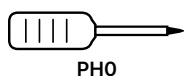
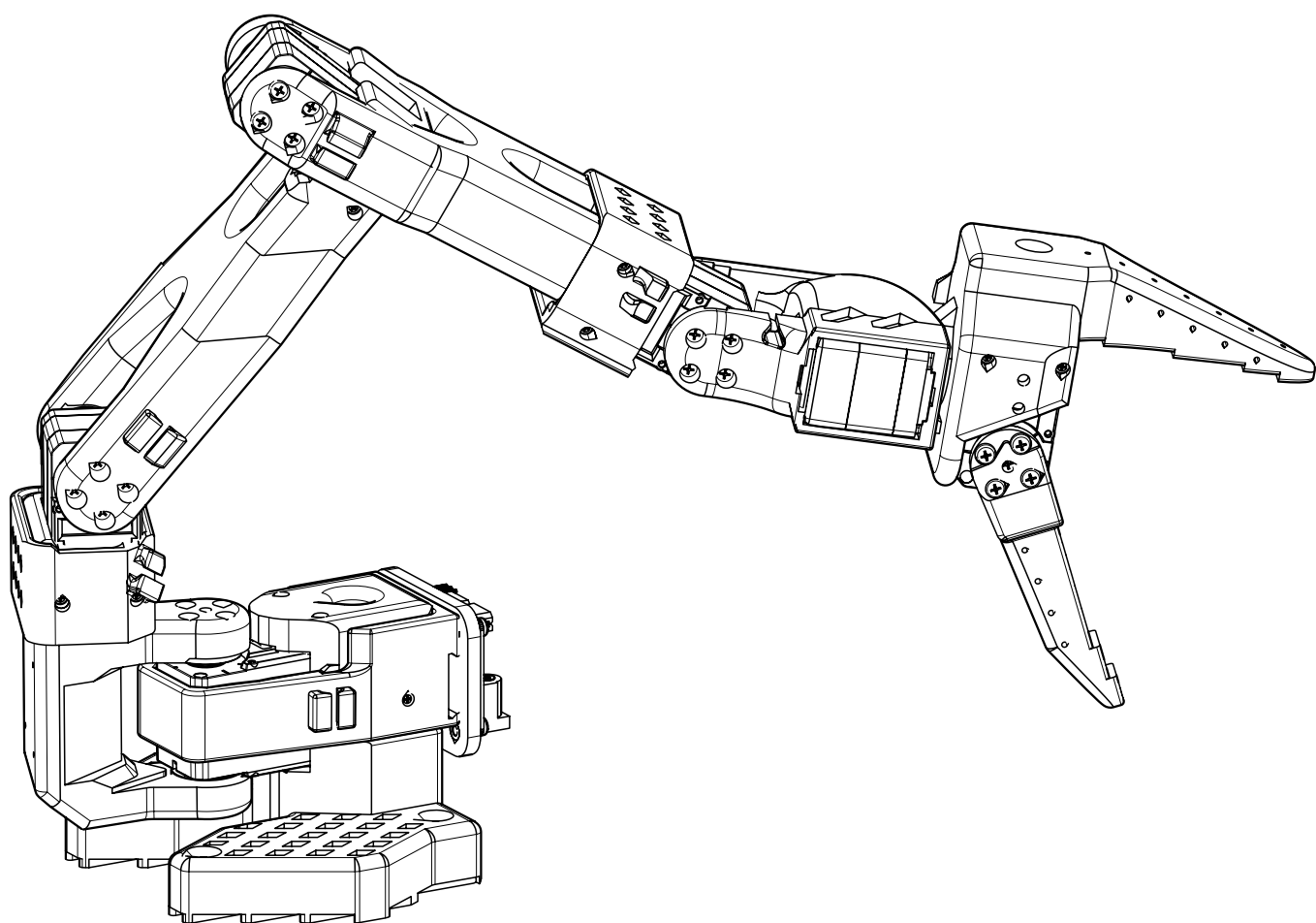


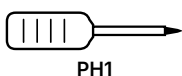
SO-101

Follower arm

Assembly instructions



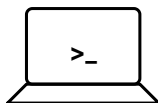
PH0



PH1



1 person



Computer, USB

78

screws



Read page 2 first

Safety

Read before assembly and before you switch the arm on. Keep these instructions.



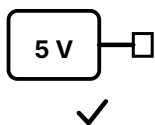
Pinch points. The gripper and every joint can trap fingers. Keep hands out of the jaws and joints while the arm has power.



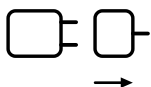
Unexpected motion. The arm can move as soon as power is applied, a program starts or torque is enabled. Keep people, cables and objects out of its reach.



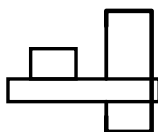
Move the arm by hand only when torque is disabled, for example during calibration. Never force a joint while torque is enabled.



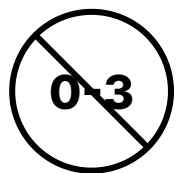
Use only the 5 V DC, 4 A supply T with the 7.4 V servos of this arm. A 12 V supply is only for the 12 V servo version. A wrong supply damages the servos and the board.



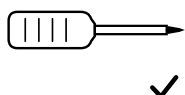
Disconnect the power supply before you work on the assembled arm or change its cables.



Clamp the base to a firm, flat table before power-up. The arm can tip over when it moves.



Small parts: screws, horns and spacers are a choking hazard. Keep them away from children under 3.

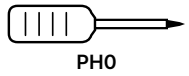


Use hand screwdrivers only. Do not overtighten: the screws in printed parts can strip the plastic.

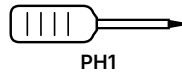
Before you start

Tools, printed parts and a clear workspace.

Tools



Phillips size 0
for M2×6 (24x)

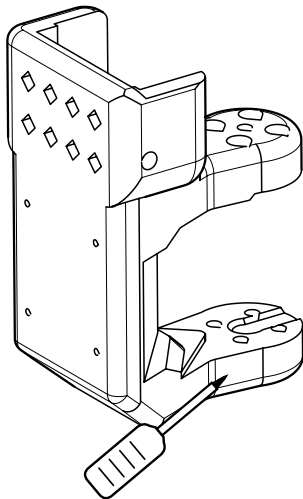


Phillips size 1
for M3×6 (50x) and M2.5×4 (4x)

Printed parts

Parts A to L are 3D printed. Settings tested by the designers:

Material	PLA+
Nozzle / layer	0.4 mm at 0.2 mm, or 0.6 mm at 0.4 mm
Infill	15 %
Supports	Everywhere, ignore slopes over 45°. No supports in horizontal screw holes.



Remove all support material. Use a small screwdriver to lift it from underneath.

Check that horn pockets, servo slots and screw holes are clean.

Software

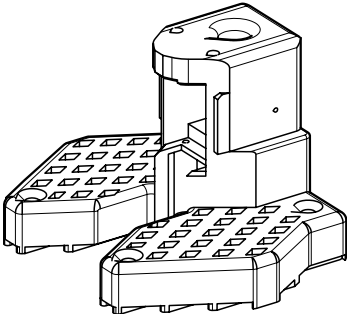
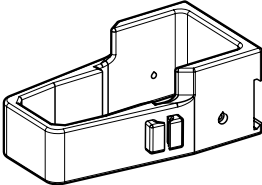
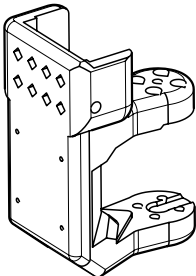
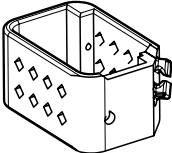
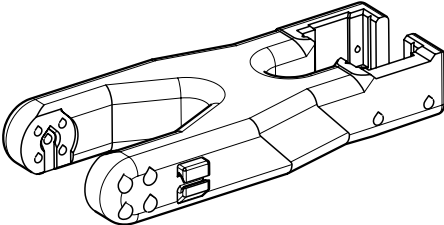
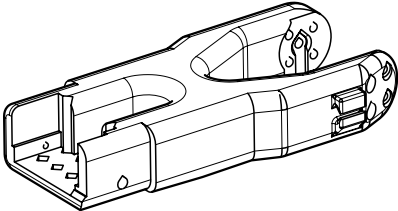
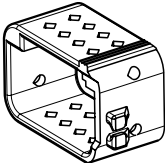
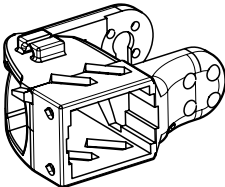
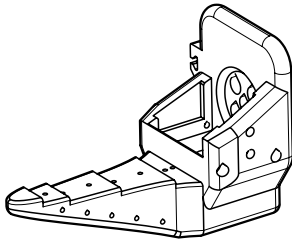
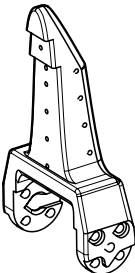
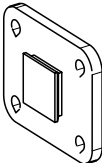
Install LeRobot on the computer and add the Feetech servo SDK, in the LeRobot folder:

```
pip install -e "[feetech]"
```

Servo setup in steps 1 and 2 needs the controller board, the power supply and the USB cable. Do it before assembly: the servos are identical until they get their IDs.

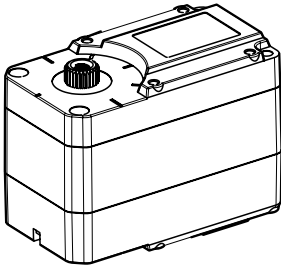
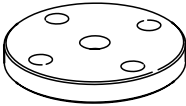
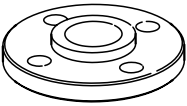
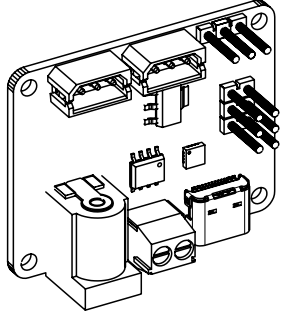
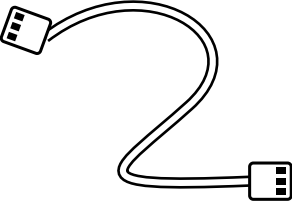
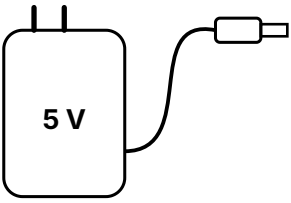
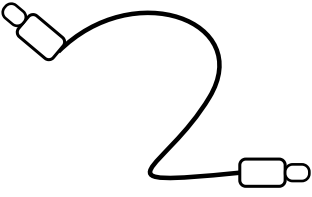
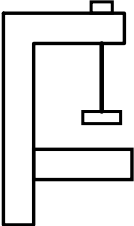
Parts

Check that all parts are complete before you start. Printed parts are drawn to the same scale.

A 1x  Base	B 1x  Base motor holder	C 1x  Shoulder
D 1x  Shoulder motor holder	E 1x  Upper arm	F 1x  Forearm
G 1x  Wrist motor holder	H 1x  Wrist	J 1x  Gripper, fixed jaw
K 1x  Moving jaw	L 1x  Board mounting plate	50 mm Drawing scale 1:2.5

Parts

Servos, horns and electronics.

(M) 6x  Servo STS3215, 7.4 V, 1/345 (C001)	(N) 6x  Horn, output (splined)	(P) 5x  Horn, idler
(R) 1x  Bus Servo Adapter (A)	(S) 6x  3-pin servo cable	(T) 1x  Power supply 5 V DC, 4 A (20 W)
(U) 1x  USB-C cable	(V) 2x  Table clamp	

The servos of the follower arm all have the 1/345 gear ratio. Their IDs are set in steps 1 and 2. Servo 5 (wrist roll) uses only an output horn N. Hardware: see the next page.

Hardware, actual size 1:1

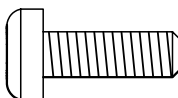
Lay a screw on its 1:1 drawing to identify it. Print at 100 % (no "fit to page").

