

T-Series 5-DoF Arm Kit

Assembly Instructions

General Warnings and Cautions

Danger (May cause serious injury or death)

- Keep water, flammables, solvents and other liquids clear from actuator.
- Keep fingers away from moving parts during operation.
- Cut power immediately if actuator emits strange odors or smoke.
- Keep actuator out of reach of children.

Warning (May cause injury or damage to actuator)

- Do not expose the actuator to permanent and strong magnetic fields.
- Do not force screws into the bottom of the actuator. T8 = 8mm Tap Depth
- Use provided hardware with accessories and hand tighten as needed.
- Attempts to disassemble actuator will void the warranty and may cause permanent damage.

For more information please visit: [***docs.hebi.us***](https://docs.hebi.us)

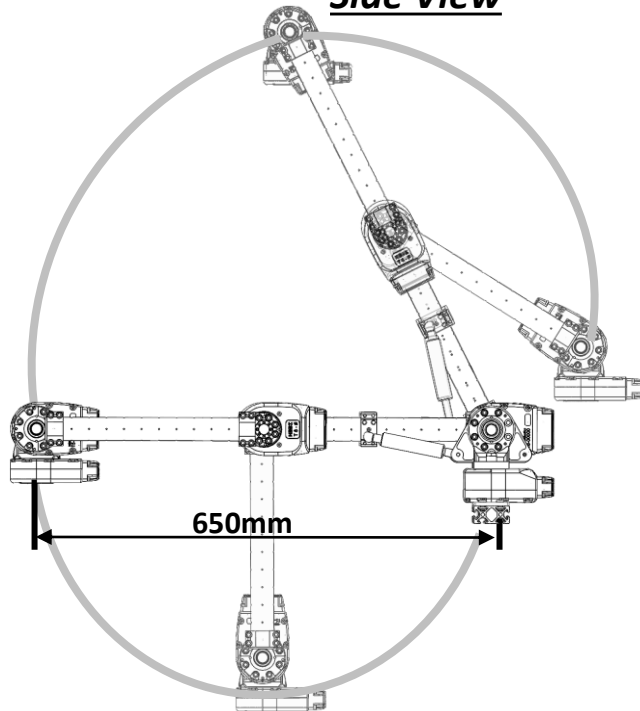
Technical Specifications

Specifications	Value
Weight	5.00 kg
Reach	650 mm
Payload at Max Reach*	1.00 kg
Payload at Half Reach*	5.00 kg

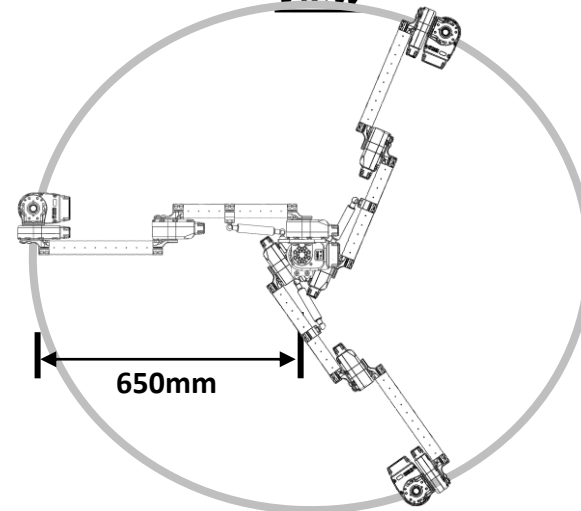
Calculated using Default Configuration with Gas Spring.
Using a different configuration of T-Series Actuators will provide different payload capacities.

Movement	Working Range	Speed
Axis 1 – Base [Default: T8-9]	Continuous (limited by wiring)	180°/s
Axis 2 – Shoulder [Default: T8-16]	0° to +70° (limited by gas spring)	90°/s
Axis 3 – Elbow [Default: T8-9]	-155° to +155° (avoid end effector collisions)	180°/s
Axis 4 – Wrist 1 [Default: T5-1]	Continuous (avoid end effector collisions)	540°/s
Axis 5 – Wrist 2 [Default: T5-1]	Continuous (limited by wiring)	540°/s

Side View



Top View

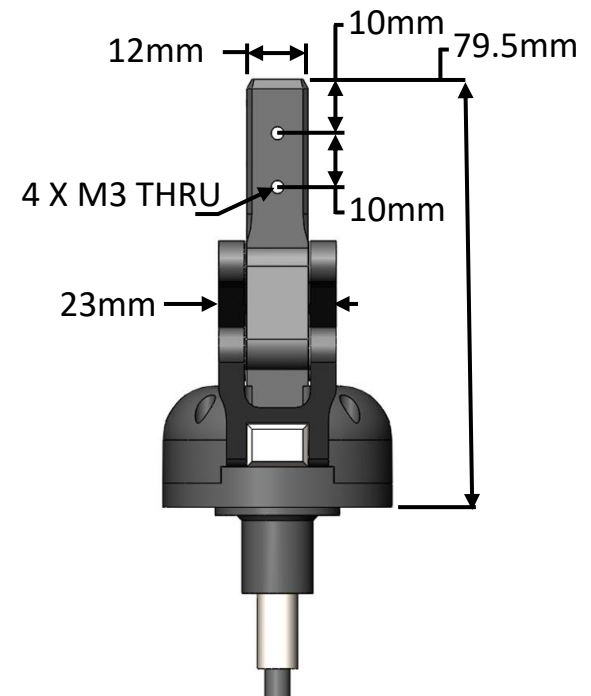
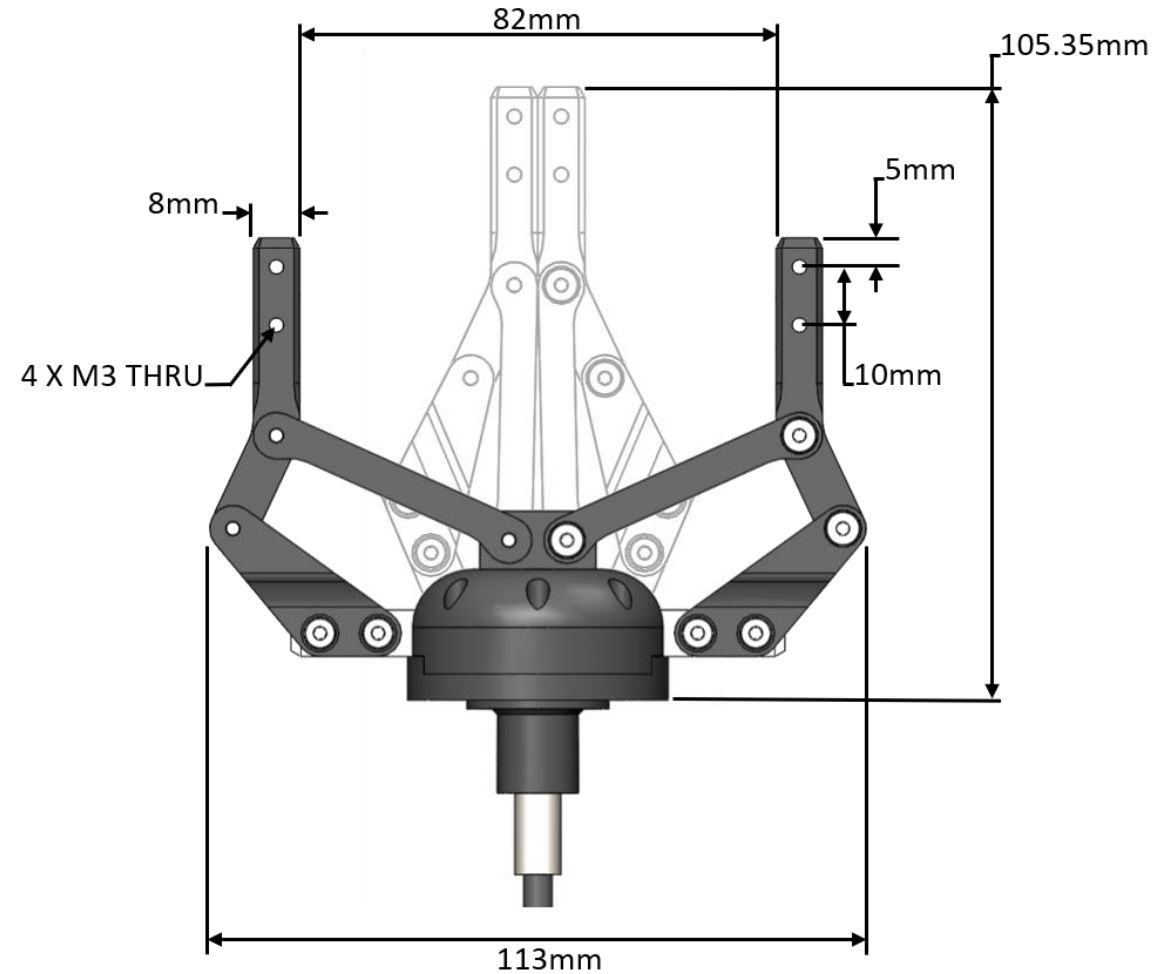


Technical Specifications

<u>Spool Module</u>	<u>Max Finger Torque</u>	<u>Max Finger Force at 50mm</u>
T5-1	0.1 Nm	2 N
T5-4	0.5 Nm	10 N
T5-9**	1.1 Nm	23 N
T8-3	0.4 Nm	8 N
T8-9	1.1 Nm	23 N
T8-16	2.0 Nm	40 N

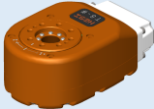
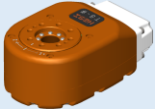
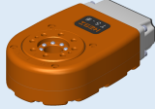
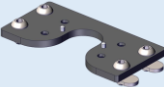
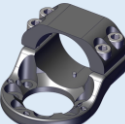
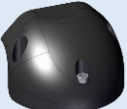
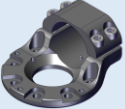
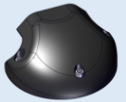
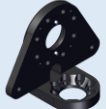

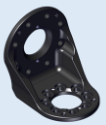

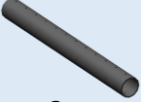

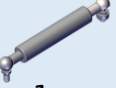
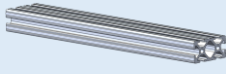
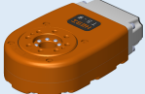
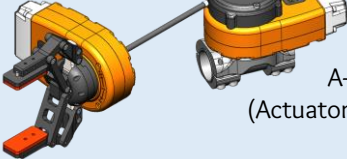
* Values assume a symmetric two-finger grasp

** Default Module



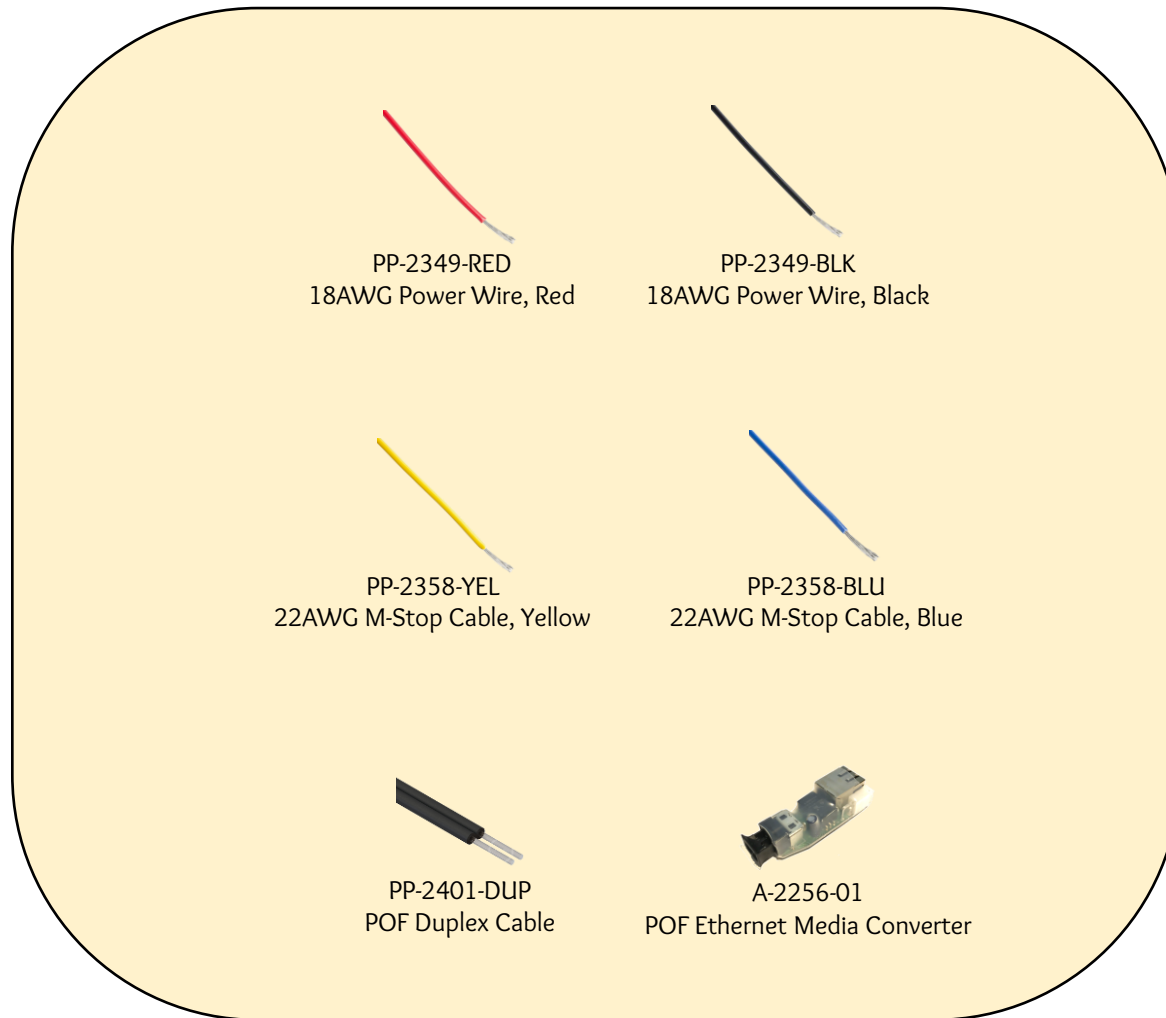
Bill of Materials – Mechanical*

Default Configuration

													
							1 x	2 x	2 x				
							T8-16	T8-9	T5-1				
													
1 x	2 x	2 x	2 x	2 x	1 x	1 x							
A-2228-01	A-2218-01	A-2090-02	A-2219-01	A-2231-01	A-2221-01	A-2232-01							
													
1 x	1 x	2 x	1 x	1 x	1 x								
A-2220-01	A-2235-01	PM-2200-02 [300mm]	A-2188-02	A-2263-57-30 (Gas Spring – 30lbs.)	PP-2141-12 (optional)								
													
							1 x	1 x					
							T5-9 (Gripper Spool)	A-2292-01 (Actuators NOT Included)					

fasteners included, not shown

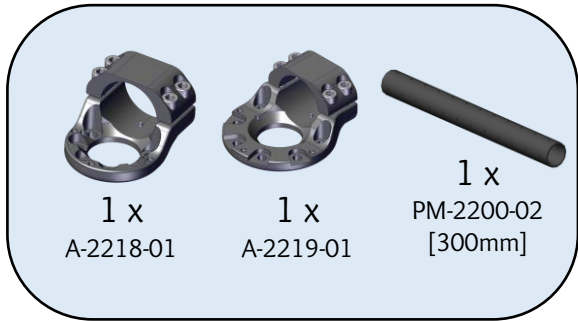
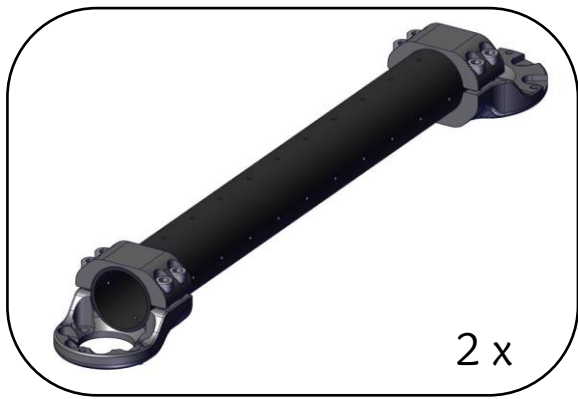
Bill of Materials - Electrical

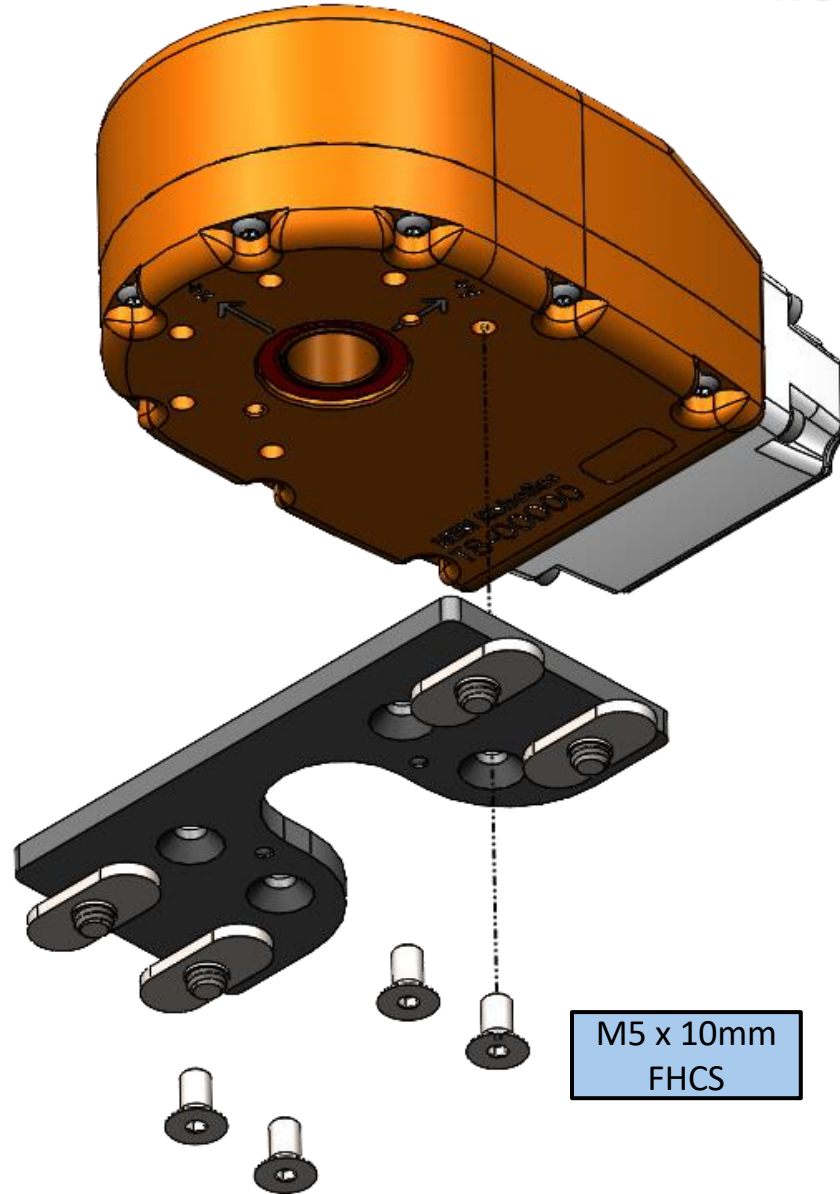
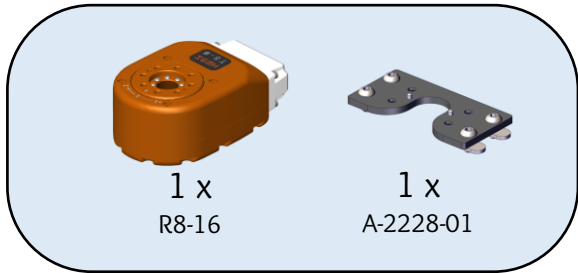
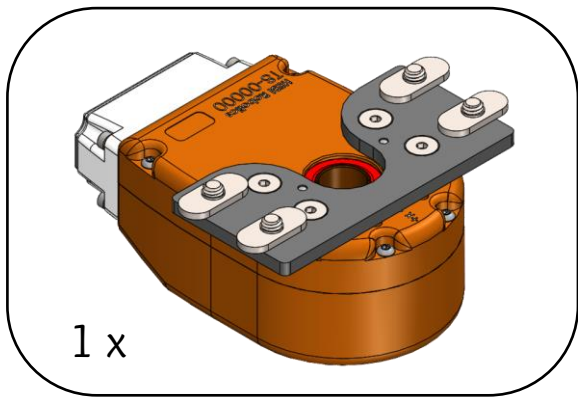


