

KINOVA®
Jaco®
assistive robot

REACH OUT AND CHANGE THE WORLD



USER GUIDE

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Disclaimer

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Periodically, changes are made to the information contained herein; these changes will be incorporated into new editions of this publication. Kinova may, at any time, make improvements or changes to the products and software programs described in this publication.

If you have any questions or comments about this document, the information it contains, or the product it describes, contact us at support@kinova.ca.

Symbols and their meanings

Throughout the manual, icons are used to draw attention to the reader.

	DANGER:	Safety measure of an impending situation that can result in serious injury or even death, or can severely damage property, if ignored
---	----------------	---

	CAUTION:	Safety measure that can lead to equipment damage if ignored
---	-----------------	---

	Warning:	Safety measure that can result in minor injury
---	-----------------	--

	Restriction:	Safety measure of what a user must not do in any circumstance
---	---------------------	---

	Attention:	Safety measure while performing a task
---	-------------------	--

	Tip:	Tip on the maintenance, operation, and manipulation of Kinova products
---	-------------	--

	Remember:	Reminder about information that supplies context to content
---	------------------	---

	Important:	General important information and best practices
---	-------------------	--

		Refer to accompanying documents
---	--	---------------------------------

		Pinch point
---	--	-------------

		Medical device
---	--	----------------

		Unique device identifier
---	--	--------------------------

		Serial number
---	--	---------------

	Date of manufacturing	
	Manufacturer	Kinova inc. 4333 boulevard de la Grande-Allée Boisbriand, Québec J7H 1M7
	Direct current	
	Compliance with WEEE2 directive	
	Mandatory conformity marking of the European Union (EU)	
	Authorized representative of the European Union (EU): AR Experts BV Boeingavenue 209 1119 PD Schiphol-Rijk The Netherlands www.ar-experts.eu	
	SRN – Number	NL-AR-000023989
	Authorized representation of the United Kingdom (UK): UKCA Experts Ltd 6 Stanford Street, Nottingham, NG1 7BQ, UK	
	Authorized representative of KS Switzerland: SKS Rehab AG IM Wyden 3 CH-8762 Schwanden	
	Telephone	+41 55 647 35 85
	Email	sks@sks-rehab.ch
	SRN – Number	CHRN-IM-20000882

About this document

The *Jaco® assistive robot user guide* contains information about the configuration and use of Jaco® assistive robot.

Jaco is a robotic arm, an interface between the wheelchair and the arm, a display, and some accessories.

Table 1: Jaco products

Product	Model number	Accessory	Part number
Jaco® assistive robot	KR MJ2 0001	Kinova® Lift Arm	KR8600-01
Kinova® Jaco Blue Universal Interface	KR UI3 0001	Kinova® Cutlery & Tool Holder	AM 8181 0001
Kinova® Jaco Blue Universal Interface with R-net	KR UI3 0001		
Kinova® OLED Display	PD 0508 0001-01		

The guide also contains information about Kinova® Assistive Robot Configurator (ARC), which is a software developed by Kinova that is used to customize how Jaco operates.

The *Jaco® assistive robot user guide* is intended for different groups of people.

- End users of the Kinova product
- Field representatives of Kinova
- Employees of authorized dealers



CAUTION: Kinova assumes no liability whatsoever for non-compliance with safety precautions. Read all information before using this product and its accessories.



CAUTION: Read all warnings on the product and in *Jaco® assistive robot user guide*.



CAUTION: Follow all instructions.



CAUTION: Keep the instructions for future reference.

Warranty



Refer to the *Term and Conditions* on the website <https://assistive.kinovarobotics.com/legal/terms-and-conditions>.

EU Declaration of Conformity

Jaco® assistive robot conforms with the requirements of EU directives and regulations, in particular the EU MDR.

The Declaration of Conformity is available upon request.

Specifications of Jaco and its accompanying products

Before integrating Jaco, make sure that the device and all accompanying products help the user.

Jaco specifications

Jaco® assistive robot is a medical device that can be used in many situations. It is important to know its specifications before incorporating it in the environment.

Table 2: Jaco specifications

General		
Intended useful life	5 years	
Environmental		
Operating temperature	-10 °C to 40 °C	
Operating humidity (non-condensing)	15% to 90%	
Mechanical		
Materials	Arm segments and base	Carbon fiber
	Actuators	Aluminum
	Fingers, outer	Arnitel EL550, <i>Thermoplastic Copolyester Elastomer (TPC)</i>
	Fingers, inner	Rubber, <i>Thermoplastic Elastomer (TPE)</i>
Total weight	5.4 kg with 3 finger gripper	
	12 lb with 3 finger gripper	
Reach	90 cm	
	35 in	
Maximum payload	Mid-point of reach, continuous	1.6 kg
		3.5 lb

	Full-reach peak, temporary	1.3 kg
		2.9 lb
Joint range (software limitation)	± 27.7 revolutions	
Maximum linear speed of the robotic arm	20 cm/s	
	7.9 in/s	
Gripper force	3 fingers: 40 N	
Water resistance	IPX2	
	(resistance against light rain and splashes from liquids)	
Electrical		
Power supply voltage	24 VDC	
Average power consumption	25 W	
Average power consumption in standby	5 W	
Peak power consumption	100 W	

Jaco Blue Universal Interface specifications

Jaco Blue Universal Interface makes it easier to communicate with Jaco. It is important to know the specifications of Jaco Blue Universal Interface before integrating it.

Table 3: Jaco Blue Universal Interface specifications

Environmental		
Operating temperature	-25 °C to 40 °C	
	 Note: When Jaco is switched on at ambient temperature, Jaco Blue Universal Interface can operate below 0 °C.	
Storage temperature	-40 °C to 70 °C	
Humidity (non-condensing)	15% to 90%	

Mechanical

Material	Anodized aluminum	
Total weight	< 0.60 kg	< 1.32 lb
Dimensions without protruding connectors	148 x 56 x 92 mm	5.83 x 2.20 x 3.62 inches
Water resistance	IPx4	
Ports	DB9 male and female	
	3.5 mm audio jack (6) and output (2)	
Mounting bracket (Optional)	M4	
Mounting wheelchair rail (Optional)	M6	

Electrical

Power supply voltage	24 V DC	
Operating voltage	18 V DC to 29 V DC	
Maximum power consumption	350 mA	
USB charging capability	5 V @ 500 mA	

Compatibility

Bluetooth device	Curtis Wright R-net	CJMS2-BT and Omni2 interface
	Quantum Rehab Q-Logic 3	
USB	Microsoft Xbox controllers	One, Series X, Series S, Adaptive
Analog joystick	DB9 Analog	Female connector, needs a DB9 mini-gender changer for the joystick
Digital joystick	DB9 Digital	Male connector, needs a DB9 mini-gender changer for the joystick

Bluetooth module: Pre-certified

Federal Communications Commission (FCC) 2AC7Z-ESPWROOM32UE

Industry Canada Identifier (IC ID) 21098-ESPWROOMUE

OLED Display specifications

OLED Display shows information to the user to make it easier for them to use Jaco. It is important to know the specifications of OLED Display before integrating it in your environment.

Table 4: OLED Display specifications

Environmental		
General	Ambient temperature	-20°C to 70°C
	Normal atmospheric pressure conditions	
Storage	Ambient temperature	0°C to 50°C
	Maximum relative humidity	55%
Mechanical		
Water resistance	Light rainfall	Limited period of time (IPX2)
		Minimal exposure to rain
Electrical		
Rated power	Voltage	24 V DC
	Current consumption	0.09 A max
		0.5A fused

Lift Arm specifications

Lift Arm is an accessory that enhances Jaco movement. It is important to know its specifications before incorporating it in your environment.

Table 5: Lift Arm specifications



Note: Weight and dimensions apply only to Lift Arm and do not include Jaco.

<i>Mechanical</i>	
Weight	5.6 kg or 12.3 lb
Dimensions	500 mm x 116 mm x 164 mm
includes mounting clamps	19.7 in x 4.5 in x 6.5 in
Dimensions of the control box	115 mm x 95 mm x 55 mm 4.5 in x 3.7 in x 2.2 in
Maximum angle of the swing-away mechanism	Swing-away angle is typically limited at approximately 180-degrees by the wheelchair and accessories that are attached to it.
Maximum angle of the forward tilt	64°
Maximum angle of the backward tilt	3°
Maximum duty cycle	10% Operation for 2 minutes maximum in every 20-minute period
<i>Electrical</i>	
Nominal electrical power	24 V DC
Electrical rating	max 2.7 A

Related topics

[Jaco specifications](#) on page 7

Safety warning levels

Follow basic safety rules when operating Jaco to prevent injury to the user or damage to the Jaco system, wheelchair, or the surroundings. Not complying with the safety directives can result in safety issues for the end user.



Notice: Notify Kinova, or a technician certified by Kinova, of any changes in contact information, such as address, telephone number, or email, to receive all communications and safety information are received.

There are several levels of warnings to consider when operating Jaco, its related products, and its accessories.

When warnings contradict each other, the warnings classified as dangerous take precedence over all other warning levels.



DANGER: A danger is an impending hazardous situation that can result in serious injury or even death, or can severely damage property. Avoid impending hazardous situations that are associated with dangers.



Warning: A warning is a potentially hazardous situation that can cause minor to moderate injury to workers, can result in serious injury or even death, and can damage the property significantly. Avoid potentially hazardous situations that are associated with warnings.



CAUTION: A caution is a hazardous situation that can cause minor to moderate injury to workers and can damage the property. Avoid hazardous situations that are associated with cautions.



A pinch point is a caution that indicates a person can pinch or crush their hand.



Restriction: Restrictions are limiting conditions and identify when not to use Jaco. Ignoring a restriction can cause irreparable harm to the user or damage the product to the point of voiding its warranty.

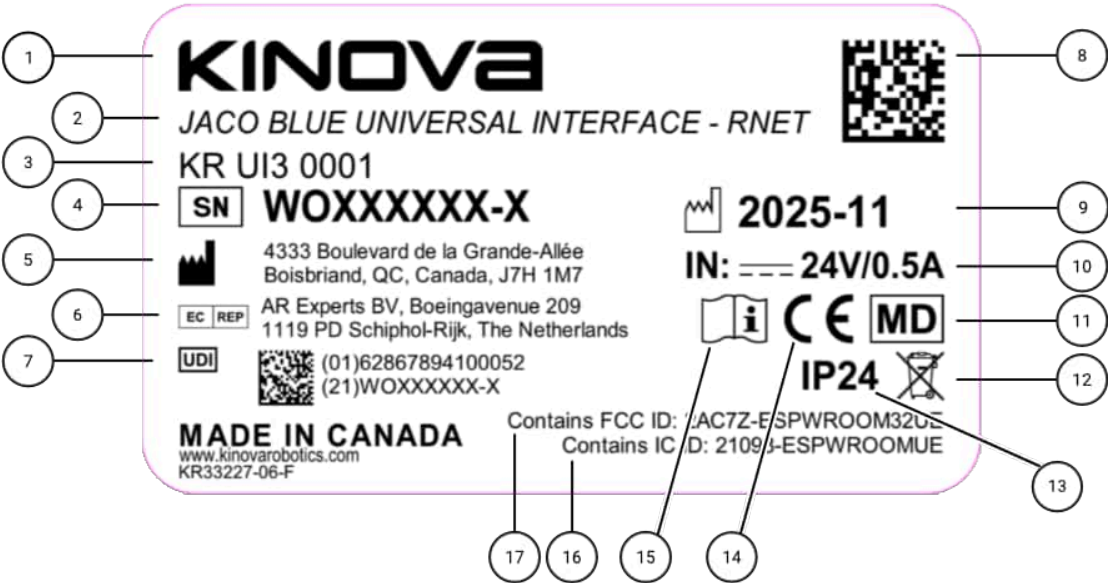
In addition to the different levels of warnings, there are indications and contraindications to remember when using Jaco.

Labels

The product has a label affixed to it that supplies pertinent information.

The label might differ from the ones accompanying the device; what is displayed on the label depends on the country. For instance, the address of the authorized representative differs for each region.

Depending on the device, the label might have fewer elements and might have the elements in different places.



1	Manufacturer	2	Product (component)	3	Model number	4	Serial number
5	Manufacturer address	6	Address of the authorized representative	7	Unique device identifier (UDI)	8	QR code of the serial number
9	Manufacturing date	10	Voltage and current input	11	Medical device	12	Compliance with WEEE2 directive
13	Ingress protection rating; amount of protection against water and solid, foreign bodies	14	European Union conformity marking	15	Read instructions before using	16	IC ID
17	FCC						

Figure 1: Example of a label

 **Note:** Ingress Protection (IP) rating IP24

2 indicates it is protected against solid particles $\varnothing > 12.5$ mm; 4 indicates it is protected against splashing water from all directions.

Examples of labels on Jaco

The product has a label affixed to it that supplies pertinent information.

Variations of the label include different addresses of authorized representatives.

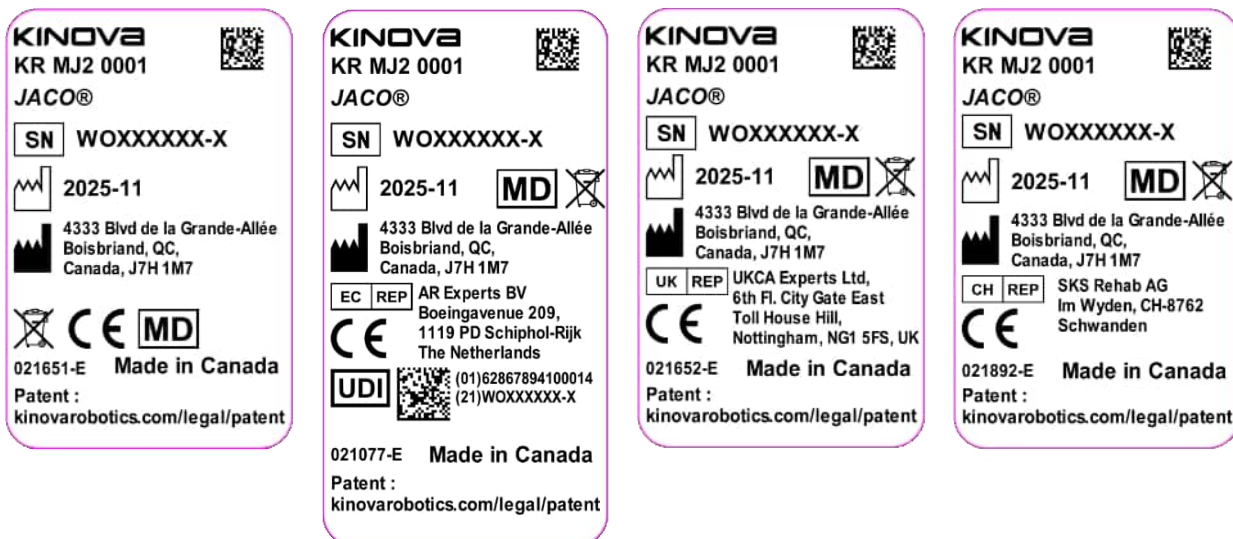


Figure 2: Sample labels with varying authorized representatives

Examples of labels on Jaco Blue Universal Interface

The product has a label affixed to it that supplies pertinent information.

Variations of the label include different addresses of authorized representatives.



Figure 3: Sample labels with different authorized representatives

Examples of labels on OLED Display

The product has a label affixed to it that supplies pertinent information.

Variations of the label include different addresses of authorized representatives.



Figure 4: Sample labels with varying authorized representatives

Examples of labels on Lift Arm

The product has a label affixed to it that supplies pertinent information.

Variations of the label include different addresses of authorized representatives.



Figure 5: Sample labels with varying authorized representatives

Jaco® assistive robot overview

Jaco® assistive robot is a medical device intended for people who are severely impaired or who have lost the functionality of their upper extremities. The device replaces the function of the upper limb on one side of the body.

Jaco is designed to grip, hold, manipulate, and operate objects within reach of the user. By using existing wheelchair drive controls and other types of accessible controls, the user can control the robotic arm independently, move it in three-dimensional space, and hold objects.

Jaco can assist with a wide variety of activities of daily living to compensate for limited arm mobility; it facilitates increased independence in both medically necessary and essential personal and social tasks.

Activities in which Jaco can help include a variety of [Mobility-related Activities of Daily Living \(MRADLs\)](#), personal, and social tasks. With Jaco, the user can grasp objects so to feed themselves, drink, take medication, handle personal hygiene, and go shopping. They can operate light switches, door handles, elevator buttons, traffic light buttons, and emergency buttons in a variety of settings. They can organize and maintain their home, work, and school environments. All these activities lead to a more independent life.