1:1

3:1

M2×6

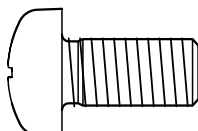
24x



Screw M2 × 6, cross recess
(smallest screw)
Servos and motor holder B

M3×6

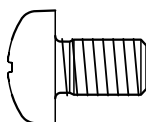
50x



Pan head screw M3 × 6, ISO 7045,
cross recess
Horns: 6 horn screws, 44 through
printed parts

M2.5×4

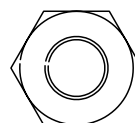
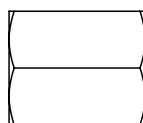
4x



Pan head screw M2.5 × 4, ISO
7045
Controller board

M2.5×6

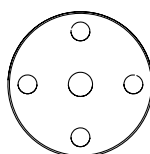
4x



Hex spacer M2.5 × 6,
female/female, 5 mm A/F
Controller board

Horns, 1:1

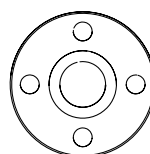
(N)



Ø19.2 mm

Output horn, splined bore

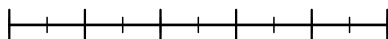
(P)



Ø19.2 mm

Idler horn

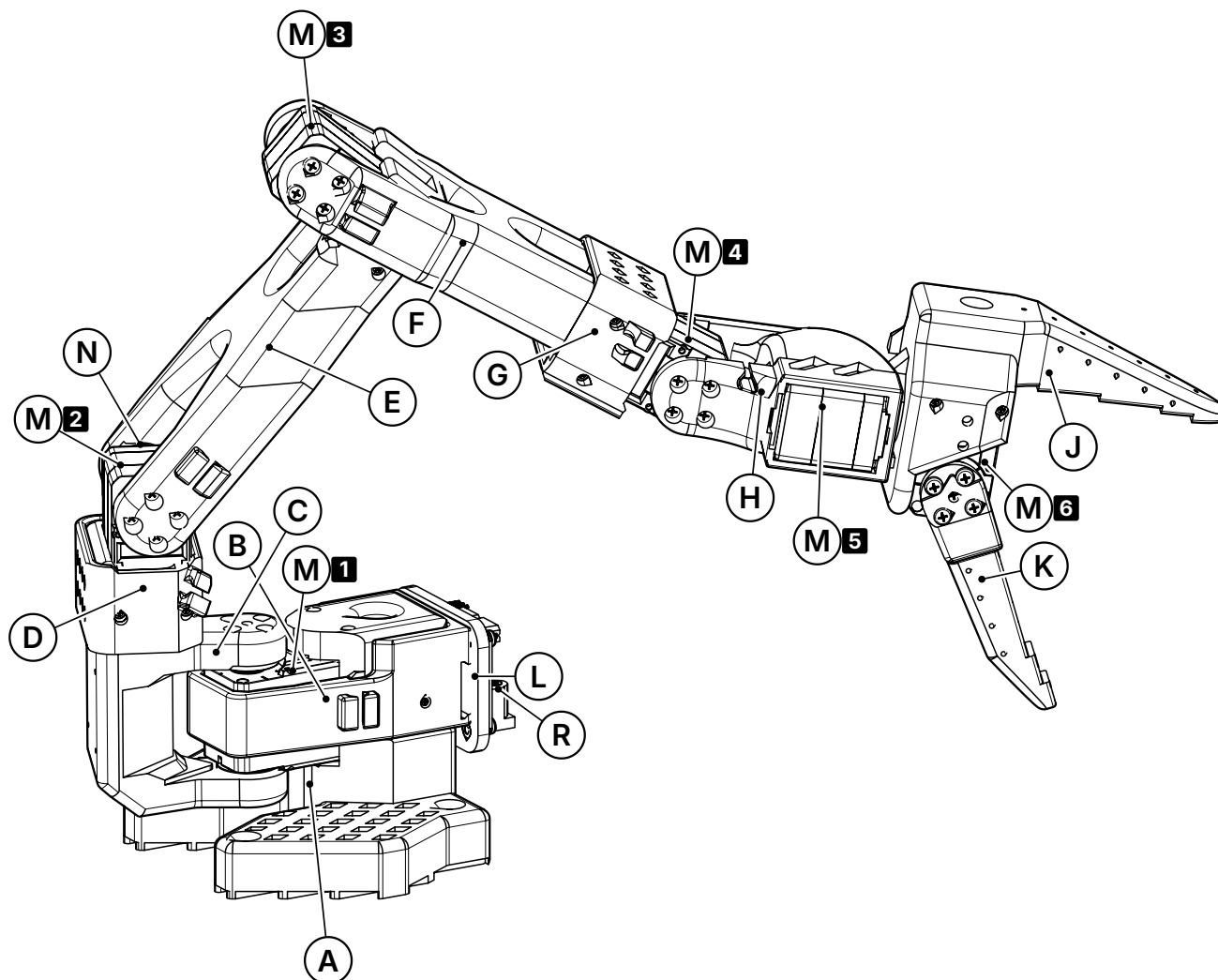
Scale check



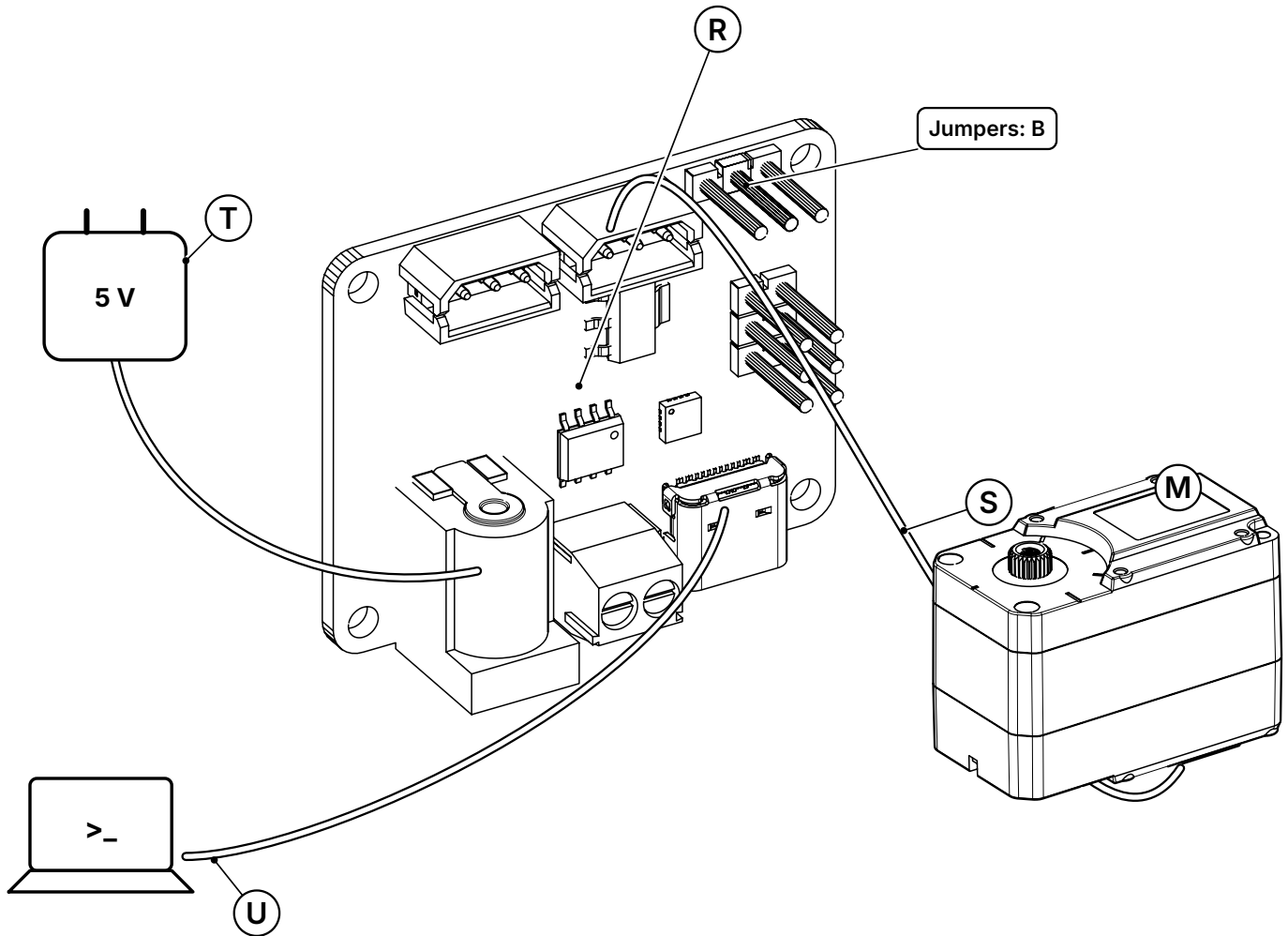
50 mm. Measure this bar: it must be 50 mm long.

The finished arm

Where each part goes. Servo IDs in black squares.



- | | | |
|---------------------------|-------------------------------|----------------------|
| (A) Base | (H) Wrist | (R) Controller board |
| (B) Base motor holder | (J) Gripper, fixed jaw | (S) Servo cable |
| (C) Shoulder | (K) Moving jaw | (T) Power supply |
| (D) Shoulder motor holder | (L) Board mounting plate | (U) USB-C cable |
| (E) Upper arm | (M) Servo STS3215 (ID 1 to 6) | (V) Table clamp |
| (F) Forearm | (N) Horn, output | |
| (G) Wrist motor holder | (P) Horn, idler | |



Set both jumpers on the board R to B (USB). Connect the board to the computer with U and to the 5 V supply T. Plug one servo M into the board with a cable S.

Find the port

Run the command. Unplug the USB cable when asked and press Enter. The script prints the port of the board. Plug the USB cable in again.

```
lerobot -find-port
```

Example ports: `/dev/ttyACM0` (Linux), `/dev/tty.usbmodem585A0076841` (macOS), COM3 (Windows). On Linux, if access to the port is denied, run: `sudo chmod 666 /dev/ttyACM0` (with your port).



Use the 5 V DC, 4 A supply T for the 7.4 V servos of this arm. Never connect a 12 V supply to them.

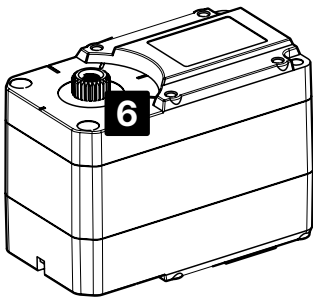
2 SERVO SETUP

/ 28

```
lerobot-setup-motors --robot.type=sol01_follower --robot.port=/dev/ttyACM0
```

Put the port from step 1 in place of /dev/ttyACM0. The script asks for one servo at a time. Plug in only that servo, alone on the board, and press Enter. It writes the ID and the baud rate (1 000 000 bps) to the servo memory. Mark each servo with its ID. Leave the cable plugged into the servo.

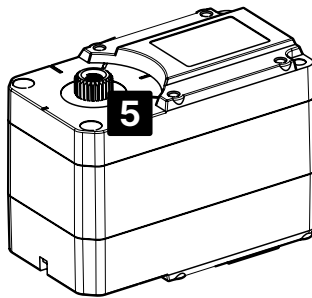
1.



gripper

ID 6

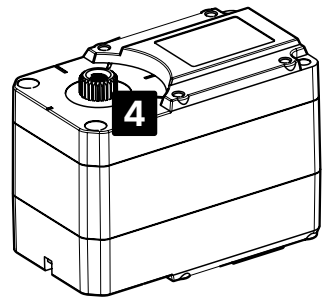
2.



wrist_roll

ID 5

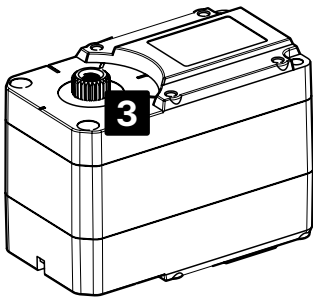
3.



wrist_flex

ID 4

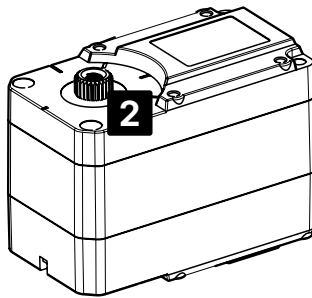
4.



elbow_flex

ID 3

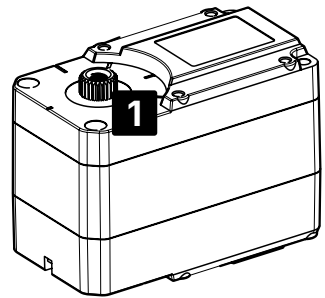
5.



shoulder_lift

ID 2

6.

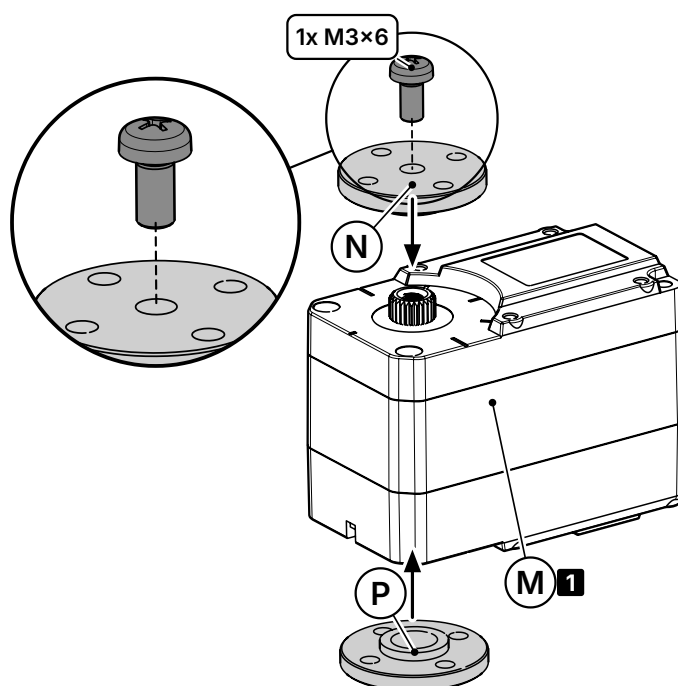
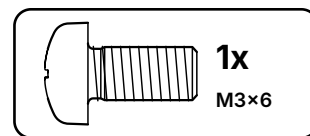
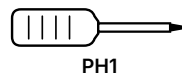