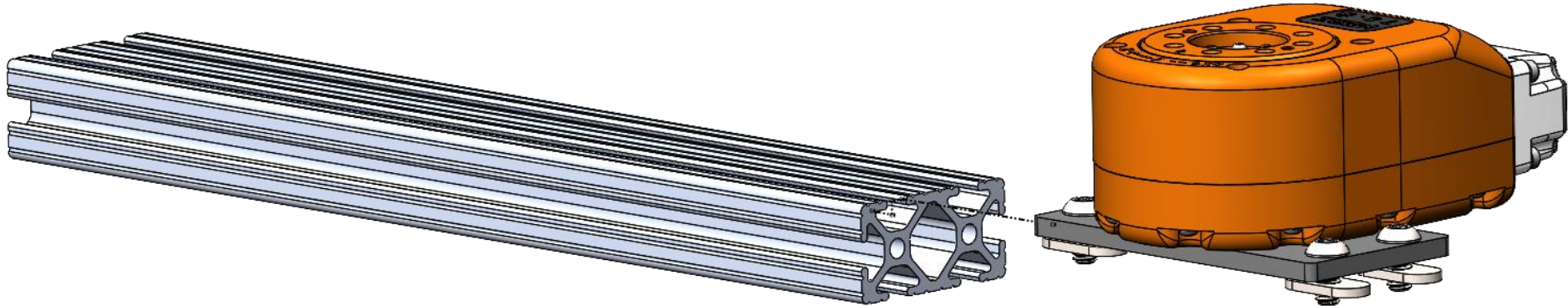
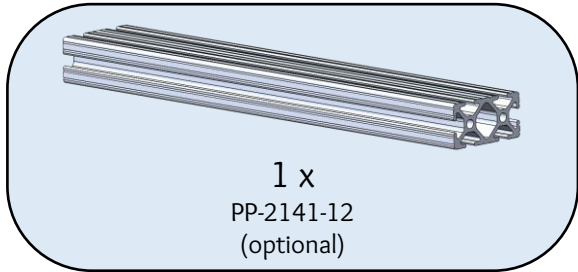
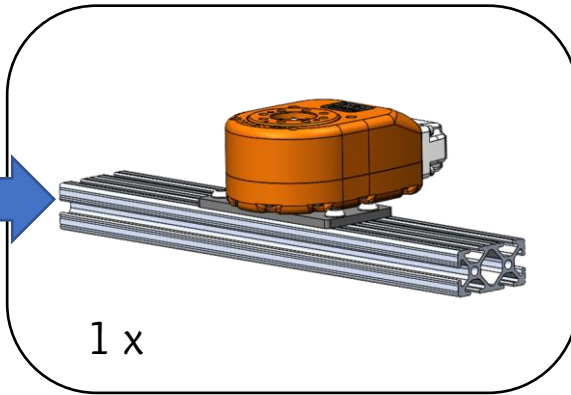
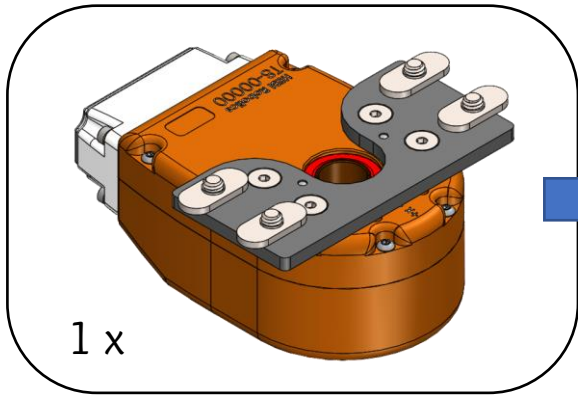
all items are included in T-Series Connection Toolbox

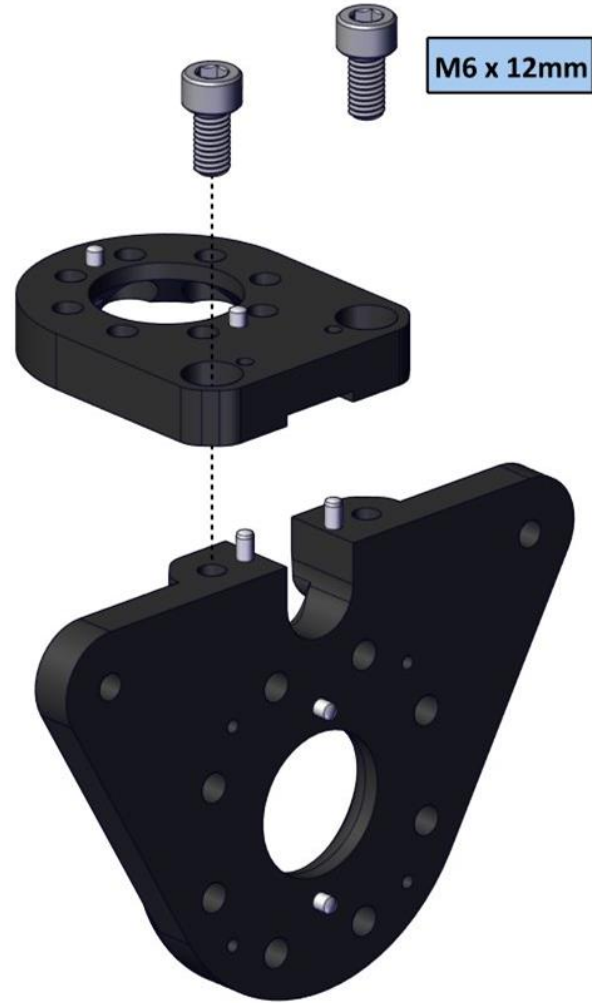
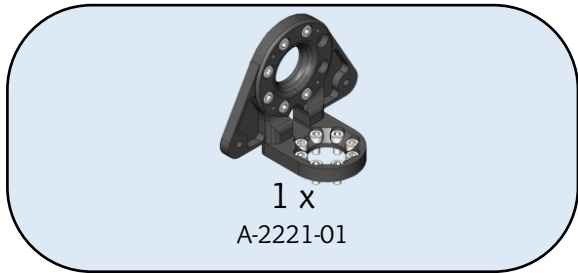
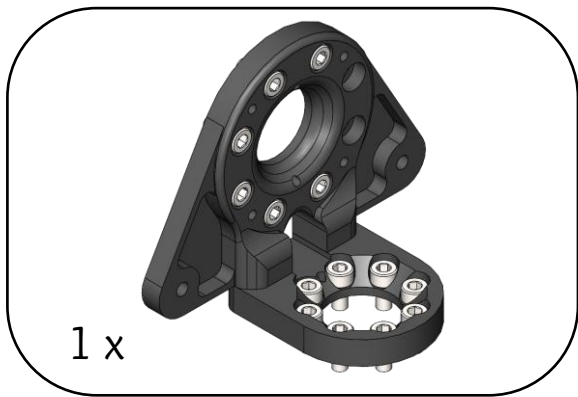
Table of Contents

<u>Assembly</u>	<u>Image</u>	<u>Pages</u>
Tubes		[8]
Base		[9-13]
Arm		[14-21]
Gripper		[22-34]
Final		[35-42]

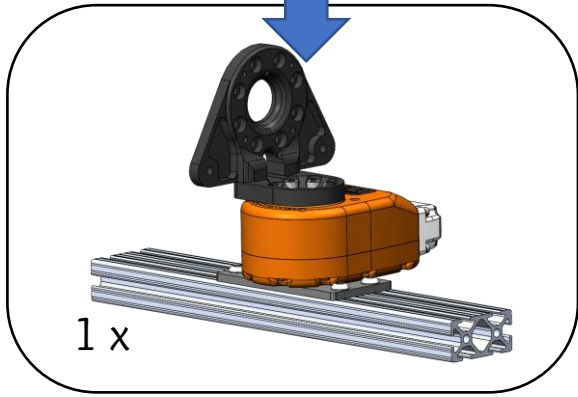
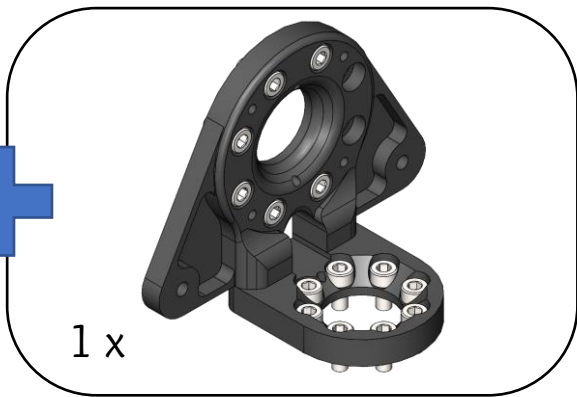
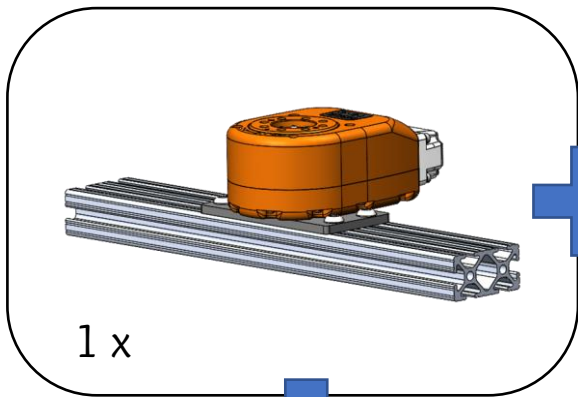




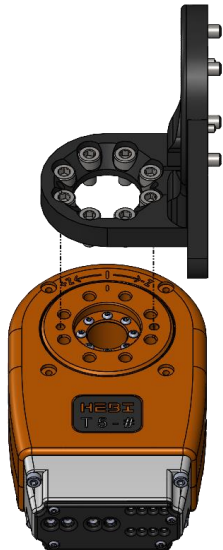
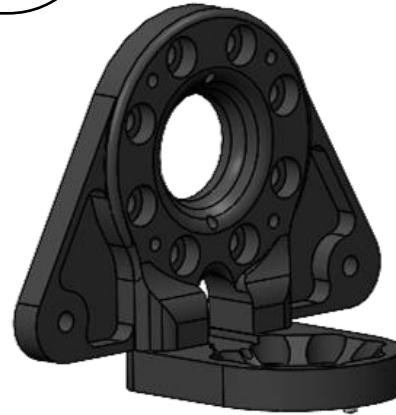




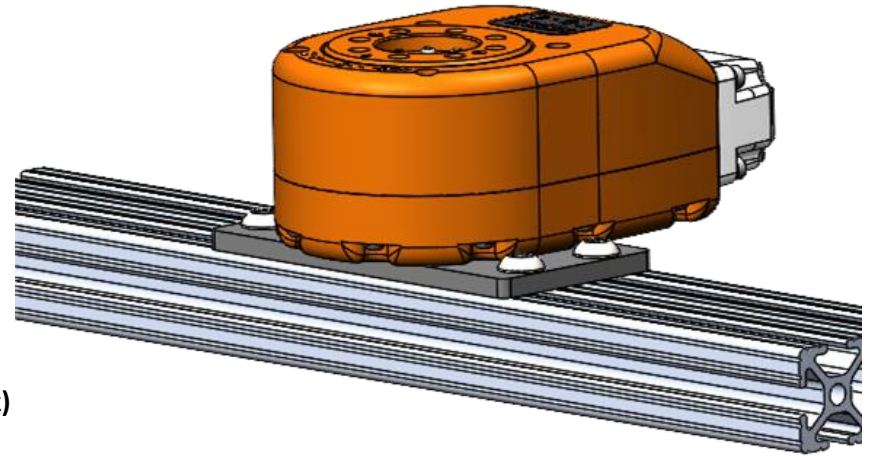
Flat face towards outside

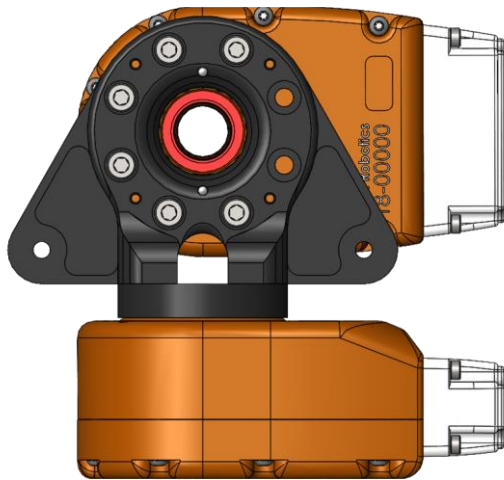
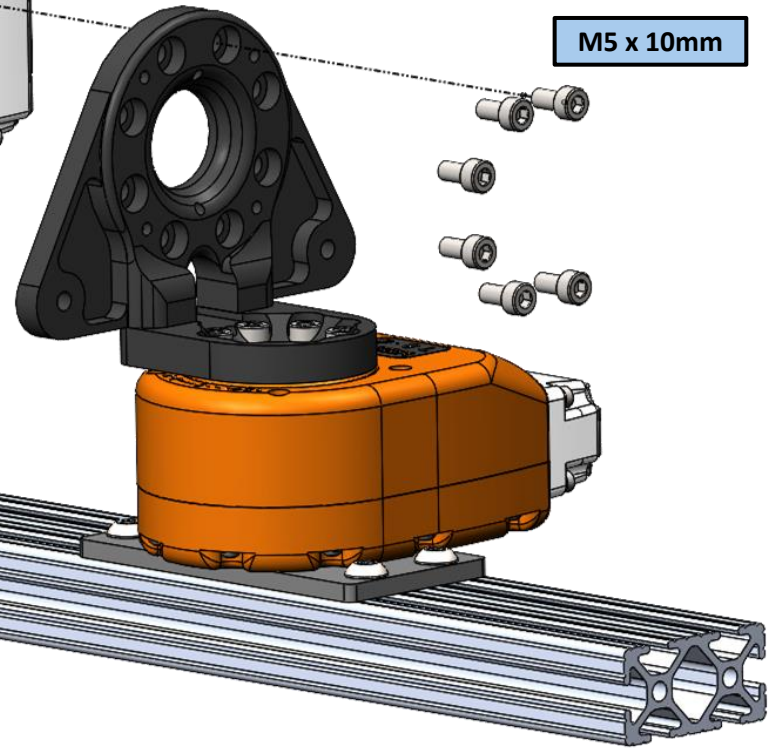
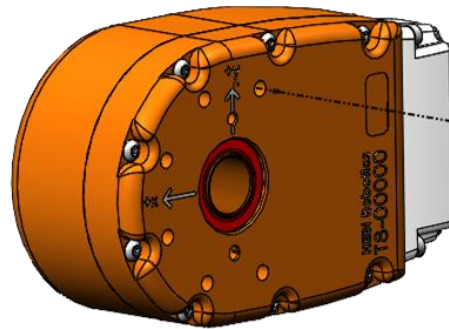
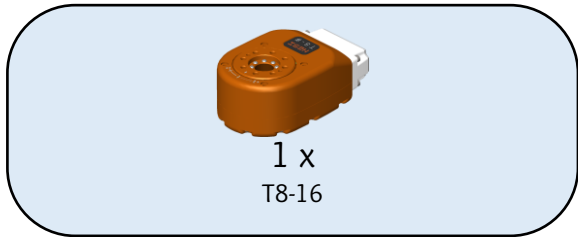
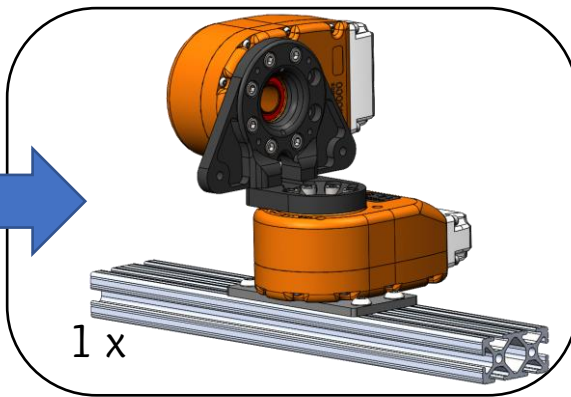
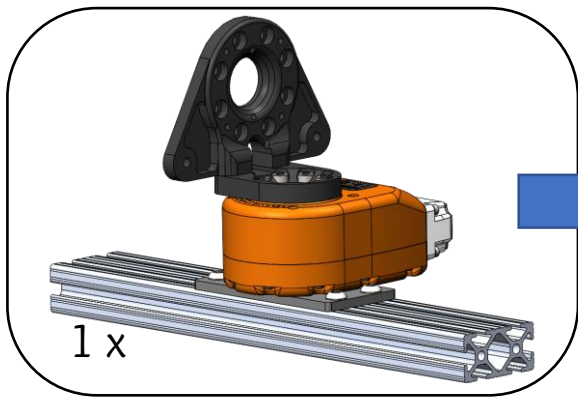