Jaco is intended for indoor and outdoor use.

Jaco can be used on the left or right side of the wheelchair. The side on which the robotic arm is used is defined by the settings in the Assistive Robot Configurator (ARC) software.

All installations include the physical installation of all hardware and the software configuration of the robotic arm.

Any installation that is not completed by a trained Kinova representative is not in the scope of the intended use. Kinova is not liable for personal injuries and property damage resulting from improper use.

Related topics

[Jaco specifications](#) on page 7

[Examples of labels on Jaco](#) on page 14

Intended use of Jaco

Jaco must be operated according to its intended use. Kinova is not liable for any use of Jaco beyond its intended use.

Jaco is intended to be used by individuals with severely restricted or lost function of the upper extremities. The patient is the intended operator of Jaco.

Jaco can be operated with a wide variety of control systems for power wheelchairs, as well as directly with other types of control inputs.

Only use accessories that are approved to be used with Jaco. For a list of compatible wheelchairs and accompanying products that are approved for Jaco, contact a Kinova representative.

Normal, or intended, use of the robotic arm means that a maximum load can be lifted, pushed, pulled, or handled continuously or intermittently.

Continuous	payload minimum to middle reach	1.6 kg	3.5 lb
	with distance between actuator #2 and the load	45 cm	17.7 in
Temporary	from middle to full reach	1.3 kg	2.9 lb
	with distance between actuator #2 and the load	90 cm	35.4 in

Jaco is used for gripping and holding objects near the user. However, in some positions at [maximum range](#) and at maximum load over a longer period of time, the robotic arm can heat up. When the robotic arm starts to heat up, the user is informed of the situation, which is a danger to the user. The warning is given by an audible signal and a warning triangle on the OLED Display; the audible signals come from the OLED Display.



CAUTION: When the audible signal sounds and the warning triangle appears on the OLED Display, remove the object from the gripper. Move the robotic arm back to the [Ready](#) or [Retracted](#) position. Wait for the warning to clear before using the robotic arm again.



Tip: If the warning does not clear, move the robotic arm to the Retracted position, and ask for caregiver assistance to switch it off and on again.



Note: During normal operation, the joints are subject to heating. The joints are normally covered with plastic protection rings that insulate the user from direct hazards caused by hot metal parts.

Related topics

[Components](#) on page 31

Indications of Jaco

Consider the indications when using Jaco.

The user has a significant or complete loss of arm and hand functionality. The user cannot move, lift, stretch, or move the affected arm freely in space. The hand cannot grasp, hold an object, or move in a controlled manner.

Related topics

[Safety warning levels](#) on page 12

Contraindications of Jaco

Jaco is not recommended in specified circumstances.



Restriction: Jaco is not recommended for anyone who experiences cognitive impairments that prevent the user from operating a power wheelchair safely; the user must be able to control the robotic arm into targeted movements.



Restriction: Jaco is not recommended for anyone who has impaired, uncorrected vision that prevents the user from clearly seeing both Jaco and the targeted objects they would manipulate with Jaco.



Restriction: Jaco is not recommended in any circumstance that prevents the safe and independent use of the drive controls of the power wheelchair.



Restriction: Jaco is not recommended for anyone whose ability to safely operate their power wheelchair is significantly impaired by medication. In this case, consult a doctor or pharmacist before trying to use Jaco trial.

Dangers related to Jaco

A danger is an impending hazardous situation that can result in serious injury or even death, or can severely damage property. Avoid impending hazardous situations that are associated with dangers.

 DANGER	
	A damaged part of Jaco is in contact with the wheelchair in any position at any time Consequence: Can result in fire, which poses a risk of thermal injury, such as severe burns, to the end user. How to avoid: The caregiver must disconnect Jaco from the power source immediately to keep the end user and the surroundings safe. 1. Unplug the power cable attached to Jaco from the power source immediately. 2. Remove Jaco from the wheelchair. 3. Put Jaco in a safe place, such as in its rigid carrying case. 4. Contact a technician certified by Kinova immediately.



DANGER: Risk of bodily harm and damage to the equipment; Risk of fire

Obey the general warnings; the robotic arm can melt or catch fire, and risks thermal injury, including severe burns, to the user.



DANGER: Always obey the warnings related to wheelchair product and make sure that any modifications are in accordance with the wheelchair manufacturer specifications.



DANGER: Contact a technician certified by Kinova if any part of Jaco is damaged, altered, or scratched, and is in contact at any point with the wheelchair or mechanical mount.



DANGER: Contact the wheelchair manufacturer or its representative if there are any mechanical or electrical problems with the wheelchair, including visibly damaged parts. Examples of issues:

- Open cables
- Damaged cables
- Pinched cables
- Malfunctioning motorized components

- Exposed electronics



DANGER: Always contact a technician certified by Kinova if any original part of Jaco is loose or missing.



DANGER: Always contact a technician certified by Kinova if any Jaco part breaks, such as fingers, shells, or plastic ring.



DANGER: Always contact a technician certified by Kinova if Jaco is not functioning properly in any way.



DANGER: Risk of bodily harm and damage to the equipment; Risk of fire
Always examine the protective coating on Jaco for damage of any kind. Damaged shell can result in fire.



DANGER: Do not hit the robotic arm on a doorframe or other hard surface. The impact can damage the internal components or break the frame of the robot, resulting in a risk of electrical shock. Always make sure that the robot has enough space to fit through the door; make sure the door cannot close on the robotic arm.



DANGER: Do not change the different modes of the wheelchair, such as wheelchair driving mode, seat adjustment, arm, and so on, while Jaco is being used. Risk of injury to the user from impact with Jaco.



DANGER: To avoid scratching the top coat of paint, make sure that the arm segments and the base of Jaco do not come into direct contact with metal parts of the wheelchair while operating Jaco.



DANGER: Any mechanical, electrical, or programmatic adjustments made to a wheelchair already equipped with a robotic arm can have a critical impact on the functionality or safety of the robotic arm. Always instruct the personnel or company that is responsible for servicing the wheelchair to contact the local technician certified by Kinova before making any changes that can affect the installation of the robotic arm or affect its electronics.



DANGER: Call a technician certified by Kinova before any update or repair on the wheelchair.



DANGER: When reinstalling Jaco at home, always attach Jaco to the mounting base according to the instructions and training provided by a technician certified by Kinova.



DANGER: Risk of bodily harm and damage to the equipment; Risk of fire

To prevent any possibility of electrical current leakage from reaching Jaco, the robotic arm must maintain a minimum distance of 15 mm from any part of the wheelchair, Lift Arm, accompanying products, or accessories at all times. The minimum distance is especially important when Jaco is in the Retracted position. The distance is necessary when the robotic arm is switched on or switched off.

When it is not feasible to maintain a 15 mm distance, use a protective pad, provided by Kinova, between the two surfaces. One of the two surfaces is Jaco; the second surface is the wheelchair, Lift Arm, or other accompanying products or accessories. Refer to *Installation guide: Mechanical and electrical integration* for more information about installation.



DANGER: Make sure to tell the end user to contact a technician certified by Kinova if the protective pad is missing or damaged.



DANGER: Make sure to tell the end user to contact a technician certified by Kinova if it is necessary to adjust the Retracted position.

Warnings related to Jaco

Avoid potentially hazardous situations that are associated with warnings.



Warning: Do not change the mechanical or electrical installation of Jaco, Lift Arm, or other accompanying products, unless authorized by a technician certified by Kinova.



Warning: No modification of Jaco is allowed.



Warning: Jaco is not intended for use next to flammable fabrics. It is not [AP](#) or [APG](#) compliant.



Warning: Do not expose the internal components of Jaco. Only the manufacturer is authorized to service these components.

Exposing the internal components voids the warranty and can result in malfunctions that might endanger the user.



Warning: If the device does not respond appropriately to the controls, do not operate the device until it has been inspected by a trained and certified technician.

For more details, contact the local Kinova representative.



Warning: Jaco supports the entire weight of an object. Trying to lift an object that exceeds the maximum payload can damage Jaco.
Any damage incurred can void the warranty.



Warning: Do not use Jaco to handle very sharp or dangerous tools or objects.



Warning: Any mechanical, electrical, or programmatic adjustment made to a wheelchair already equipped with Jaco can have significant impacts on the functionality or safety of Jaco.

Always instruct the staff or company responsible for the maintenance of the wheelchair to contact the local Kinova representative before making any changes that alter the mode of the chair that controls Jaco.



Warning: The seating position can be used as a reference for programming *Protection zones* and for speed reduction.

The Protection zone is a preset area and does not move with the user. Any change in the seating position can cause Jaco to come into contact with an object or part of the body of the user that was intended to be in the preset Protection zone. Changes in the sitting position in the wheelchair cannot be registered by Jaco.

The software in Jaco, which controls the *safety zone* around the user and the movement of Jaco, refers only to the coordinates stored at the time of the definition of the *Protection zone*.



Warning: If Jaco is removed from its mount and must be reinstalled, make sure it is in a safe position before switching it back on.

Make sure Jaco is in the same Ready position as the positions programmed by the installation professional.

If the position or movement of the arm is no longer correct, contact the local Kinova representative.



Warning: No parts can be repaired or replaced by the end user. If there is a problem with the medical device, contact the local Kinova representative.



Warning: Do not make any changes to Jaco without authorization of the manufacturer.



Warning: To avoid electric shock, Jaco must be connected to a supply mains with protective earth when it is connected with a mains adapter; the connection must use cables approved by Kinova, if applicable.



Warning: Do not apply excessive force to immovable objects, such as doors, walls, and tables. Applying excessive force can damage the fingers and internal components of Jaco.



Warning: Do not apply excessive force on the device. For example, do not rest on the device.



Warning: Make sure that there is enough space between all parts and any immovable objects when driving through tight spaces, such as doorways.



Warning: Do not move the robotic arm to the [Ready](#) or [Retracted](#) position when carrying liquids. The two positions are based on a preset and the wrist could rotate during movement and the liquid could spill.



Warning: Do not immerse Jaco in water or snow, either in whole or in part.



Warning: Do not expose Jaco to corrosive environments.

Related topics

[Contact support](#) on page 110

[Jaco specifications](#) on page 7

[Safety warning levels](#) on page 12

Precautions related to Jaco

Avoid hazardous situations that are associated with cautions.



CAUTION: Before using Jaco, make sure it is installed properly.



CAUTION: Do not to exceed a payload of 1.6 kg, or 3.5 lb, in the middle position of reach and 1.3 kg, or 2.9 lb, in the full, extended, reach of Jaco.

Do not use Jaco to lift any parts of the body that are more than the maximum payload.



CAUTION: If Jaco is switched off at the main switch in the base and is not in the programmed [Retracted position](#), Jaco descends until it rests below its current position. Depending on the position of Jaco at the time of deactivation, it can cause damage to itself or its surrounding environment.

An attendant or caregiver must always hold Jaco before switching it off when it is not in the Retracted position.

-  **CAUTION:** When using the wheelchair drive controls to move Jaco, the wheelchair mode must not be changed. For example, do not switch the wheelchair mode to Driving mode when Jaco is in motion. There is a risk that the robotic arm continues moving in the direction of the movement command when the chair mode changes.
-  **CAUTION:** Do not block the movement of Jaco when the robotic arm moves into the Retracted position.
-  **CAUTION:** Know the location of nearby transmitters, such as radio and TV stations; do not come near them.
-  **CAUTION:** Know that adding accessories or components near Jaco can make Jaco more susceptible to [EMI](#).
-  **CAUTION:** Report all incidents of unintended shutdowns to the local distributor or to Kinova. State if there is a source of [EMI](#) nearby.
-  **CAUTION:** The fingers of the robotic arm are flexible to protect the internal mechanisms. When moving objects with the fingers, the user must not bend the fingers beyond their maximal limit; otherwise, the internal mechanism or parts of the finger might be damaged.

Related topics

[Safety warning levels](#) on page 12

Restrictions related to Jaco

Anyone who can operate a power wheelchair can operate Jaco. However, there are situations that restrict the operation of Jaco.

-  **Restriction:** Do not use the robotic arm near heat sources, such as radiators. Do not use it for handling of hot objects, including hot liquids.
-  **Restriction:** Do not use the robotic arm in heavy rain or in heavy snowfall.
-  **Restriction:** Do not overstretch the fingers of the robotic arm outward or inward during use; the fingers and internal components might be damaged.

Related topics

[Safety warning levels](#) on page 12

Security features

Jaco is monitored electronically at all times. It is equipped with safety features.

Collision indicator	When there is increased resistance, Jaco stops moving; it sends signals visually and audibly on OLED Display.
Automatic switch off of the finger	The movement of the fingers is stopped in case of increased resistance.
<i>No-go zone</i>	The <i>range of motion (ROM)</i> between Jaco and the body of the user is limited electronically.
<i>Slow zone</i>	The speed at which Jaco moves is reduced automatically.
Temperature monitoring	Sensors in Jaco monitor the temperature of each axis.

Inside the box

Jaco comes in a rigid carrying case.

Depending on the needs of the user, different equipment is in the packaging.

Basic supplies

Jaco is delivered with additional supplies that are necessary for mechanical and electrical integration with the power wheelchair, and to provide accessible control of Jaco and Lift Arm.

Table 6: Basic equipment

Item	Details
Jaco with three (3) fingers	Fully assembled
Kinova® Jaco Blue Universal Interface	Converts wheelchair and other accessible control interfaces to a communication protocol that is compatible with Jaco and Kinova® Lift Arm
Kinova® OLED Display	Shows the current mode of operation and status notifications Emits audible signals for warnings.
Power cable	Supplies power to Jaco Blue Universal Interface
Communication cable	Transmits control commands from Jaco Blue Universal Interface to Jaco

Item	Details
USB cable	Programming
	 Tip: Connects a cable to the base of Jaco when troubleshooting remotely
USB stick	Contains the <i>Jaco® assistive robot user guide</i> and the Assistive Robot Configurator (ARC) software for configuring the robotic arm for the user
Touch-up pen	Retouches small scratches
Rigid carrying case	Prevents damage to Jaco during transportation

Additional supplies

Depending on the needs of the user, additional equipment might be provided.

Table 7: Additional supplies

Item	Details
Kinova® Lift Arm	Motorized wheelchair mount for Jaco Swing-away and height-adjustable mounting bracket
Kinova® Cutlery & Tool Holder	Accessory
Mounting kit	Display holder Positions OLED Display in the field of vision of the user
	Mounting plate
	Seat rail adapters
	Screws
Standard mounting kit	Hardware for fixed installation of Lift Arm and Jaco
Wheelchair data cables	Integrates Jaco and Lift Arm with the wheelchair control unit
Power cable	Supplies power to the wheelchair electronics
Hardware bag	Protected storage of the control unit, interface, and cables Attaches to the outside of the back of the wheelchair.
Input device	Different accessible buttons, adaptive switches, capacity switches for assistive devices with a 3.5 mm jack plug

Item	Details
Jaco protective sleeve	Acts as a rain cover for Jaco



CAUTION: Equipment from other manufacturers can be used only if they have a CE (C) label and only if it is intended to be used as a medical device.



CAUTION: Commercially available buttons can be connected to Jaco Blue Universal Interface only if they trigger a signal to change a function by closing a contact.

Supplies for use on a power wheelchair

Specific equipment is needed to integrate Jaco with a power wheelchair control system. When electrically integrated, the user controls Jaco® assistive robot with the wheelchair drive controls.

Item	Details
Wheelchair-specific interfaces	Integrates Jaco and Lift Arm with the wheelchair control system
Wheelchair-specific cables	Integrates Jaco and Lift Arm with the wheelchair control system and integrates the power supply
Hardware bag	Protects the control unit, interfaces, and cables Attaches to the outside of the back of the wheelchair.
Mounting equipment	
Additional buttons	Buttons, with associated mounting equipment, can be used as additional operating controls, if required and depending on the user

Related topics

[Jaco specifications](#) on page 7

[Jaco Blue Universal Interface specifications](#) on page 8

Supplies for use when not on a wheelchair

Specific equipment is needed to install Jaco on something other than a wheelchair.