shoulder_pan

ID 1

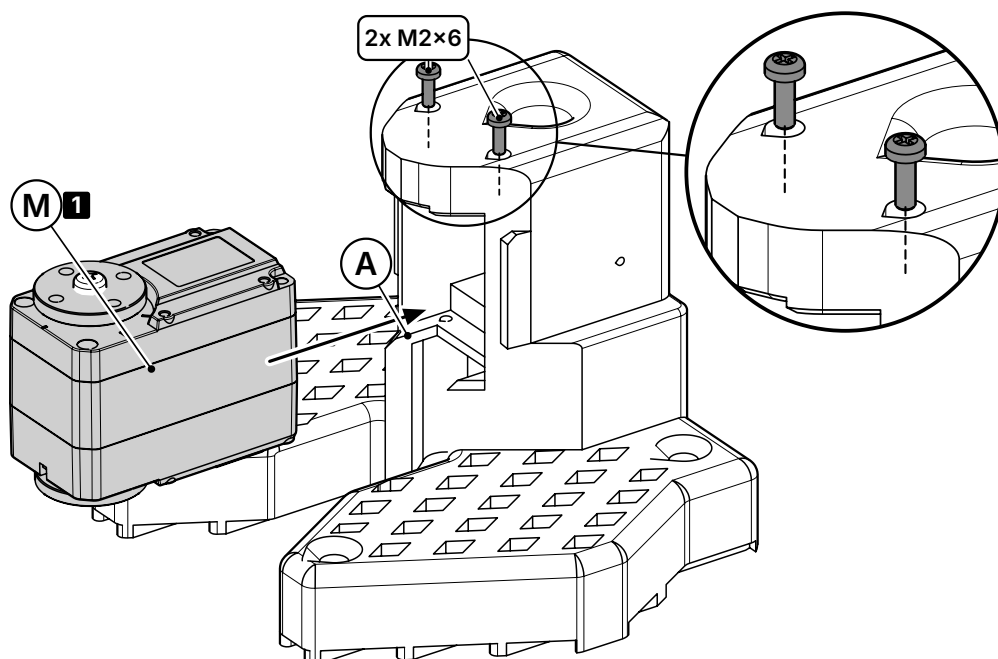
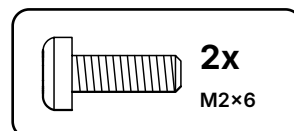
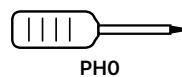
All six servos are STS3215 7.4 V, 1/345. After the last servo the script ends. Then assemble the arm: each servo goes to the joint with its ID.

3 JOINT 1 / 28



Press horn N onto the splined output shaft of servo 1 and fix it with 1 screw. Press horn P onto the other side. No screw.

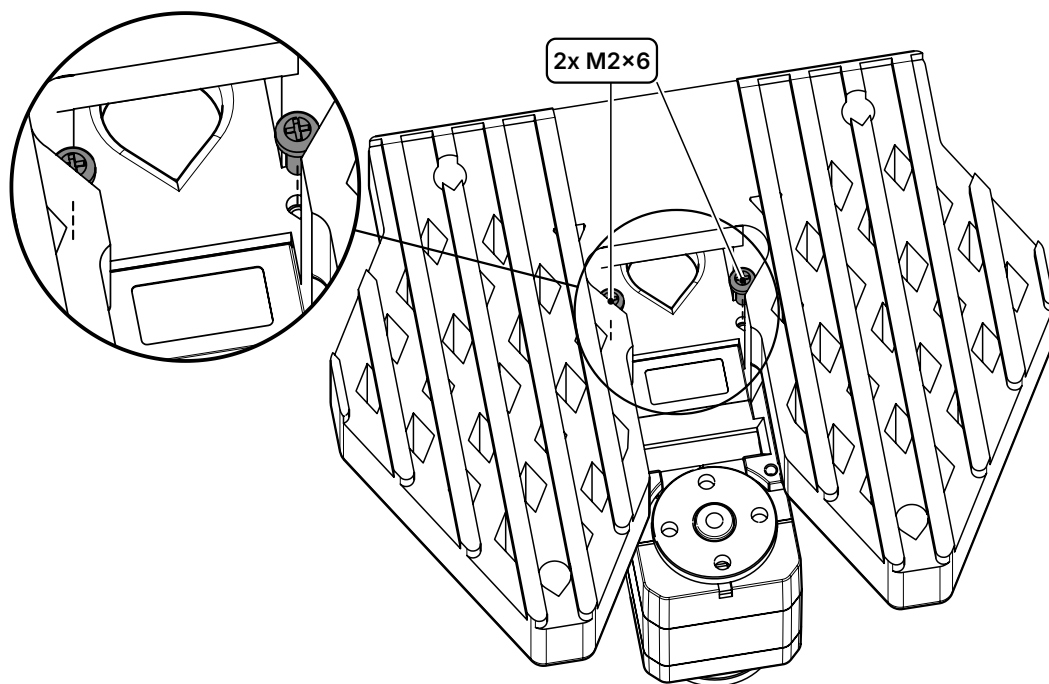
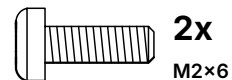
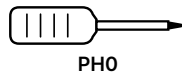
4 / 28



Slide servo 1 into the base A, horn up. Fix it with 2 screws from the top.

5

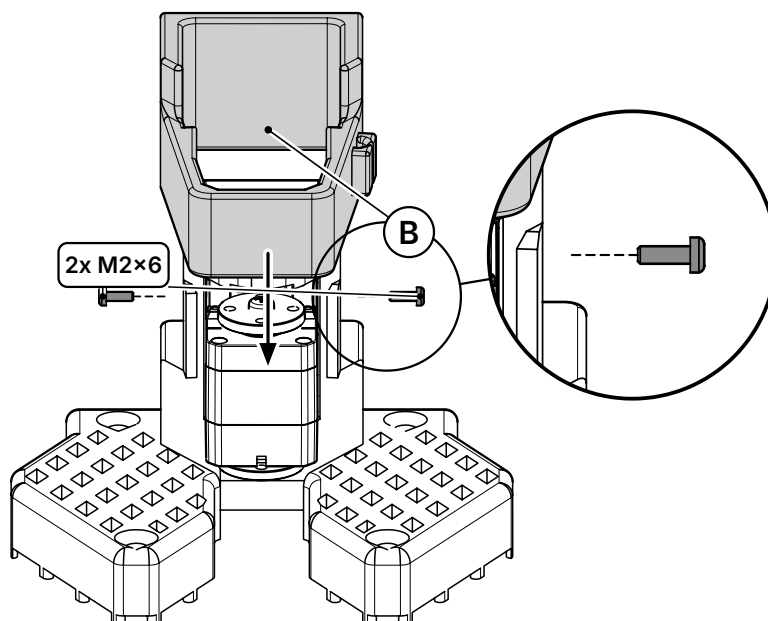
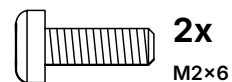
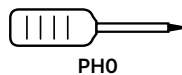
/ 28



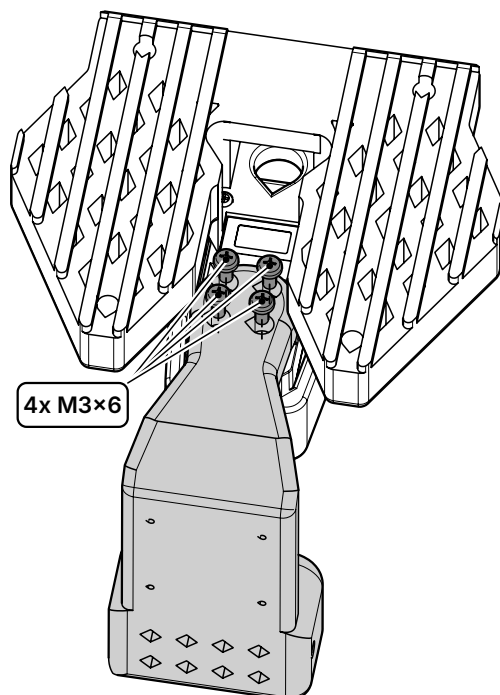
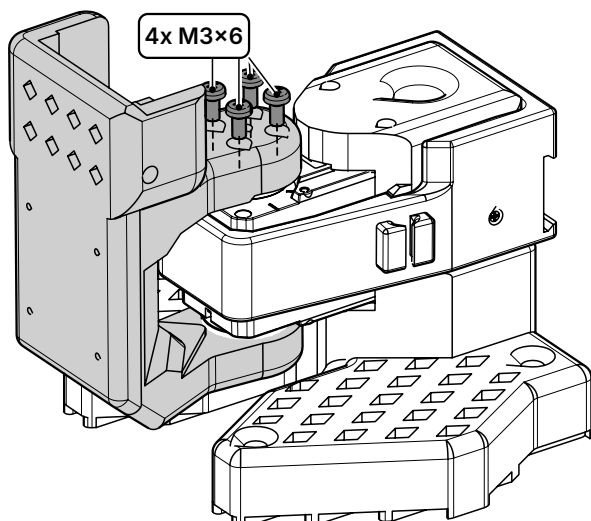
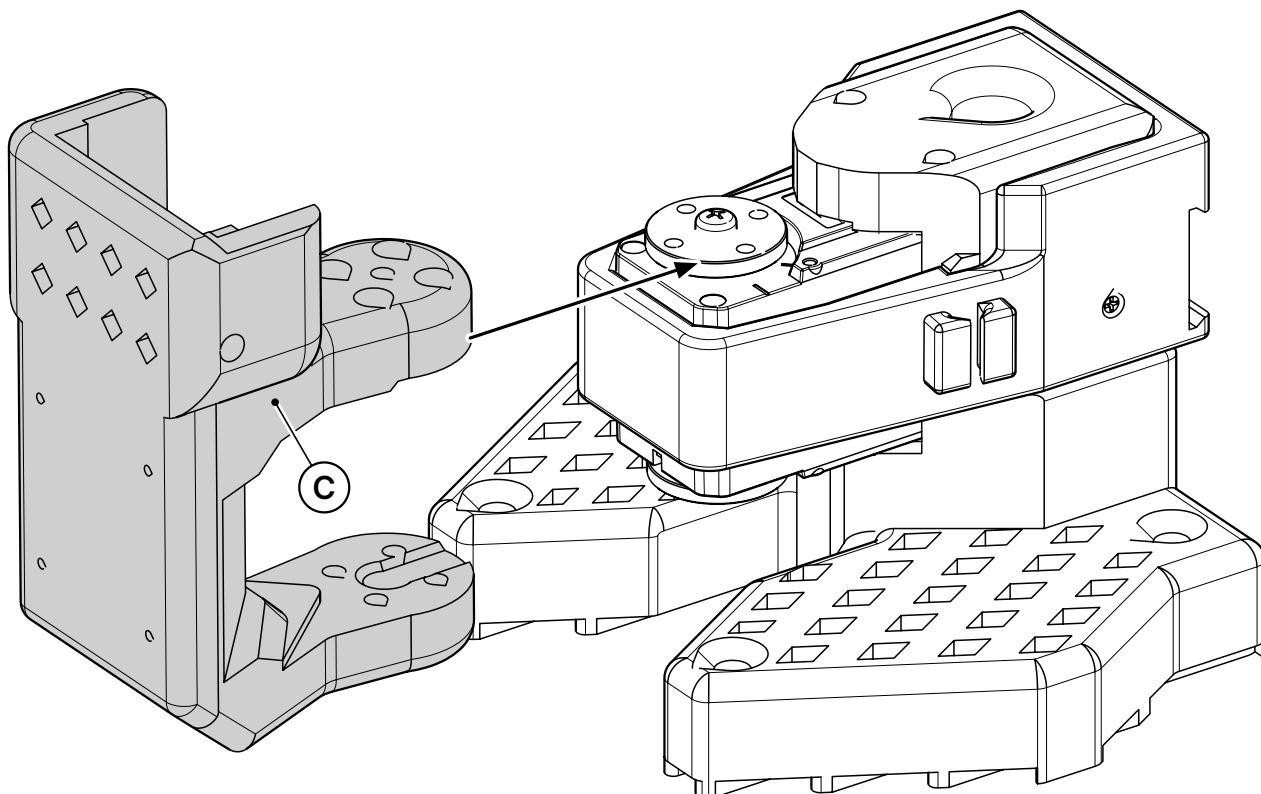
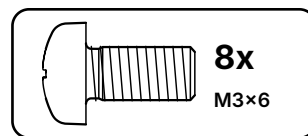
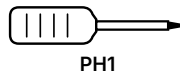
Turn the base over. Fix servo 1 with 2 screws from the bottom.

6

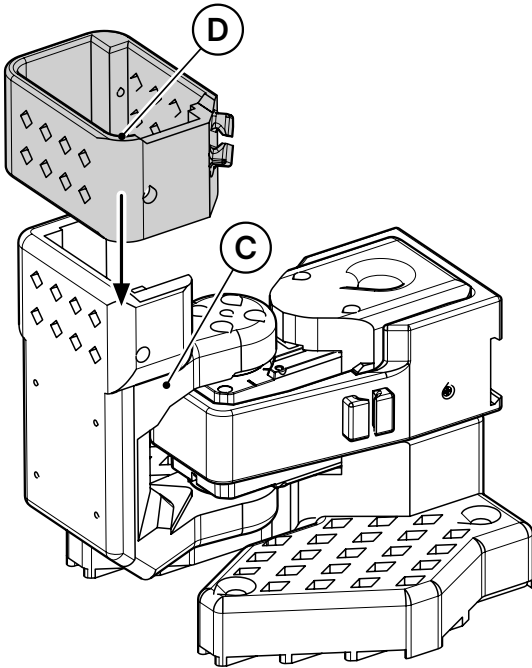
/ 28



Slide the motor holder B down over servo 1. Fix it with 1 screw on each side.