M5 x 10mm

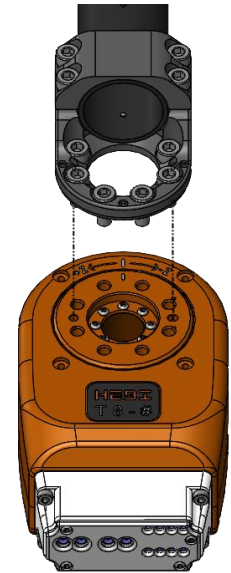
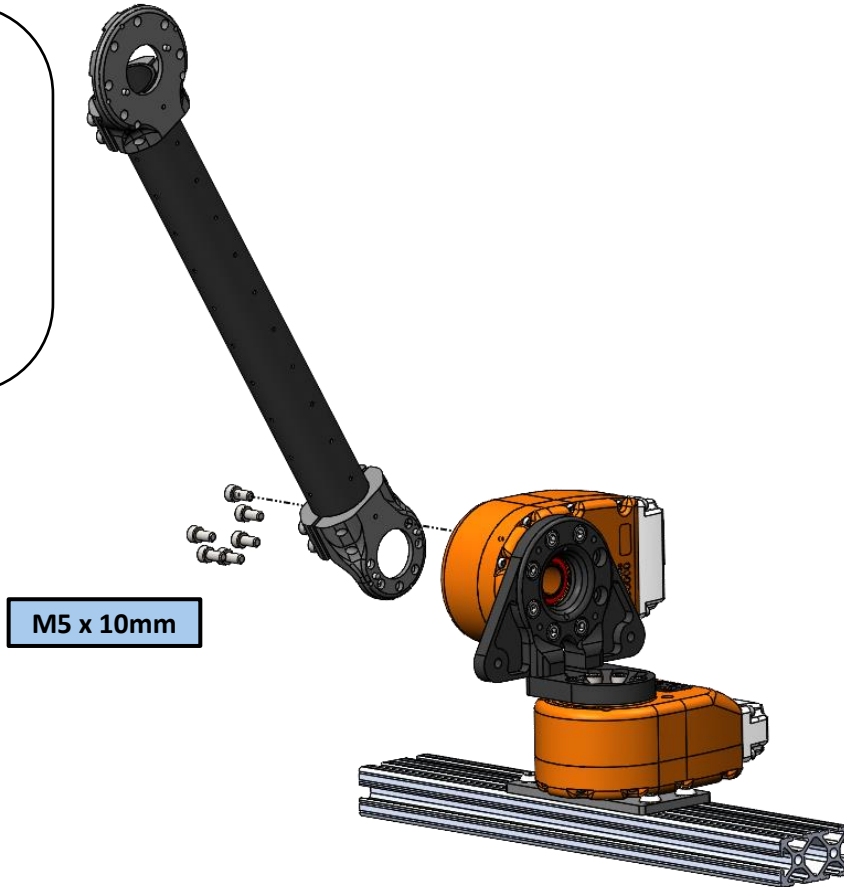
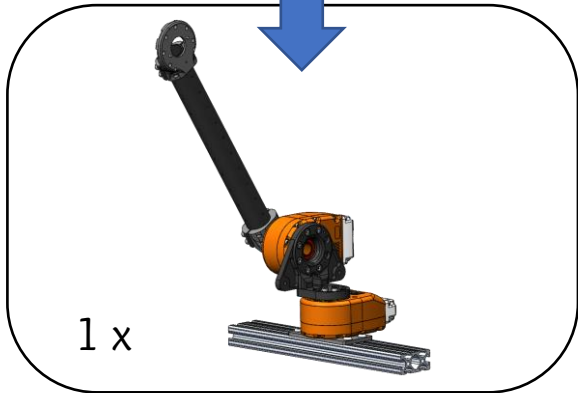
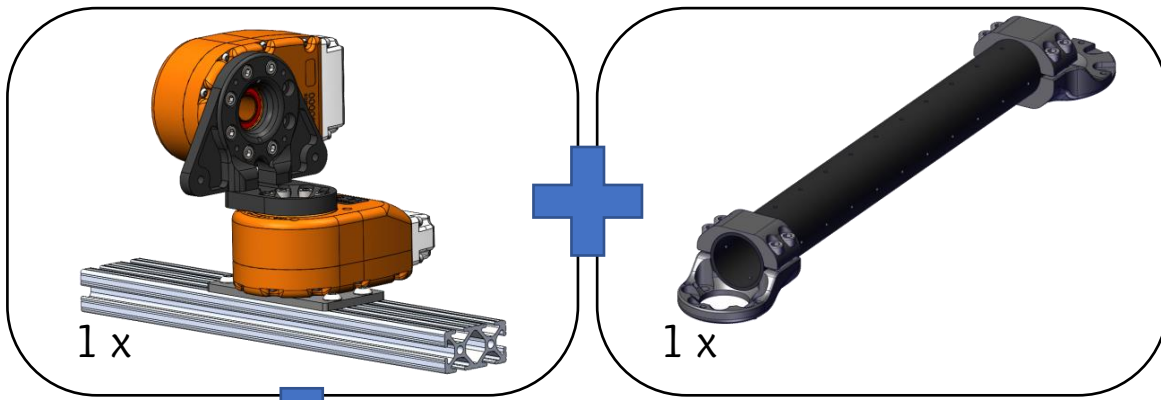



Align with actuator
output hub tick mark
(Flat face parallel with tick mark)

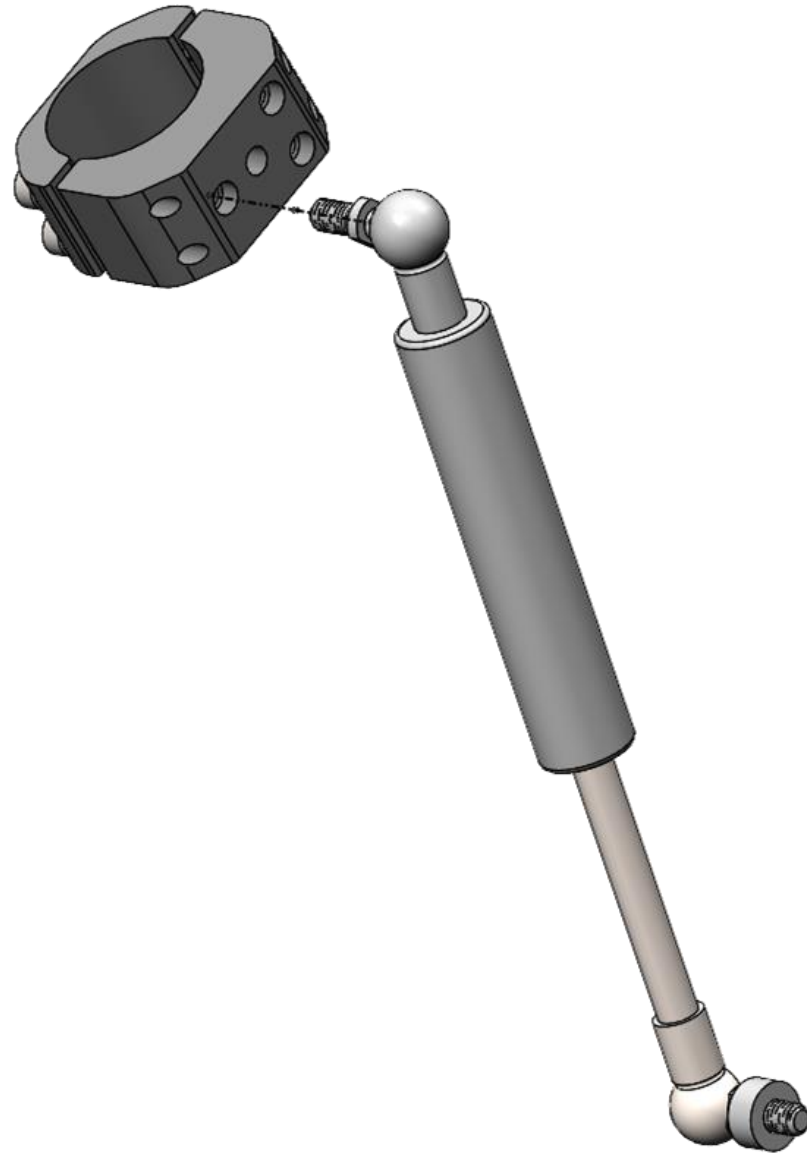
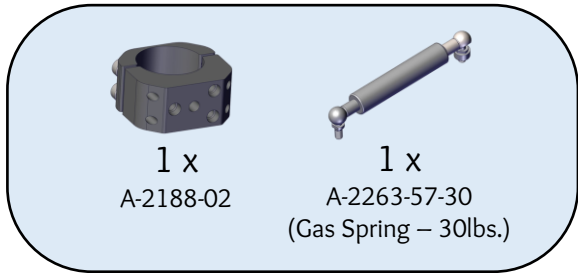
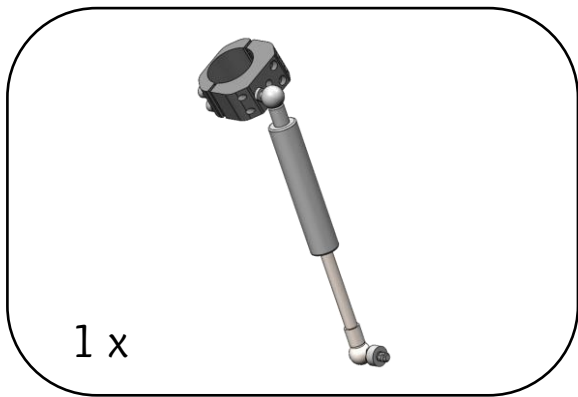


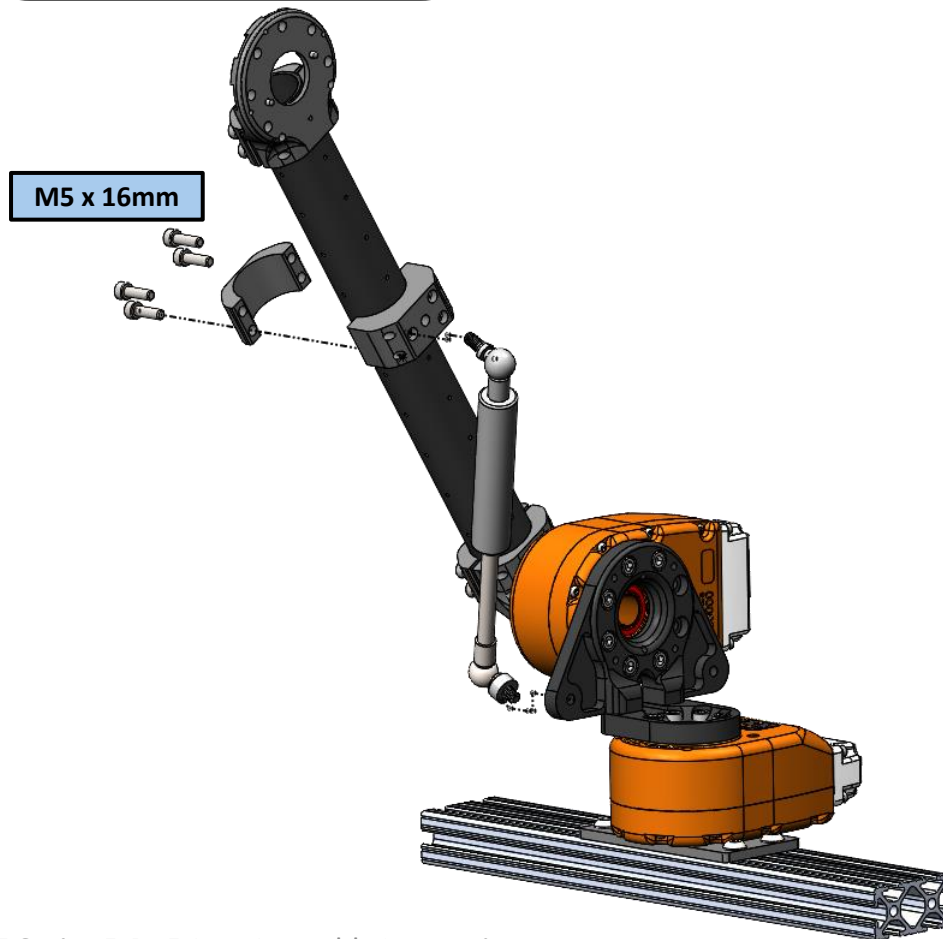
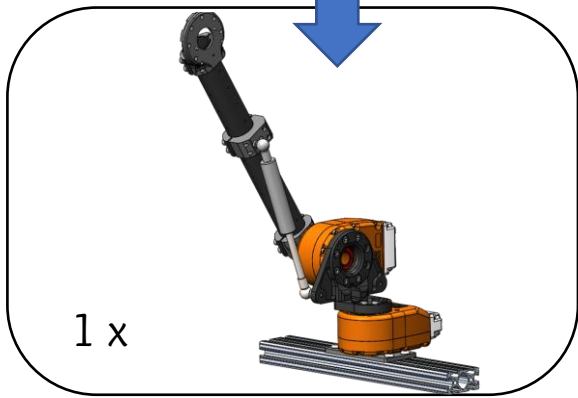
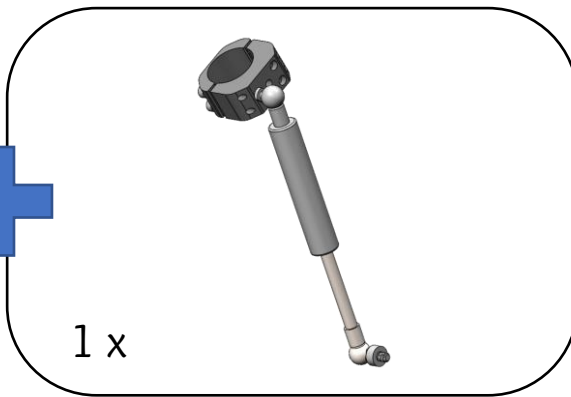
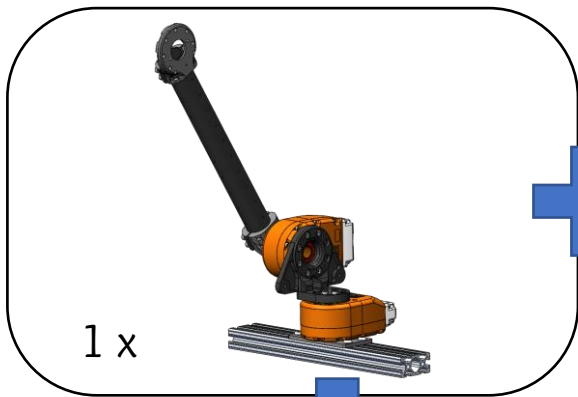


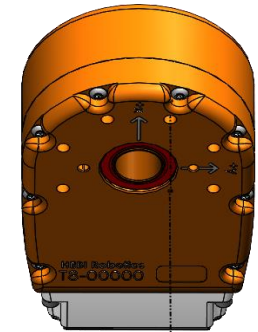
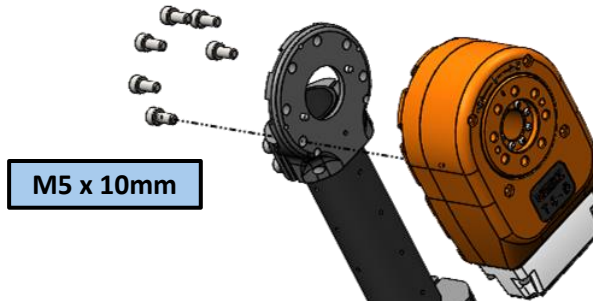
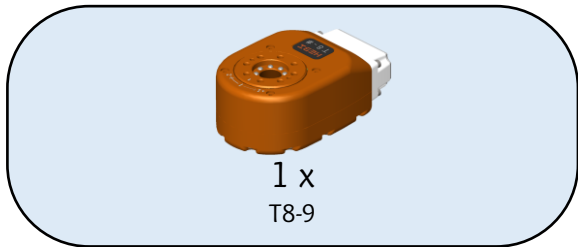
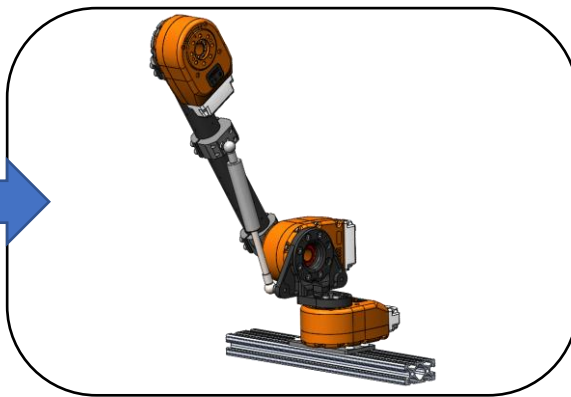
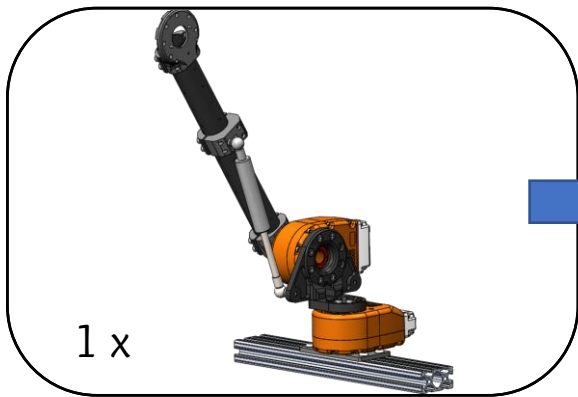
 **Connectors of both modules point the same way**



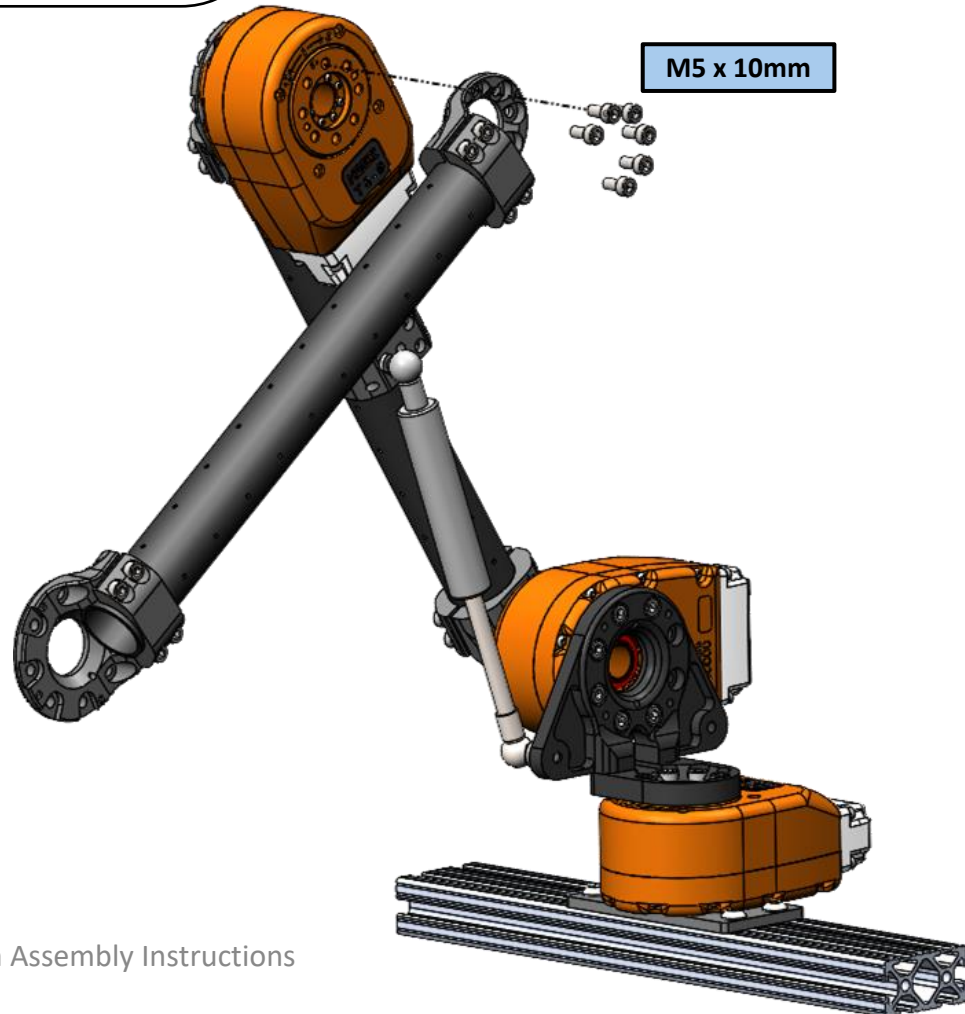
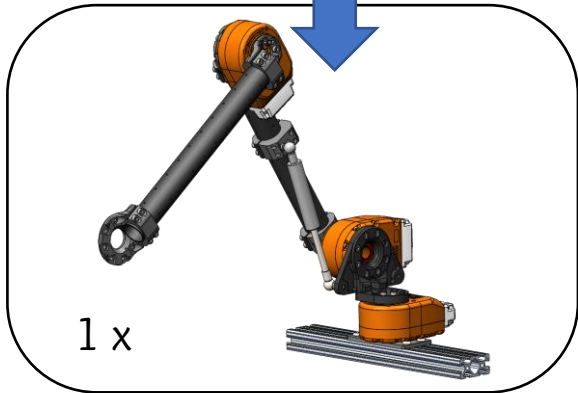
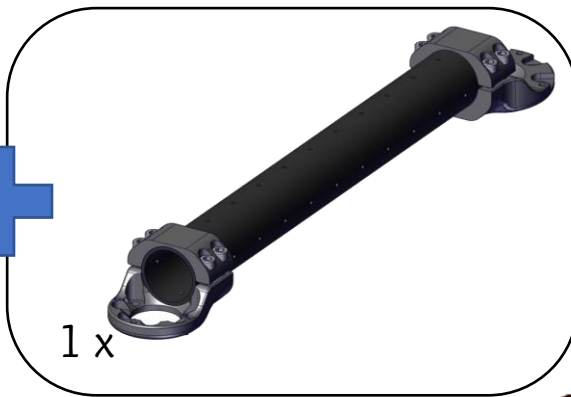
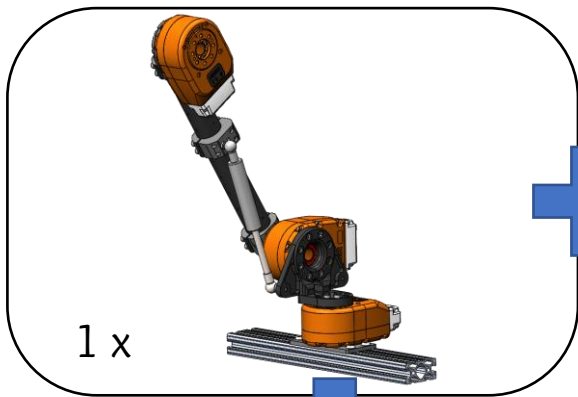
 **Align with actuator
output hub tick mark**
(Tube aligns with tick mark)



