the head

⑩ Screw M3x15 for fixing skate tire

⑪ Steel spacer Φ3x3 For fixing skate tires

⑫ Servo horn

Assembling the right leg unit

1

required parts



Foot plate (common to left and right)



Instep plastic cover R (There is R notation on the back)



ankle frame R



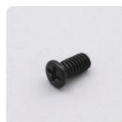
Foot servo block R (long lead wire)



① Screw M1.7 (3 pieces)



② Screw M2x2.5 (4 pieces)

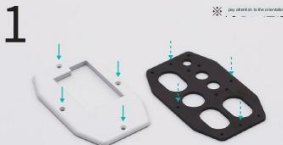


③ Screw M2x4 (4 pieces)



④ Screw M2.6 (1 piece)

1



③ Screw M2x4 (4 places)

Attach the "foot instep plastic cover R" to the "sole plate" with "③ screw M2 x 4"

[Note]

Do not use screw-fastening agent on the parts that fix the plastic material

2



3



Attach "Ankle Frame R" with "② Screw M2x2.5"

4



5



Insert the "foot servo block R (long lead wire)" into the "ankle frame"

6



Fix the front side with "④ Screw M2.6"

7



Fix the servo horn with "① screw M1.7" To do

8



Assem

Assembling the right leg unit

2

required parts



Foot plate (common to left and right)



ankle frame R



① Screw M1.7 (3 pieces)



② Screw M2x4 (4 pieces)



Shin frame (common to left and right)



① Screw M1.7 (6 pieces)



Knee servo unit R



② Screw M2.6 (2 pieces)

1



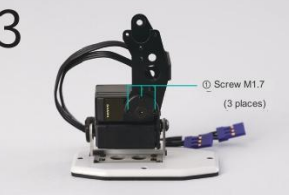
Insert the "shin frame" into the "leg servo block R (long lead wire)"

2



Fix the inside with "② Screw M2.6"

3

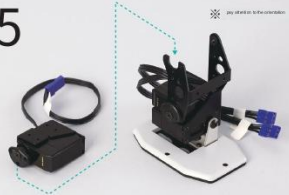


Fix the servo horn with "① screw M1.7"
To do

4

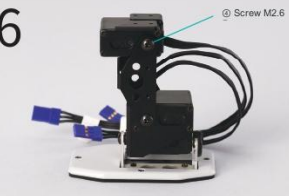


5



Insert the "Knee Servo Unit R" into the "Shin Frame"

6



Fix the inside with "② Screw M2.6"

7



Fix the servo horn with "① screw M1.7"
To do

8



Assem

Assembling the right leg unit

3

required parts



Foot plate (common to left and right)



ankle frame R



① Screw M1.7 (3 pieces)



② Screw M2x4 (4 pieces)



thigh frame R



Foot servo block R (short lead wire)



① Screw M1.7 (3 pieces)



③ Screw M2x2.5 (4 pieces)



④ Screw M2.6 (1 piece)

1

③ Screw M2x2.5 (4 places)



Attach "Thigh Frame R" to "Knee Servo Unit R" with "③" Screw M2 x 2.5"

2



3



"Momomo Frame R" "Foot servo block R (short lead wire)" plug in

4

④ Screw M2.6



Fix the inside with "④" Screw M2.6"

5



Fix the servo horn with "①" screw M1.7"

6



Completed right leg unit

Assembling the left leg unit

1

required parts



Foot plate (common to left and right)



Instep plastic cover L (There is L notation on the back side)



ankle frame L



Foot servo block L (long lead wire)



① Screw M1.7 (3 pieces)



② Screw M2x2.5 (4 pieces)

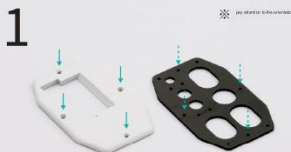


③ Screw M2x4 (4 pieces)



④ Screw M2.6 (1 piece)

1



③ Screw M2x4 (4 places)

Attach "Foot Instep Plastic Cover L" to "Foot Sole Plate" with "③ Screw M2x4"

[Note]
Fix the plastic exterior
Do not use
threadlocker on
parts!