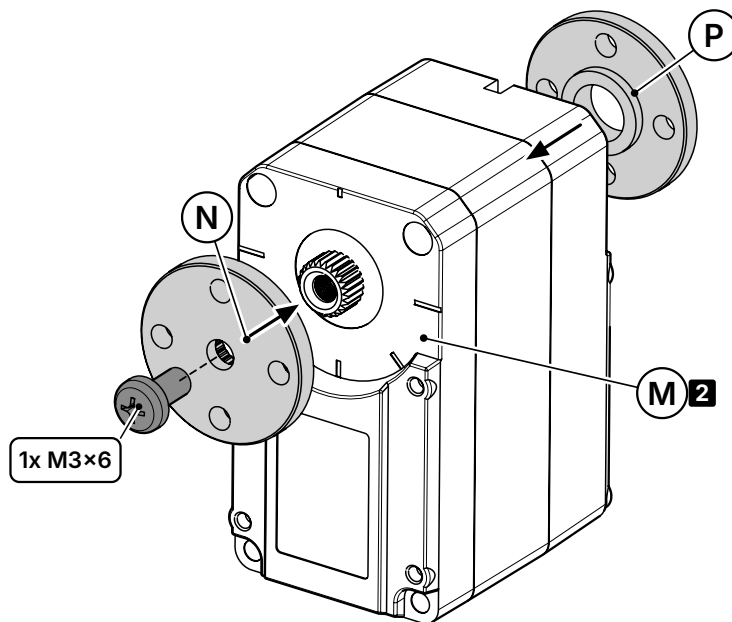
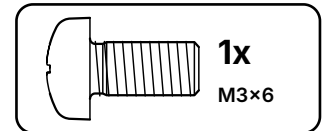
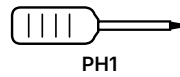


Slide the shoulder C onto both horns of servo 1. Fix it with 4 screws through the top horn. Turn over and fix 4 screws through the bottom horn.

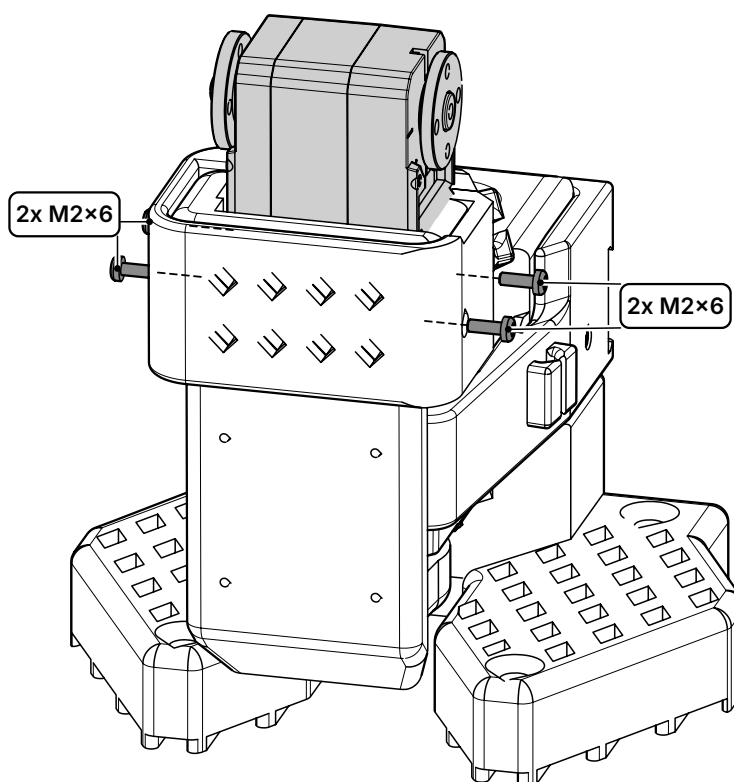
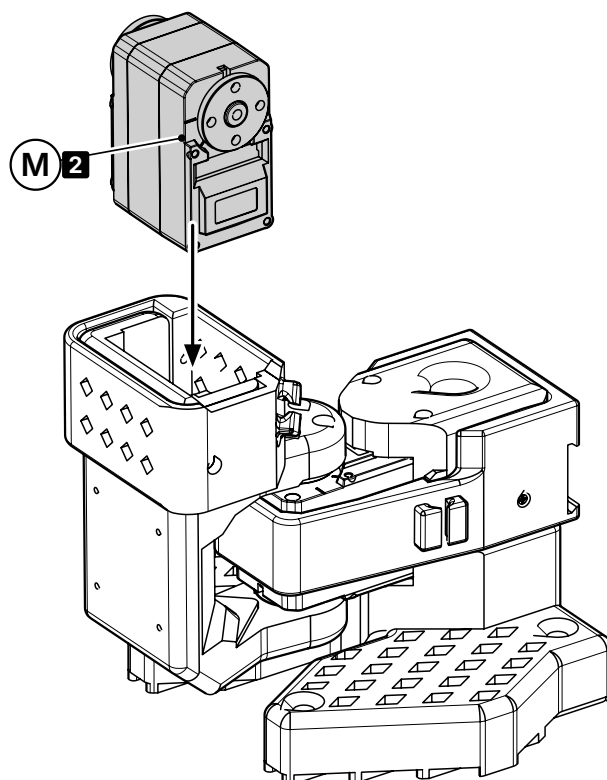
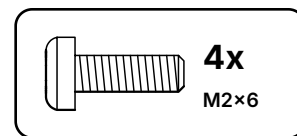
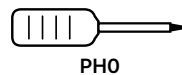


Place the motor holder D into the shoulder C.

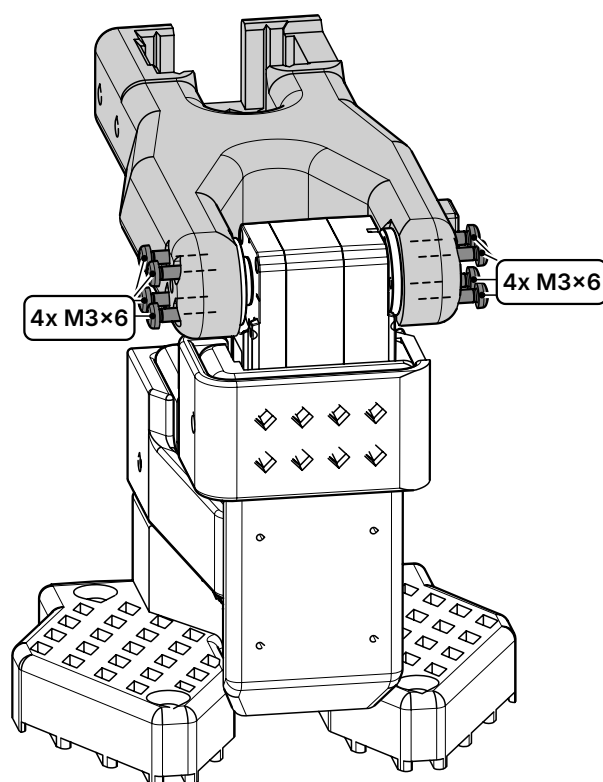
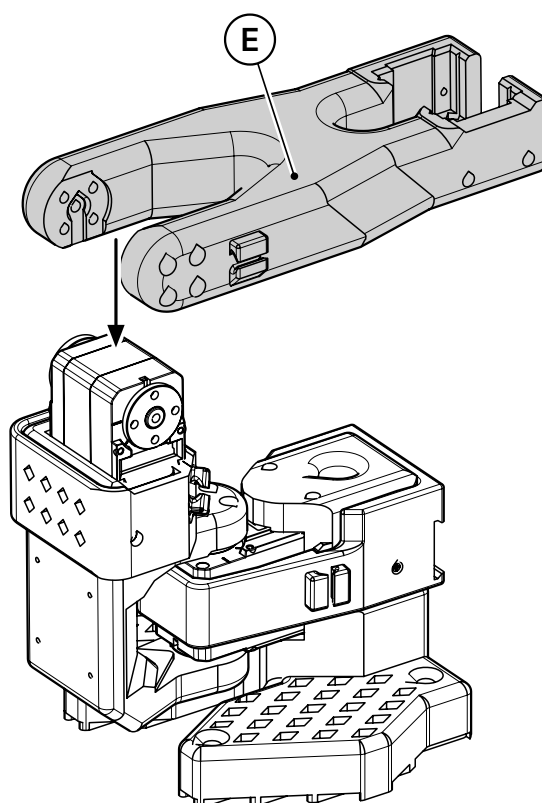
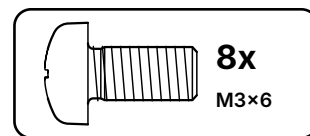
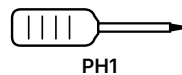
/ 28



Fit horns N and P to servo 2. Fix N with 1 screw.



Slide servo 2 into the holder D from the top, horn N on the side shown. Fix it with 4 screws, 2 on each side.

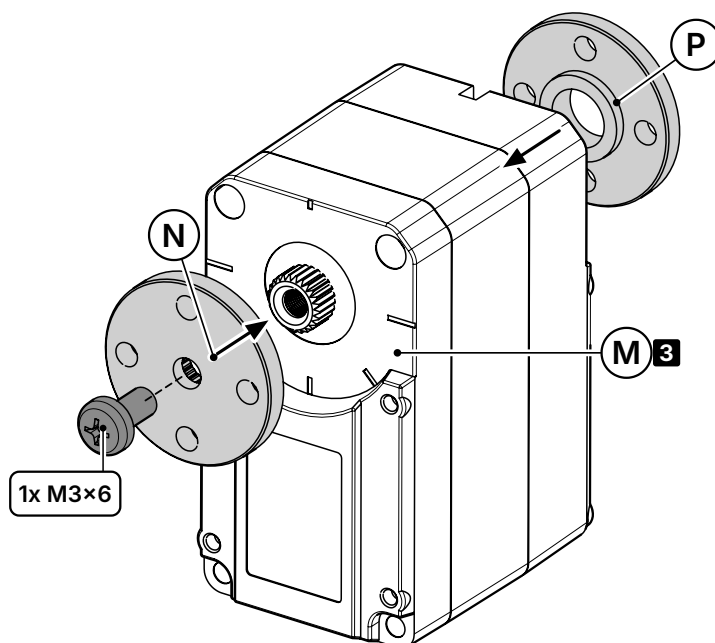
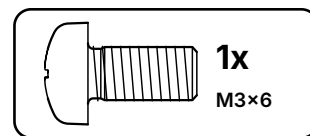
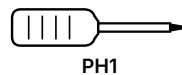


Place the upper arm E over both horns of servo 2. Fix it with 4 screws on each side.

12

JOINT 3

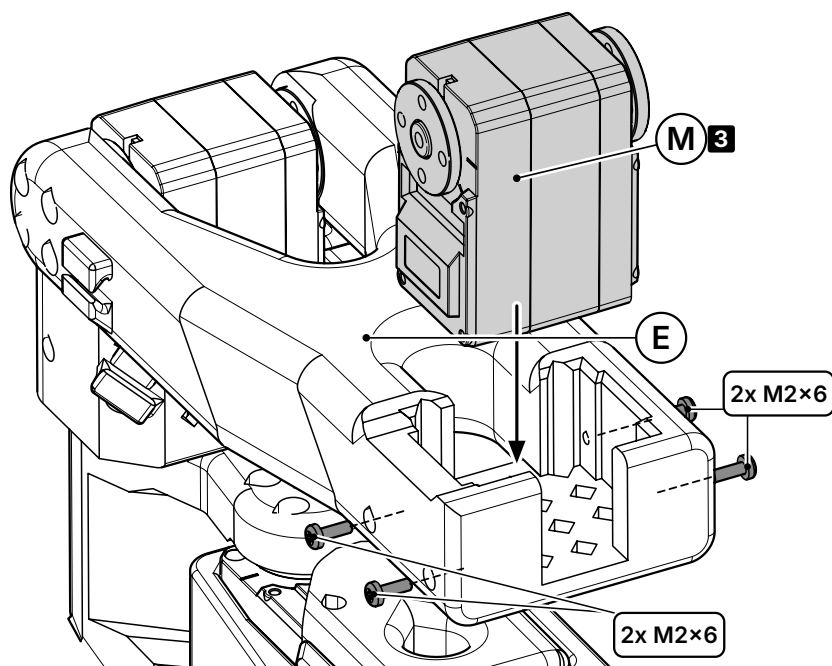
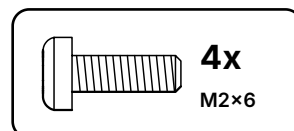
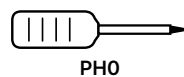
/ 28