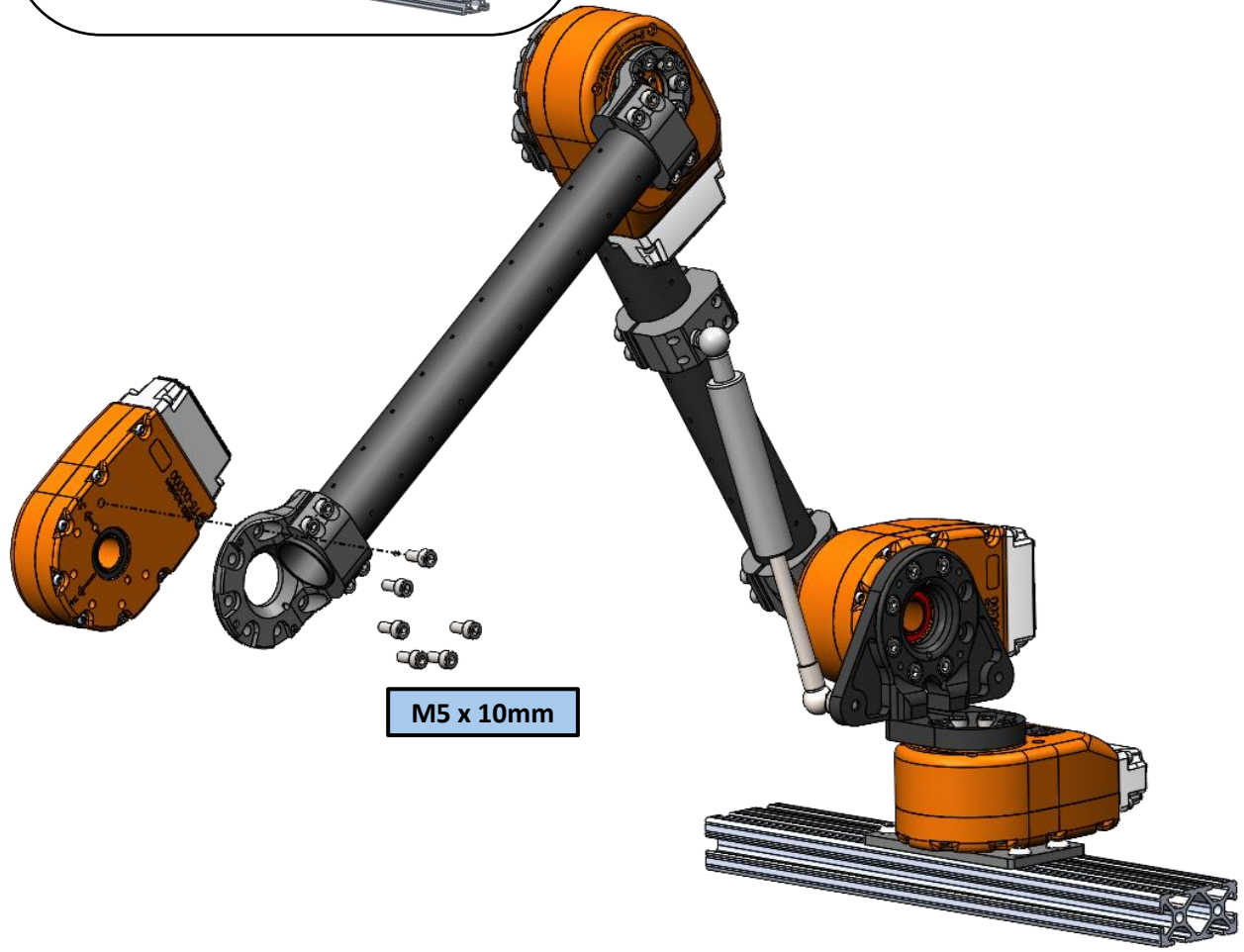
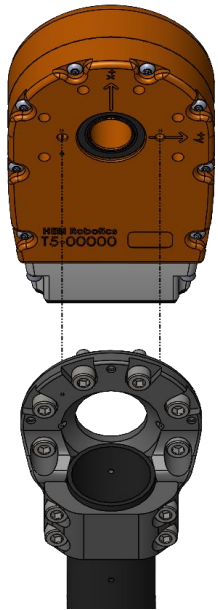
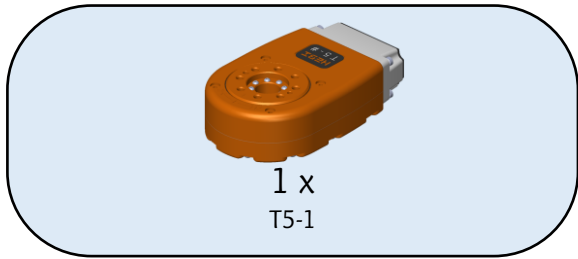
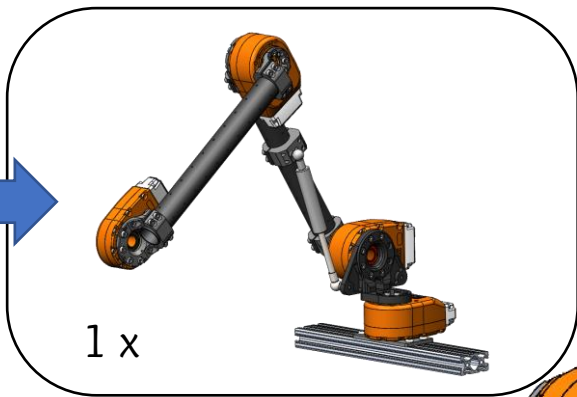
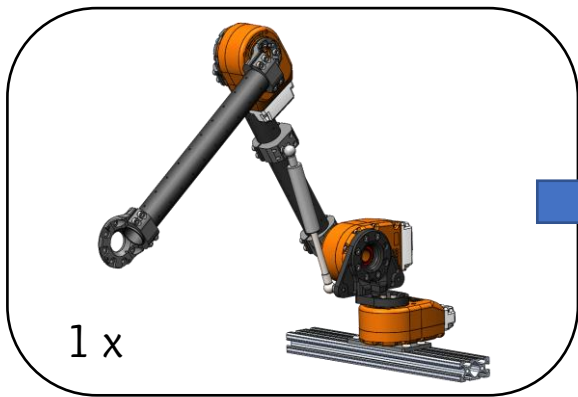




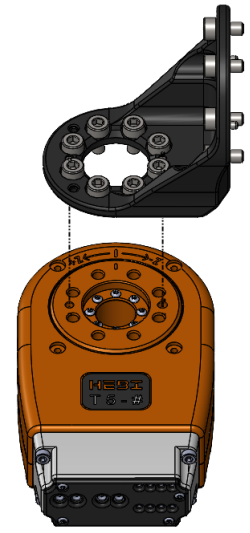
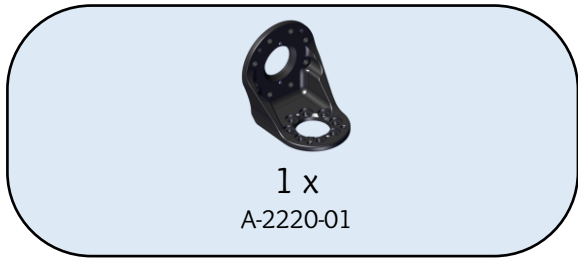
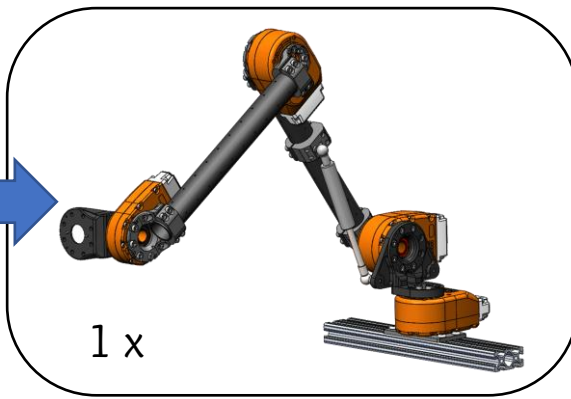
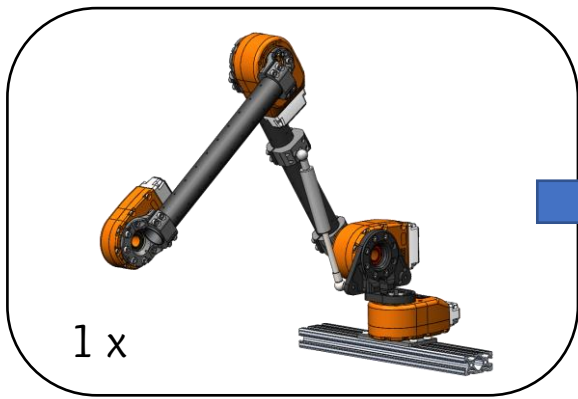
Align actuator connectors with tube




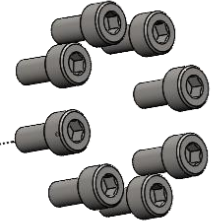
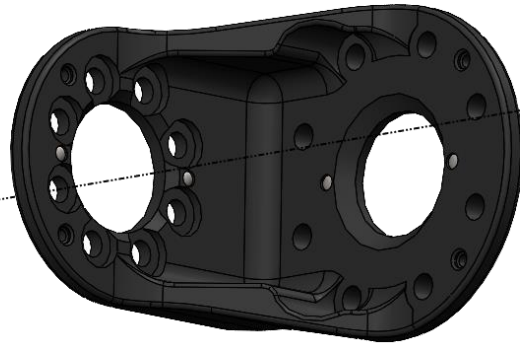
**Align with actuator
output hub tick mark
(Tube aligns with tick mark)**



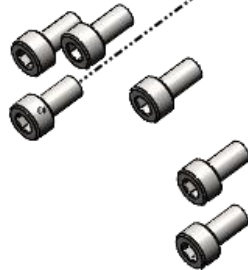
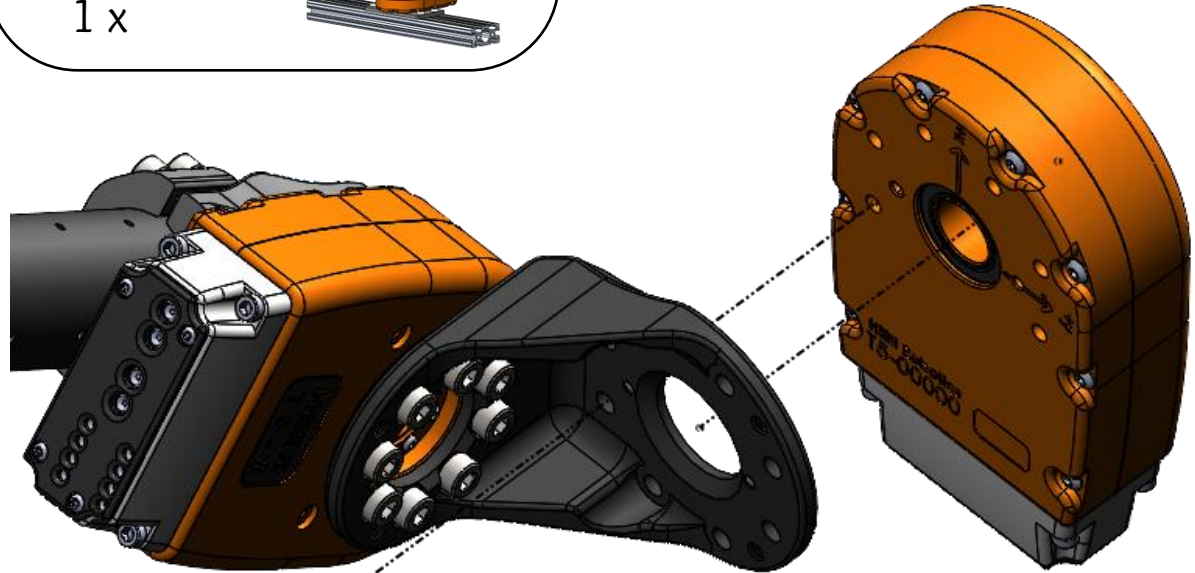
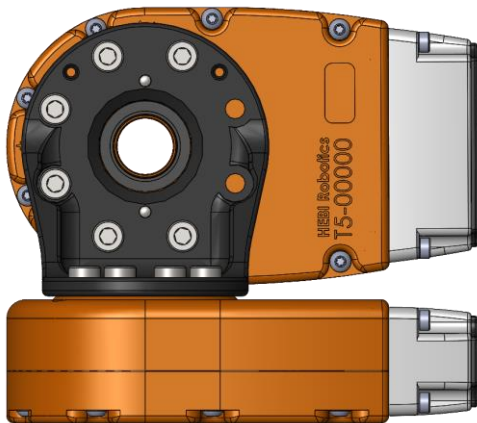
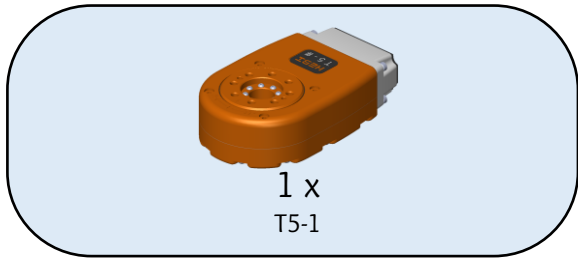
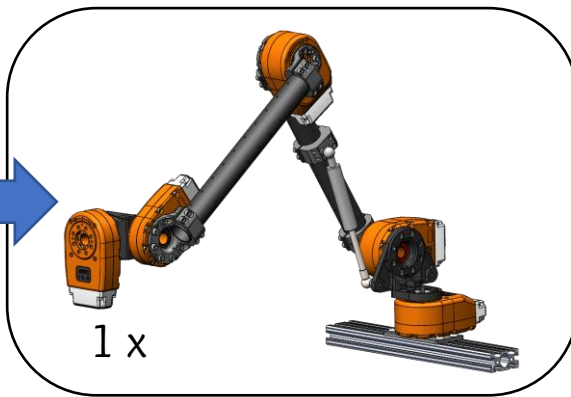
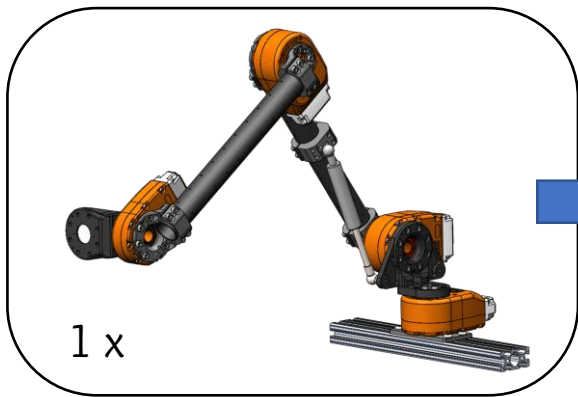
Align actuator connectors with tube




 **Align with actuator output hub tick mark**
(Flat face parallel with tick mark)

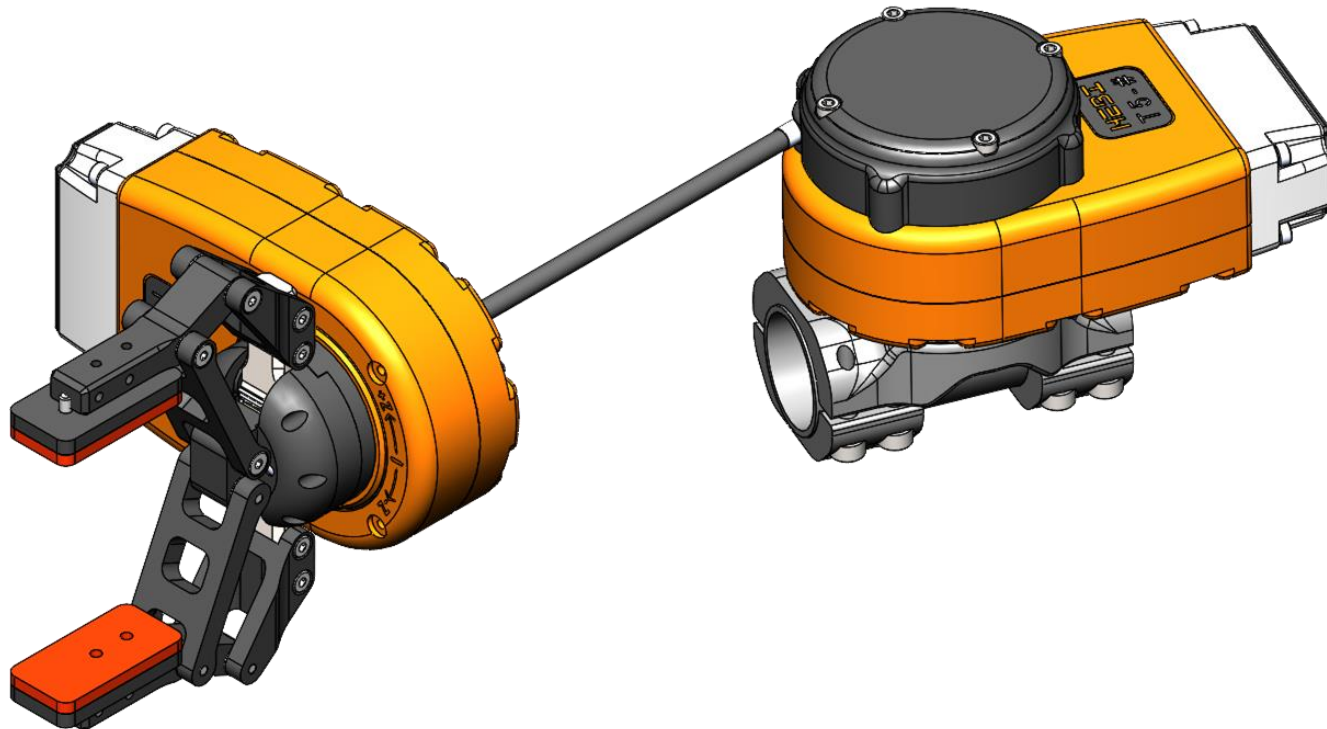


M5 x 10mm

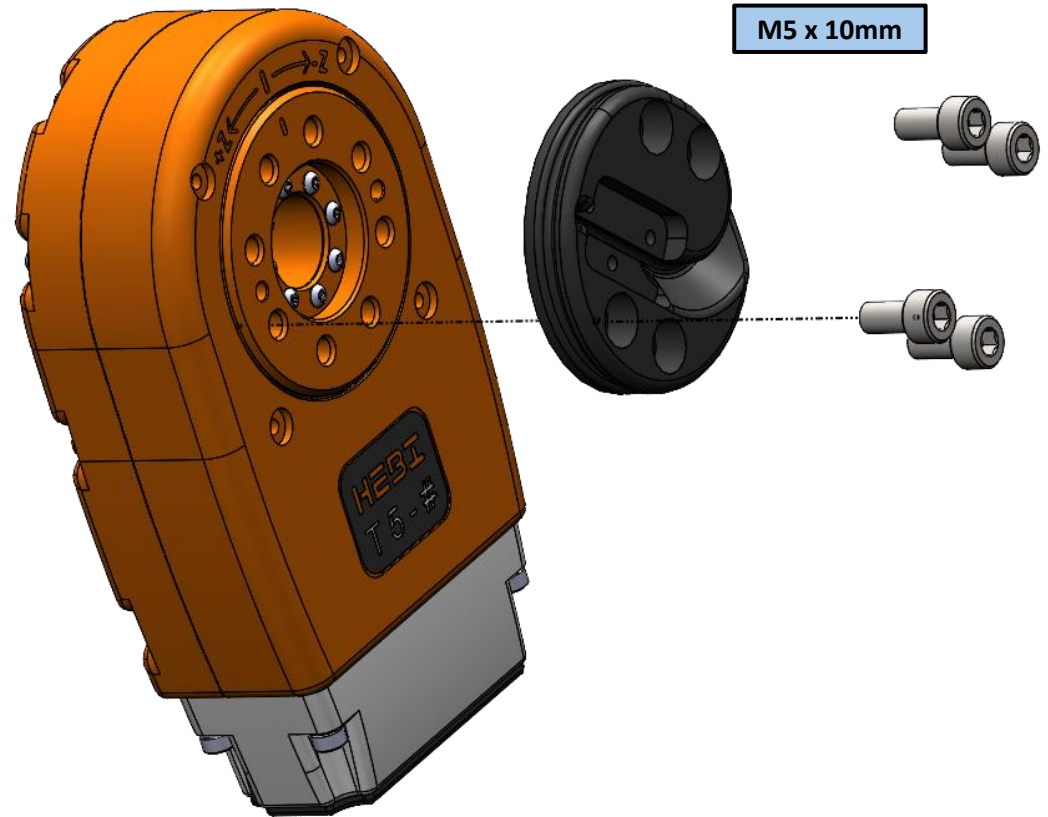
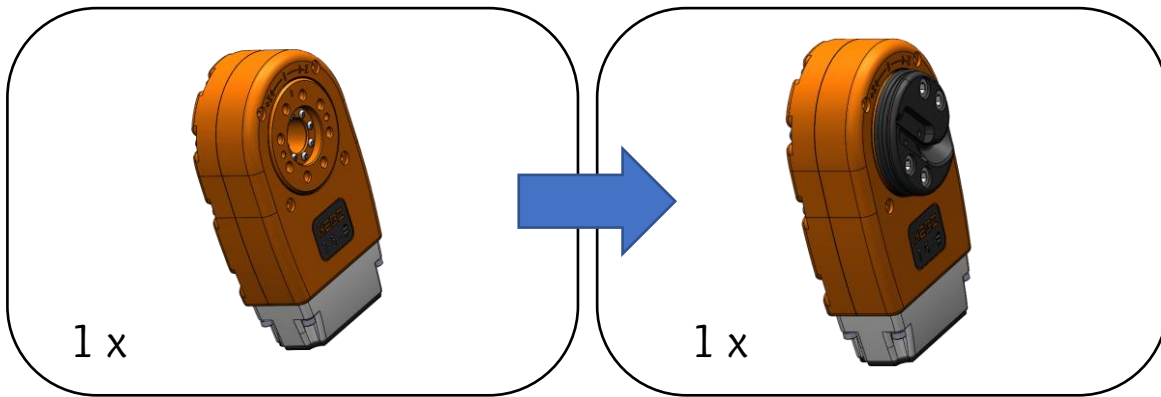