2



3



② Screw M2x2.5 (4) PF

Attach "Ankle Frame L" with "② Screw M2x2.5"

4



5



"Foot Servo Block L (long lead wire)" into the "ankle frame"

6



④ Screw M2.6

Fix the front side with "④ Screw M2.6"

7



① Screw M1.7 (3 places)

Fix the servo horn with "① screw M1.7" To do

8



Assembling the left leg unit

2

required parts



with bush

Shin frame (common
to left and right)



*Cable No. 7

Knee servo unit L



① Screw M1.7 (6
pieces)



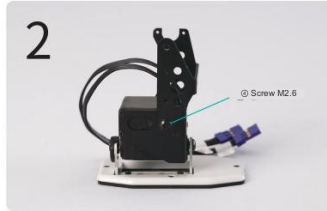
② Screw M2.6 (2
pieces)

1



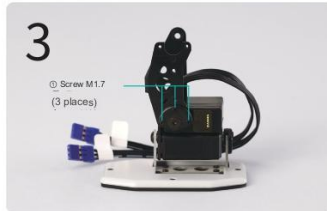
Insert the "shin frame"
into the "leg
servo block L (long
lead wire)"

2



Fix the inside with "②
Screw M2.6"

3

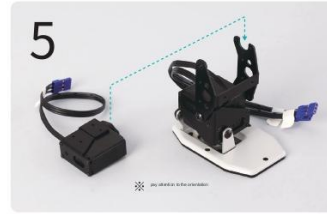


Fix the servo horn
with "① screw M1.7"
To do

4

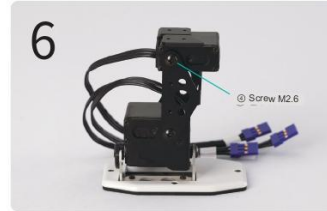


5



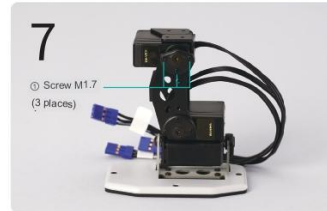
Insert the "Knee
Servo Unit L" into
the "Shin Frame"

6



Fix the inside with "②
Screw M2.6"

7



Fix the servo horn
with "① screw M1.7"
To do

8



Assembling the left leg unit

3

required parts



thigh frame L



Foot servo block L
(short lead wire)



① Screw M1.7 (3
pieces)



② Screw M2x2.5 (4
pieces)



③ Screw M2.6 (1
piece)



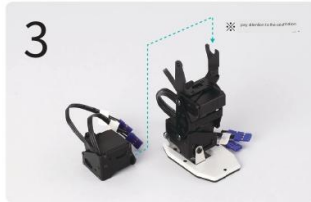
1

② Screw M2x2.5
(4 places)

Attach "Thigh Frame
L" to "Knee Servo
Unit L" with "②
Screw M2 x
2.5".



2



3

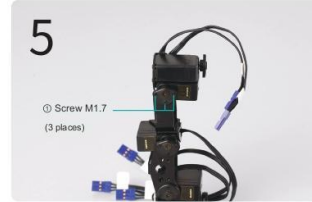
"Momo Frame L"
"Foot servo block L
(short lead wire)"
plug in



4

③ Screw M2.6

Fix the inside with "③
Screw M2.6"



5

① Screw M1.7
(3 places)

Fix the servo horn
with "① screw
M1.7"



6

Completed left leg unit

Assembling the arm unit

required parts



*Cable No. 12/13

arm servo unit R



*Cable No. 34

arm servo unit L



Elbow frame (2 pieces) Common for left and right



① Screw M1.7 (6 pieces)



② Screw M2.6 (2 pieces)



1

*Cable No. 12/13

right arm

"Arm Servo Unit
Insert the "elbow frame"
into "R"



2

② Screw M2.6

Fix the front side with
"(4) M2.6 screws (2 pieces)"
To do



3

① Screw M1.7
(3 places)