Item	Details
Analog DB9 joystick or Xbox-compatible USB controller	Direct control Jaco Example: mo-Vis

Item	Details	
External power supply or specific cables	Power Supply Unit (PSU)	AE 0000 0029
	PSU Cord (US)	EH 0300 0001
	PSU Cord (AUS)	EH 2500 0002
	PSU Cord (EU)	EH 2500 0001 21
	PSU Cord (UK)	EH 2500 0003 25
Hardware bag	Protected storage of control unit, interfaces, and cables	
Mounting equipment	Table mount or rolling stand	

Related topics

[Jaco specifications](#) on page 7

[Jaco Blue Universal Interface specifications](#) on page 8

Example of packaged content for installing Jaco on an R-net wheelchair control system without Lift Arm

The content of the packaging varies; it depends on the intended use of Jaco

Quantity	Item	Notes
	Jaco with 3 fingers, fully assembled	
1	Kinova® Jaco Blue Universal Interface, with Kinova Communication cable for transmitting control commands to Jaco	Connects Jaco with Jaco Blue Universal Interface
1	Kinova® OLED Display	
1	Kinova® OLED Display Holder	
1	R-net power cable to Jaco	Power supply to Jaco through R-net Bus
1	R-net power cable extension (male/female) 0.5 m	Added to the standard R-net power cable to Jaco if additional length is required
	R-net input/output module (IOM)	Interface that transmits the control signal from the wheelchair drive controls to Jaco
1	DB9 Adapter male/male	Mini Gender Changer for adapting to the socket of the IOM

Quantity	Item	Notes
1	R-net 4-Port Connector Block	Distribution strip for additional R-net Bus cables
1	R-net bus cable male/male, 1.2 m	Connects the IOM to the R-net 4-Port Connector Block
1	R-net bus cable male/male, 0.5 m	Connects the IOM to the R-net 4-Port Connector Block
1	Hardware bag	Protective storage of control unit, interfaces, and cables
	Mounting kit	All mechanical integration hardware between the wheelchair seat rail and the perforated mounting plate

* Quantity depends on the wheelchair accessories currently available and connected by the cable.

Components

Jaco is made of several components.

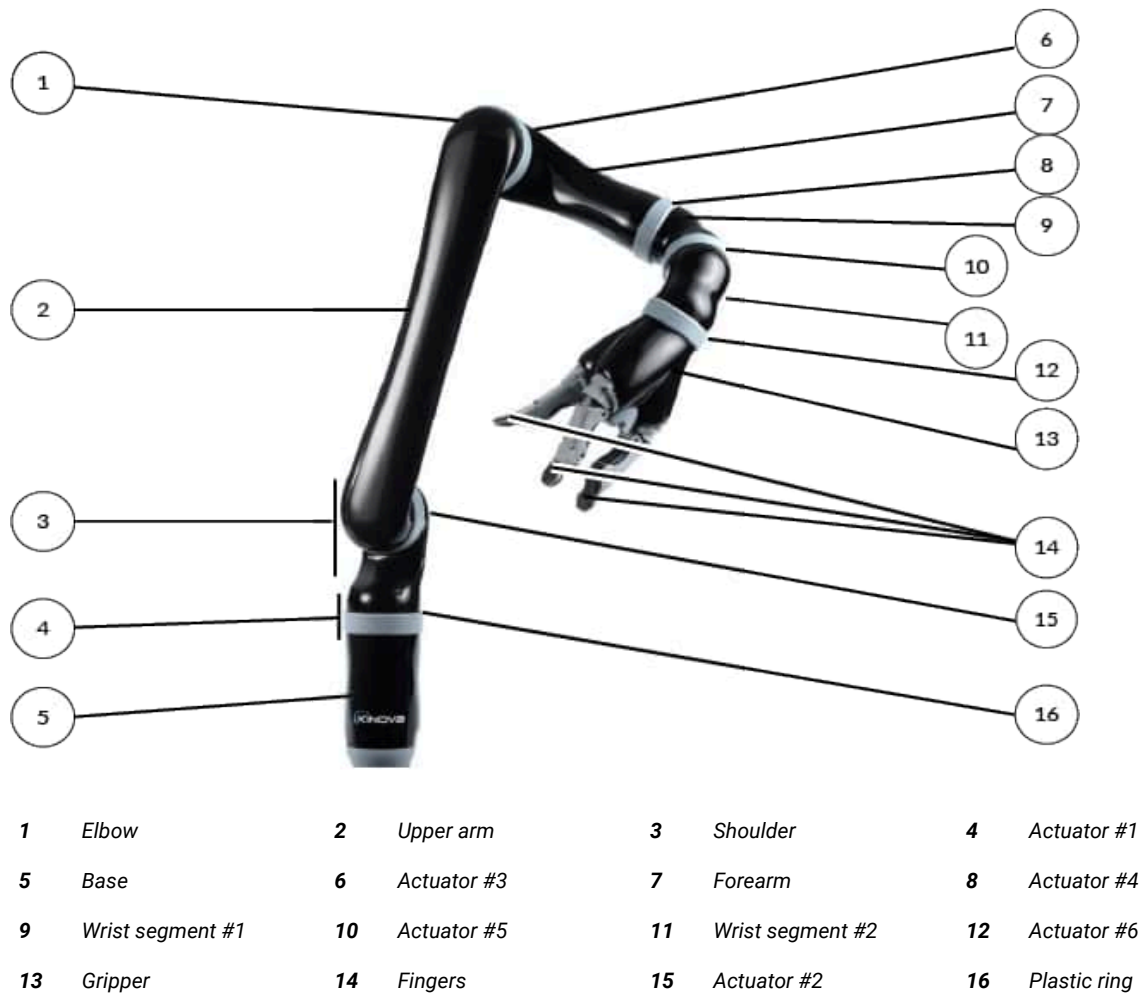
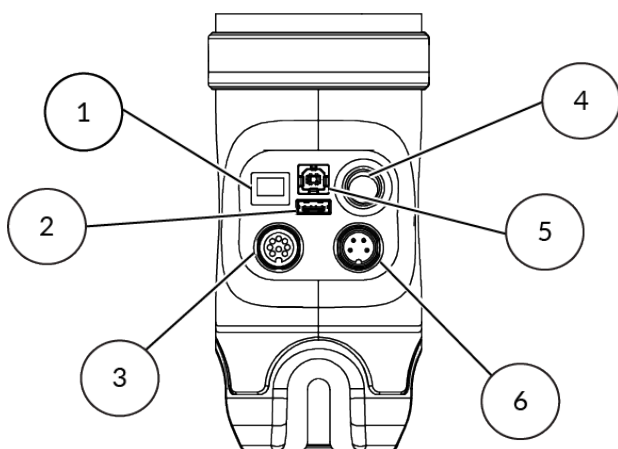


Figure 6: Components of the robotic arm

External connectors of Jaco

Jaco can connect to wheelchairs and other devices using different connectors.



- | | | | | | |
|---|---------------------|---|--|---|---|
| 1 | Ethernet (not used) | 2 | USB-A (not used) | 3 | 8-pin Communication cable for Jaco Blue Universal Interface |
| 4 | On/off switch | 5 | USB-B for programming, updating, and troubleshooting | 6 | 4-pin power supply |

Figure 7: External connectors

The panel at the back of the base has multiple connectors and a power on/off switch.

On/off switch	Switches Jaco on or off
----------------------	-------------------------

Power connector	Connects Jaco to the power supply
------------------------	-----------------------------------



Tip: A power supply is a power wheelchair or a power supply.

8-pin connector	Connects the control cable from Jaco Blue Universal Interface to transmit control commands
------------------------	--

USB-B port	Connects to a PC for maintenance and configuration
-------------------	--



Warning: The connectors for the control cables and the power supply are intended for connections to a device approved by Kinova. Connecting other devices might reduce performance, might become inoperable, and might lead to electric shock or fire. Also, using the control cables and power supply for an unapproved device voids the warranty.



Restriction: Do not use extension cores; cords increase the risk of fire or electric shock.



Restriction: Do not to step on or pinch the cables.

Installation, configuration, and operation of the robotic arm

A technician certified by Kinova uses the instructions in the *Jaco® assistive robot integration guide* to install the robotic arm. Contact Kinova to make sure the person installing the robotic arm is a technician certified by Kinova. The technician installs the robotic arm by following the instructions in the *IG-003 Jaco Mechanical and electrical integration installation guide*.

A technician certified by Kinova is responsible for installing Jaco. The technician physically installs the robotic arm on the power wheelchair.

- The technician integrates the robotic arm with the wheelchair power supply and controls.
- The technician certified by Kinova uses the ARC software to configure Jaco.

The technician configures the safety settings for the robotic arm, including speed limits and protective no-go zones around the body of the end user.

- The technician maps the controls of the robotic arm to the wheelchair controller.
- The technician defines the *Ready* and *Retracted* positions of the robotic arm.

The factory settings of Jaco are the initial configuration. The technician can adapt the robotic arm to the needs of the user. Discuss the requirements with the technician prior to installation and configuration.

There are two ways to install Jaco.

- Install on a power wheelchair, with integration into the power supply and control of the wheelchair
- Install on a stand, connecting it to the power supply and the control unit

After installation, the technician configures Jaco using the Kinova® Assistive Robot Configurator (ARC) software.

The configurations make sure the robotic arm controls are accessible, safe, and predictable for the user. There are three main settings to consider.

- Safety settings for the robot, including speed limits and a *Protection zone* around the body of the user
- Mapping movements of the robotic arm to the accessible controller
- Setting up *Ready* and *Retracted* positions

The installation and initial user training process might take several hours. The technician makes sure that the installation of the robotic arm is configured to meet the needs of the user, and the mechanical and electrical integration requirements of their power wheelchair or other installation base.

The technician certified by Kinova, who installs and configures the robot, provides training on how to move and operate Jaco to do different tasks after the robotic arm is installed and configured. The technician gives each customer a customer file that contains data related to the installation and configuration of the robotic arm on the wheelchair.



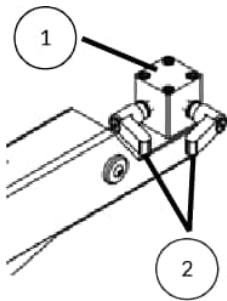
Remember: Always contact the technician certified by Kinova when Jaco needs to be reinstalled on a different wheelchair, mobile stand, or bedside stand.

Removing Jaco from the mount

Remove Jaco from the mounting hardware when the user needs to remove it temporarily, such as when the user is traveling.

About this task

The mounting hardware is the mounting post that Jaco sits on. Locking levers affix the base of Jaco to the mounting post.



1 Mounting post

2 Locking levers

Figure 8: Jaco mount

Procedure

1. Move Jaco into the [Retracted position](#).
2. Switch off Jaco.
3. Disconnect and remove the power supply cable.
4. Disconnect and remove the control cable.
5. Loosen the locking levers on the mounting post.
6. Lift Jaco from the mount.

Related topics

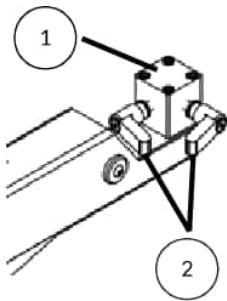
[External connectors of Jaco](#) on page 32

Installing Jaco onto the mount

Use the mounting hardware to install Jaco directly onto the wheelchair or on the aluminum mounting post that Jaco sits on.

About this task

The mounting hardware is the mounting post that Jaco sits on. Locking levers affix the base of Jaco to the mounting post.



1 Mounting post

2 Locking levers

Figure 9: Mount for Jaco

Procedure

1. Lift Jaco onto the mounting post.
2. Tighten the locking levers on the mounting post.
3. Connect the control cable.
4. Connect the power supply cable.
5. Move Jaco into the *Retracted position* by hand.
6. Switch on Jaco.

Related topics

[External connectors of Jaco](#) on page 32

Kinova® Jaco Blue Universal Interface overview

Kinova® Jaco Blue Universal Interface is an interface between Jaco and the wheelchair electronics or other external control elements.

There are two variants of Jaco Blue Universal Interface. There is a basic model and a model for [R-net](#) devices.

Different types of devices can be used for input control.

Table 8: Input control devices

Device	Information
Standard digital joysticks	Male connector, needs a DB9 mini-gender changer for the joystick
Standard analog joysticks	Female connector, needs a DB9 mini-gender changer for the joystick
Button, or adaptive switch, with 3.5 mm jack plug	Connection through one of six (6) audio jack ports
Microsoft devices:	Connection through the USB-C port
Xbox One	
Xbox Series X	
Xbox Series S	
Xbox Adaptive Controller	

All connections are on one side of the housing.

The incoming control signals are transmitted to the robotic arm and cause the movements, or functional changes, that are seen on OLED Display.

Connect Jaco Blue Universal Interface to Jaco and to the wheelchair. Control Jaco with the wheelchair drive controls and from direct control methods.

Jaco Blue Universal Interface is compatible with Bluetooth technology, [Input/Output Modules \(IOM\)](#), [Environmental Control Units \(ECU\)](#), and [Electronic Control Modules \(ECM\)](#) from major power wheelchair manufacturers. Compatible manufacturers include R-net from Curtiss-Wright, LiNX and MK6 from Dynamic Controls, and Q-Logic and ICON from Curtis Instruments .

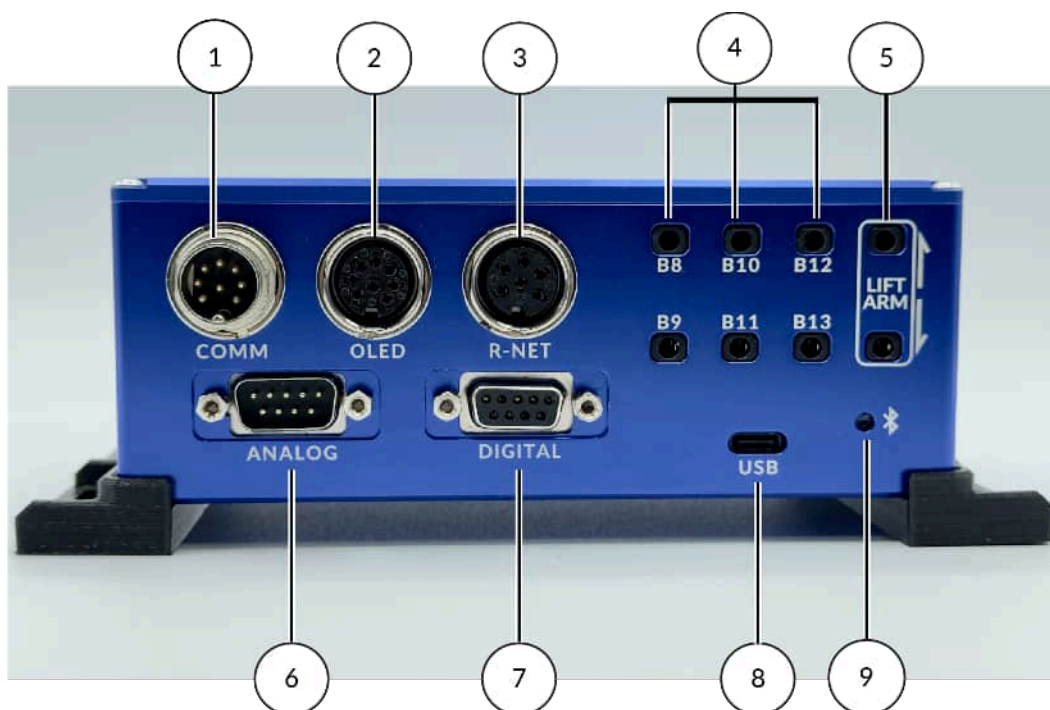


Figure 10: External connectors on Jaco Blue Universal Interface

1	COMM	Lumberg male, 8 pins	Power and communication port between Jaco and Jaco Blue Universal Interface
2	OLED	Lumberg female, 8 pins	Port for OLED Display, which shows the arm mode and status of Jaco
3	R-NET	Lumberg female, 6 pins	Port to interface with the R-net protocol
4	B8 to B13	3.5 mm audio jack	6 inputs for buttons and adaptive switches
5	LIFT ARM	3.5 mm audio jack	2 output ports to control Lift Arm
! Important: mono auxiliary cable only			
6	ANALOG	DB9 male	Port to interface with standard analog joystick
7	DIGITAL	DB9 female	Port to interface with a digital joystick or with a wheelchair module
8	USB	USB-C	USB-C port to interface with Microsoft Xbox devices and to charge mobile devices

9	Bluetooth	N/A	Recessed Bluetooth pairing button Interface with compatible Bluetooth devices on supported wheelchair interfaces
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Four [LEDs](#) on the top of Kinova® Jaco Blue Universal Interface show the operating status.



1 Bluetooth status indicator

2 Power indicator

3 Status indicators

Figure 11: Top view of Jaco Blue Universal Interface

Related topics

[Control for raising and lowering Lift Arm](#) on page 89

[Jaco Blue Universal Interface specifications](#) on page 8

[Examples of labels on Jaco Blue Universal Interface](#) on page 14

Warnings related to Jaco Blue Universal Interface

Avoid potentially hazardous situations that are associated with warnings.



Warning: Do not modify Jaco Blue Universal Interface without authorization of the manufacturer.