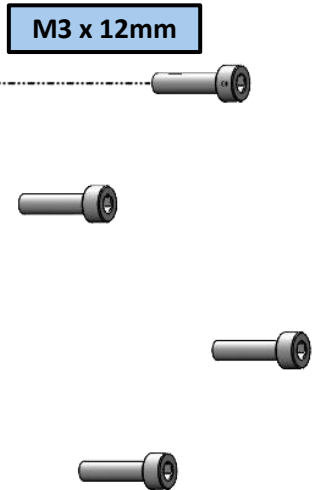
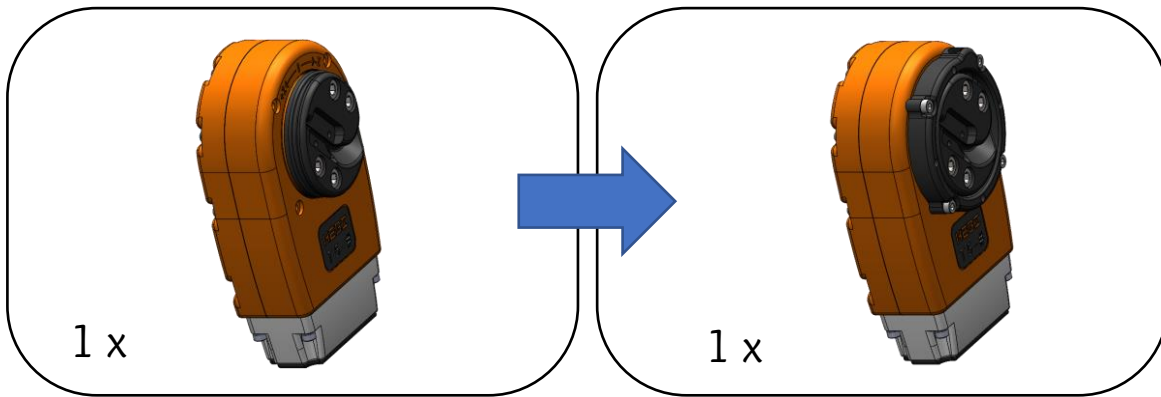
M5 x 10mm

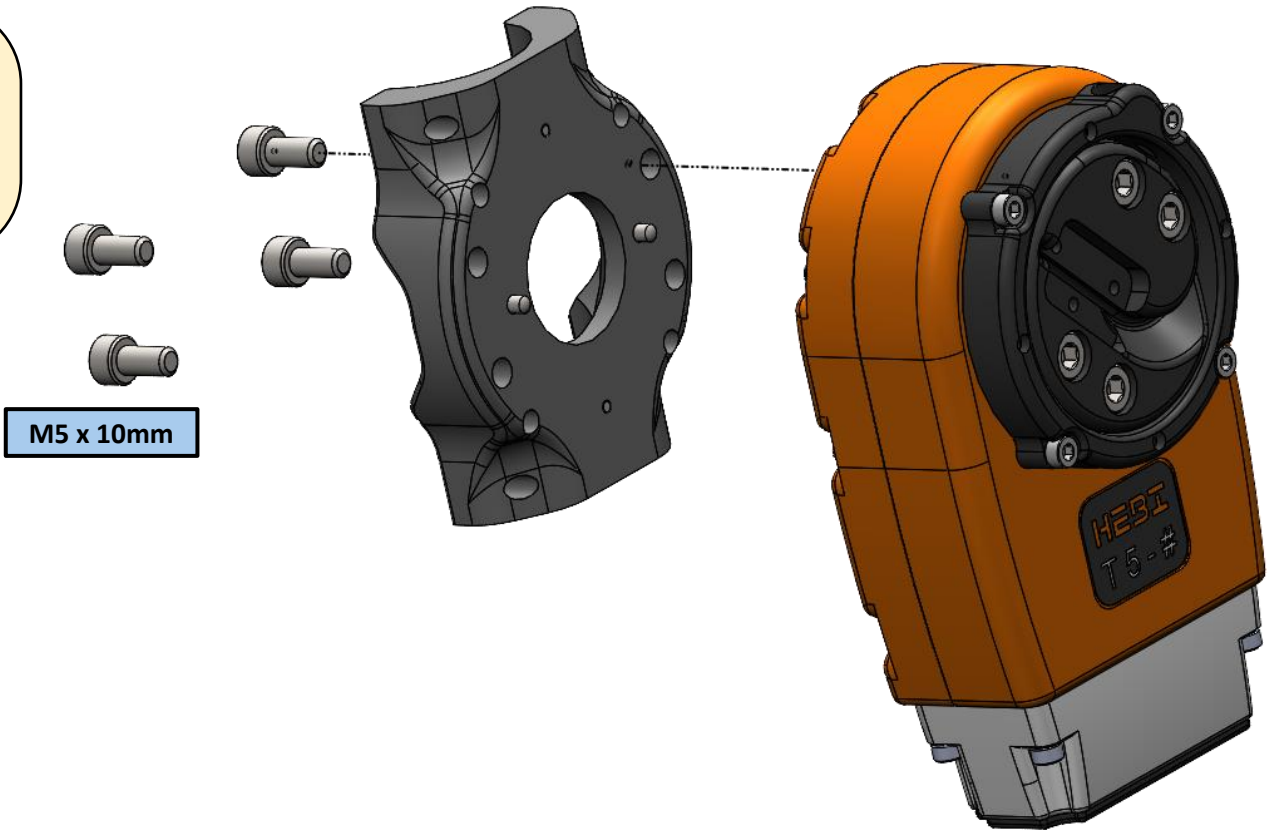
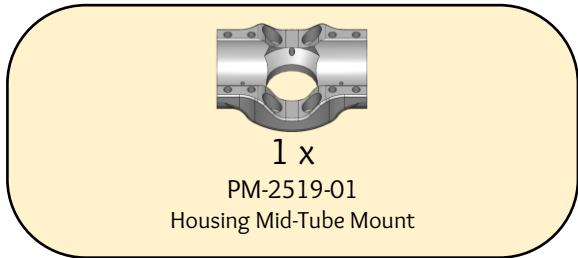
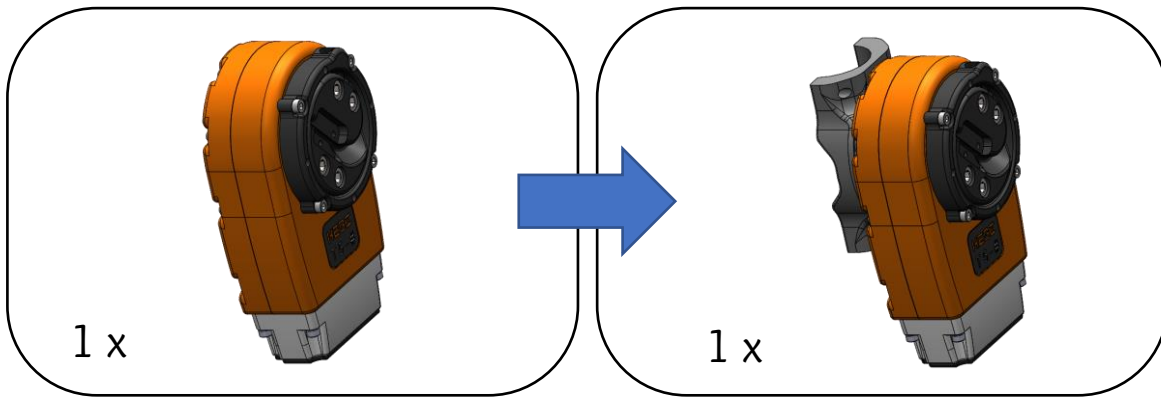
 **Connectors of both modules
point the same way**

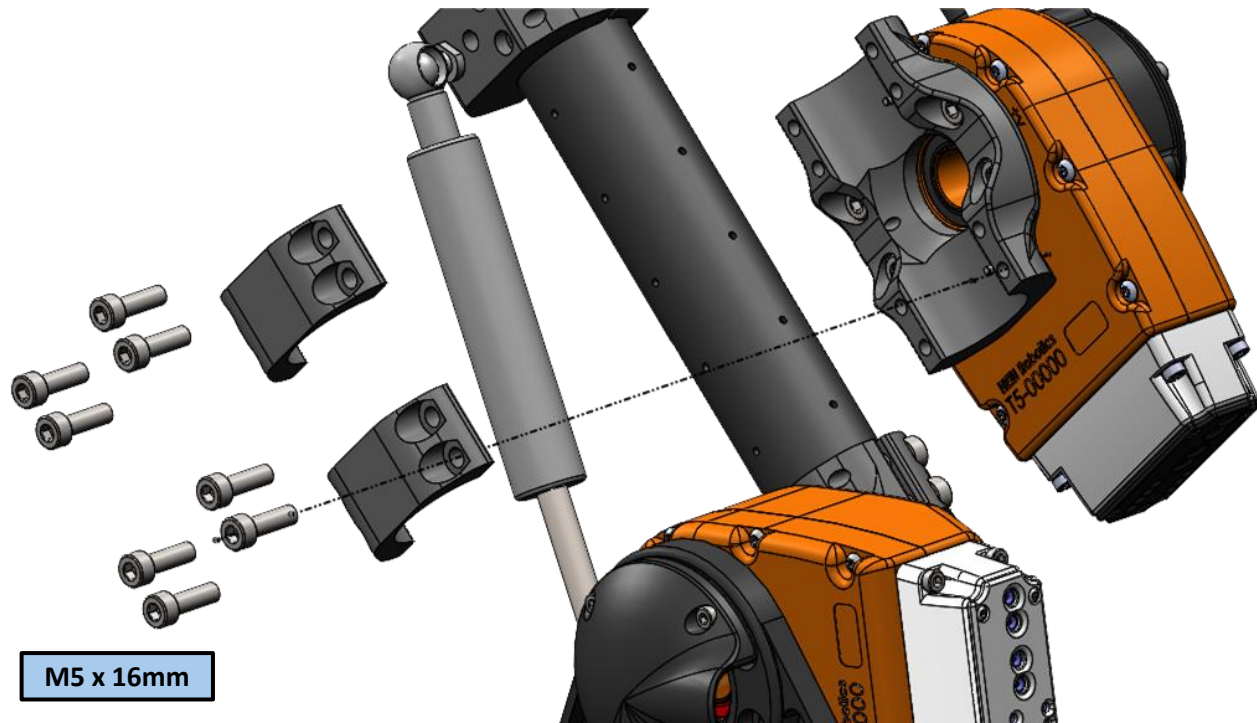
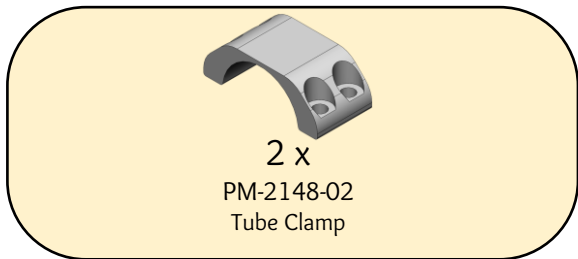
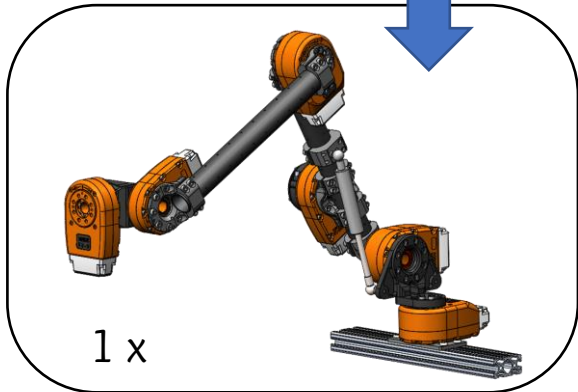
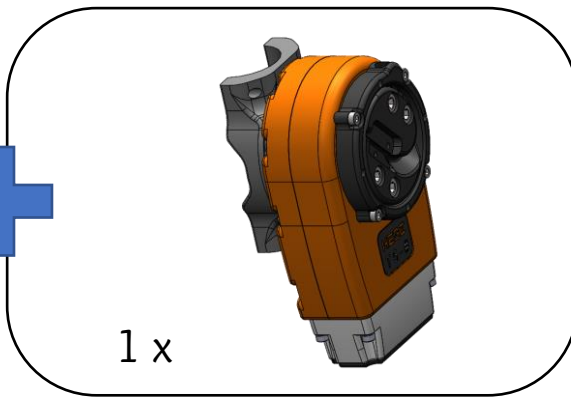
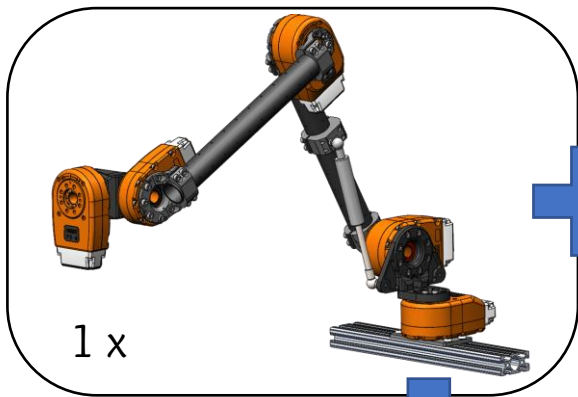


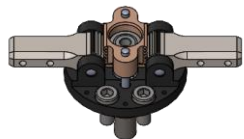
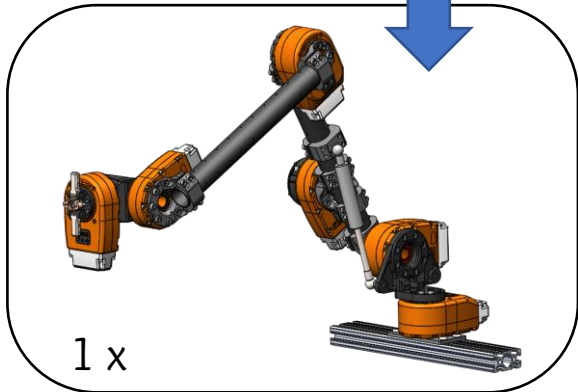
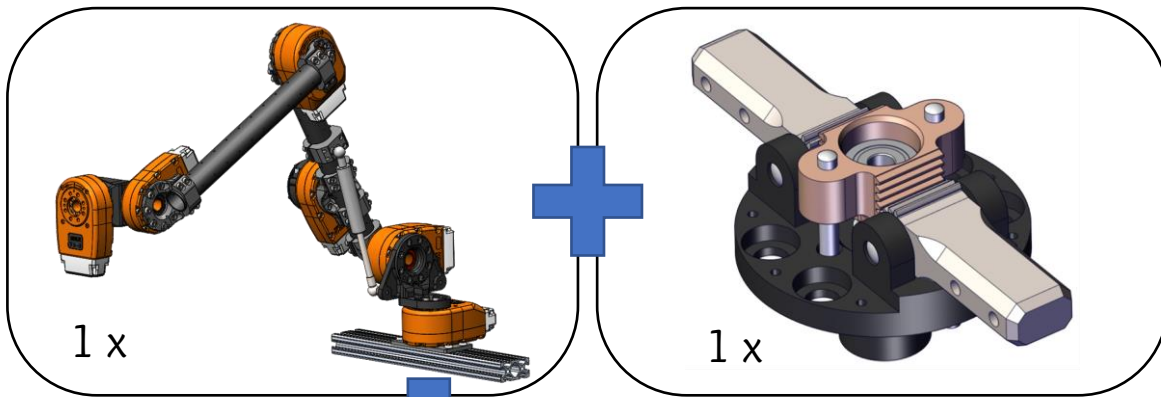
Gripper



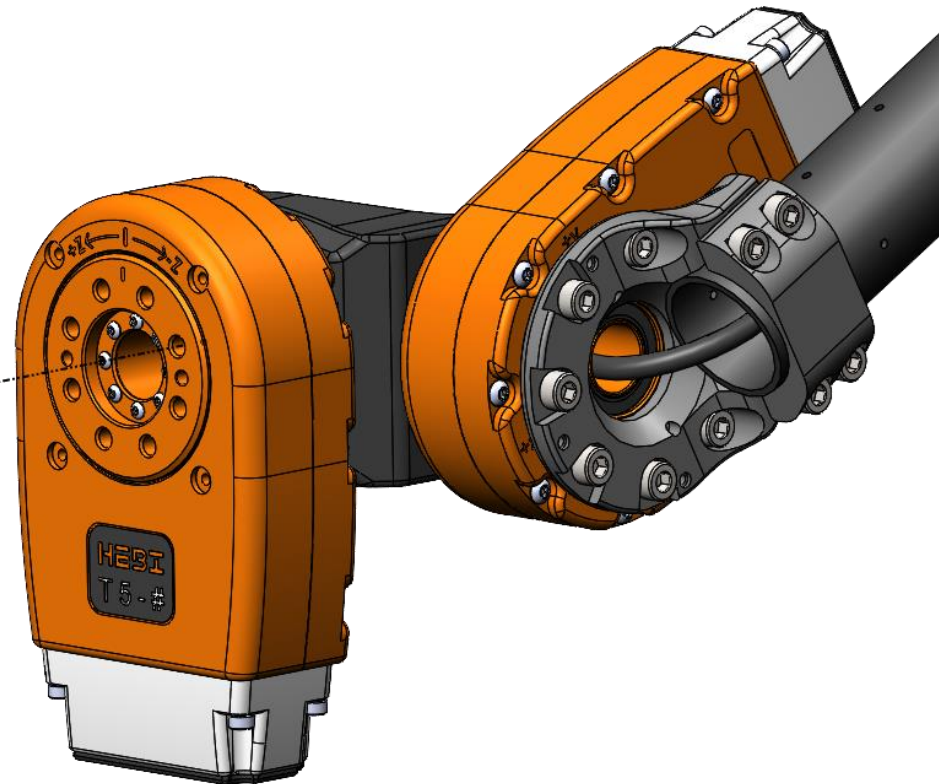
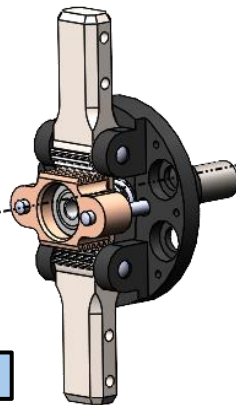