Fix the servo horn
with "① screw M1.7"
To do



4

Completed right arm unit
is



1

*Cable No. 34

left arm

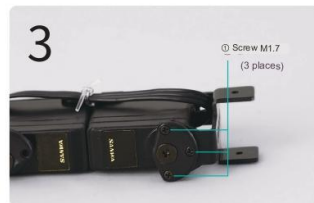
"Arm Servo Unit
Insert the "elbow frame"
into "L"



2

② Screw M2.6

Fix the front side with
"(4) M2.6 screws (2 pieces)"
To do



3

① Screw M1.7
(3 places)

Fix the servo horn
with "① screw M1.7"
To do



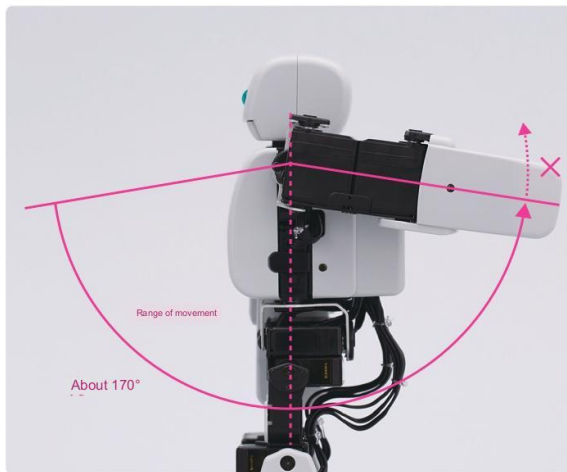
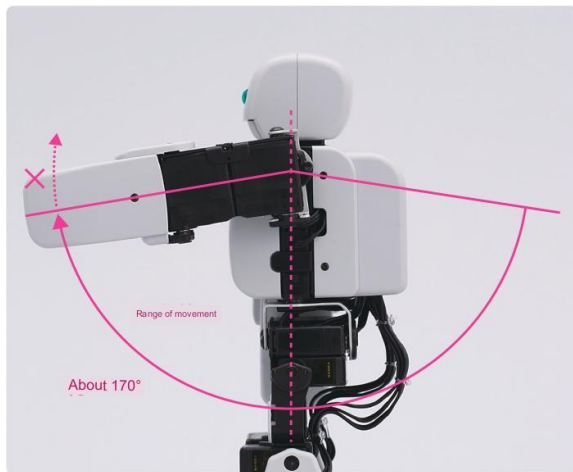
4

Completed left arm unit
is



Precautions regarding the operating range of the servo motor

The servo motors used in PLEN's joints have a movable range of about 170 degrees.



*If you try to move it manually beyond its movable range, the motor will break, so please be careful when handling it when the power is off.

Assembling the fuselage unit

required parts



shoulder servo unit



waist servo unit



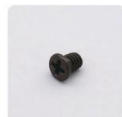
right arm unit



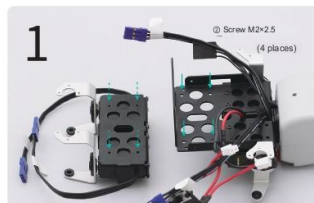
left arm unit



vinyl binding wire



① Screw M2x2.5 (4 pieces)



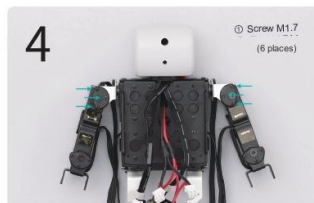
Attach the "Waist Servo Unit" to the "Shoulder Servo Unit" with "① Screw M2x2.5" (4 places)



Completed fuselage unit is



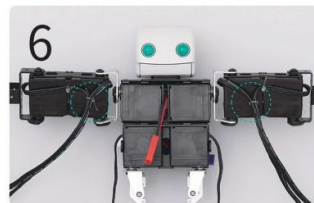
Insert the left and right arm servo unit units into the torso unit.