LED status indicators

Jaco Blue Universal Interface has four [LED](#) indicators on its top.

Each color shows a status. Some events cause the LED indicator [light-emitting diode \(LED\)](#) not to be illuminated.

Table 9: LED status indicators

LED	State	Information
Bluetooth	Flashing	Bluetooth pairing mode
	Steady	Bluetooth connection
	Not illuminated	No Bluetooth devices paired
 Green	Steady	Power
	Not illuminated	No power
 Orange	Flashing	Synchronization and arm status  Note: Press and hold the Mode button to move the robotic arm to the Retracted position .
	Steady	Warning • Minor communication issue • A short-circuit is detected in the USB-C port • One of the Lift Arm outputs is disconnected • Warning from Jaco
	Not illuminated	Normal operation
 Red	Steady	Fault • Major communication issue • Fault from Jaco
	Not illuminated	Normal operation



Trouble: When no lights illuminate on Jaco Blue Universal Interface, Jaco Blue Universal Interface is not switched on.

1. Make sure Jaco Blue Universal Interface is connected to Jaco.
2. Make sure all connectors are engaged completely in their correct ports.
3. Switch on Jaco from its base.

Installation and configuration

The technician installs Jaco Blue Universal Interface with the correct cable connections. They configure Jaco after it is installed.



Important: Installation and configuration are performed only by a technician certified by Kinova.

The technician uses the Assistive Robot Configurator (ARC) software to configure communication between Jaco and Jaco Blue Universal Interface. They use ARC to define the functionality of each socket and other interface functions.

When it is necessary to adjust configurations available only in the **Professional** role, contact Kinova or a technician certified by Kinova.

When power wheelchair drive controls are used to operate Jaco, the technician configures the wheelchair control output to connect to send information to Jaco Blue Universal Interface.

Pairing Jaco Blue Universal Interface with a Bluetooth device

Jaco Blue Universal Interface can bond, or connect, with the Bluetooth output of compatible power wheelchairs. The initial pairing registers the devices with each other; when the devices are powered on in the future, they connect automatically.

About this task

Bluetooth devices can be paired with Jaco Blue Universal Interface only when Jaco Blue Universal Interface and the Bluetooth device are powered on. Discuss compatibility with your Kinova representative.

Figure 12: Recessed, Bluetooth pairing mode button on Jaco Blue Universal Interface



Important: Bluetooth pairing must be initiated in less than two (2) minutes of initiating the Bluetooth pairing mode on Jaco Blue Universal Interface.

When a Bluetooth device is paired with Jaco Blue Universal Interface and a new Bluetooth connection is initiated, the connection from before is removed.



Note: The instructions are generic and the general steps apply to all types of Bluetooth devices.

Procedure

1. Switch on Jaco.

Jaco switches on and Jaco Blue Universal Interface powers on.

2. Switch on the wheelchair.

The Bluetooth device on the wheelchair powers on.

3. Press and hold the recessed Bluetooth pairing mode button on Jaco Blue Universal Interface for five (5) seconds.



Tip: Use a SIM tool or a pen.

Bluetooth on Jaco Blue Universal Interface is discoverable. The Bluetooth indicator flashes.



Important: Initiate pairing with the Bluetooth device on the wheelchair in less than two (2) minutes.

4. Navigate the wheelchair menu and make the Bluetooth device on the wheelchair discoverable.

5. Pair with the Bluetooth output of the power wheelchair.

Results

When the devices are paired, the Bluetooth indicator on Jaco Blue Universal Interface illuminates continuously. Future Bluetooth connections between Jaco Blue Universal Interface and the Bluetooth device on the wheelchair are automatic.

There are possible causes for a Bluetooth device not to pair with Jaco Blue Universal Interface.

- The Bluetooth device is powered off.
- The Bluetooth device is not in Discovery mode.
- Jaco Blue Universal Interface is powered on for more than two (2) minutes since the start of Bluetooth initiation.

Recovery procedure

1. Power off Jaco Blue Universal Interface.
2. Power off the Bluetooth device.
3. Restart the procedure.

Related topics

[Initiating Bluetooth pairing with CJS2-BT on page 44](#)

[Initiating Bluetooth pairing with Q-Logic 3 on page 46](#)

Initiating Bluetooth pairing with CJS2-BT

Jaco Blue Universal Interface can pair with the Curtis-Wright CJS2-BT joystick, which is a wheelchair joystick with Bluetooth capabilities.

Before you begin

Bluetooth on Jaco Blue Universal Interface is discoverable.

About this task

Use the CJS2-BT joystick to navigate its menu.



Important: Bluetooth pairing must be initiated in less than two (2) minutes of initiating the Bluetooth pairing mode on Jaco Blue Universal Interface.

Figure 13: CJS2 joystick

Procedure

1. Navigate to the Bluetooth mode configuration.
2. Move the joystick forward and hold until a beep sounds.
3. Move the joystick backward and hold until one more beep sounds.

A Bluetooth logo on the CJS2-BT screen flashes to show the Bluetooth on the device is discoverable.

4. Wait for the Bluetooth logo on the CJS-2 BT screen to be steady.



Tip: The Bluetooth indicator on Jaco Blue Universal Interface illuminates a steady blue when it has a Bluetooth connection.

Results

When the devices are paired, the Bluetooth indicator on Jaco Blue Universal Interface illuminates continuously. Future Bluetooth connections between Jaco Blue Universal Interface and the Bluetooth device on the wheelchair are automatic.

There are possible causes for a Bluetooth device not to pair with Jaco Blue Universal Interface.

- The Bluetooth device is powered off.
- The Bluetooth device is not in Discovery mode.
- Jaco Blue Universal Interface is powered on for more than two (2) minutes since the start of Bluetooth initiation.

Recovery procedure

1. Power off Jaco Blue Universal Interface.
2. Power off the Bluetooth device.
3. Restart the procedure.

Related topics

[Pairing Jaco Blue Universal Interface with a Bluetooth device](#) on page 42

Initiating Bluetooth pairing with Q-Logic 3

Jaco Blue Universal Interface is compatible with the Q-Logic 3 Advanced Drive Control System, which is an adaptive joystick with Bluetooth capabilities for wheelchairs.

Before you begin

Bluetooth on Jaco Blue Universal Interface is discoverable.

About this task

Use the Q-Logic 3 joystick to navigate through the menu.



Figure 14: Q-Logic 3 joystick

Table 10: User actions on the wheelchair

User action	Result
Move the joystick left and right	Cycles through the menus
Move the joystick forward	Confirm action
Press the green Home button to return to the	Return to the HOME screen



Important: Bluetooth pairing must be initiated in less than two (2) minutes of initiating the Bluetooth pairing mode on Jaco Blue Universal Interface.

Procedure

1. Press the green **HOME** screen (🏠) button.



2. Move the joystick to the left two (2) times to access the **Auxiliary** menu.
The **Auxiliary** menu launches.



3. Select **Bluetooth operation** with the joystick.

4. Move the joystick to the right to access the **Joystick connections** menu.



5. Select **NEW** by moving the joystick to the right.



6. Move the joystick to the right to start the Bluetooth connection.

An image of a joystick with the Bluetooth logo at top is displayed on the screen.



7. Wait until there is confirmation of a connection.

A confirmation dialog launches.



8. Move the joystick forward to confirm the selection.

Results

The top of the screen and the image of the joystick on the screen illuminate blue to confirm the Bluetooth pairing is complete.



When the devices are paired, the Bluetooth indicator on Jaco Blue Universal Interface illuminates continuously. Future Bluetooth connections between Jaco Blue Universal Interface and the Bluetooth device on the wheelchair are automatic.

There are possible causes for a Bluetooth device not to pair with Jaco Blue Universal Interface.

- The Bluetooth device is powered off.
- The Bluetooth device is not in Discovery mode.
- Jaco Blue Universal Interface is powered on for more than two (2) minutes since the start of Bluetooth initiation.

Recovery procedure

1. Power off Jaco Blue Universal Interface.
2. Power off the Bluetooth device.
3. Restart the procedure.

Related topics

[Pairing Jaco Blue Universal Interface with a Bluetooth device](#) on page 42

Initiating Bluetooth pairing with the Omni2 Interface

The Omni2 Interface is an adapter for operating power wheelchairs with Alternative Drive Controls, such as head array and sip-and-puff controllers, which have Bluetooth capabilities.

Before you begin

Bluetooth on Jaco Blue Universal Interface is discoverable.

About this task

Use the Alternative Drive Control to navigate its menu.



Figure 15: Omni2 Interface



Important: Bluetooth pairing must be initiated in less than two (2) minutes of initiating the Bluetooth pairing mode on Jaco Blue Universal Interface.

Procedure

1. Send a forward command until a beep sounds.
2. Send a backward command until one more beep sounds.

Results

The Bluetooth logo flashes on the Omni2 interface. When the devices are paired, the Bluetooth indicator on Jaco Blue Universal Interface illuminates continuously. Future Bluetooth connections between Jaco Blue Universal Interface and the Bluetooth device on the wheelchair are automatic.

There are possible causes for a Bluetooth device not to pair with Jaco Blue Universal Interface.

- The Bluetooth device is powered off.
- The Bluetooth device is not in Discovery mode.
- Jaco Blue Universal Interface is powered on for more than two (2) minutes since the start of Bluetooth initiation.

Recovery procedure

1. Power off Jaco Blue Universal Interface.
2. Power off the Bluetooth device.
3. Restart the procedure.

Kinova® OLED Display overview

OLED Display is designed to provide a visual interface that indicates the current modes of operation, and the status of Jaco through graphical representations and LEDs. It also emits an audible warning.

OLED Display is used with Jaco and Jaco Blue Universal Interface to show the user the directions of movement, status, and functions.



Note: The OLED Display is designed for use with Kinova® Jaco Blue Universal Interface. It can also be used with the older versions of Universal Interface.

Related topics

[OLED Display specifications](#) on page 10

[Examples of labels on OLED Display](#) on page 15

Warnings related to OLED Display

Avoid potentially hazardous situations that are associated with warnings.



Warning: Do not immerse OLED Display in water or snow, either in whole or in part.



Warning: Do not expose OLED Display to corrosive environments.



Warning: If the device is dropped, hit, or endures any damage, water resistance can be affected.



Warning: Do not modify OLED Display without authorization of the manufacturer.

Related topics

[Safety warning levels](#) on page 12

Precautions related to OLED Display

Avoid hazardous situations that are associated with cautions.



CAUTION: Switch off the system before connecting or disconnecting any cable connections.



CAUTION: Do not expose the device to heavy rainfall.



CAUTION: Monitor the warning notice on OLED Display.

An orange triangle illuminates and two audible beeps sound specifies an overload.

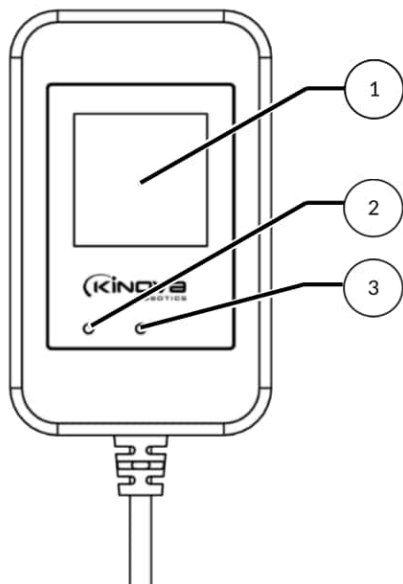
Reduce the weight or force exerted on Jaco.

Related topics

[Safety warning levels](#) on page 12

Identification of parts

The OLED Display has a simple user interface.



1 *LCD* screen

2 *LED*

3 *Ambient light sensor*

Figure 16: Designation of parts of the display module

Table 11: Description of the parts of OLED Display

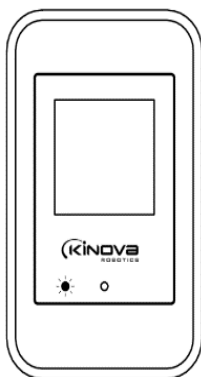
Name	Description	
LCD screen	Shows symbols that identify the direction of movement and errors	
LED indicator	Provides information about the power supply and the connection status of the display when it is switched on	
	Power-on sequence	The indicator flashes
	Normal operating mode	The indicator illuminates steady
	Standby mode	The indicator does not illuminate
Ambient light sensor	Detects the ambient light conditions and adjusts the brightness of the screen accordingly	

Power-up sequence of OLED Display

When Jaco is switched on, it supplies power to OLED Display. When OLED Display shows the Kinova logo, Jaco can respond to a Mode button hold to begin moving from the [Retracted position](#) to the [Ready position](#).

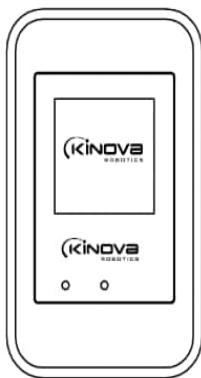
When the robotic arm is switched on, the display powers on automatically. A sequence of three steps takes place.

1. OLED Display shows a blank screen.



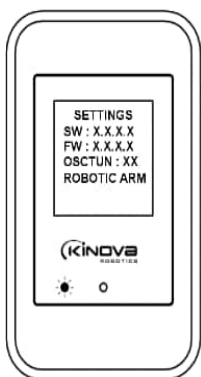
- Nothing is shown on the display for about ten (10) seconds.
- The [LED](#) illuminates blue when OLED Display receives power.

2. OLED Display shows the Kinova logo.



- The **LCD** shows the Kinova logo for about five (5) seconds.
- The LED indicator does not illuminate.

3. OLED Display shows the **SETTINGS** screen.



- The **SETTINGS** screen shows information for a maximum of two (2) seconds.
- A blue LED flashes.

screen



Note: To troubleshoot, the technician can request the information on the **SETTINGS** screen. If there is not sufficient time to write down the information or take a picture of the screen, **reboot** Jaco to see the information.

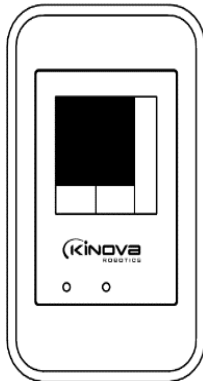
Screen areas

Each of the four (4) areas of the display has a one use.

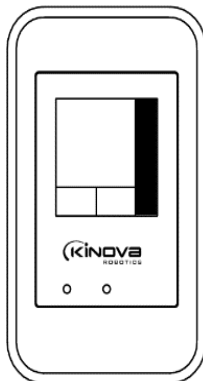
The location of each area of the display is highlighted in black.

Table 12: Areas of the OLED display**Main area**

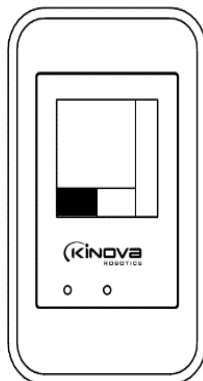
The Main area shows *active movements* and *available movements*

**Status bar**

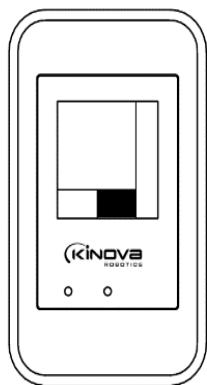
The Status bar shows the status of the position of the arm, *Drinking mode*, and the speed

**Mode area**

The Mode area shows the current mode of operation and the index



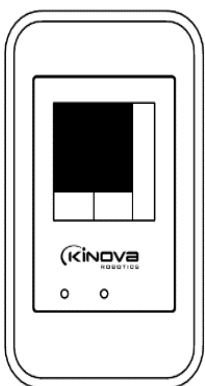
Function area



The Function area shows details of the recorded positions, trajectories, and error and warning signals

Screen area: Main

The Main area displays the current configuration of Jaco as left-handed or right-handed, the *available* and *active* movements of the robot, the wrist movements, and the finger movements.



Handedness of the arm

Handedness, or arm *laterality*, indicates if the arm is used in left-handed or right-handed configuration.

During installation, the technician configures Jaco to fit on the left side or the right side. OLED Display shows the configuration of the robotic arm.



Note: When the integrator installs Jaco on the right side of the wheelchair, they configure the robotic arm to be right handed. When the integrator installs the robotic arm on the left side of the wheelchair, they configure it to be left handed.



Figure 17: Example of showing right handedness in the OLED Display



Figure 18: Example of showing left handedness in the OLED Display

Available and active movements

Jaco can move in multiple directions. Depending on how it is moving, some other movements are made available.

Available movements illuminate on OLED Display as a green arrow that points in the direction of movement in the currently active mode.