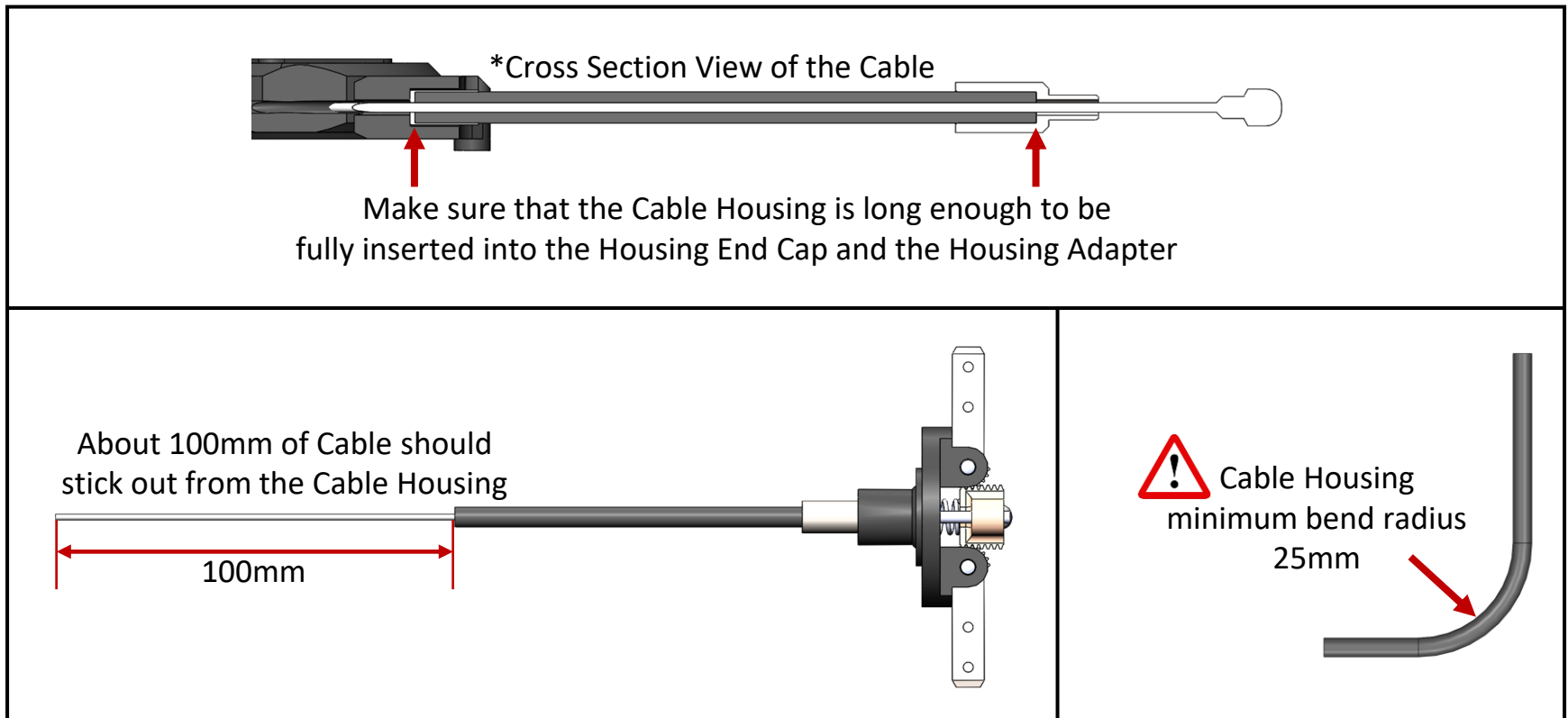
M5 x 8mm

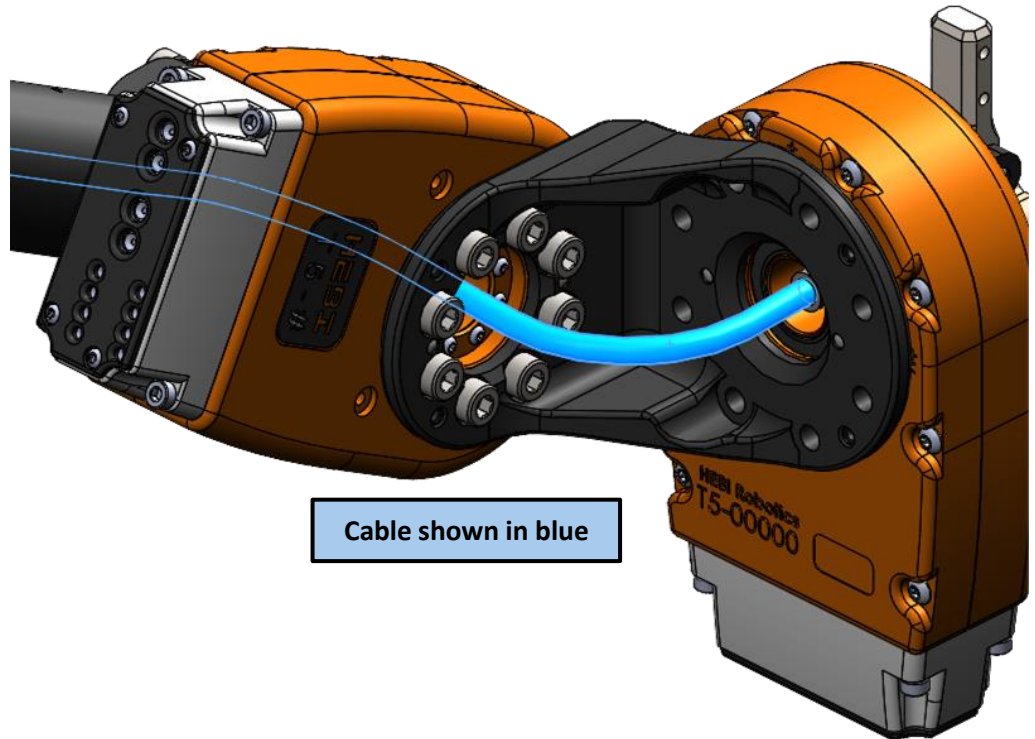
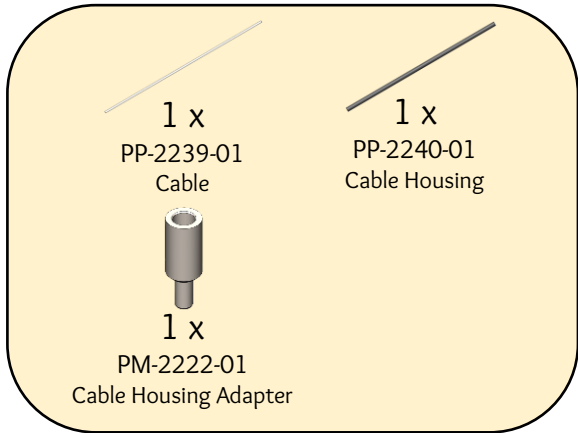
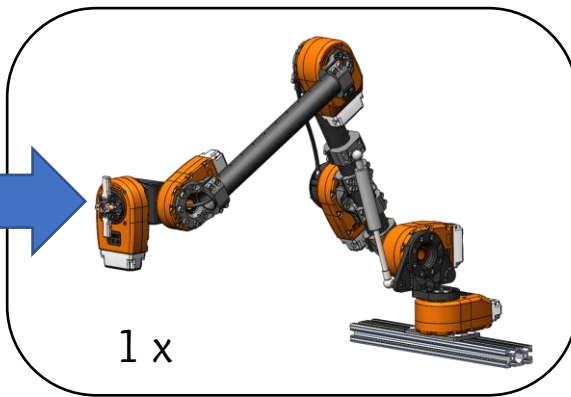
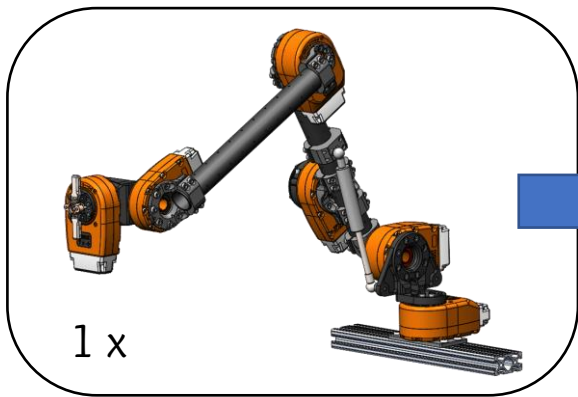


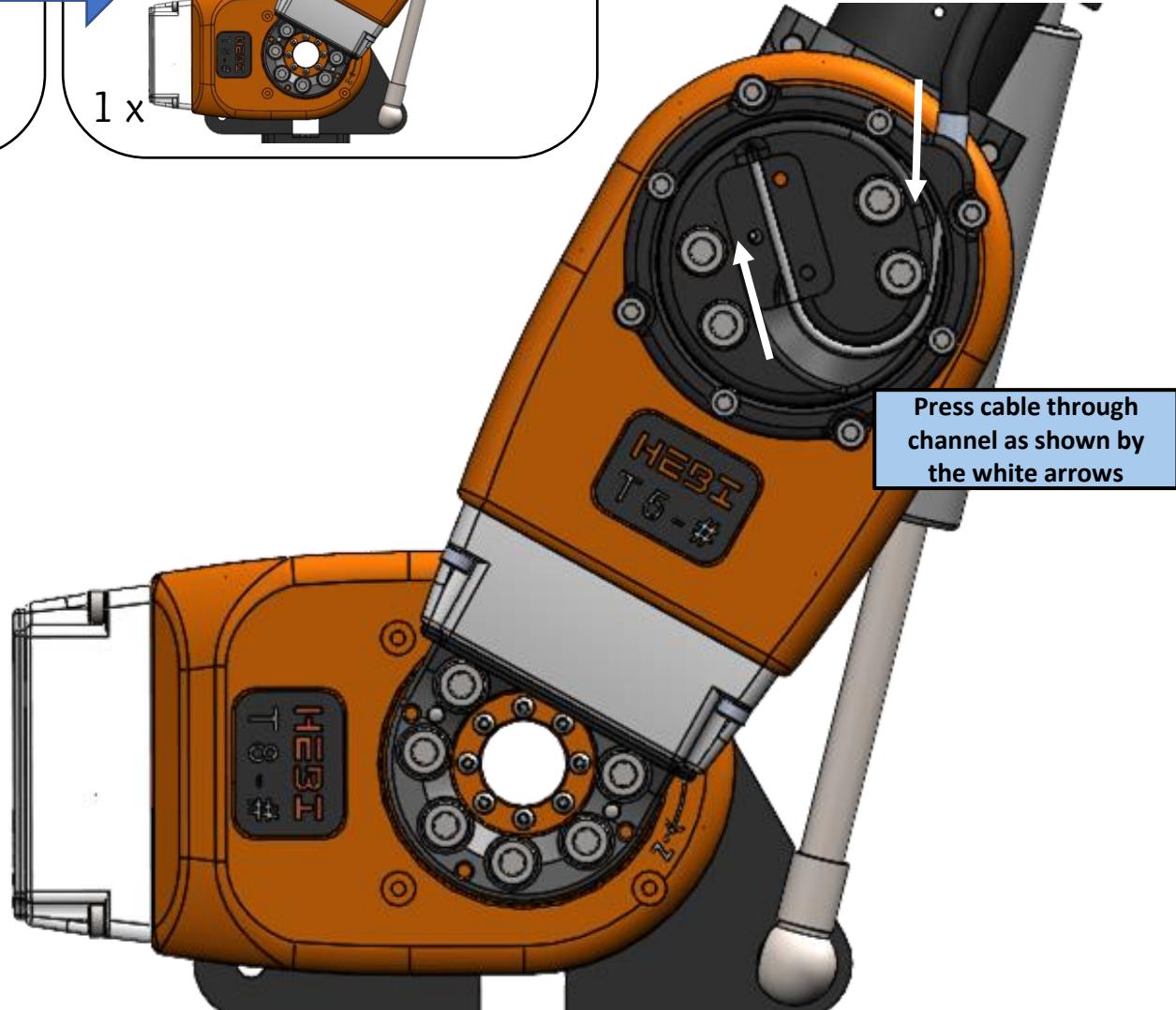
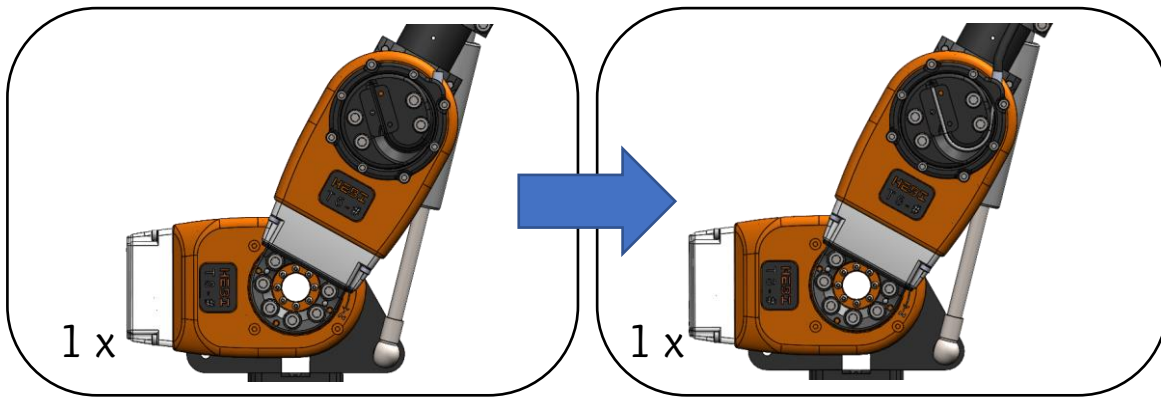
 **Align with actuator output hub tick mark**
(Fingers perpendicular to the tick mark)

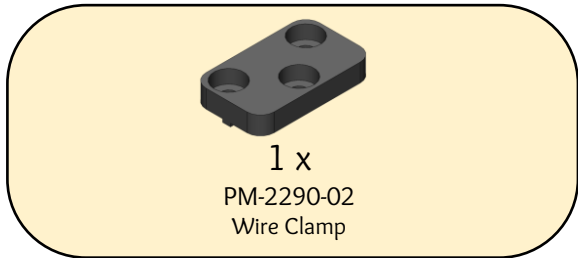
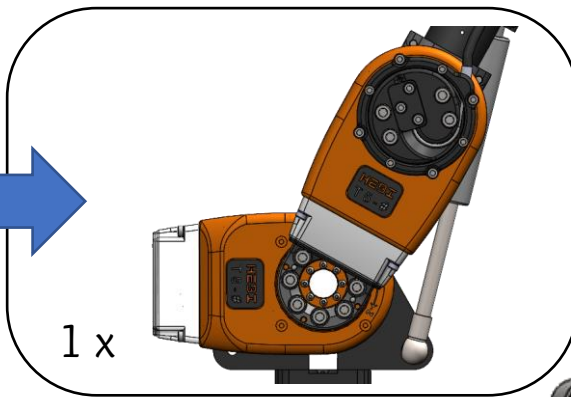
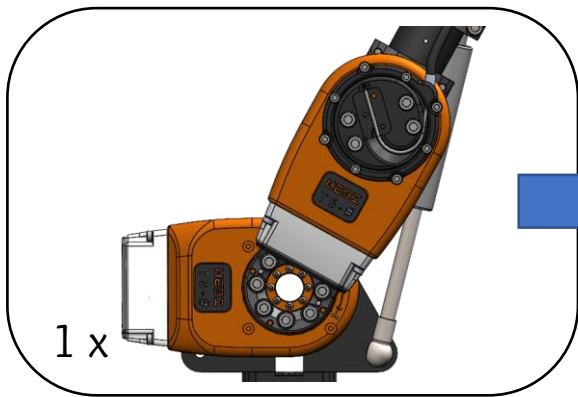
Running the Cable Through

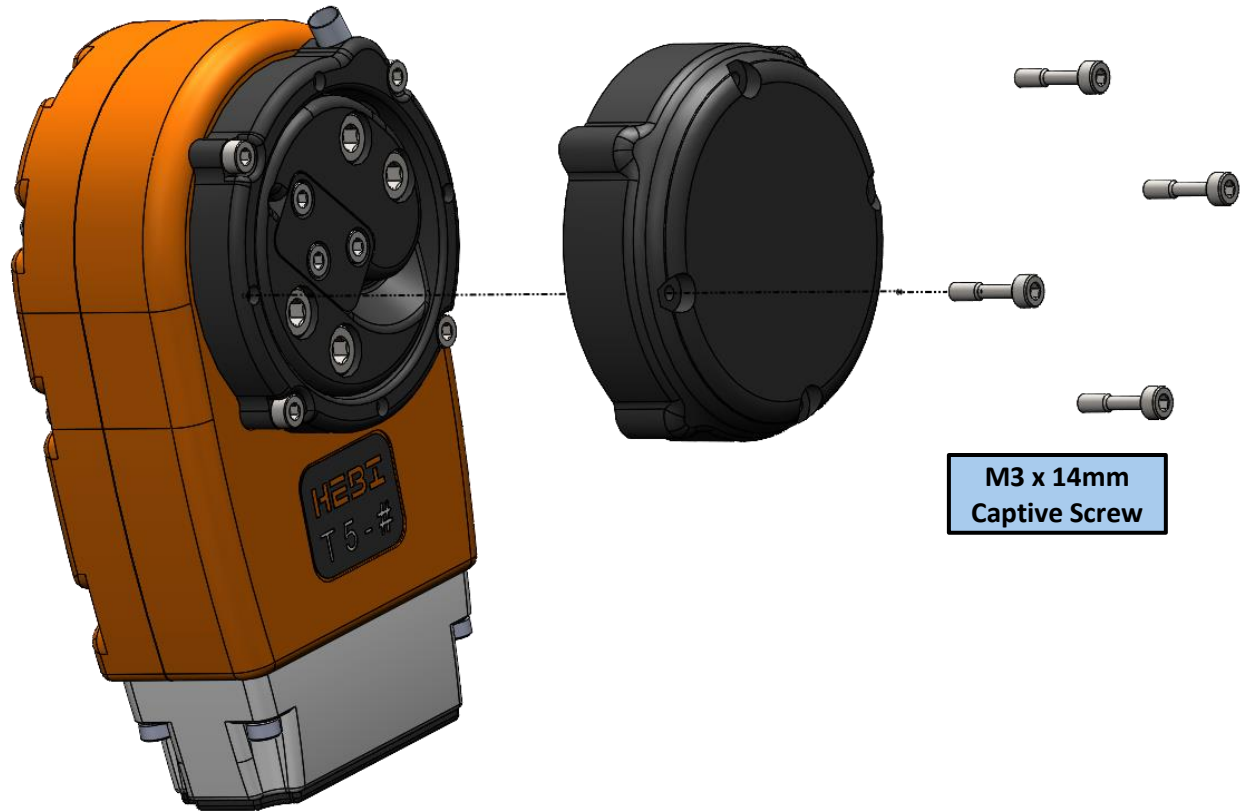
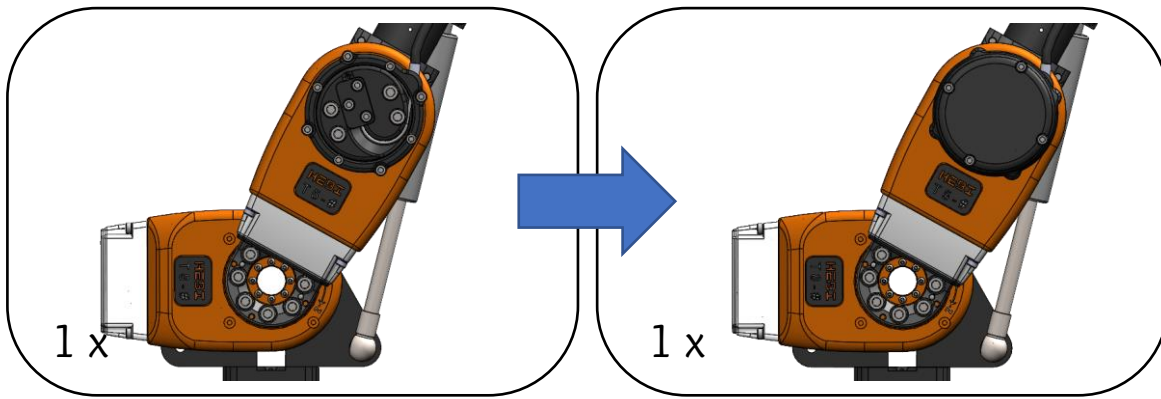
- Make sure to use a Standard Road Bike Brake Cable.
- Run the cable to fit your system.
- Run both the cable and the cable housing before cutting them to ensure that the cable is long enough.
- Cut the cable housing first, and then cut the cable.