Fix the servo horn with "① screw M1.7"

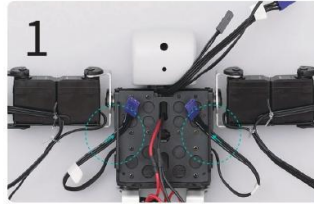


Fix the front side with "③ Screw M2.6 (2 pieces)"

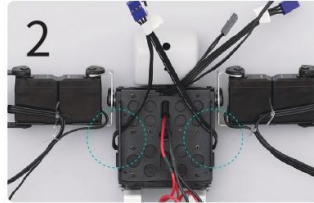


Tie the cable of the "arm servo unit" with the "vinyl binding wire"

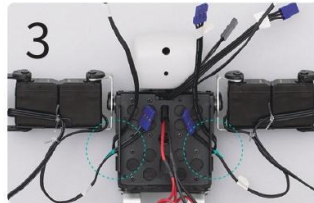
upper body wiring



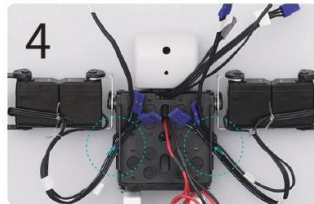
Pass No.2 and
No.11 cables through the
holes in the fuselage
unit



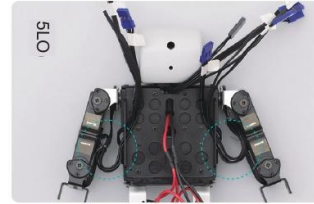
Be careful not to
twist the base
of the cable,



Pass the No.3 and
No.12 cables through the
holes in the "fuselage
unit"



Pass No.4 and
No.13 cables through the
holes in the fuselage
unit



In the same way,
give the cable some
slack and tie it with
a "vinyl tie" line.

Installing the microcomputer board and power switch

required parts



① Screw M2x2.5 (2 pieces)



② Screw M2x8 (4 pieces)



③ Steel spacer 3x5 (4 pieces)



1

Pay attention to the orientation of the microcomputer board.

Place the "microcomputer board" on the back of the "fuselage unit".



Put "③ Steel spacer 3x5 (4 pieces)" under the "microcomputer board" and fix it with "② Screw M2x8 (4 pieces)".

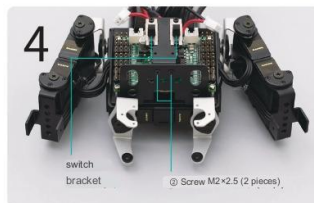
"It is convenient to use tweezers when inserting the spacer."



3

Fix the 4 points with screws

[Caution]
Be careful not to press the cable on the back side of the "microcomputer board".



4

switch bracket

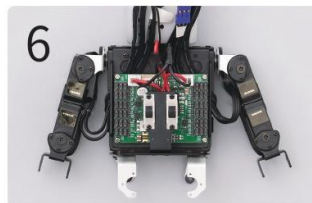
① Screw M2x2.5 (2 pieces)

shoulder servo unit
Attach the "switch bracket" attached to the kit to the "fuselage unit" with "① screw M2 x 2.5".



5

Insert the switch connector into the microcomputer board



6

[Note]
Be careful not to insert the connector left and right



7

[Caution]
Leave the power cable protruding on the abdomen side long.

Attaching the foot unit

required parts



right leg unit



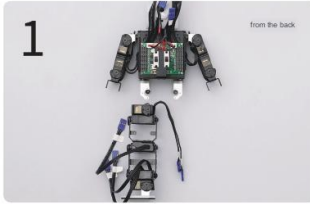
left leg unit



① Screw M1.7 (6 pieces)



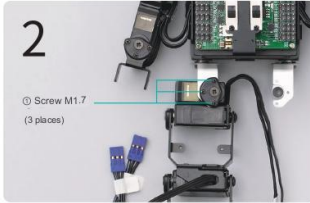
② Screw M2.6 (2 pieces)