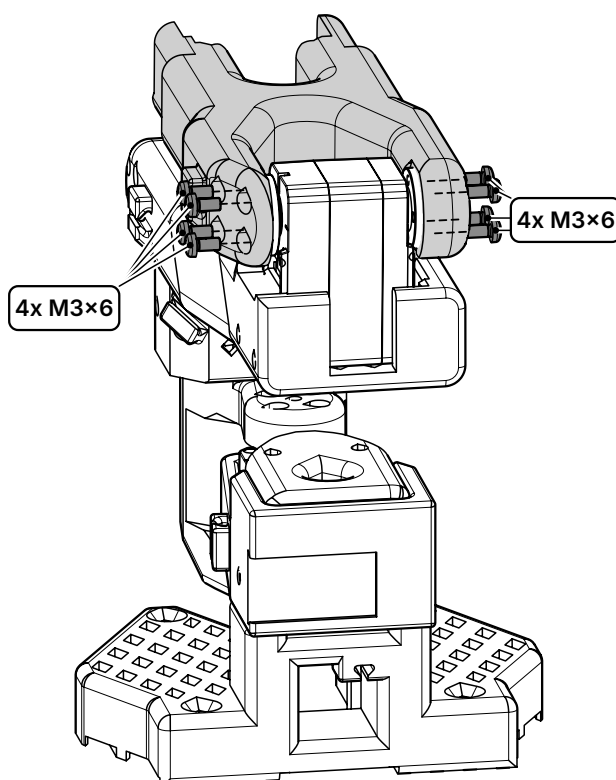
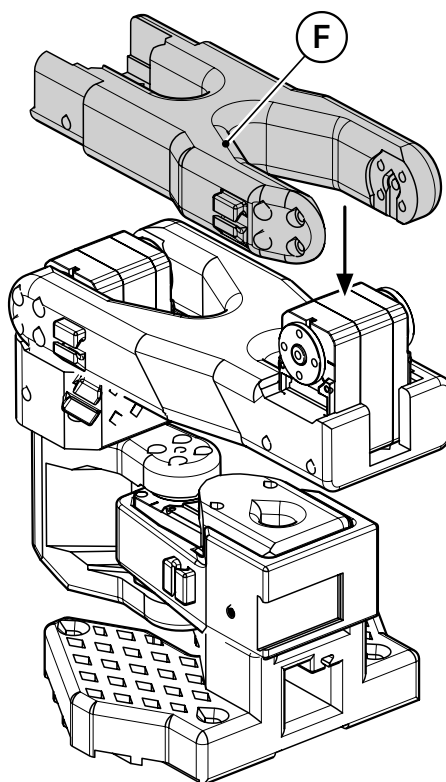
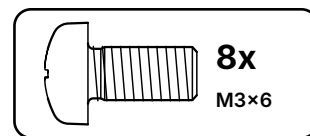
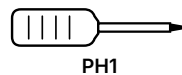
Fit horns N and P to servo 3. Fix N with 1 screw.

13

/ 28



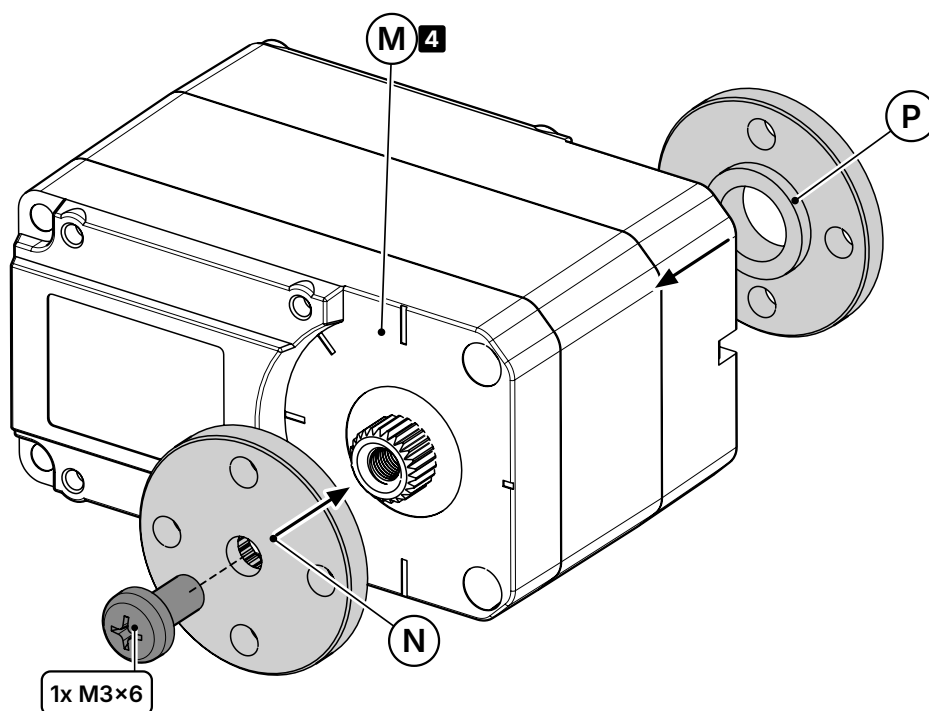
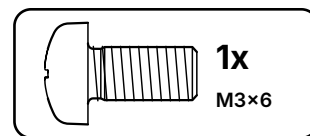
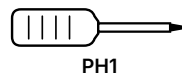
Insert servo 3 into the upper arm E, horn N on the side shown. Fix it with 4 screws, 2 on each side.



Place the forearm F over both horns of servo 3. Fix it with 4 screws on each side.

15

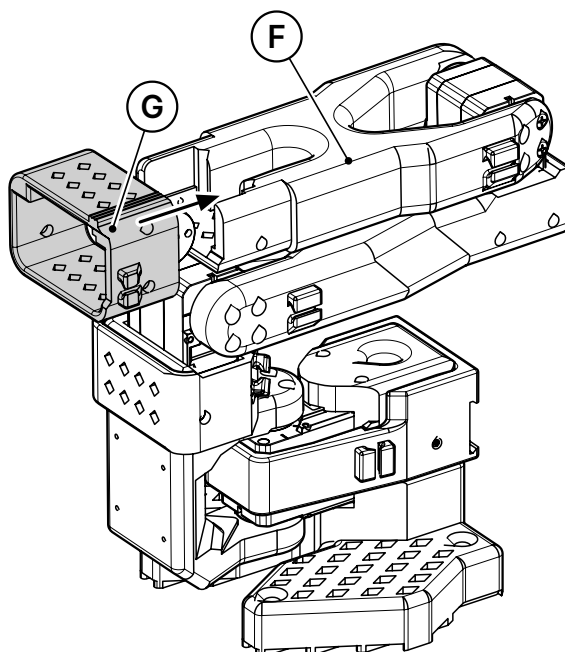
JOINT 4
/ 28



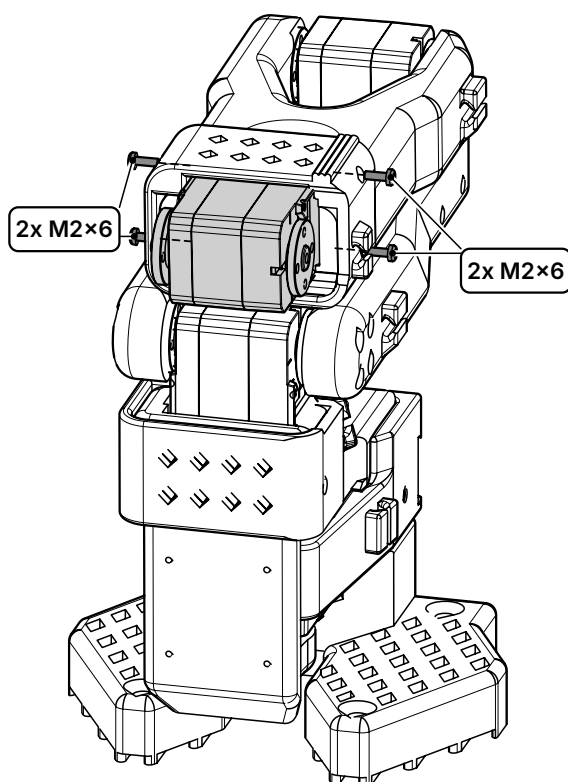
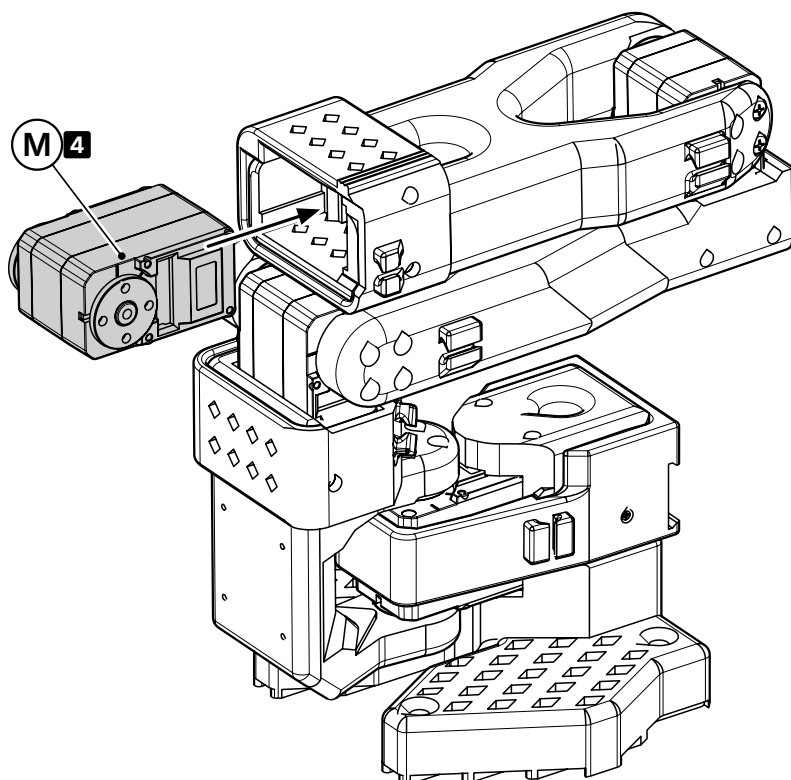
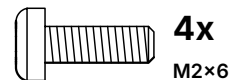
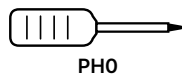
Fit horns N and P to servo 4. Fix N with 1 screw.

16

/ 28



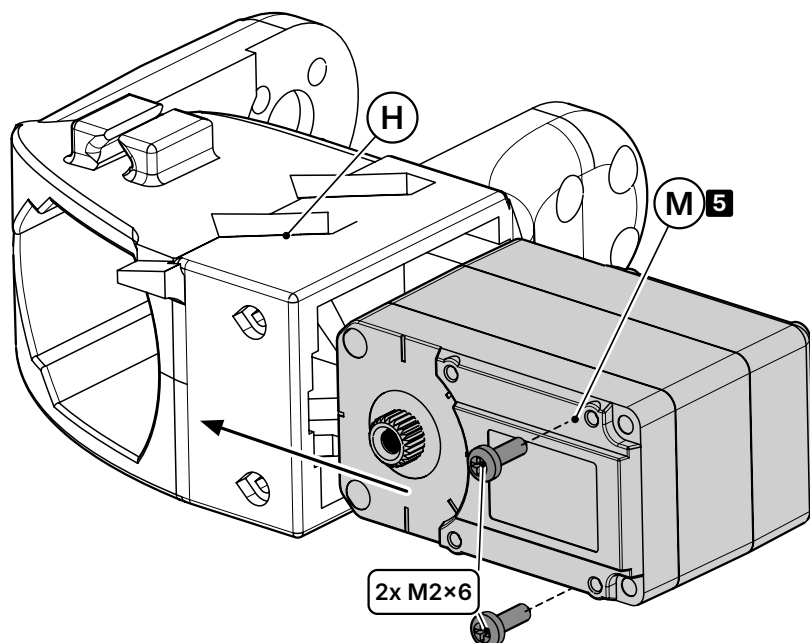
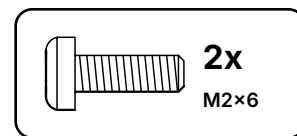
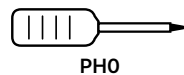
Slide the motor holder G onto the end of the forearm F.



Slide servo 4 into the holder G, horn N on the side shown. Fix it with 4 screws, 2 on each side.