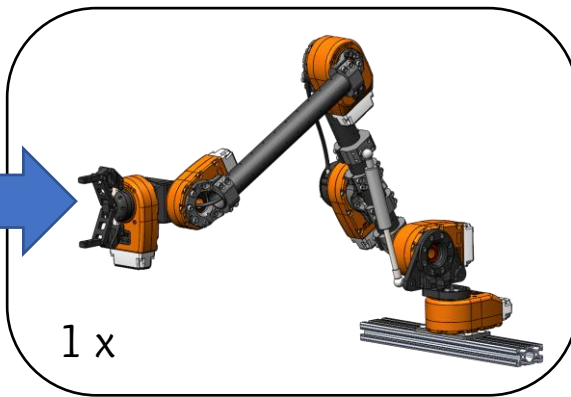
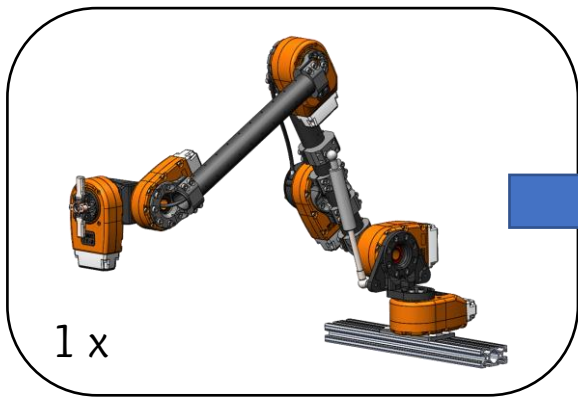






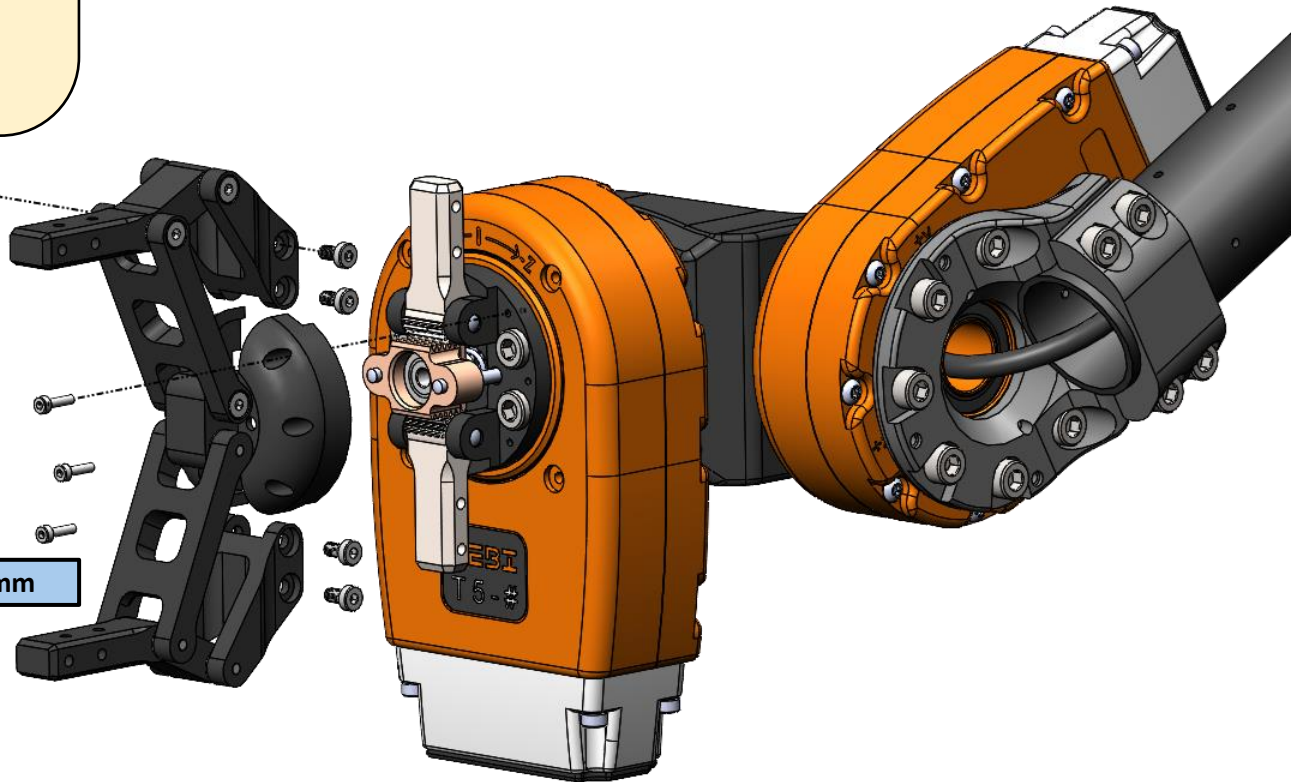






M3 x 6mm
Low Profile

M2 x 8mm



Wiring Notes

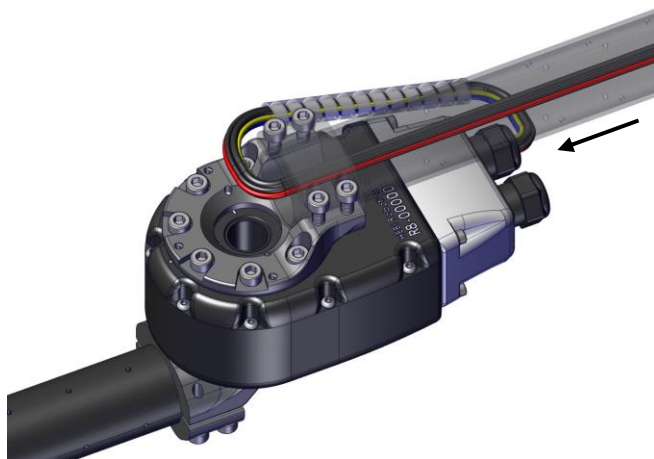
- Keeping wires organized will help prevent tangling and add a nice aesthetic.
 - Spiral sleeving is a good accessory for organizing loose wires
- Visit the following link to see detailed instruction on connecting wires to T-Series Modules.

<http://docs.hebi.us/#r-series-quickstart>

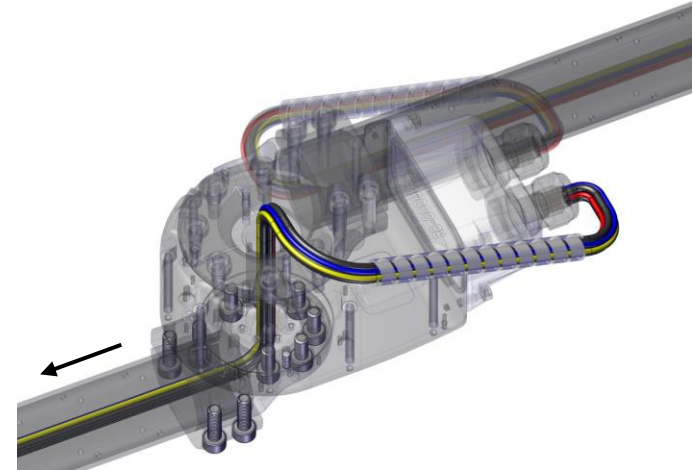
For more information visit: docs.hebi.us



[Spiral sleeving]

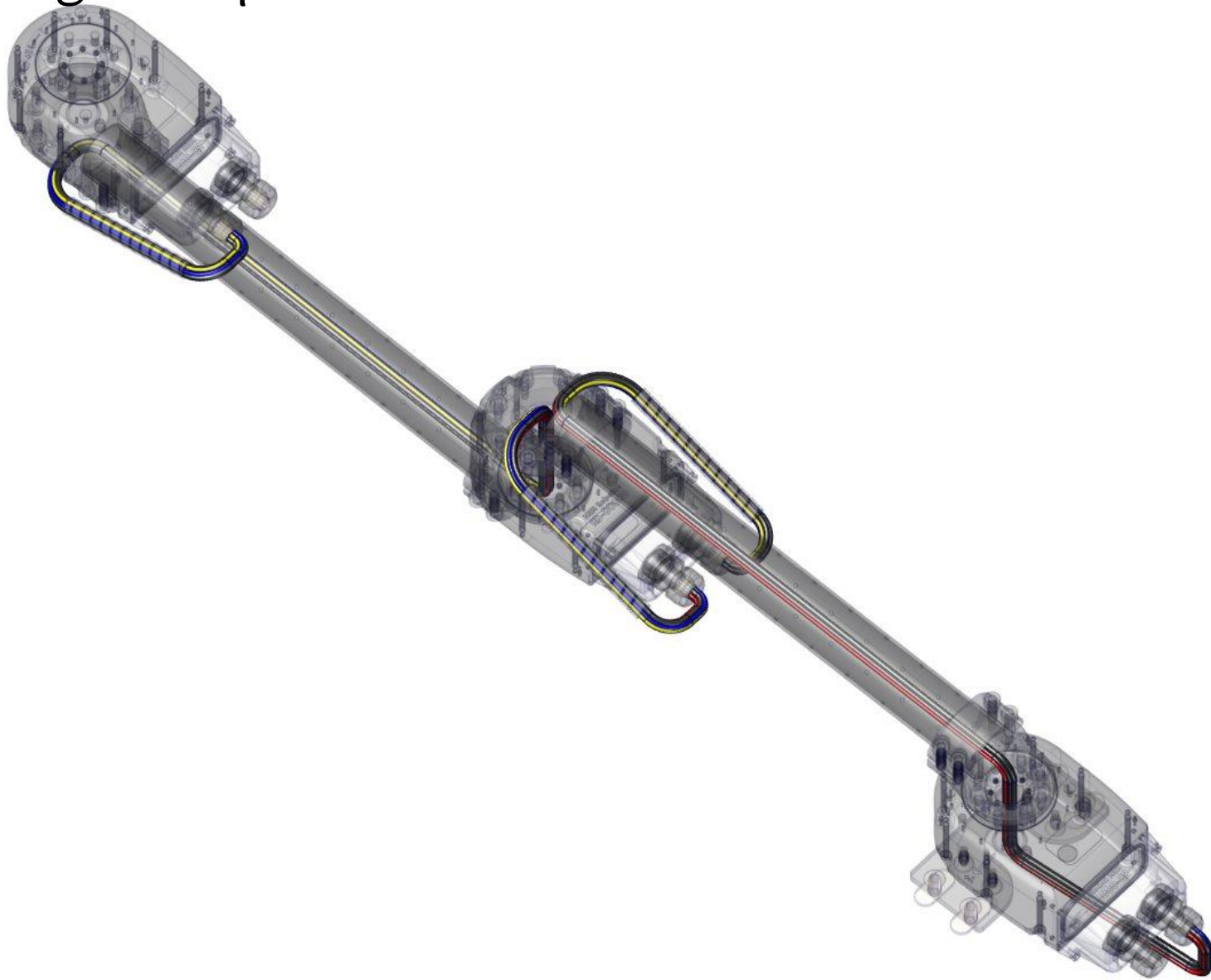


Wires that come from the previous joint should be inserted directly to actuator ports.

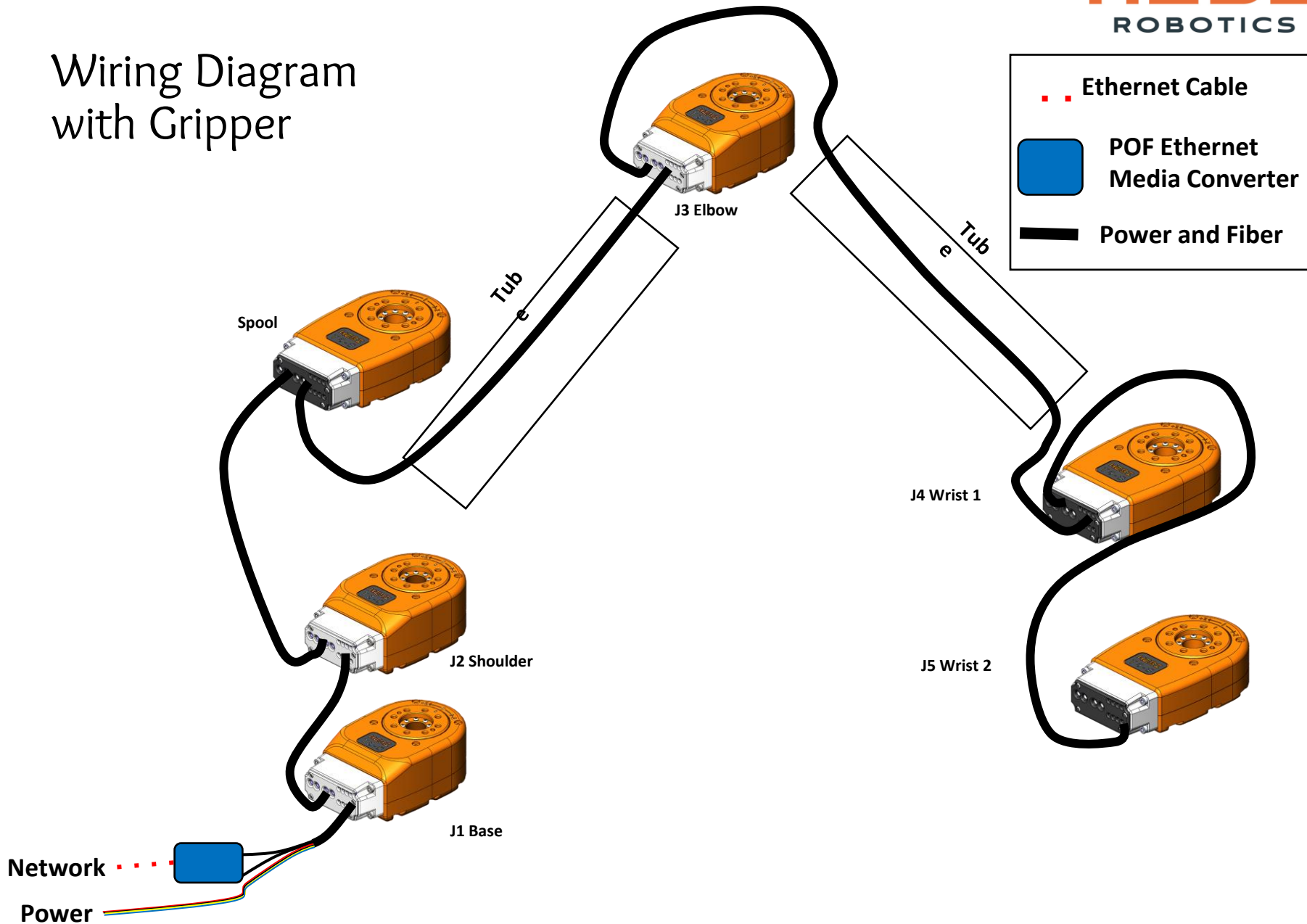


Wires that connect to the next joint should be threaded through the actuator's bore hole.

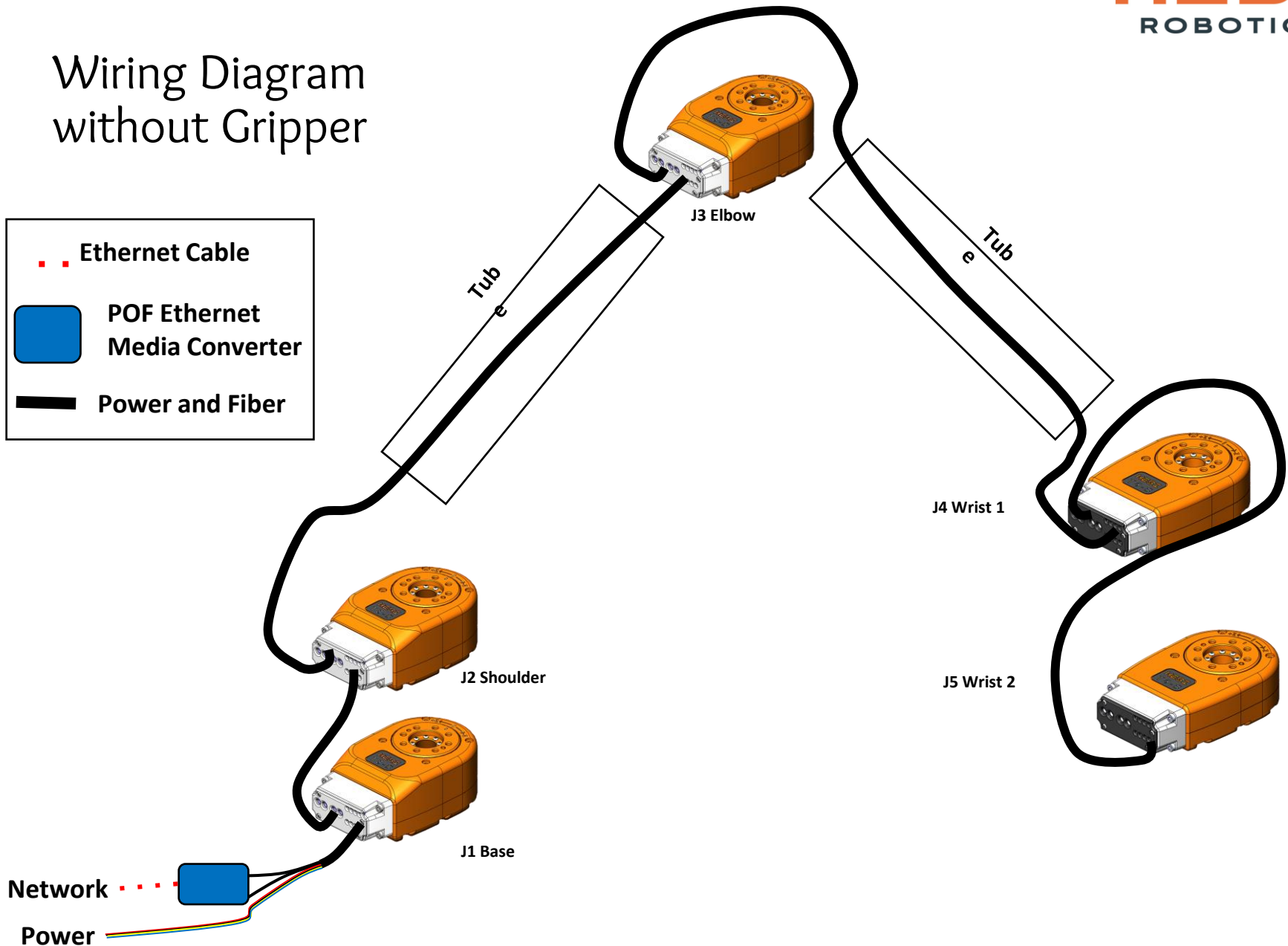
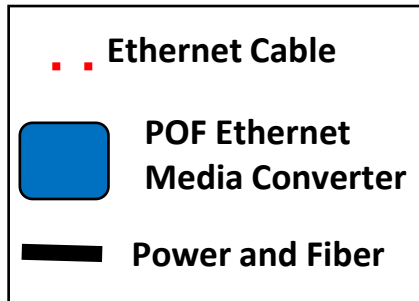
Wiring Example