1

from the back

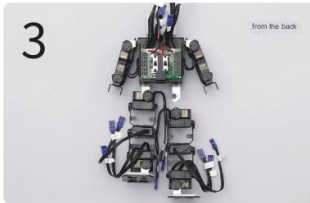
Insert the "Left Leg Unit" into the "Waist Servo Unit L"



2

① Screw M1.7 (3 places)

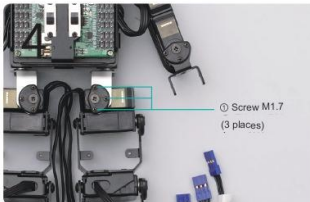
Fix the servo horn with "① screw M1.7"



3

from the back

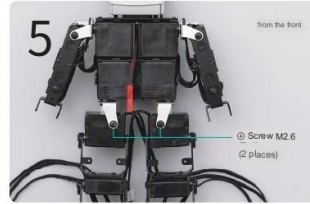
Insert the "Right leg unit" into the "Waist support unit R"



4

① Screw M1.7 (3 places)

Fix the servo horn with "① screw M1.7"



5

from the front

② Screw M2.6 (2 places)

Fix the front side with "② Screw M2.6"

cable bundling

1

required parts



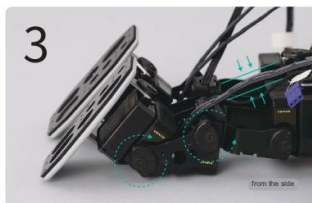
vinyl binding wire



Before cable bundling



Ankle Cable (Right:
No. 17, 18/
Left: No. 89) with
"vinyl binding
wire"



Make the joint of the foot
the angle of the photo



Left and right "knee frame"
8・9)
Pass through the "bundle",
cable under the knee
まとめ、通した「ビ
ニール結束線」で結
(Right: No.16 17・
18/ Left: No.7・
8・9)

cable bundling

2

required parts



vinyl binding wire



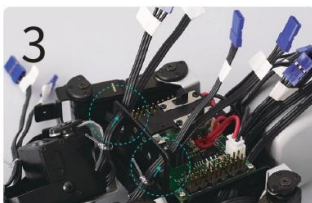
Tie the position
of the photo with

the

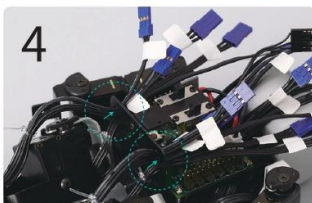
photo



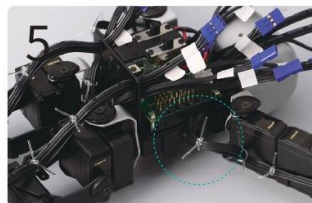
Bundle the hip joint
cables (Right:
No. 14, 15/Left:
No. 56) and tie them
with "vinyl ties" wire.



Pass each hip joint cable
(Right: No. 14, 15/
Left: No. 56) through
the hole at the bottom
of the body unit.

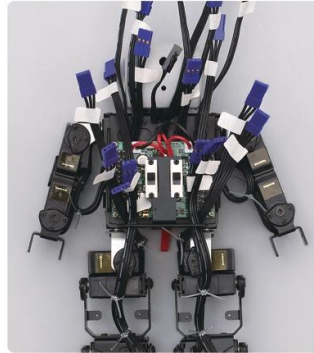


each cable below the knee
(Right: No. 16, 17, 18 /
Left: No. 7, 8, 9) pass
through the hole at the bottom
of the "Tuselage unit"

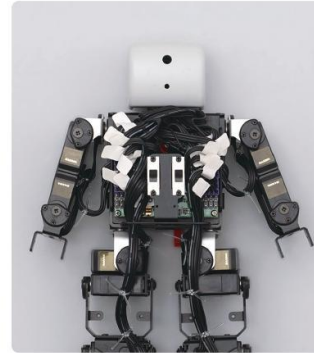


Tie the cable of
the arm unit with
a "vinyl tie" line.