18

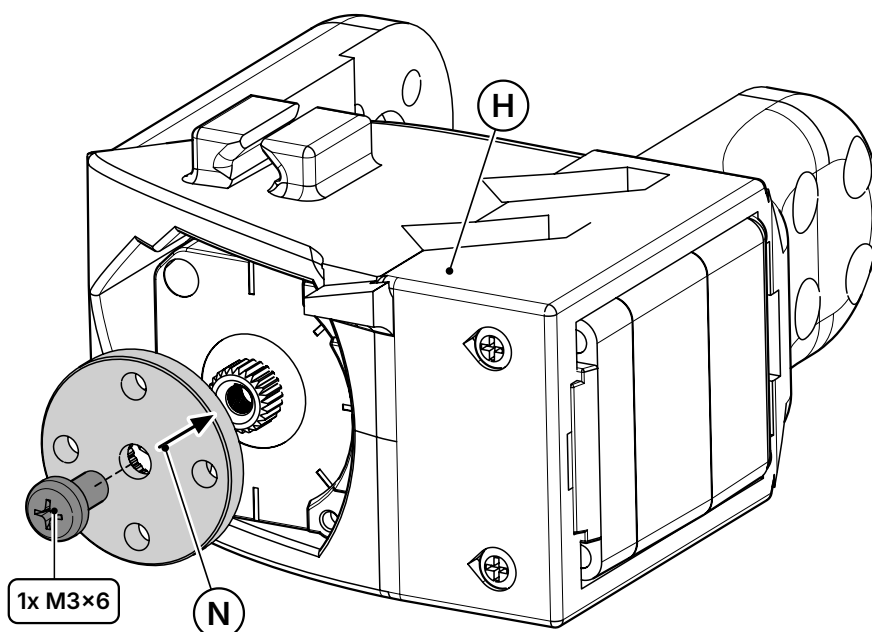
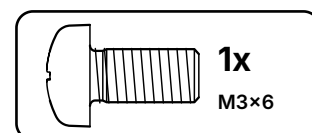
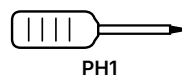
JOINT 5
/ 28



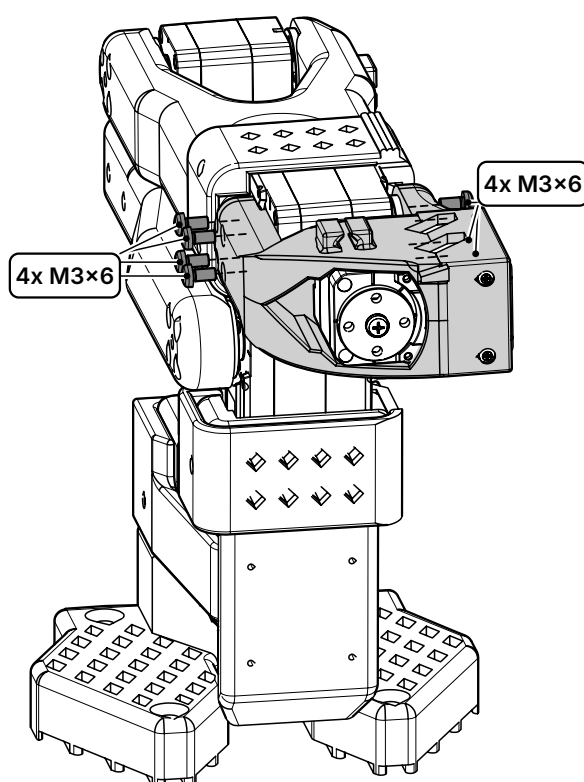
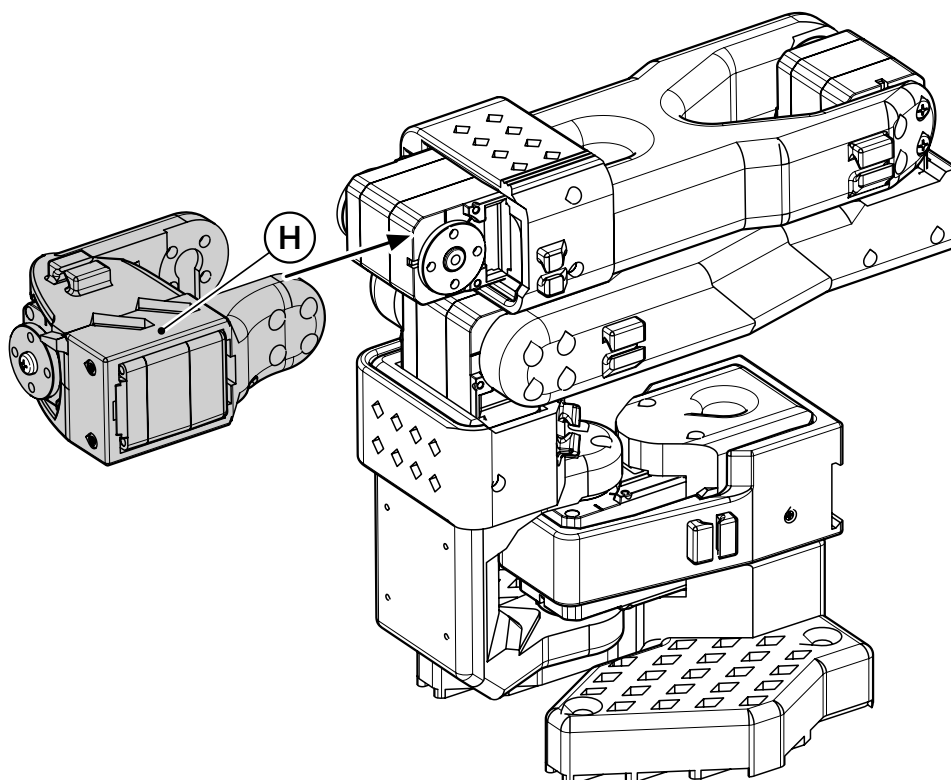
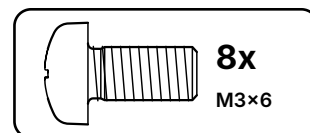
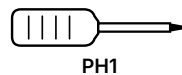
Insert servo 5 into the wrist H, output shaft on the side shown. Fix it with 2 screws at the front.

19

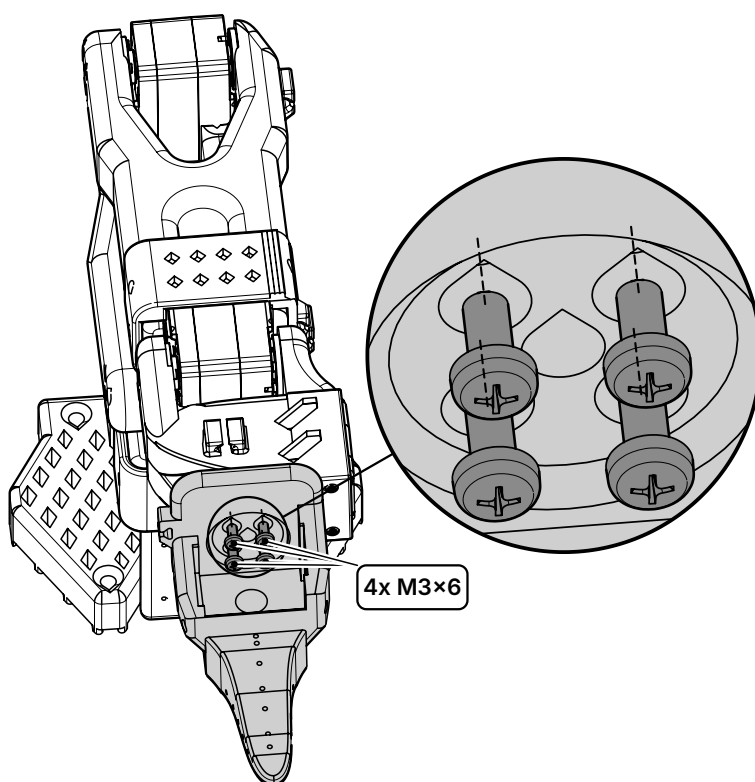
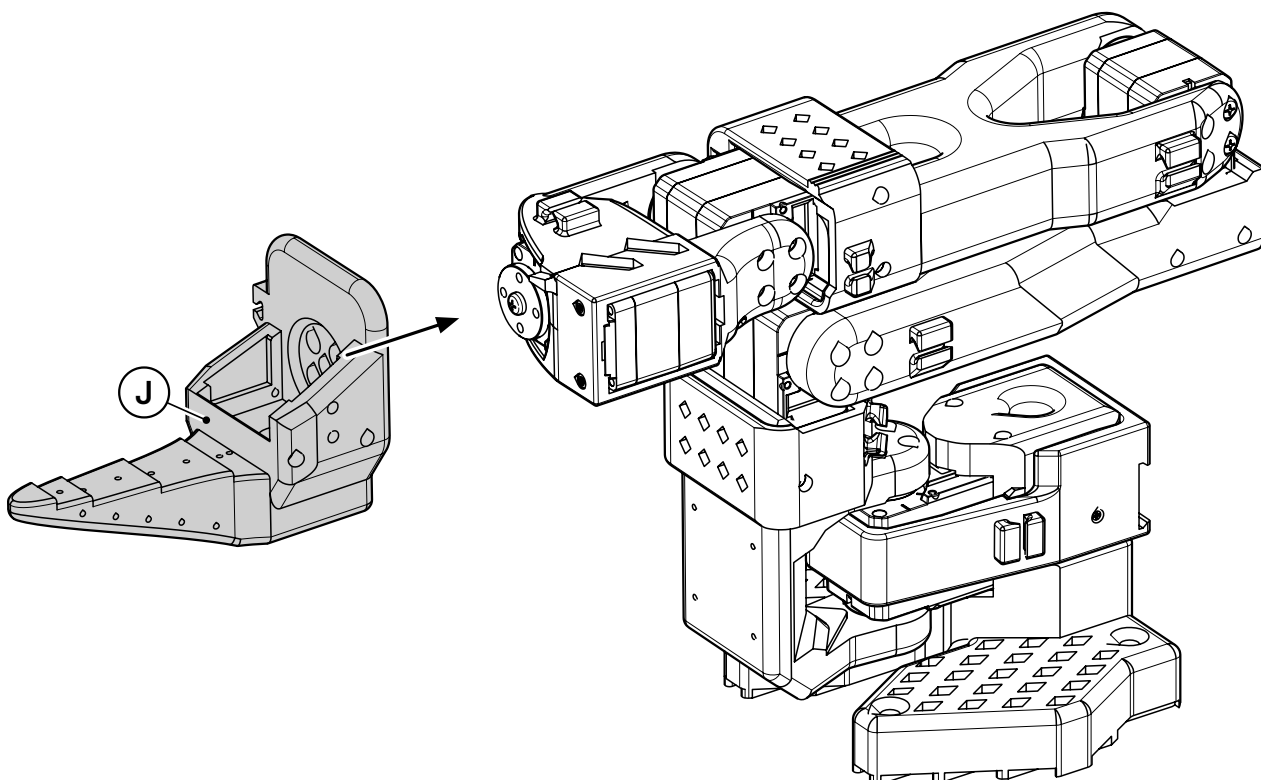
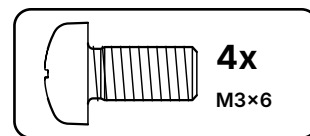
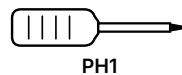
/ 28



Fit only horn N to servo 5. Fix it with 1 screw. Servo 5 gets no horn P.

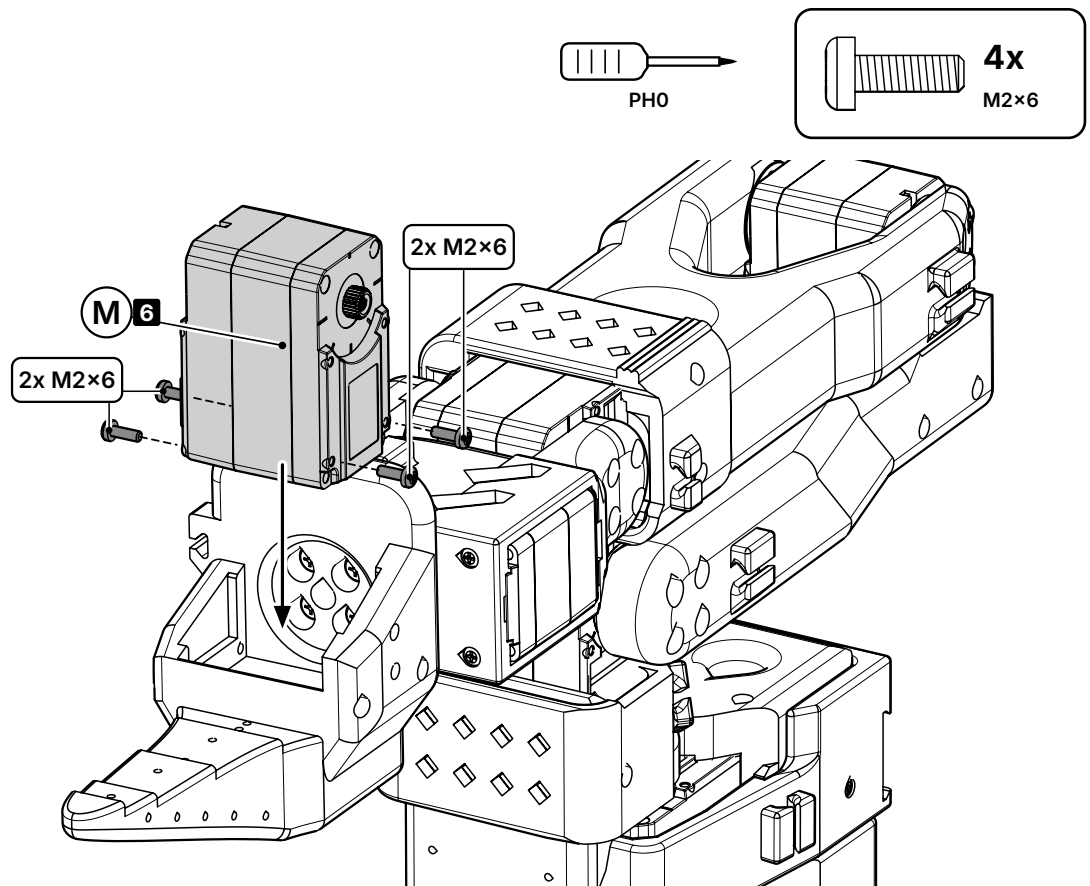


Slide the wrist H over both horns of servo 4. Fix it with 4 screws on each side.