Figure 19: Left and right



Figure 20: Up and down



Figure 21: Forward and backward

Active movements illuminate as a yellow highlight around the currently active mode.



Figure 22: Available movement



Figure 23: Active movement



Figure 24: Example of translation movements

Wrist movements

The hand of Jaco rotates around the *wrist*.

The movement of the wrist is sometimes referred to as *orientation* or rotational movements; it is the way the wrist moves.

The wrist has three sections that rotate. The rotation changes the orientation of the gripper from facing left to facing right, from facing down to facing up, or forward toward the object to be grasped. Each type of rotation helps the change the position of the gripper to achieve the goal of the user.



Figure 25: Move gripper right and left



Figure 26: Move gripper down, up, and forward



Figure 27: Turn gripper clockwise and counterclockwise



Note: When the gripper turns clockwise or counterclockwise, the wrist rotates 360° and the gripper stays in the same orientation.



Figure 28: Example of orientation movement

Finger movements

The gripper of Jaco works like fingers on a hand. When the mode for the fingers is selected, the fingers illuminate orange on OLED Display.

The number of arrows shows the number of fingers that are moving.



Figure 29: Example of finger movement being available



Figure 30: Example of movement of 3 active fingers



Figure 31: Example of movement of 2 active fingers

Screen area: Status bar

The status bar displays all symbols related to the status of Jaco.

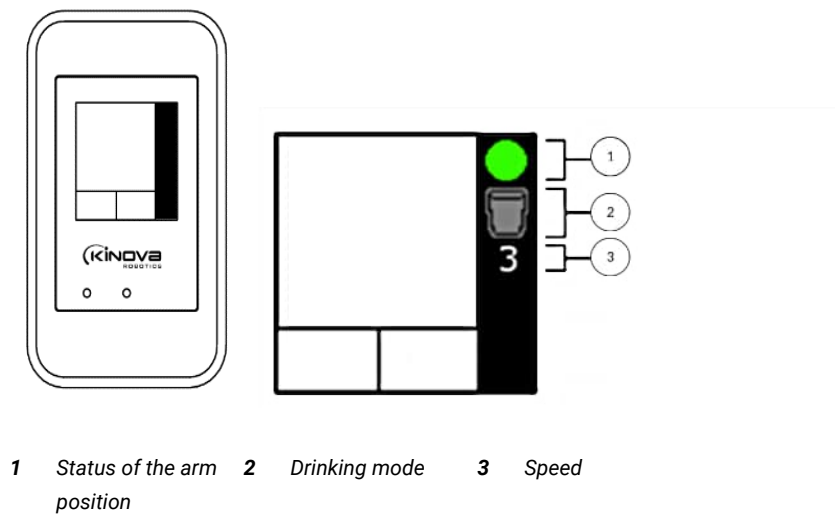


Figure 32: Location of the Status bar and its symbols

Table 13: Visual indicators in the Status bar

Symbol	Status	Information
Arm position		
	Ready	Jaco is operational in the <i>Ready position</i> The user can control Jaco.
Steady green		

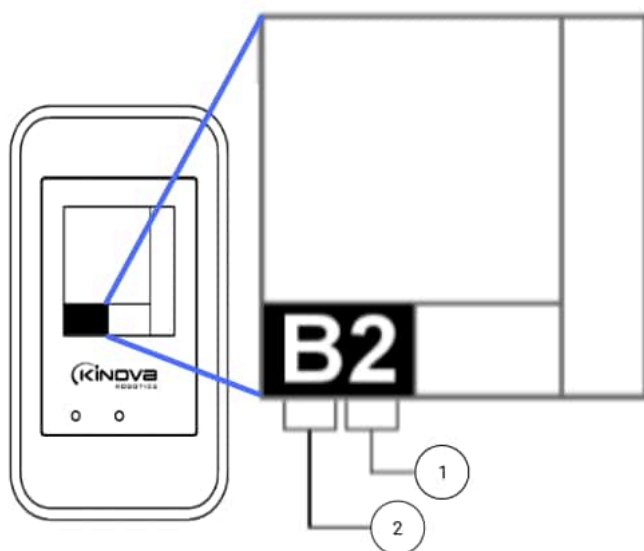
Symbol	Status	Information
 Steady orange	Retracted	Jaco is in its <i>Retracted</i> , or stored, position
 Flashing orange	In Progress	Jaco is between its Ready position and its Retracted position
		 Notice: The user must press and hold the <i>Mode button</i> to move the robotic arm to the Retracted or Ready position.
Drinking mode		
 Gray glass		Drinking mode is available in the current mode, but is not currently active
 Blue glass		Drinking mode is currently active
No glass		Drinking mode is not available and not active
Robot speed		
1	Lowest speed	5 cm/s
2	Low speed	10 cm/s
3	High speed	15 cm/s
4	Highest speed	20 cm/s

Screen area: Mode

The Mode area is used to communicate information about the currently active control configuration, or *mapping*.

The Mode area shows the list of movements available in the current mode.

- Current mode list
- Current mode list index



1 Index to mode list 2 Mode list

Figure 33: Mode area and its symbols

The two current mode lists are named A and B.

The current mode list is a list of the different controller mappings that are available. Each list can store a maximum of six (6) different control mappings, or indices, each designated by a number from 1 to 6.

Modes B1 through B4 are available with the factory settings of Jaco.



Restriction: The user and the caregiver cannot change the modes independently. Adjustments must be done by a qualified technician certified by Kinova.



Tip: When Lift Arm is installed with Jaco, the *integrator* defines an operating mode for Lift Arm that is kept separate from the modes of operation of Jaco. They might define the operating mode for Lift Arm on mode B5 or on one of the A modes.

Table 14: Default operating modes and their movements

Mode	Description
B1	Horizontal movement mode Forward, backward, left, right
B2	Vertical movement and wrist rotation mode Up, down, clockwise hand rotation, counter-clockwise hand rotation

Mode	Description
B3	Gripper and wrist orientation mode
B4	Finger and grasp mode Open and close two (2) fingers Open and close three (3) fingers
B5	Optional B5 or A mode for Lift Arm operation

 **Important:** Used only when Jaco is installed with Lift Arm

Related topics

[Operation and control of Jaco with a power wheelchair](#) on page 103

[Operation and control of the robot](#) on page 100

Drinking mode

Use [Drinking mode](#) when the user wants to drink directly from a glass, cup, or bottle.

Drinking mode is possible only in combination of turning the wrist and the function mode B2, which is the mode used for moving the hand vertically up and down, and rotating the hand clockwise and counterclockwise.

When the user activates hand rotation in Drinking mode, the wrist turns and lifts the glass about a fixed point around the rim. Turning the wrist balances the height and radius of a glass to imitate the way in which the human forearm and wrist move to keep the rim of the glass in place on the lower lip.



Note: To reproduce the action of drinking, the caregiver or technician programs the height and diameter of the preferred glass of the user. After installation, the caregiver or the technician can use the Assistive Robot Configurator (ARC) software to reprogram the preferred drinking glass.

Activating and using the Drinking mode

Drinking mode lifts and rotates the gripper to help the user drink. Before the user can drink, they must activate Drinking mode.

About this task



Important: The user is the person who is in the wheelchair; the user activates and uses Drinking mode.

The user looks at OLED Display, and decides if they must change the operating mode and activate Drinking mode before they try to use Jaco for drinking.

Procedure

1. Look at OLED Display to see the current operating mode.
2. Switch to operating mode B2 with the *Mode button*.

OLED Display shows the icon in the status bar to be a gray, filled glass (.

3. Press and hold the Mode button for two (2) seconds.

The icon in the status bar changes to a blue, filled glass (.

4. Move the arm to place the rim of the glass, mug, or cup in front of your lower lip.

Deactivating the Drinking mode

Drinking mode lifts and rotates the gripper to help the user drink. When the user does not want to drink any more, they must deactivate Drinking mode.

About this task



Important: The user is the person who is in the wheelchair; the user deactivates Drinking mode.

The user looks at OLED Display, and decides if they must change the operating mode and deactivate Drinking mode before they try to use Jaco for another purpose.

Procedure

1. Look at OLED Display to see the current operating mode.
2. Switch to operating mode B2 with the *Mode button*.

OLED Display shows the icon in the status bar to be a blue, filled glass (.

3. Press and hold the operating mode button for two (2) seconds.

The icon changes to a gray, filled glass (.

Robot speed

The speed at which Jaco moves can be changed. Slower speeds are recommended when getting to know how to operate the robot or when first trying more challenging tasks.

Table 15: Available speeds

Symbol	Type of speed	Value
1	Lowest speed	5 cm/s
2	Low speed	10 cm/s
3	High speed	15 cm/s
4	Highest speed	20 cm/s



Note: The caregiver or the technician uses Assistive Robot Configurator (ARC) to program the speed initially when Jaco is installed. The user and the caregiver can adjust the speed settings in any given operating mode.



Note: The factory settings for speed is set to level 3, which is 15 cm/s or approximately 5.9 in/s.



Note: When Jaco is in a programmable *Slow zone*, the robotic arm automatically reduce its speed.

Reducing speed

At any time, the user can make Jaco move slower.

About this task



Important: The user is the person who is in the wheelchair; the user slows the movement of the robotic arm.

The user looks at OLED Display, and decides if they must change the operating mode before they try to reduce the speed of Jaco.

Procedure

1. Look at OLED Display to see the current operating mode.
2. Switch to the operating mode that has a speed adjust command enabled.

The technician certified by Kinova enables the speed adjustment command to one of the operating modes or to a [Go-To](#), or [Memory](#) , position.



Tip: Click the [Mode button](#) once.

3. Press and hold the Mode button for four (4) seconds.
The speed is reduced by one level.
The status bar of OLED Display shows the current speed.
4. Repeat the procedure to decrease the speed by one level.

Increasing speed

At any time, the user can make Jaco move faster.

About this task



Important: The user is the person who is in the wheelchair; the user increases the speed of the robotic arm.

The user looks at OLED Display and decides if they must change the operating mode before they try to increase the speed of Jaco.

Procedure

1. Look at OLED Display to see the current operating mode.
2. Switch to the operating mode that has a speed adjust command enabled.

The technician certified by Kinova enables the speed adjustment command to one of the operating modes or to a [Go to](#), or [Memory](#), position.



Tip: Click the [Mode button](#) once.

3. Press and hold the Mode button for two (2) seconds.

The speed increases by one level.

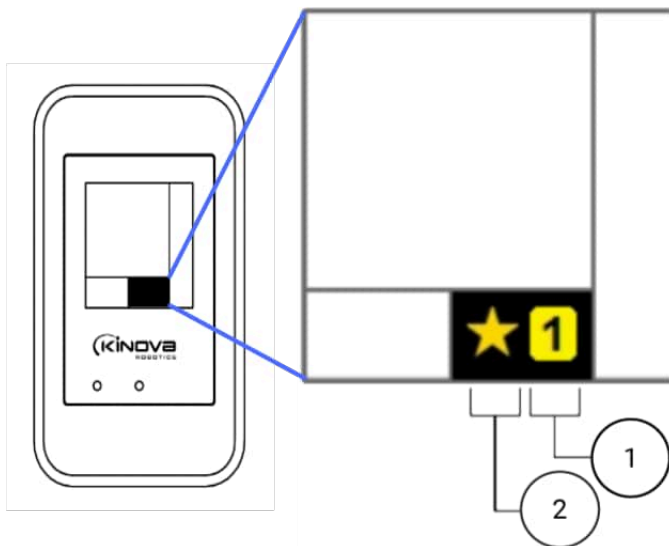
The status bar of OLED Display shows the current speed.

4. Repeat the procedure to increase the speed more.

Screen area: Function

The Function area show the details of the recorded positions, trajectories, errors, and warning signals.

The information is displayed with symbols.



1 Index to list of functions

2 Function, warnings

Figure 34: Function area

The functions are divided into three (3) categories.

- Available
- Active
- Warnings

When one or more special functions are available in the current mode, the function is displayed on the left-hand side.

Table 16: Symbols for functions that are available in the current mode

Symbol	Information
 Star with red circle	Record function and recorded <i>Go to</i> , or <i>Memory</i> , position commands are available
 Star with letter S	Management of <i>recorded positions</i> • Standard record function • Record a point • Play a point • Maximum of five (5) points • Also known as Go to position or Memory position

Symbol	Information
 Star with letter A	Management of <i>trajectories</i> • Advanced record function • Add a point, to a maximum of twenty-one (21) points • Read a trajectory • Delete a trajectory • Maximum of five (5) trajectories • Also known as <i>Advanced Go to</i> position
 Star with no letter	Standard and Advanced record functions are defined in the same profile

When a function is activated, the type and its index are displayed. After five (5) seconds, the index is not displayed and the original symbol for available functions in the current mode is displayed.

Table 17: Symbols for active functions

Symbols of active functions	Index symbol	Information
 Standard Go to position		Specifies which of the five (5) Memory positions the user is using currently
		Shows that a Memory position instruction has been sent
 Advanced Go to position		Specifies which of the five (5) trajectories the user is using currently
		Shows that a trajectory instruction has been sent

Whenever an error occurs, an orange triangle overwrites the existing symbol for Memory position until the error is corrected. Errors are grouped into minor and major errors.

Table 18: Warning symbols

Symbol	Error type	Information
 Orange Triangle	Minor errors	OLED Display sounds two times The main area does not change
	Major errors	OLED Display sounds four times The Main area shows a red, robotic arm 

Example of function and index workflow

The symbol reflects the currently selected function. The examples show how the user navigates through the symbols in the Function area to control Jaco.

Workflow step	Symbol displayed	Description	Result
1		An empty star is displayed	No joystick command is sent A Standard <i>Go to position</i> instruction and an <i>Advanced Go to</i> position instruction in the current mode
2	 	An asterisk with the letter "S" inside it shows that a Standard Go to position function is invoked	The user is pressing the button corresponding to the function Standard Go to position 2
3		A number 2 shows that the Go to position function number 2 is operating	The user is pressing the button associated with the Go to position 2 function The function is operating for a maximum of five (5) seconds

Sleep mode

To save energy and to prevent distractions, the display enters *Sleep mode* after three (3) minutes of inactivity.

OLED Display reactivates when a button is pressed or any joystick movement is detected.

Major errors

When major errors with the device occur, the display enters *Major error mode*.

OLED Display sounds four (4) times to attract attention and displays the symbol for a major error. After the error is cleared, the display shows Jaco is in *Standard mode*.



Figure 35: Visual indicator of a major error

Error: Joystick and communication

When there is an error with the accessible control input or when the OLED Display cannot communicate with Jaco for any other reason, a joystick with an X is displayed in the Main area of OLED Display.



Figure 36: Visual indicator of joystick and communication error

Error: Lost communication

When communication between OLED Display and Jaco is interrupted, the Reconnect icon is displayed in the Main area.



Figure 37: Visual indicator to reconnect



CAUTION: Do not try to disconnect and reconnect OLED Display or Jaco Blue Universal Interface while Jaco is switched on. Always power off the system before plugging and unplugging any connectors.

Assistive Robot Configurator software overview

The technician and the user can configure Jaco by using the Assistive Robot Configurator (ARC) software.

During installation, the technician customizes the needs of the user by configuring Jaco and the external control devices.

The software has two *roles*: **Professional** and **User**. *Integrators* and technicians, certified by Kinova, sign into ARC with the **Professional** role. Caregivers and users of Jaco sign in with the **User** role.

Each role accesses a predefined set of configurations. The set of configurations available in a role determines the *access level* of the person using the ARC software.

The **Professional** role has access to all configurations. The **User** role has access only to those configurations that do not have an effect on safety.

The integrator or technician, certified by Kinova, can change the access level of the **User** role by assigning specific configurations to the user. For each configuration that the user accesses, the integrator or technician must make sure that any errors made in the configuration does not become a safety issue for the person who uses Jaco.

Installing Assistive Robot Configurator

A [USB storage device](#) is included in the rigid carrying case with Jaco. The USB drive contains software used for configuring Jaco to meet the needs of the user.

Before you begin

Collect all necessary tools for installation.

- [PC](#) with USB-A port ()
- USB from the rigid carrying case
- USB cable from the rigid carrying case

About this task

The USB is needed only for installing Assistive Robot Configurator (ARC) and for saving exported Jaco profiles.

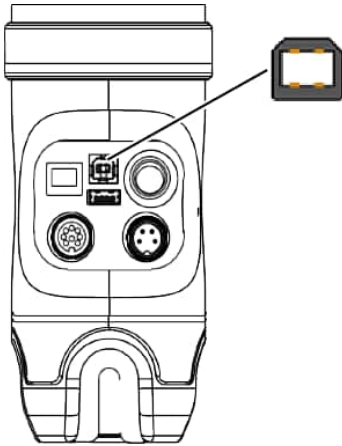
The driver software that corresponds to the robotic arm in the rigid carrying case is installed when ARC is installed.