Wiring Diagram with Gripper

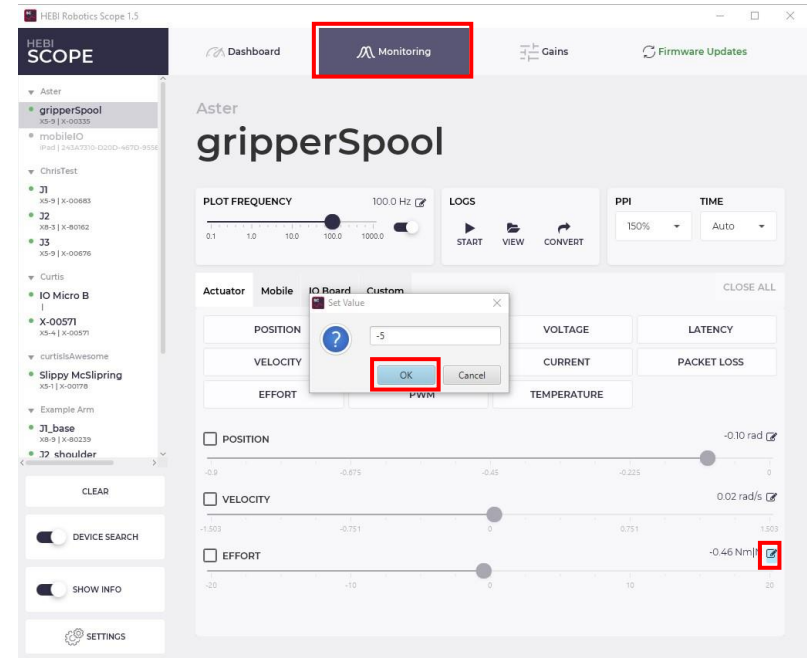
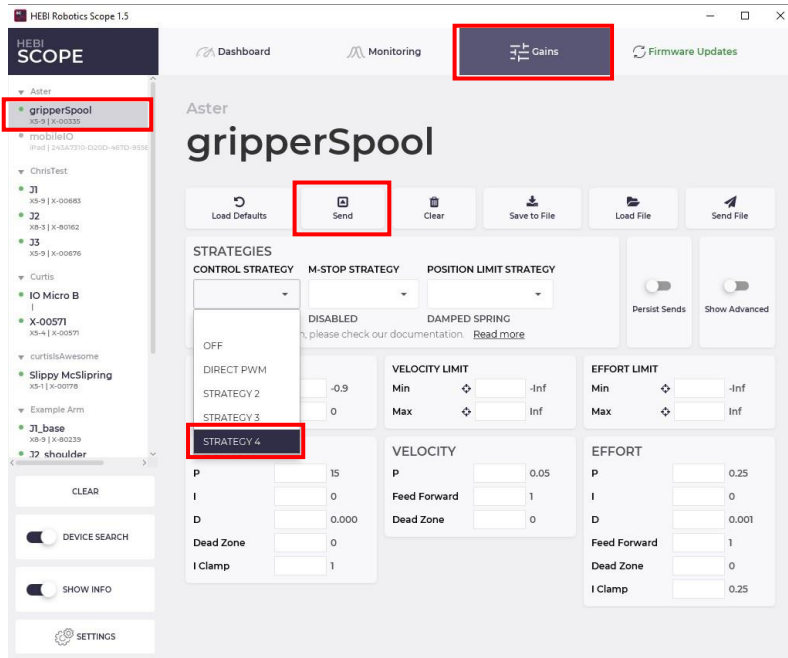


Wiring Diagram without Gripper



Initializing the Spool, pt. 1

- I. Connect the Spool Module into the network, and turn it on
- II. Open HEBI Scope GUI



III. Set the Strategy of the Spool Module to “STRATEGY_4”

1. Click on your Spool Module
2. Go to “Gains” tab
3. Use the Control Strategy drop down menu to select a Suitable Strategy for your Application
4. Click “Send”

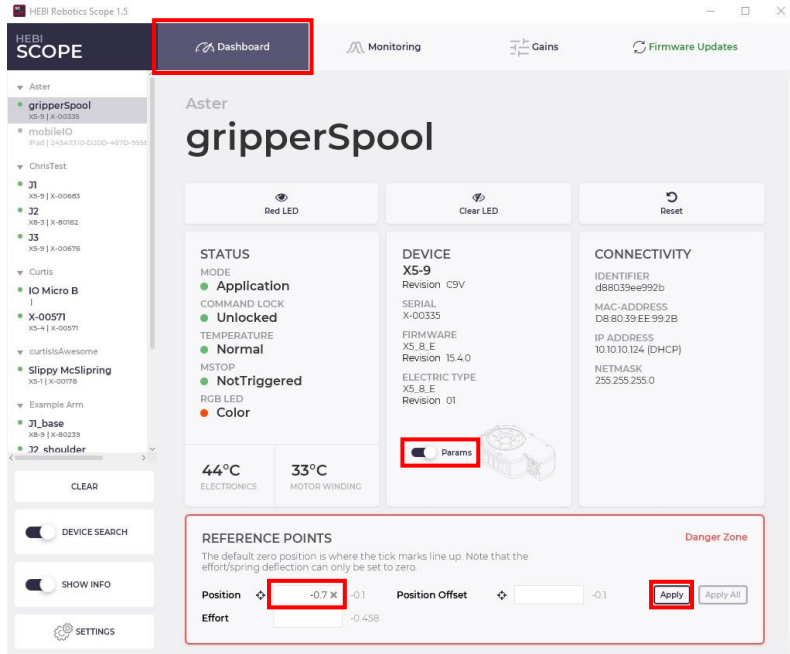
IV. Command the Effort to -5 Nm

1. Go to “Monitoring” tab
2. Click the “Target Button” for the Effort
3. Type “-5” and Click “OK”



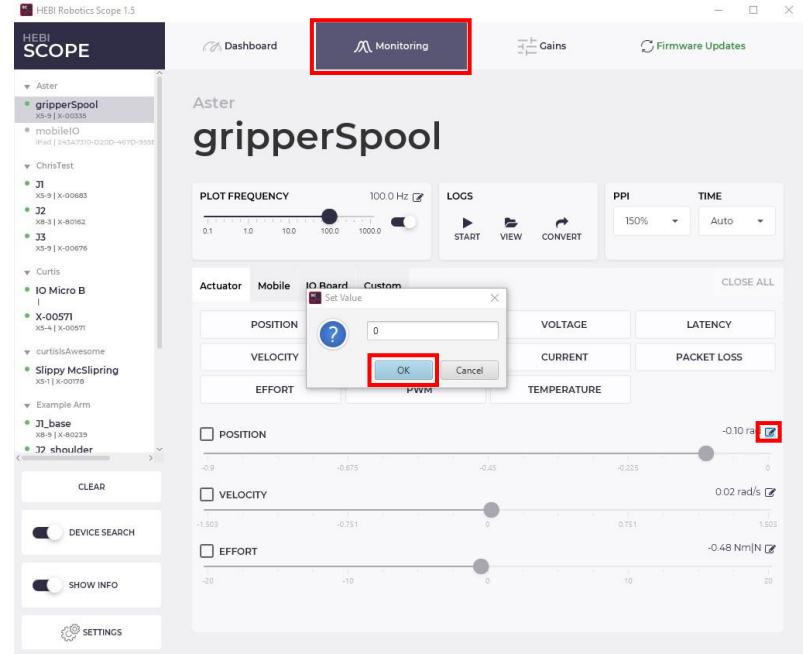
The Spool will wind the Cable and close the Fingers.

Initializing the Spool , pt. 2



V. While Commanding the Effort, set the current position to “-0.7”

1. Go to “Dashboard” tab
2. Toggle “Params” as shown
3. Type “-0.7” for Position
4. Click “Apply”



VI. Stop commanding the effort, and command the position to 0.

1. Go to “Monitoring” tab
2. Click the “Target Button” for Position
3. Type “0” and Click “OK”

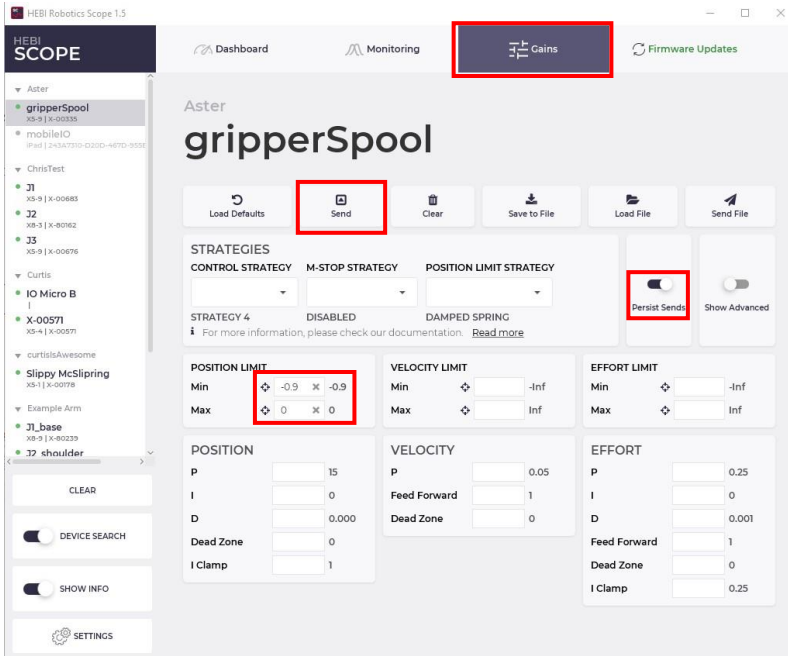


The Spool will unwind the Cable and open the Fingers.

To close the gripper, turn the spool clockwise.

To open the gripper, command the spool to zero position.

Initializing the Spool, pt. 3



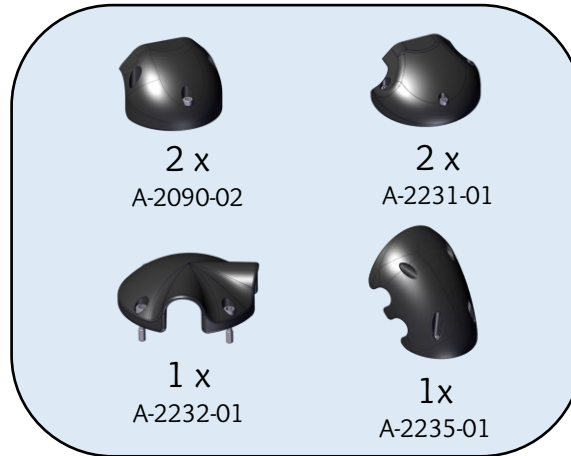
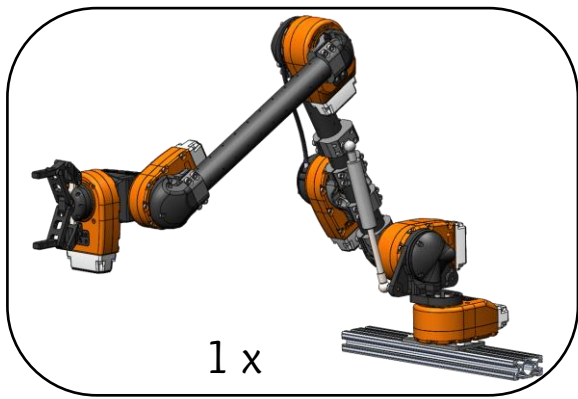
If the Safety Limits are not set, the spool can turn to a position greater than zero, and break the cable.

To close the gripper, turn the spool clockwise (negative effort).

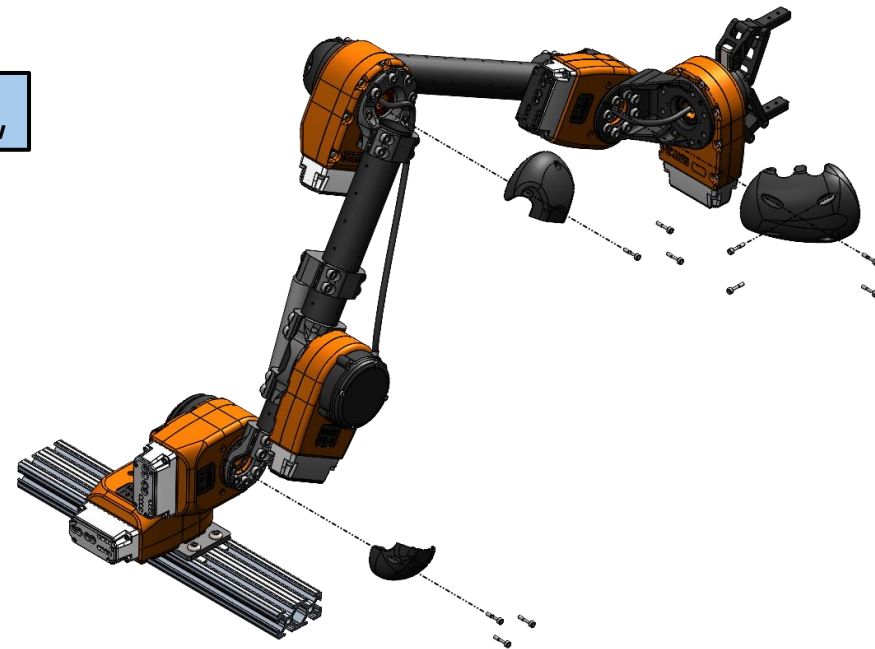
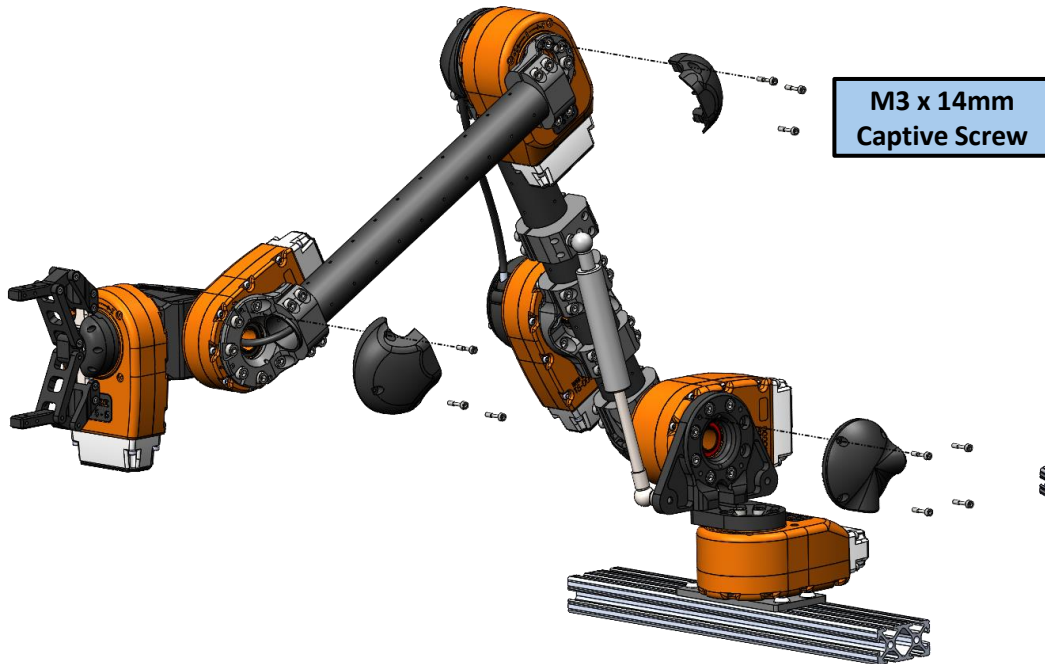
To open the gripper, turn the spool counter-clockwise (positive effort)

VII. Set Safety Limits for the Spool

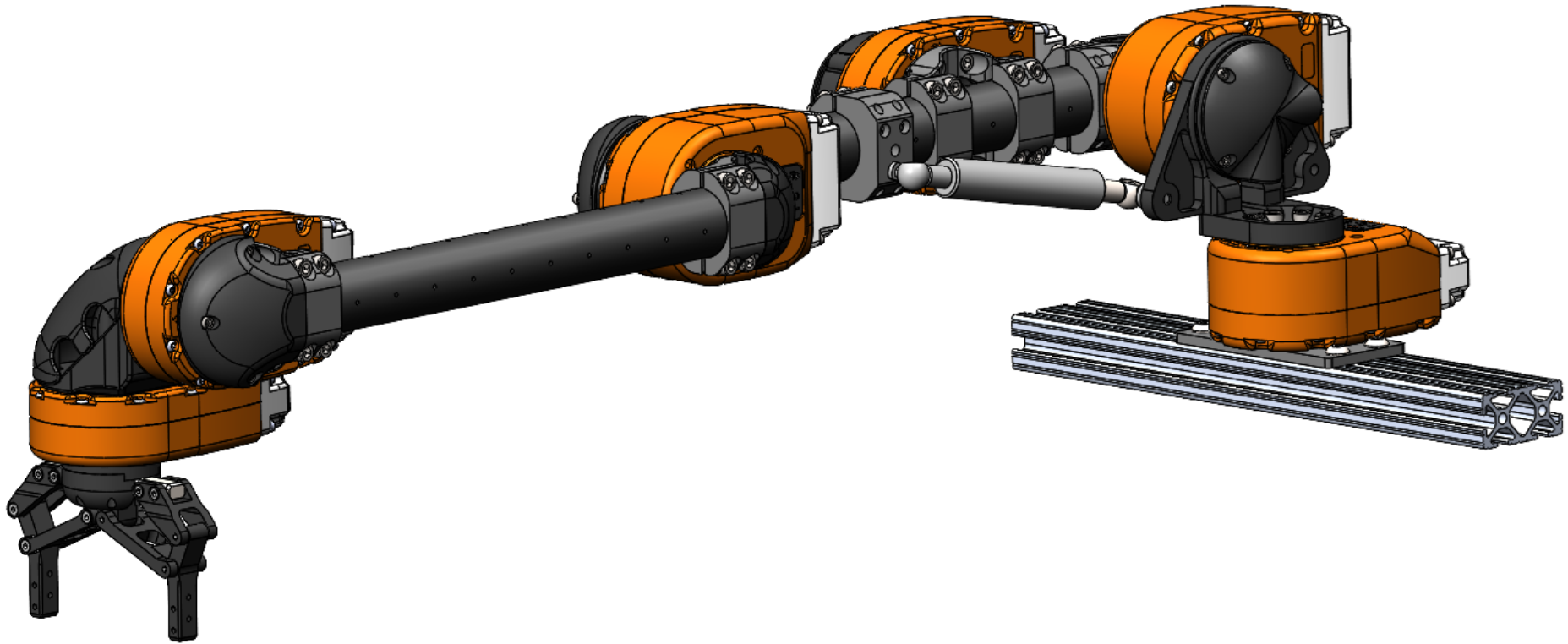
1. Go to "Gains" tab
2. Type "-0.9" for Min Position
3. Type "0" for Max Position
4. Toggle "Persist Sends" as shown
5. Click "Send"



Install cables before adding caps



All axes at zero degrees



Additional Accessories

- Power Supply, 36V 220W (A-2098-36)
 - Comes with correct Molex Minifit Jr 2 connector

- HEBI I/O Board (A-2116-01)
 - Integrate with 3rd party end effectors or tools using HEBI APIs



HEBI

ROBOTICS