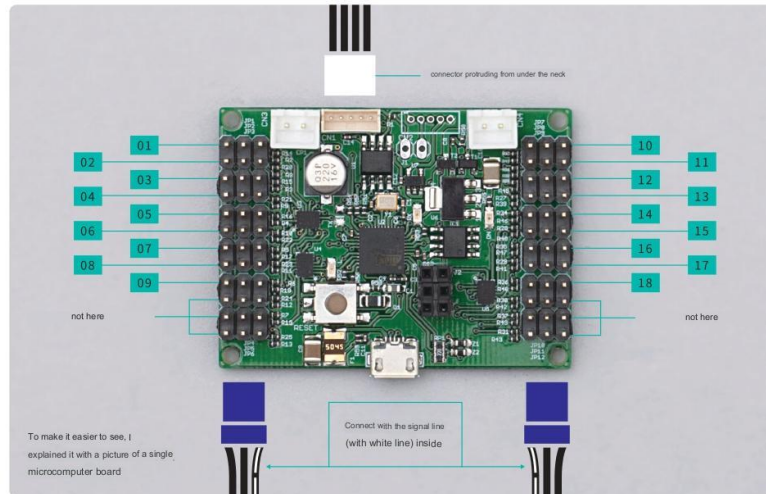
Connector connection



Microcomputer



After connection



Insert the head connector into the pin of the "microcomputer board"

Insert the servo motor connector into the pins of the microcomputer board according to the numbers.

Sheath installation

1

required parts



Shin plastic cover R-in [R-in engraved on the back]



Shin plastic cover L-in [L-in engraved on the back]



Shin plastic cover R-out Shin plastic cover L-out [R-out engraved on the back] [L-out engraved on the back]



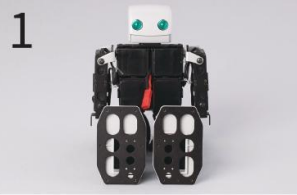
Sole plastic cover (x2) (Common for left and right)



① Screw M2x2.5 (4 pieces)



② Screw M2x4 (12 pieces)



1

[Caution]
Do not use screw-fastening agent on the parts that fix the plastic cover!

Align the "sole plastic cover" with the sole of the foot



2

Orientation where the letters of PLEN can be read

③ Screw M2x4 (8 places)

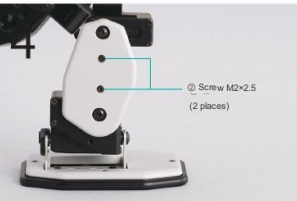
Attach the "sole plastic cover" with "③ screws M2 x 4"



3

④ Screw M2x2.5 (2 places)

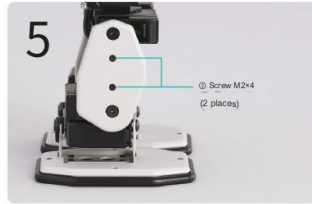
Attach the "shin plastic cover R-in" with "④ screw M2x2.5"



4

⑤ Screw M2x2.5 (2 places)

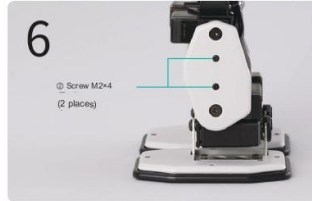
Attach the "shin plastic cover L-in" with "⑤ screw M2x2.5"



5

⑥ Screw M2x4 (2 places)

Attach "shin plastic cover R-out" with "⑥ screw M2x4"



6

⑦ Screw M2x4 (2 places)

Attach "shin plastic cover L-out" with "⑦ screw M2x4"

Sheath installation

2

required parts



back plastic cover



Front shin plastic cover (x2) [Common
for left and right]



Thigh plastic cover (x2) [Common
for left and right]



① Screw M2x2.5
(12 pieces)



1

from the back

[Note]

Do not use screw-fastening
agent on the parts
that fix the plastic
cover

Keep the cables on
your back as compact
as possible



2

① Screw M2x2.5
(4 places)

① same for the other side

Cover the "back plastic
cover" and attach
it with ① screws
M2x2.5



3

① Screw M2x2.5
(4) PF

Attach the "front shin
plastic cover" with "①
screw M2 x 2.5"



4

① Screw M2x2.5
(4 places)

Attach the "Momo
Plastic Cover" with "①
Screw M2 x 2.5"

Sheath installation

3

required parts



Arm Plastic Parts R



Arm Plastic Parts L



Elbow plastic cover (x2) Common for left and right



① Screw M2x2.5 (6 pieces)



1

Pay attention to the direction from the front

[Note]
Do not use screw fasteners on the parts that fix the plastic exterior.