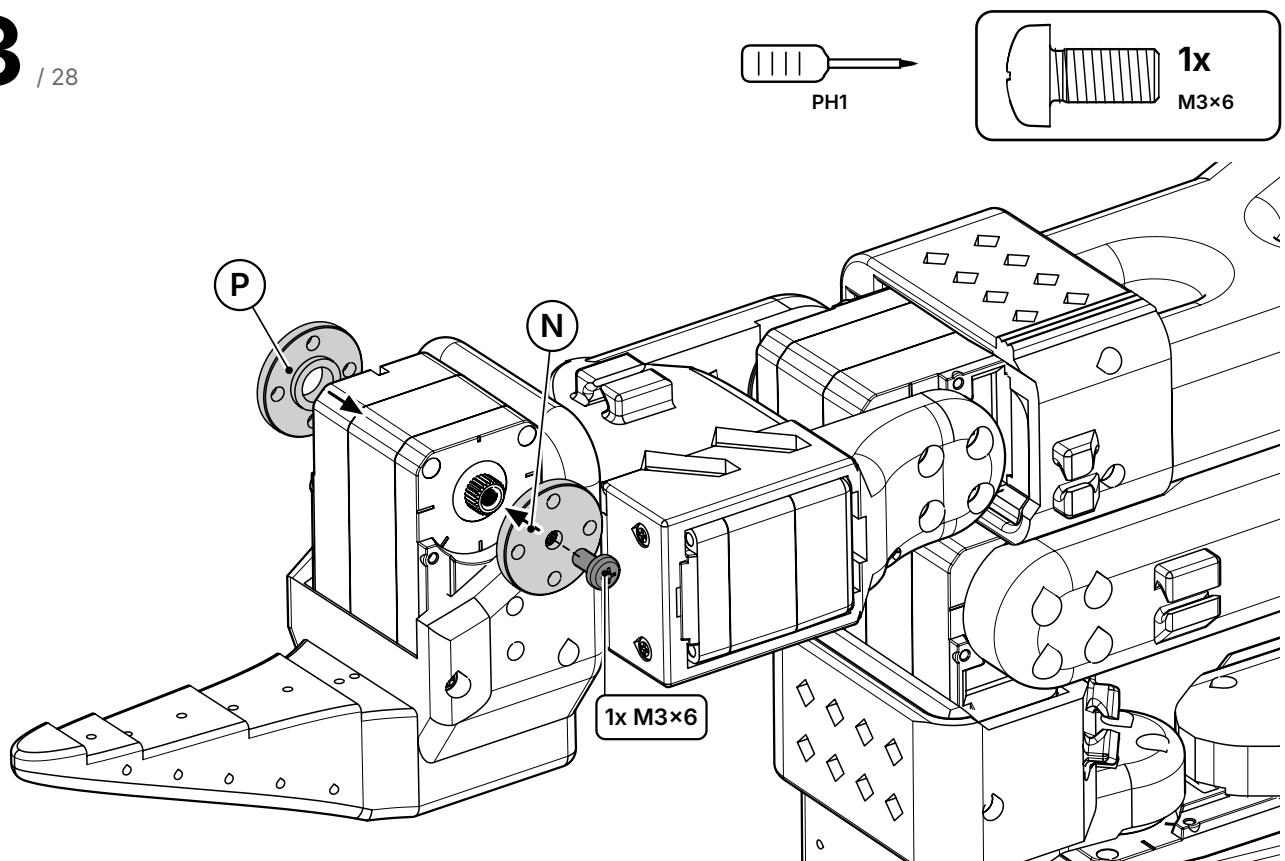
Place the gripper J on horn N of servo 5. Fix it with 4 screws from inside J.

22 / 28

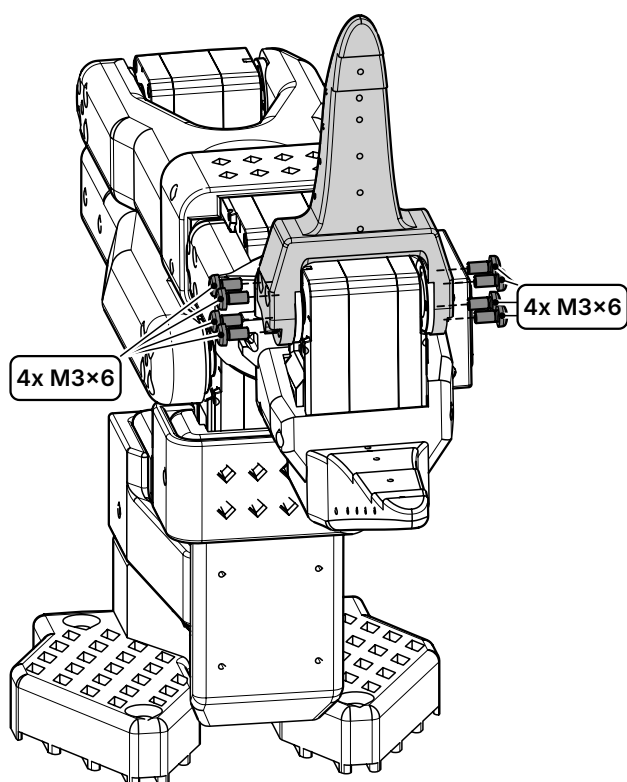
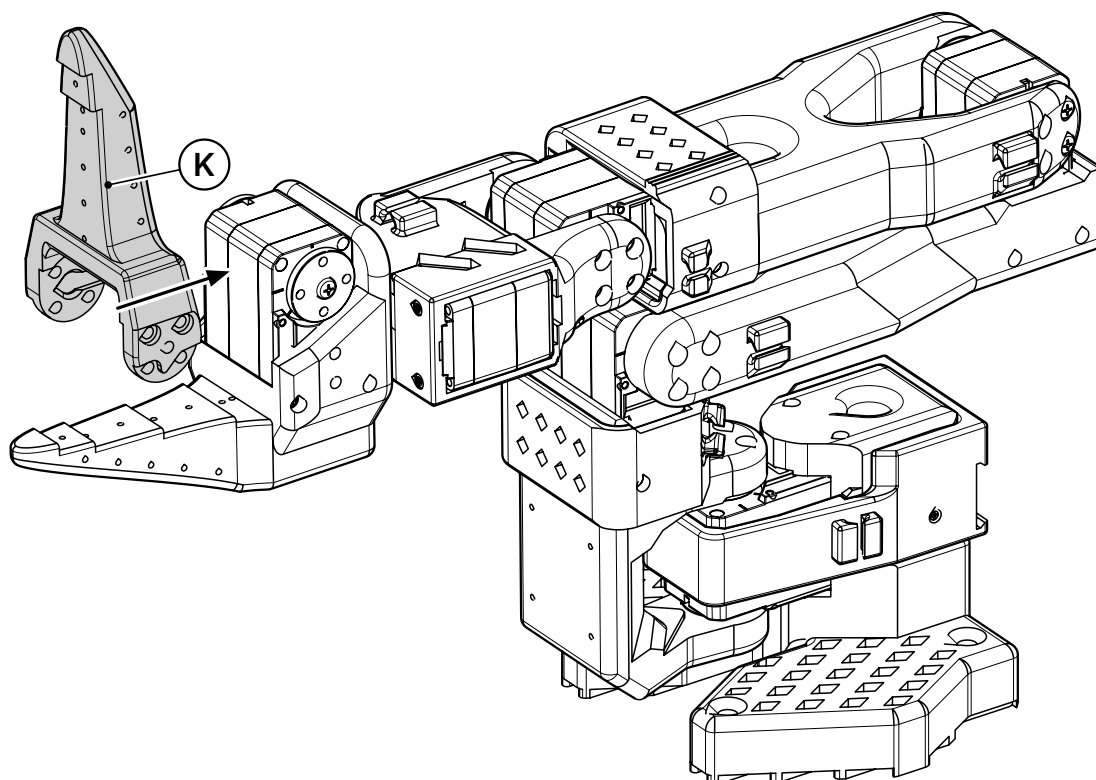
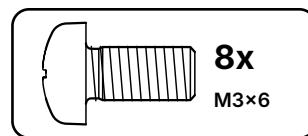
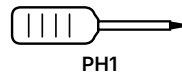


Insert servo 6 into the gripper J, output shaft on the side shown. Fix it with 2 screws on each side.

23 / 28

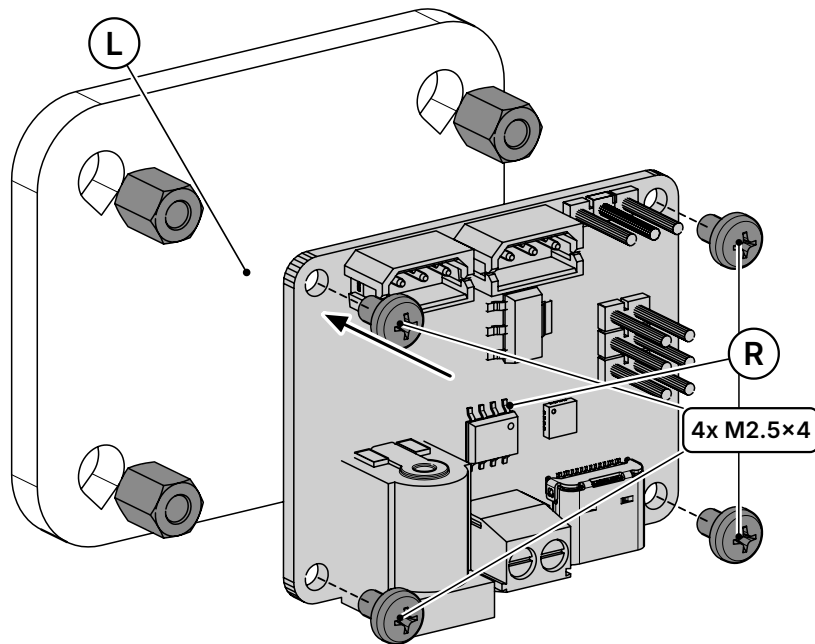
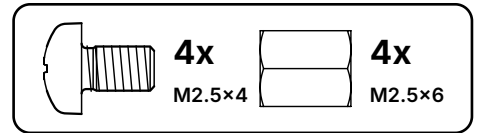
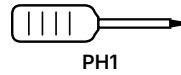


Fit horns N and P to servo 6. Fix N with 1 screw.



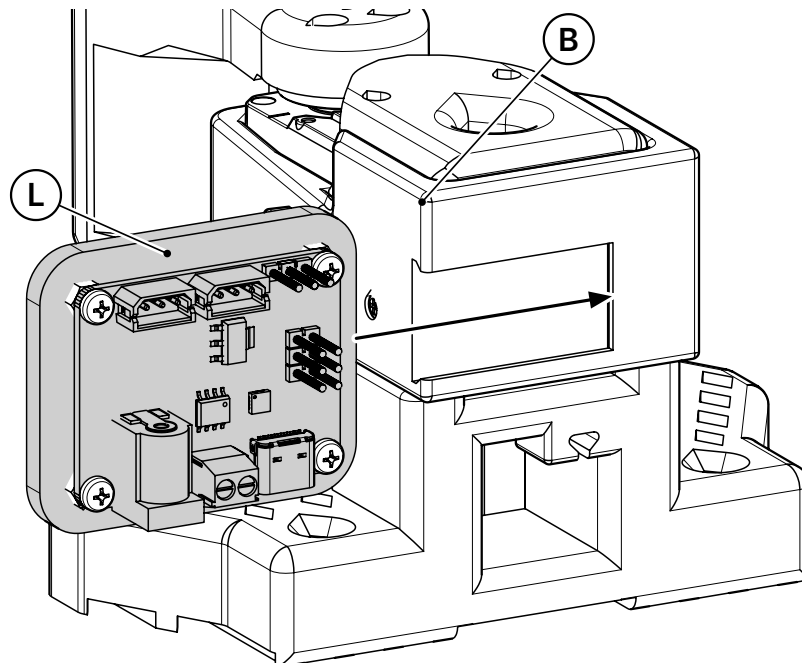
Place the moving jaw K over both horns of servo 6. Fix it with 4 screws on each side.