Procedure

1. Connect the USB storage device to a computer.
2. Launch File Explorer on the computer.
3. Navigate to the file `AssistiveConfigurator-setup.exe` on the USB.
4. Double click `AssistiveConfigurator-setup.exe`.

5. Connect Jaco and the computer with the USB cable.

Jaco has a USB-B port.



The computer must have a USB-A port.



Operating Assistive Robot Configurator software

Use Assistive Robot Configurator (ARC) to make adjustments to some of the functions of Jaco.

Before you begin

1. Make sure the software is installed on a [PC](#).
2. Connect Jaco to the PC that is running the software.

About this task

The technician and caregiver can use the ARC software. But, the caregiver and user have fewer configuration options available to them than the technician.

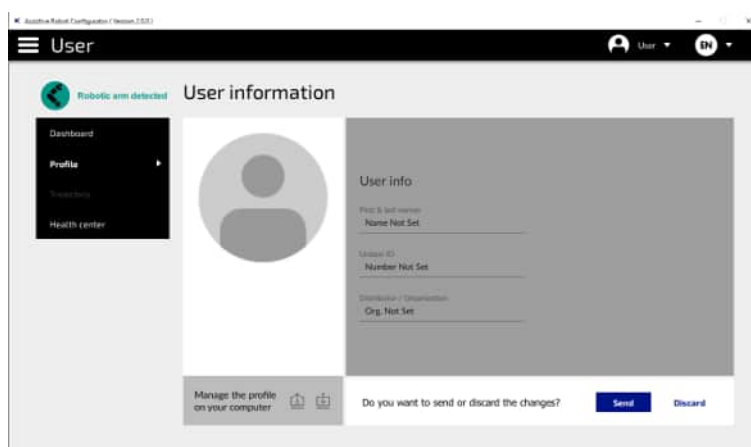
Procedure

1. Select the desktop icon (.

The software launches and automatically detects Jaco.

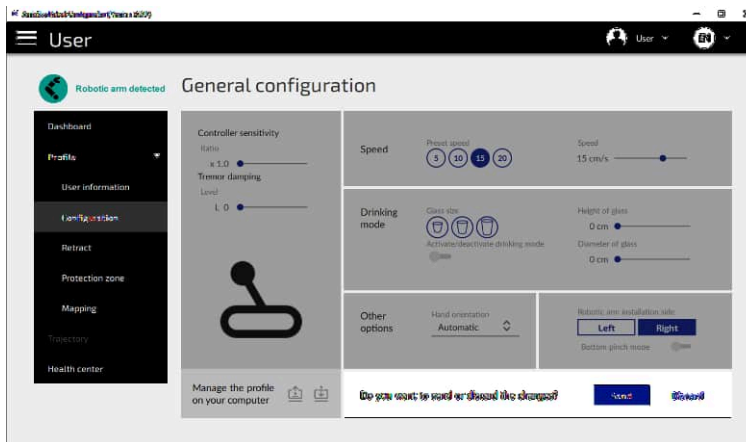


Information about the user, the serial number of Jaco, and the supplier are on the **User information** page.



2. Select **Profile > Configuration**.

The **General configuration** page launches.



Note: Some settings are locked and can be changed only by a technician.

3. Make changes to the current configuration.



Warning: The user can change settings only when they know the effects of the change.

4. Select **Send** () to transfer the changes to Jaco.



Note: Changes to settings that are not transferred to Jaco are yellow in the side menu and on their actual settings.

Configurations available to the user

At the time of installation, the caregiver receives the training needed to change configurations that are on the **General configuration** page.

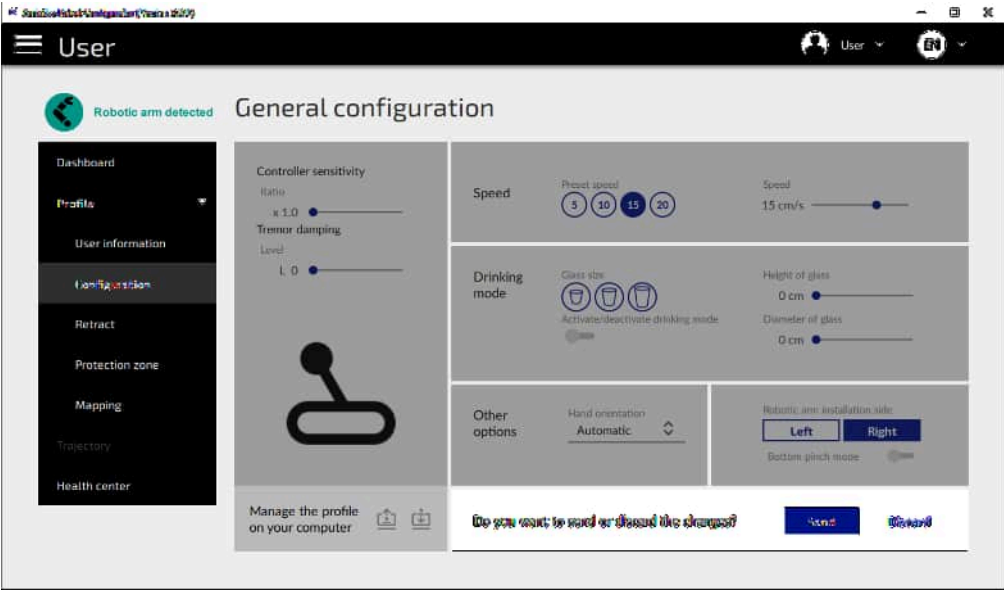


Figure 38: General configuration page

Table 19: User configurations

Label	Configuration	Description
Speed	Speed of movement	Measured in cm/s
Icon Action		
Preset speed 5 10 15 20 Select a preset speed from Preset speed.		
Speed 15 cm/s Use the Speed slider to select the speed.		
Drinking mode	Mode for drinking	Three (3) icons represent preset glass sizes.
Height and diameter are measured in centimeters.		

Label	Configuration	Description
	Icon Glass size 	Action Select the glass icon that best represents the size of the glass to be used.
	Height of glass 0 cm 	Use the Height of glass slider to specify the height of the glass.
	Diameter of glass 0 cm 	Use the Diameter of glass slider to specify the diameter of the glass.
	Activate/deactivate drinking mode 	Move the Activate/deactivate drinking mode toggle to the right to activate Drinking mode.  Note: Activate Drinking mode only when the user wants to drink from a glass, cup, or bottle; the user can reach for the drink and control it with Jaco.
		Move the Activate/deactivate drinking mode toggle to the left to deactivate Drinking mode.  Note: Deactivate drinking mode when the user is finished drinking and wants to perform other movements with Jaco.
Controller sensitivity	Sensitivity of the controller	
	Icon Controller sensitivity Ratio x 1.0 	Action Move the slider to increase and decrease how quickly the joystick reacts to control movements.  Note: Only available when using a proportional joystick.
Tremor damping	Absorption of tremors and muscle rigidity	

Label	Configuration	Description
	Icon	Action
	 Tremor damping Level L 0	Move the slider to one of the four (4) desired values to compensate for tremors. i Tip: Increase the value to slow Jaco down before it reaches the maximum set speed. Larger values make it easier for people with tremors to control Jaco. i Tip: Decrease the value to move Jaco more quickly before it reaches the maximum set speed. Smaller values can be used for people without tremors.

Dashboard and Health center pages

If there are technical problems, a technician can ask for real-time information that is sent from Jaco to Assistive Robot Configurator (ARC).

The information on the **Dashboard** and **Health center** pages can help to get an initial assessment of possible problems.

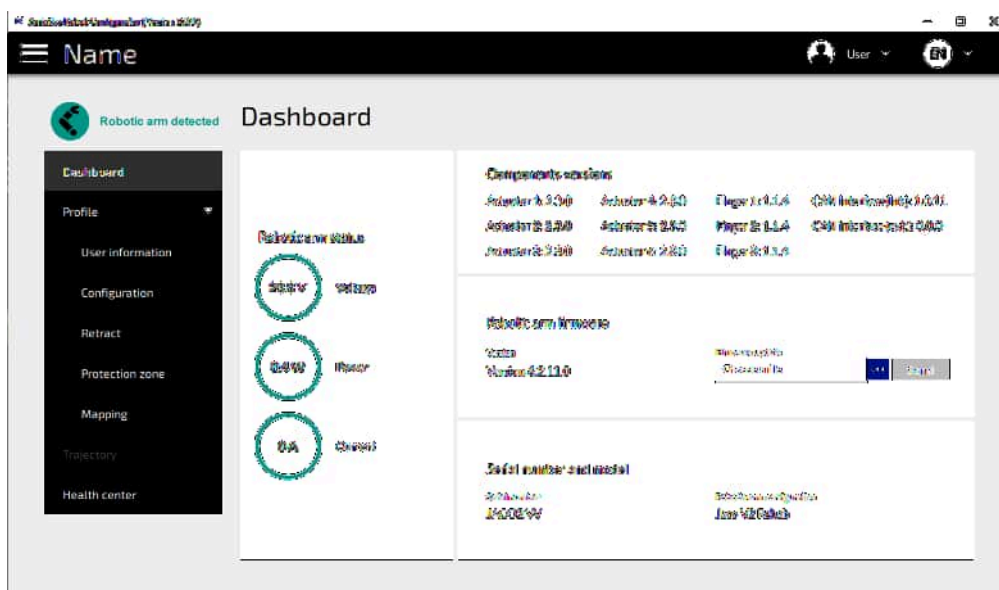


Figure 39: Dashboard page

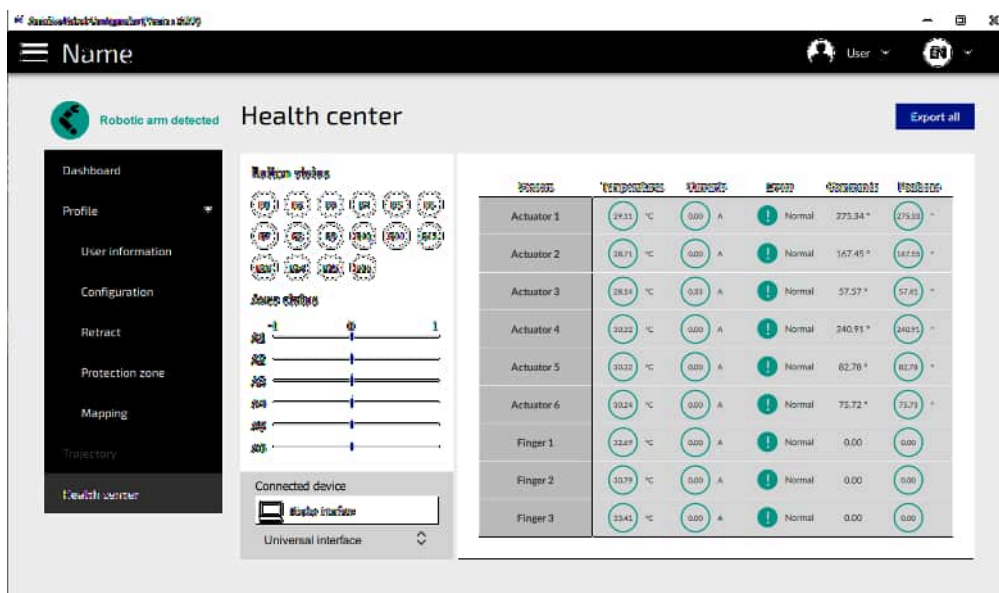


Figure 40: Health center page

Exiting Assistive Robot Configurator

There are two (2) ways to exit Assistive Robot Configurator (ARC).

About this task

Choose one of the two ways to exit the software before disconnecting Jaco from the computer.

Procedure

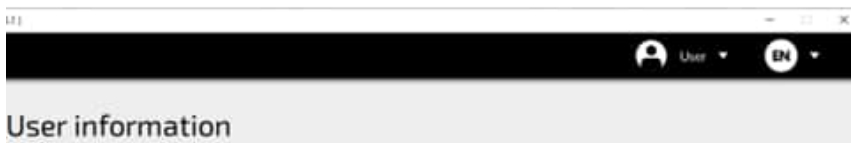
Method 1

1. Expand the *main menu* (☰).
2. Select **Exit**.



Method 2

3. Select **X** in the upper right corner.



Kinova® Lift Arm overview

Lift Arm is a motorized, tilt-adjustable, dynamic mounting system that is installed on a power wheelchair to increase the reach and flexibility of the robotic arm.

Lift Arm consists of the physical object and an electronic system to control it. The same accessible controls that move Jaco and change modes can be used to operate Lift Arm.

The range of movement of Lift Arm is limited between fully *lowered* and fully *raised*.

Lift Arm lowers and raises Jaco. It moves the robotic arm out of the way, making it easier to transfer the user safely.

Jaco can be used at any height along the range of movement of Lift Arm.

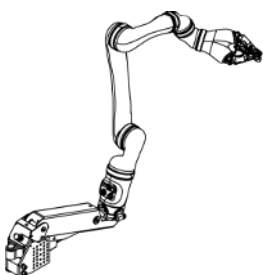


Figure 41: Tilted 20°

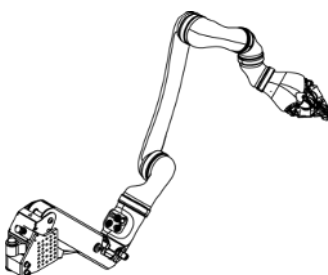


Figure 42: Tilted 45°

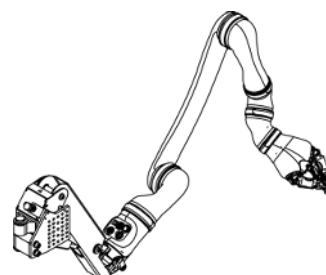


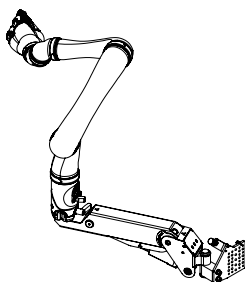
Figure 43: Tilted 60°

When Lift Arm is in the *raised* position, Jaco is in the field of vision of the user; they can control Jaco in all directions.

Using the integrated swing-away mechanism, Lift Arm and Jaco can be moved away from the user toward the back of the wheelchair to help transfer the user in and out of the power wheelchair easily.



Restriction: Do not operate Jaco when the swing-away mechanism of Lift Arm is not latched.



Lift Arm can be configured with Jaco on the right side or the left side.

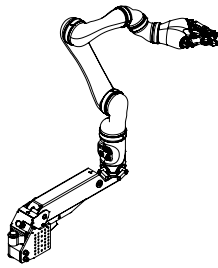


Figure 44: Lift Arm installed for configuration on the left side

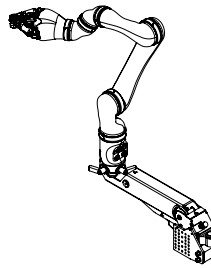


Figure 45: Lift Arm installed for configuration on the right side

Lift Arm can be used directly with Jaco or directly with Jaco Blue Universal Interface.

Related topics

[Lift Arm specifications](#) on page 11

[Examples of labels on Lift Arm](#) on page 15

Dangers related to Lift Arm

A danger is an impending hazardous situation that can result in serious injury or even death, or can severely damage property. Avoid impending hazardous situations that are associated with dangers.



DANGER: Contact Kinova or a technician certified by Kinova if there are any mechanical or electrical issues with Lift Arm.



DANGER: No modification of Lift Arm is allowed.



DANGER: Lift Arm must be installed only by a technician certified by Kinova.



DANGER: The end user or their caregiver must not repair or replace any parts without the express Kinova authorization. If any problem with the device occurs, only a technician certified by Kinova can repair it.



DANGER: If the device is not responding properly to the controls, do not use the device until it is verified by a technician certified by Kinova. Contact Kinova support for more details.



DANGER: The swing-away action of Lift Arm must be activated when the wheelchair is not moving. Do not move the wheelchair while Lift Arm is swung out to the side. There is a risk of the arm hitting an object and damaging Jaco or Lift Arm.



DANGER: Be careful when driving the wheelchair forward while Lift Arm is lowered, and the gripper of the robotic arm is close to the floor. Driving the wheelchair while Jaco is touching the floor or ground can damage Jaco or Lift Arm, and cause serious injury.



DANGER: Buttons must not be disconnected from the Lift Arm control, except by a technician certified by Kinova.



DANGER: Only a technician certified by Kinova can adjust the limit switch.