Insert the "arm plastic part R" into the "elbow frame"



2

① Screw M2x2.5

Attach "Arm Plastic Parts R" with "① Screw M2 x 2.5"



3

Pay attention to the direction

Insert the "arm plastic part L" into the "elbow frame"



4

① Screw M2x2.5

Attach "arm plastic part L" with "① screw M2 x 2.5"

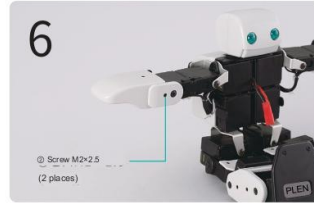


5

① Screw M2x2.5 (2 places)

from the front

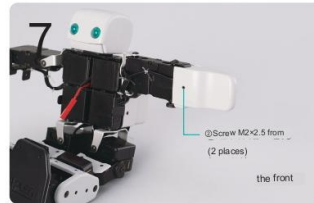
Attach "arm plastic parts R" with "① screw M2 x 2.5"



6

① Screw M2x2.5 (2 places)

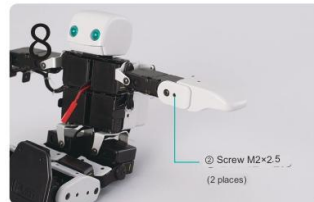
Attach the "elbow plastic cover" with "① screw M2 x 2.5"



7

① Screw M2x2.5 from the front (2 places)

Attach "arm plastic part L" with "① screw M2 x 2.5"



8

① Screw M2x2.5 (2 places)

Attach the "elbow plastic cover" with "① screw M2 x 2.5"

Battery pack charging

required parts



Battery Charger

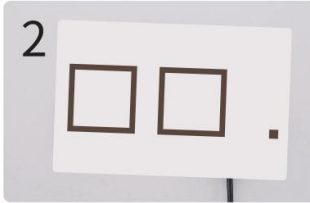


battery pack



1

When the "Battery
Charger" is plugged
in, the light
will turn blue



2

"battery pack"
and the battery
charger are connected, the
lamp lights up in red,
to start charging



3

When the charging is
completed, the lamp lights
up in blue, so please
remove the "battery
pack" immediately.

*Charging takes about
60 minutes.

Installing the battery pack

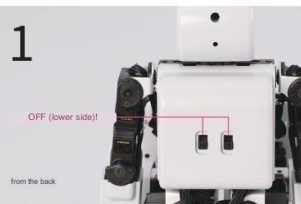
required parts



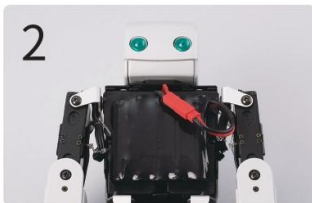
battery pack



belly plastic cover

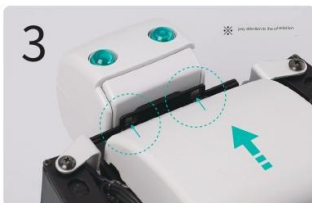


Make sure both
power switches
are OFF (down)



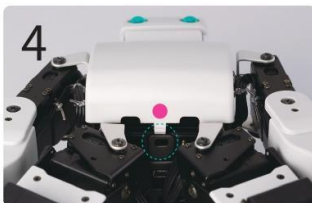
Connect the connector of
the "battery pack" and the
connector of the main unit

Don't move PLEN2
For safety, remove
the battery and
attach only the "belly
plastic cover".