25 CONTROLLER BOARD / 28

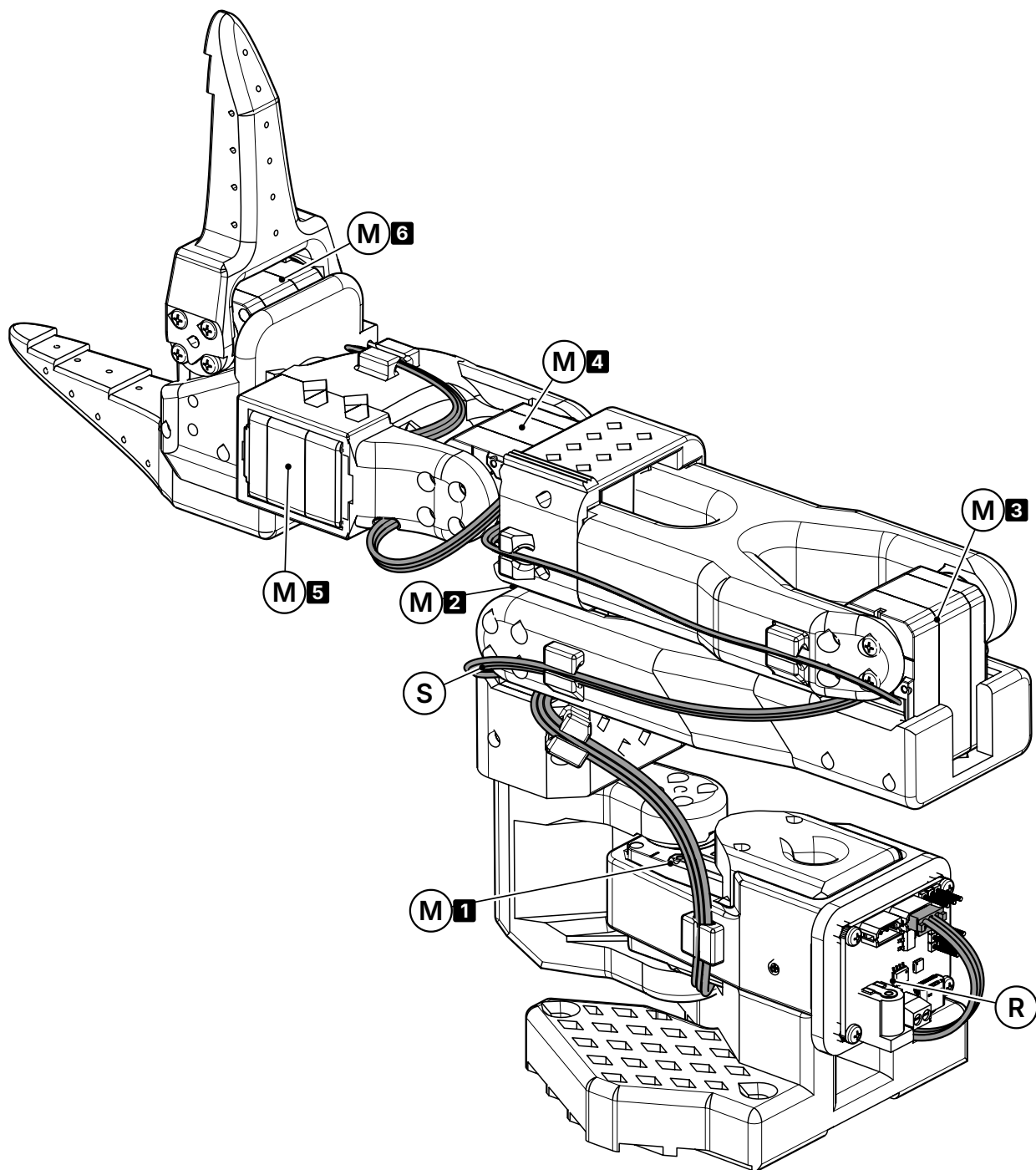


Press 4 spacers into the plate L. Fix the board R on the spacers with 4 screws.

26 / 28



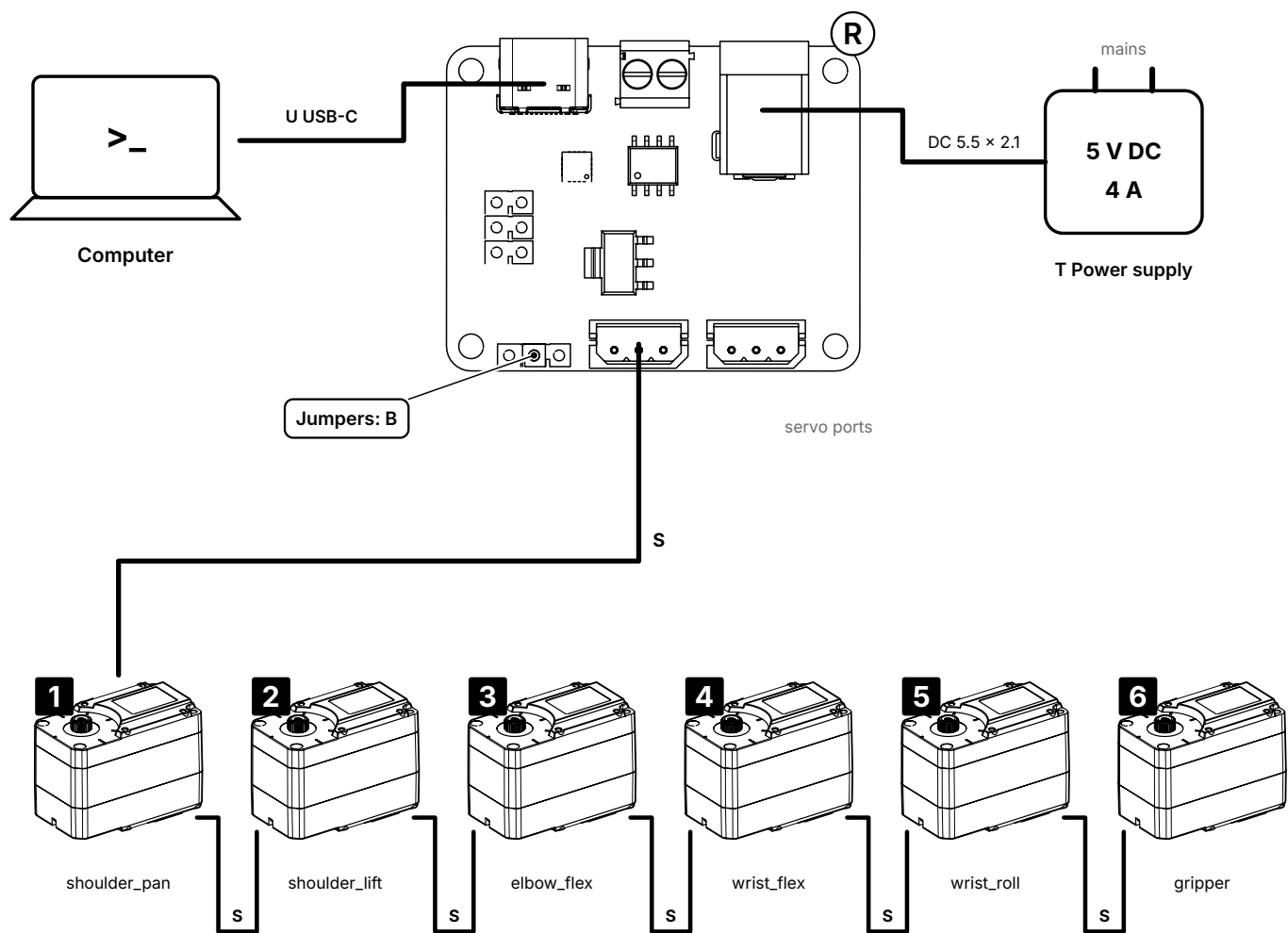
Slide the plate L sideways into the slot at the back of the motor holder B, as shown.



Connect the servos in a chain: board R to servo 1, then servo 1 to 2, 2 to 3, 3 to 4, 4 to 5 and 5 to 6. Each servo has two equal ports. Route the cables as shown. Leave slack at every joint so that the arm can move through its full range.

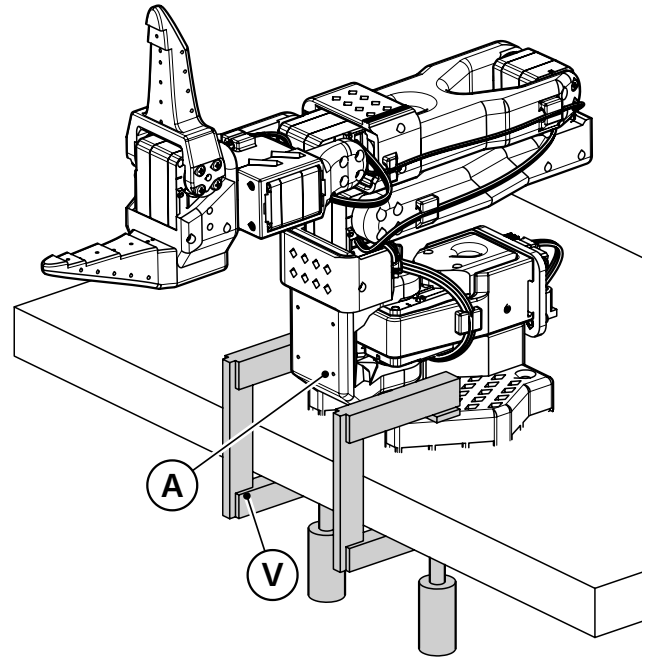
Wiring diagram

One serial bus. All servos share power and data in a daisy chain.



Bus	Feetech serial bus (TTL), 3-pin cables, daisy chain. Both ports of a servo are equal.
Baud rate	1 000 000 bps, all servos
IDs	1 shoulder_pan, 2 shoulder_lift, 3 elbow_flex, 4 wrist_flex, 5 wrist_roll, 6 gripper
Servos	6x STS3215, 7.4 V, gear 1/345 (C001)
Supply	T: 5 V DC, 4 A (20 W), plug 5.5 × 2.1 mm, into the DC jack of R. For the 7.4 V servos of this arm. 12 V servo version: 12 V, 5 A or more.
Computer	USB-C, board jumpers on B. LeRobot robot type: so101_follower

- 1 Clamp the base A to the table with 2 clamps V.
- 2 Check that all 6 servo cables are plugged in and that no tools or parts lie on the arm.
- 3 Connect the USB-C cable U to the computer.
- 4 Plug the power supply T into the board R, then into the mains socket.

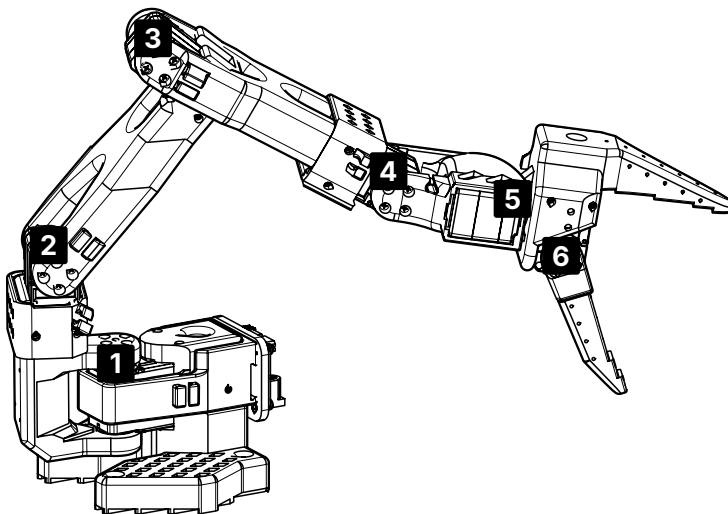


- 5 Calibrate. Run the command with the port from step 1 in place of /dev/ttyACM0. The id gives the arm a unique name. Move all joints by hand to the middle of their range and press Enter. Then move every joint through its full range and press Enter.

```
lerobot-calibrate --robot.type=so101_follower --robot.port=/dev/ttyACM0 \
--robot.id=my_awesome_follower_arm
```

Function check

Move each joint by hand during calibration. It must move freely, without grinding, through its full range.



1	shoulder_pan	Base turns left and right	☐
2	shoulder_lift	Upper arm tilts	☐
3	elbow_flex	Forearm bends	☐
4	wrist_flex	Wrist tilts	☐
5	wrist_roll	Gripper rotates	☐
6	gripper	Jaw opens and closes	☐

Parts list

Item	Description	Qty	Material / spec
A	Base (Base_SO101)	1	3D printed, PLA+
B	Base motor holder (Base_motor_holder_SO101)	1	3D printed, PLA+
C	Shoulder (Rotation_Pitch_SO101)	1	3D printed, PLA+
D	Shoulder motor holder (Motor_holder_SO101_Base)	1	3D printed, PLA+
E	Upper arm (Upper_arm_SO101)	1	3D printed, PLA+
F	Forearm (Under_arm_SO101)	1	3D printed, PLA+
G	Wrist motor holder (Motor_holder_SO101_Wrist)	1	3D printed, PLA+
H	Wrist (Wrist_Roll_Pitch_SO101)	1	3D printed, PLA+
J	Gripper, fixed jaw (Wrist_Roll_Follower_SO101)	1	3D printed, PLA+
K	Moving jaw (Moving_Jaw_SO101)	1	3D printed, PLA+
L	Board mounting plate (WaveShare_Mounting_Plate_SO101)	1	3D printed, PLA+
M	Servo STS3215, 7.4 V, gear 1/345 (C001)	6	Feetech, serial bus
N	Servo horn, output, splined	6	Metal, 4x M3 holes
P	Servo horn, idler	5	Metal, 4x M3 holes
R	Bus Servo Adapter (A)	1	Waveshare, USB-C, DC 5.5 × 2.1 mm
S	Servo cable, 3-pin	6	Plugs 3-pin, 2.5 mm pitch
T	Power supply, 5 V DC, 4 A (20 W)	1	Plug 5.5 × 2.1 mm, centre positive
U	USB-C cable	1	Data cable, USB-C at the board
V	Table clamp	2	Opening ≥ table thickness + 18 mm
M2×6	Screw, cross recess, M2 × 6 (smallest screw)	24	Steel
M3×6	Pan head screw ISO 7045, cross recess, M3 × 6	50	Steel 4.6
M2.5×4	Pan head screw ISO 7045, cross recess, M2.5 × 4	4	Steel 4.6
M2.5×6	Hex spacer, female/female, 6 mm, 5 mm A/F	4	M2.5 through thread

Rev.	Date	Description	By
A	2026-10-28	First issue, generated from SO101 Assembly.step (SO-ARM100 commit a758567)	First Angle
B	2026-10-28	Power supply rating 5 V DC, 4 A. Full commands in steps 2 and 28. Parts list specifications completed.	First Angle

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