DANGER: Make sure the swing-away mechanism is latched and Lift Arm is level when passing through narrow areas, such as doorways, narrow hallways, aisles in shops, and so on.



DANGER: The software in Jaco, which controls the protective areas around the user and the movement of the arm, assumes that the base of the arm is immobile with respect to the wheelchair and the user. The software does not take into account the tilt of Lift Arm. A lowered Lift Arm influences the set protection area.



DANGER: When lowering Lift Arm, make sure that the hand of Jaco does not come into contact with the ground.



DANGER: Do not use Jaco or Lift Arm when the swing-away mechanism is unlocked.



DANGER: When Lift Arm is swung to the side, additional weight must not be applied to Jaco or Lift Arm. The additional weight adds stress to the brackets that attach Lift Arm to the wheelchair; the extra weight also adds stress to the mounting rail of the wheelchair.



Important: Do not try to move Lift Arm beyond its stopping point when Lift Arm comes into contact with the side of the wheelchair, or one of the wheels of the wheelchair. The angle at which the contact occurs depends on the wheelchair and the configuration.

Related topics

[Safety warning levels](#) on page 12

Warnings related to Lift Arm

Avoid potentially hazardous situations that are associated with warnings.



Warning: Do not modify Lift Arm without authorization of the manufacturer.



Warning: Do not expose the internal components of Lift Arm. Only the manufacturer is authorized to service these components.

Exposing the internal components voids the warranty and can result in malfunctions that might endanger the user.



Warning: Lift Arm supports Jaco and the entire weight of an object. Trying to lift an object that exceeds the maximum payload can damage Lift Arm.

Any damage incurred can void the warranty.



Warning: Do not immerse Lift Arm in water or snow, either in whole or in part.



Note: Do not expose Lift Arm to corrosive environments.

Related topics

[Safety warning levels](#) on page 12

Precautions related to Lift Arm

Avoid hazardous situations that are associated with cautions.



CAUTION: Do not use in heavy rain or snowfall.



CAUTION: Do not immerse Lift Arm in water or other liquids. Wipe off water and liquids immediately after exposure.



CAUTION: Wipe the product after contact with water or other liquids.



CAUTION: Unlock the swing-away mechanism of Lift Arm only when the wheelchair is stationary.

Do not move the wheelchair when Lift Arm is swung to the side. There is a risk that Jaco or Lift Arm might hit something; the robotic arm or Lift Arm can be damaged.



CAUTION: The control unit must not be disconnected from Lift Arm except by a professional approved by Kinova.



Lift Arm has areas where there is a risk of entrapment.

The points are marked on Lift Arm. The risk to the user is low, but make sure that other people, especially children, do not reach into the mechanism of Lift Arm.

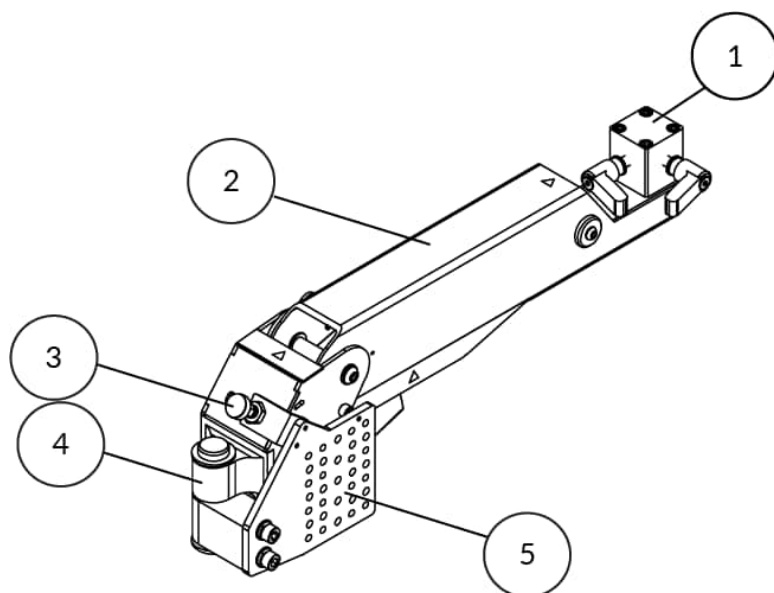
Related topics

[Safety warning levels](#) on page 12

Lift Arm components

Lift Arm has multiple parts.

The Lift Arm system consists of Lift Arm and a control box.



- | | | |
|--|--|--|
| <p>1 <i>Mounting post for Jaco</i></p> <p>4 <i>Hinge of the swing-away mechanism</i></p> | <p>2 <i>Body of Lift Arm with integrated motor</i></p> <p>5 <i>Mounting plate to attach Lift Arm to the wheelchair</i></p> | <p>3 <i>Release pin of the swing-away mechanism</i></p> |
|--|--|--|

Figure 46: Components of Lift Arm

Control for raising and lowering Lift Arm

Control Lift Arm with the same accessible joystick or alternative drive control that is used to operate Jaco, or with two dedicated, accessible Up and Down Lift Arm buttons.

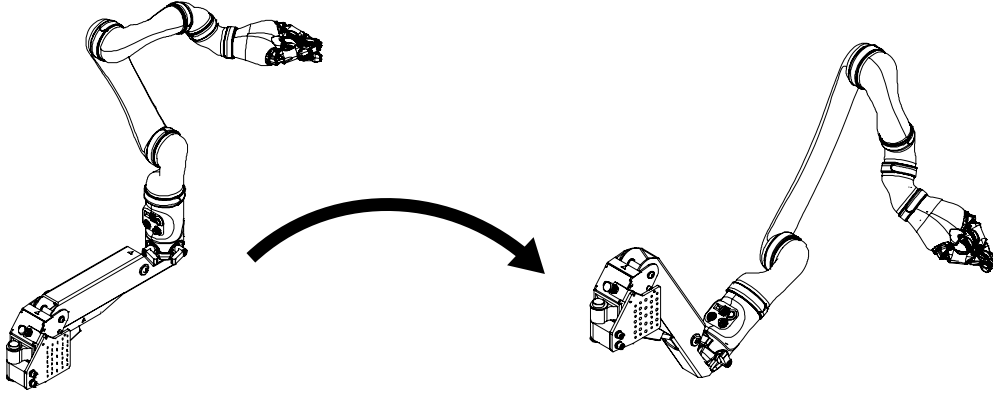


Figure 47: Lower Jaco

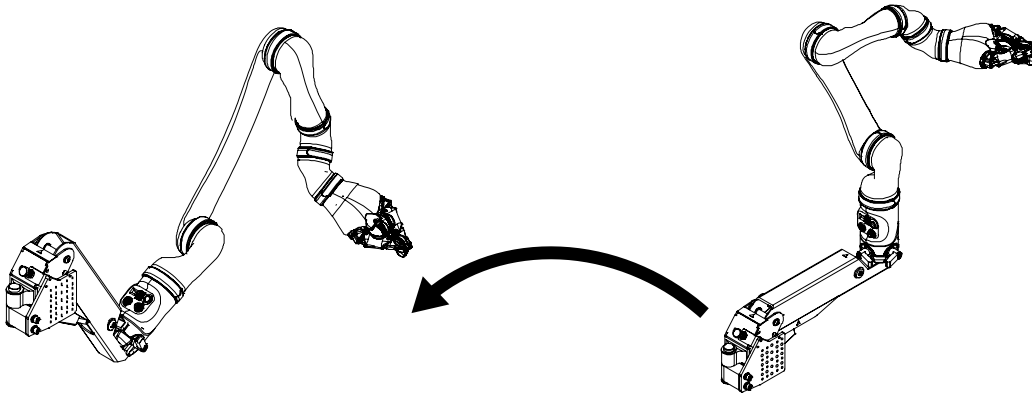


Figure 48: Raise Jaco

Controlling Lift Arm using an IOM and dedicated power wheelchair output mode

Lift Arm can be integrated as a function into a wheelchair control system and its menu.

About this task

Power wheelchairs have wheelchair-dependent interfaces. The technician integrates Lift Arm into the control menu of the wheelchair during installation.

Procedure

1. Select Lift Arm from the control menu of the wheelchair.
2. Operate the wheelchair control.

Lift Arm moves in the direction of control.

- a) Move the control forward to lower Lift Arm.
- b) Move the control backward to raise Lift Arm.
- c) Operate the wheelchair control until Lift Arm is in the correct position.
- d) Release the wheelchair control.

When Lift Arm is moved further than intended, use the wheelchair control to correct the angle in the opposite direction.

The position of Lift Arm can be moved continuously to its end points.

3. Select Jaco from the wheelchair menu after Lift Arm is in the correct position.

Related topics

[Kinova OLED Display overview](#) on page 53

Controlling Lift Arm with accessible buttons

Control Lift Arm with two (2) accessible Up and Down Lift Arm buttons that can be installed in any convenient location on the wheelchair.

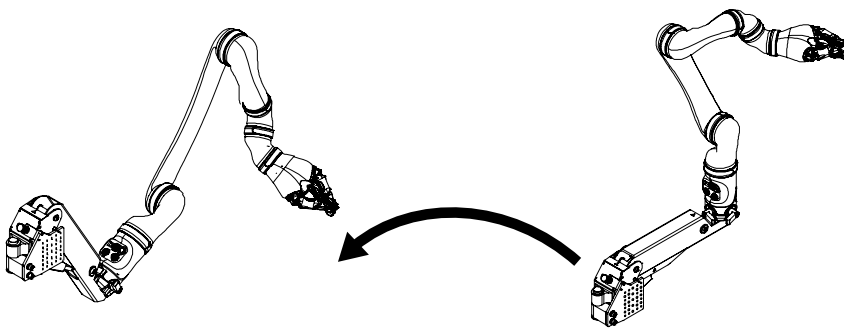
About this task

One button lowers Lift Arm; another button raises it.

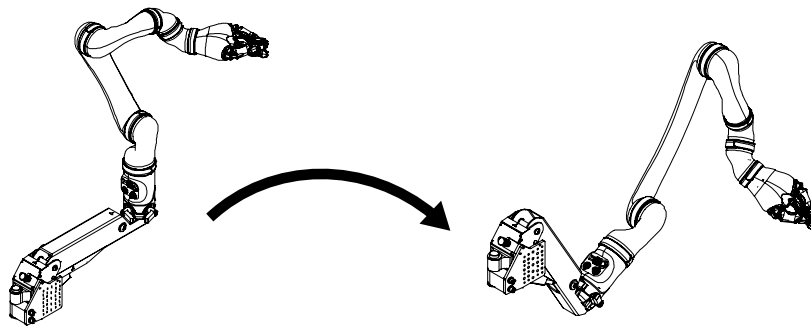
Procedure

1. Press and hold one of the two buttons to move Lift Arm.

- Button to raise Lift Arm.



- Button to lower Lift Arm.



2. Release the switch when Lift Arm is in the correct position.

When Lift Arm is moved further than intended, use the wheelchair control to correct the angle in the opposite direction.

The position of Lift Arm can be moved continuously to its end points.

Controlling Lift Arm with Jaco Blue Universal Interface

Control Lift Arm with a Bluetooth connection through Jaco Blue Universal Interface.

About this task

The technician connects Jaco Blue Universal Interface to Lift Arm with a mono cable. They use Assistive Robot Configurator (ARC) to configure one of the modes to forward and backward joystick movements from the wheelchair to Jaco.

Procedure

1. Select Lift Arm from the control menu of the wheelchair.
2. Operate the wheelchair control.

Lift Arm moves in the direction of control.

 - a) Move the control forward to lower Lift Arm.
 - b) Move the control backward to raise Lift Arm.
 - c) Operate the wheelchair control until Lift Arm is in the correct position.
 - d) Release the wheelchair control.

Swing-away mechanism

The swing-away mechanisms helps to move Jaco out of the way of the wheelchair, making it easier for the user to be transferred safely in and out of the wheelchair.

The mechanism has two (2) parts.

- A hinge, around which Jaco revolves
- A spring-loaded latch that locks Lift Arm to the side of the wheelchair

The swing-away mechanism revolves around the hinge and moves Lift Arm with Jaco outward from the side of the wheelchair.

When the swing-away mechanism is not in use, the mechanism must be locked to the frame of Lift Arm.

There is no powered control for the swing-away mechanism; a caregiver must operate the swing-away mechanism.

Using the swing-away mechanism

There are times when Jaco must be moved out of the way, such as when the user needs to be transferred out their wheelchair.

About this task

There is no powered control for the swing-away mechanism; a caregiver must operate the swing-away mechanism.

Procedure

1. Lift the latch to release, or unlock, the swing-away mechanism.
2. Move Lift Arm out and back by hand.

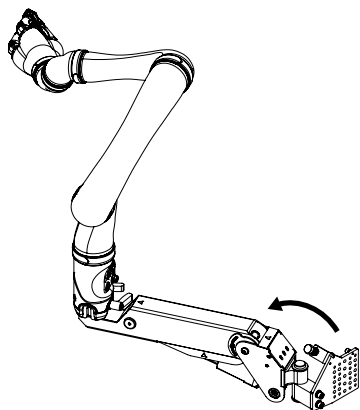
Latching the swing-away mechanism

The swing-away mechanism must be latched before using Jaco.

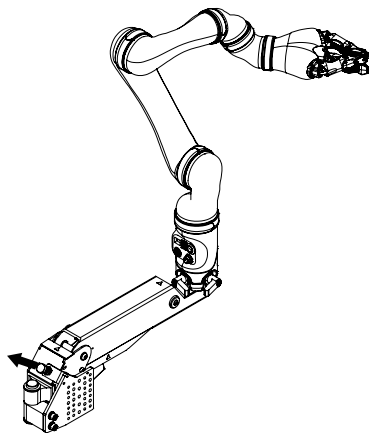
About this task

Procedure

1. Lift the latch slightly.



2. Swing Jaco back to the *Ready position*.



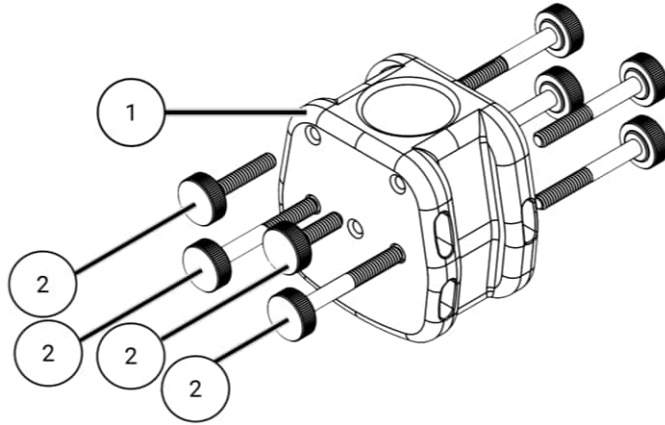
3. Hold Lift Arm firmly in place; do not let it swing back out.
4. Release the latch.

The plunger mechanism engages in the slot on Lift Arm.

5. Make sure the swing-away mechanism is latched correctly before operating Jaco.

Cutlery & Tool Holder overview

The Cutlery & Tool Holder accessory is used for cutlery and other objects that support [MRADL](#) tools. The tool makes the user more independent.



1 Cutlery & Tool Holder 2 Thumb screw, knurled head

Figure 49: Cutlery & Tool Holder components



1 Tool opening 2 Cutlery opening

Figure 50: Cutlery & Tool Holder

Objects are clamped tightly in the carrier. There are slots for the fingers of the robotic hand on the two sides, which makes sure the Cutlery & Tool Holder is held tightly.

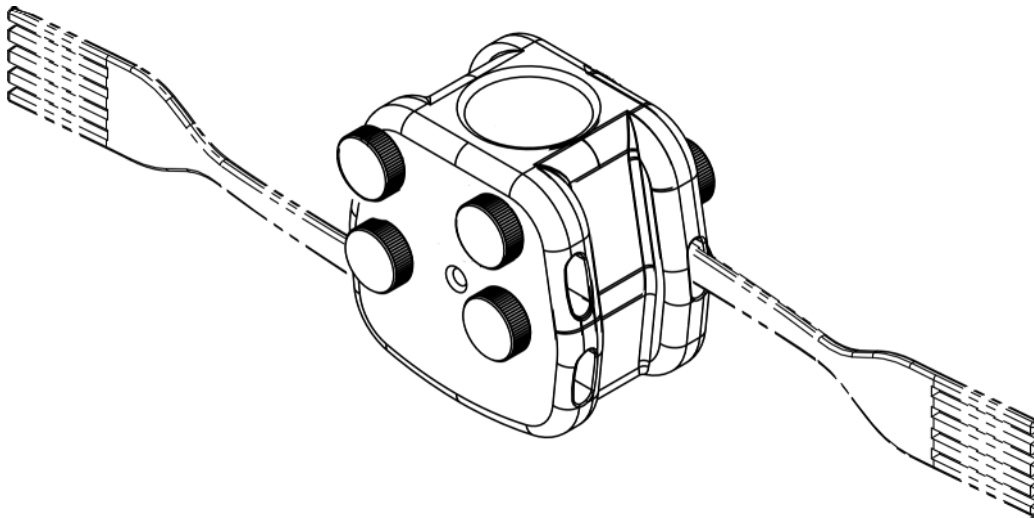


Figure 51: Example of Cutlery & Tool Holder holding cutlery



Figure 52: Cutlery & Tool Holder holding a fork

The tool holder makes sure the cutlery stays firmly in place while dining.