Cover the "belly
plastic cover" over the
"battery pack"

Just slide it up and insert
the hooks of the "belly
plastic cover bar" into the
two holes under the neck.
to watch



the red circle part of the photo
Remove the "belly plastic cover"
while pressing it with your thumb.
attach

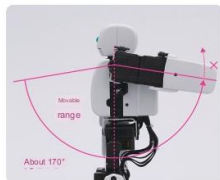
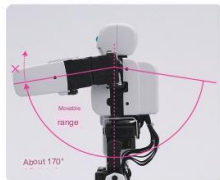
(The claws of the "belly plastic
cover" will hang on the hole indicated
by the dotted line.)

Remove the "belly plastic cover"
When removing, reverse the procedure
and remove while pressing the
red circled part with your thumb.

Complete

Precautions regarding the operating range of the servo motor

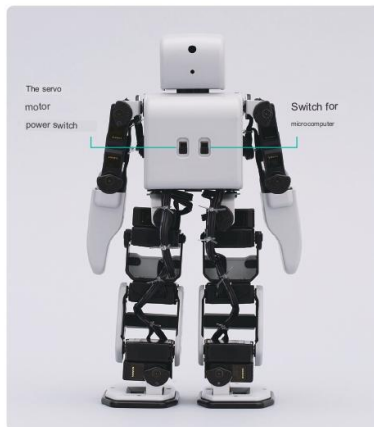
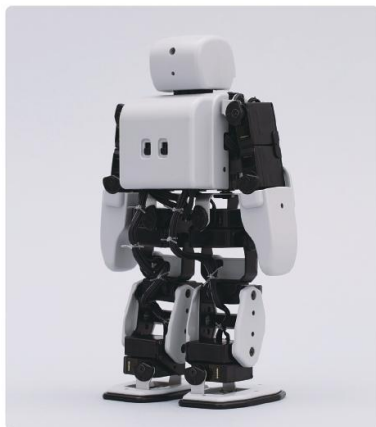
The servo motors used in PLEN's joints have
a movable range of about 170 degrees.



*If you try to move it manually beyond its
movable range, the motor will break, so be
careful when handling it when the power is off.



Allow slack
in leg cables
さい



How to assemble roller skates

* Please refer to the separate "Assembly of Roller Skates" manual.

How to operate on iPhone

* Please refer to the separate sheet "How to operate from various apps iPhone version".

How to operate on Android

* Please refer to the separate sheet "Operating methods from various apps for Android".

If you thought it was a malfunction

① Power does not turn on



The battery may be dead. Be sure to charge the "battery pack" until the "battery charger" light turns blue.

(2) Failing frequently / Feeling weak



The battery may be dead. Charge the "battery pack".

③

When the switch is turned on, even if you are not doing anything
A high-pitched squealing sound is heard intermittently



This sound is unique to digital servo motors. This is not a malfunction.

④ Something like oil comes out of the servo motor



The grease inside the case of the servo motor is seeping out. This is not a malfunction, but please wipe it off with a cloth.

⑤ Do not walk straight



A robot that walks on two legs cannot go perfectly straight. If it bends too much, please contact our support center.

⑥ Joints are stiff and do not move



It may be moving to a position beyond the movable range of the servo motor. Don't try to force
-> turn on the power. At that time, if an abnormal sound is emitted or the servo motor does not
move, immediately turn off the power and contact the support center.

*Repair is charged

⑦ Shaky joints / idling



The servo motor stopper may be damaged. Please contact the support center.

*Repair is charged

⑧ I dropped it



If you find any abnormalities in operation, please contact the support center as soon as possible. *Repair is charged

Main Specifications

specifications

CPU	Arduino compatible
number of ports	18 axes
communication port	USB
radio equipment	Bluetooth
Operating time	About 25 minutes (fully charged battery)
size	height 250mm
	Width 130mm
	Depth 70mm
weight	700g

accessories

Complete PLEND assembly kit
charger
ball
box (paper craft)
Phillips screwdriver (1)

DMM.make ROBOTS