The Cutlery & Tool Holder can be equipped on the two sides, if required, which is useful when a fork and a spoon are to be used. The cutlery that is needed can be selected by turning the hand.



Restriction: Do not use Jaco for cutting, or for handling sharp or dangerous objects.

Preparing to use the Cutlery & Tool Holder accessory

Although the accessory helps the user to be more independent, a caregiver must set it up.

About this task

After a caregiver sets up the Cutlery & Tool Holder, the user can complete their task independently.

Procedure

1. Insert the required item into the slot or opening of the Cutlery & Tool Holder.
2. Secure the item with the thumb screw.
3. Place the Cutlery & Tool Holder on a stable, non-slip surface.

Results

The user can perform tasks independently.

Related topics

[Using the Cutlery & Tool Holder accessory](#) on page 98

Using the Cutlery & Tool Holder accessory

The user performs tasks independently with the the tool after the caregiver attaches it to the Cutlery & Tool Holder.

About this task

The tool that is attached to the Cutlery & Tool Holder to help the user complete their task independently.

Procedure

1. Hold the Cutlery & Tool Holder with the pincer fingers.



Note: We recommend lowering the hand near the surface and turn the hand until the two pincer fingers are directly above the non-slip surface.



2. Close the fingers until they stop.



3. Lift the Cutlery & Tool Holder.



Related topics

[Preparing to use the Cutlery & Tool Holder accessory](#) on page 97

Operation and control of the robot

Jaco is intended to be connected and controlled through different types of accessible inputs. Power wheelchair drive inputs and other accessible inputs can control the robotic arm directly with Jaco Blue Universal Interface.

To operate and control Jaco, press the ON/OFF switch on the base of the device.

The robotic arm is controlled in a Cartesian coordinate system; the user controls movements of the hand of the robotic arm, and the other joints move to place the hand where the user commands. The wrist always moves in circular movements around the center point of the hand. The center of the hand is the reference point for movement; the reference point moves minimally. The different joints are controlled automatically, according to the command given to the software. The user cannot control the joints individually.

Jaco can perform sixteen (16) different movements. The movements can be divided into different modes of operation. Each mode of operation depends on which control element is used.



Note: Jaco might respond to a command differently than described because of a *singularity* near the end of its *range of motion*, and avoidance algorithms built into the kinematics. The response is normal protective behavior of the robotic arm and depends on the position of Jaco.

Table 20: Control modes of the robot

Translation mode



Figure 53: Left and right



Figure 54: Forward and backward



Figure 55: Up and down

Wrist mode



Figure 56: Lateral orientation: Pan left and right



Figure 57: Vertical orientation: Swing up and down



Figure 58: Wrist rotation: Rotate left and right

Finger mode

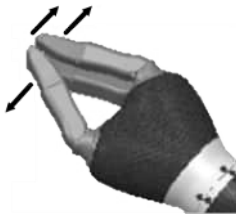


Figure 59: Open all fingers



Figure 60: Close all fingers



Figure 61: Open two fingers

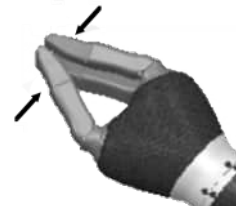


Figure 62: Close two fingers

Use OLED Display to look at the modes of operation of Jaco.

Use Lift Arm with Jaco for greater flexibility in operations.

Related topics

[Kinova OLED Display overview](#) on page 53

[Kinova Lift Arm overview](#) on page 84

Ready and Retracted positions

Jaco comes with two configurable factory default pre-set positions: *Ready position* and *Retracted position*.

Configure the *Ready position* and *Retracted position* with Assistive Robot Configurator (ARC). During the operating briefing, the technician adjusts these configurable positions to the circumstances of the user.

Move Jaco into the Ready position or the Retracted position by pressing an additional external button from a wheelchair control.

Examples:

R-net

Press and hold the speed button on the wheelchair joystick in the slow direction.

The direction alternates between the Ready and the Retracted position with each activation.



Note: The speed button invokes the adjustable speed functionality.

LiNX

Press the programmable button on the joystick.



Note: Can be used with digital DB9 connections

Q-Logic 3

Press an external button.



DANGER: When moving Jaco from the Ready position to the Retracted position, Jaco must not be obstructed or blocked. Jaco must not come into contact with the wheelchair, the accompanying products and accessories attached to the wheelchair, or any object that might be in the path.

If there is an obstruction, or if Jaco comes into contact with the wheelchair, the accessories attached to the wheelchair, or any other object that is in the path when moving Jaco from the Ready position to the Retracted position, contact a technician certified by Kinova immediately.

A smooth landing on the protective pad is required at the end of the retract sequence to prevent damage to the outer shell of the arm of Jaco.



Tip: When setting up the advanced Retracted position, use a pad. Create the pad by folding paper towels to a 2 mm thickness and place the pad under any joints of Jaco that touch mechanical parts. The extra padding while setting up the advanced Retracted position induces a smooth landing.

The Ready position is the position Jaco is in when it is ready to be used. In the Ready position, the robotic arm waits for control commands from an operating device. When Jaco is not in the Ready position, control commands are ignored.

The Retracted position is the position of Jaco when it is not in being used. The user must always put Jaco in the Retracted position when it is not being used to decrease the space it uses. In the Retracted position, the robotic arm is in standby mode; the functions of the control unit are deactivated, and the power consumption is significantly lower.



CAUTION: Never hold the [Mode button](#) when carrying liquid. The automated Retract sequence that can be mapped to a hold command with this button could cause a spill.

Operation and control of Jaco with a power wheelchair

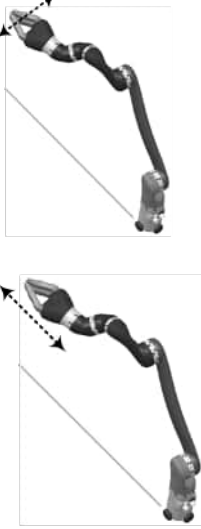
It is possible to control Jaco with a factory default Jaco profile. A technician certified by Kinova can customize the Jaco profile .

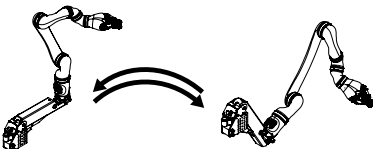
Jaco can be controlled through the wheelchair control system and the each wheelchair control element; that is, Jaco can be controlled by a wheelchair joystick, chin control, head control, and so on, depending on the equipment on the wheelchair.

Wheelchair controls have four (4) basic directions: forward, backward, left, and right.

Jaco has sixteen (16) possible movements. The robot movements are divided into five (5) operating modes.

* Custom configurations might not be the same as the images in the table.

Operating Mode	Default movement *	Description
B1		Horizontal movement mode Forward, backward, left, right
B2		Vertical movement and wrist rotation mode Up, down, clockwise hand rotation, counter-clockwise hand rotation
B3		Gripper and wrist orientation mode

Operating Mode	Default movement *	Description
B4		Finger and grasp mode Open and close two (2) fingers Open and close three (3) fingers
B5		Optional B5 or A mode for Lift Arm operation  Important: Used only when Jaco is installed with Lift Arm

OLED Display shows the currently selected operating mode.

The display on the power wheelchair cannot show any information coming from Jaco.

Switching between operating modes depends on the needs of the user and the final configuration of the wheelchair integrated with Jaco. The user can press on an additional button or press the [Mode](#) or [Profile](#) button on the wheelchair joystick to select the output mode associated with Jaco.

Scroll through the Jaco operating modes by pressing the Mode button with a single click.



Remember: When Lift Arm is not installed, the user scrolls through operating modes B1 to B4.

When Lift Arm is installed, the user scrolls through operating modes B1 to B5, or through modes B1 to B5 and A operating modes.



Note: The A operating modes control Jaco attributes and movements, and can control Lift Arm movements.

To reach an object, combine the movements of the operating modes to guide Jaco to the object. Use the gripping function to grasp an the object, and operating mode B2 to lift the object.

Maintenance

Preventive maintenance averts major issues that can arise; it keeps Jaco and users safe.

Maintenance includes servicing and cleaning.



Note: Do not reuse the product unless it is re-installed by a technician certified by Kinova.

Basic maintenance

Preventive maintenance helps to keep the product in good working order.

Clean the surface of Jaco, especially the fingers, any time food or liquids are spilled on the robot.

Clean Lift Arm any time food or liquids are spilled on the robot.

Contact the Kinova representative if the fingers of the robotic arm squeak when they move. The fingers need to be cleaned and lubricated.



Warning: Refer all servicing to a technician certified by Kinova. Servicing is necessary when Jaco is damaged in any way. For example, the power cable or plug is damaged, the product does not operate correctly, or the product is dropped.



Restriction: The product has no user serviceable parts. Do not open.

Cleaning Jaco

Keep the exterior of Jaco gently wiping it down from time to time.

Before you begin

Make sure the required equipment is available.

- Clean, cotton cloth
- Mild dish detergent

About this task

Only a technician certified by Kinova is authorized to clean internal components, such as the motor or internal mechanisms.

If there is any heavy contamination around Jaco, contact Kinova directly.

Obey the safety warnings before starting to clean Jaco.



Warning: Do not immerse any part of the product in water or snow.



Warning: The product is not intended to be sterile. No sterilization procedure should be undertaken with the product.



Warning: Do not rub the external surfaces with abrasive materials.

Procedure

1. Prepare a room-temperature water and soap solution using about 2 ml of dish soap for 100 ml of water.
2. Immerse a clean cotton cloth in the solution.
3. Remove the cloth and wring the cloth out thoroughly.
4. Rub the external surface to be cleaned gently.

Cleaning Kinova® Lift Arm

Keep the exterior of Lift Arm clean by wiping it with a dry, lint free cloth it from time to time.

Before you begin

Make sure the required equipment is available.

- Clean, cotton cloth
- Mild dish detergent

About this task

Only a technician certified by Kinova is authorized to clean internal components, such as the motor or internal mechanisms.

If there is any heavy contamination around Lift Arm, contact Kinova directly.

Obey the safety warnings before starting to clean Jaco.



Restriction: Do not immerse Lift Arm in water or other liquids.

Procedure

1. Immerse a clean cotton cloth in the solution.
2. Remove the cloth and wring the cloth out thoroughly.
3. Rub the external surface gently.

Disposal of Jaco and its accompanying products

Parts of the product and of the accompanying products are considered to be hazardous substances, while other parts are recyclable.

Accompanying products include Lift Arm, OLED Display, OLED Display Holder, Jaco Blue Universal Interface, and Cutlery & Tool Holder.



Restriction: Do not discard Jaco® assistive robot, or its accompanying products, in municipal waste.

Jaco and its accompanying products contain hazardous substances. To prevent potential harm to the environment and human health from hazardous electrical substances, the electrical substances must be removed from the product and collected for the recycling procedure dedicated to the electrical parts.

Always discard the product and their packaging through a recognized agent that can disassemble and sort the parts of the product for correct disposal.

Contact the local authorities or Kinova, through their website, for return instructions at the end of the intended useful life of Jaco and its accompanying products.

Related topics

[Contact support](#) on page 110

Contact support

Direct questions about Jaco or the information in the *Jaco® assistive robot user guide*, through the support page of the Kinova website at <https://assistive.kinovarobotics.com/reach-us/customer-support>, by phone, or by email.

For effective assistance with problem reports, make sure to have specific information ready for Kinova or the distributor.

- Date and time the problem occurred
- Environment where the problem occurred
- Actions performed immediately before the problem occurred
- Serial number of the product

The serial number acts as a cross reference to the exact product, software version, part revisions, part characteristics, and so on.

If the product needs to be returned to Kinova, make sure the product is packaged in its original rigid carrying case for transportation and servicing.

Report all serious incidents that have occurred with the use of Jaco, or any of its accessories, to Kinova or any competent authority.

For technical support issues or more information about product end of life, contact Kinova.

Kinova inc.	4333 boulevard de la Grande-Allée, Boisbriand, QC, Canada, J7H 1M7
Telephone	1-855-6-KINOVA
Email	support@kinova.ca

Customers in Germany can contact our German office.

Kinova Europe GmbH	Vorderbreitenthann 150, 91555 Feuchtwangen
Telephone	0800 5466822
Email	support@kinovarobotics.de

Glossary

access level

definition of what a person can do in the confines of their role; authorization to work with specific settings or configurations in a system

ACM

an accessible input that enables a user to control the robotic arm independently of the wheelchair drive controls

disambiguation: *Auxiliary Control Module (ACM)*

active configuration

a configuration defined in a software and applied to the robot; the configuration currently being used

active movements

the current movement; movements that are currently in progress

Advanced Go to

a set of a maximum of twenty-one (21) *recorded positions* played one after the other

synonym: *trajectory*

AP

flammable anesthetic mixture with air

APG

flammable anesthetic mixture with oxygen or nitrous oxide

available movements

all movements that are possible, or available, in the current operating mode

synonym: [possible movement](#)

CAN bus

a message-based communication protocol that behaves like a nervous system, connecting the actuators, sensors, and controllers of the arm without needing a central host computer

disambiguation: controller area network (CAN bus)

CB radio

public, bi-directional voice communication service over a short distance

disambiguation: citizens band radio (CB radio)

control elements

devices used to control the product

Examples: button-style accessible switch, external joystick

DoF

the number of independent, motorized joints, or axes of motion, the arm possesses, that help the arm to move in specific directions that copy how the human arm moves

disambiguation: degrees of freedom (DoF)

Drinking mode

mode of operation in which the user can use Jaco to drink

ECM

a device that handles movement and motor control of a wheelchair; expandable switch-enabled device

Example: environmental control or environmental interface for Curtis Instruments Q-Logic 3 and ICON electronics on some power wheelchairs

disambiguation: *Electronic Control Module (ECM)*

ECU

an assistive device that sends directional output from the wheelchair drive control through a digital DE-9 connector



Note: DE-9 is commonly called a DB9 connector

Example: environmental control or environmental interface for Curtis Instruments Q-Logic 3 and ICON electronics on some power wheelchairs

disambiguation: *Environment Control Unit (ECU)*

synonym: *ACM, IOM*

EMI

electromagnetic interference generated by an external source

disambiguation: *electromagnetic interference (EMI)*

end user

a person who uses Jaco to accomplish daily activities

Error mode

mode of operation that indicates there is an error



Important: Uncorrected errors can lead to *major errors*

FCC

governmental agency of the United State of America that regulates interstate and international communications

disambiguation: *Federal Communications Commission (FCC)*

Finger mode

a mode of operation that uses the Jaco® assistive robot fingers

fixed environment

an object that does not move on its own

Example: light switches, doors, walls, tables, and so on

full reach

the maximum distance the robotic arm can extend and continue operating

synonym: [maximum reach](#), *effective reach*

Go to position

a Cartesian point with (x, y, z) coordinates saved to a switch or joystick; point that can be reached without cycling through modes; point that can be reached by holding the mapped input

synonym: [Memory position](#)

hamburger menu

three vertical lines that, when tapped or clicked, expose a menu of actions or tasks from which the user can select; usually used for main menus



synonym: *hamburger*, *menu*, [main menu](#)

handedness

the tendency to use one hand more than the other

Home position

physical position of Jaco when it is ready to be used; the robotic arm is waiting for commands from a control device; control features are enabled; power consumption is normal; Jaco is in [Standby mode](#)

synonym: [Ready position](#), [Starting position](#)

IC ID

disambiguation: *Industry Canada Identifier (IC ID)*

Ingress Protection rating

a rating that states how much protection an enclosure has against dust, contact, and water

The first number is the class for the protection against solids. The second number is the class for the protection against liquids. Higher numbers show greater protection. An X instead of a number shows the device has not been tested for the category.

disambiguation: *Ingress Protection (IP) rating*

input device

the device used on the wheelchair to communicate with Jaco; a joystick; a switch

synonym: *adaptive switch; capacity switch; accessible button; button*

integrator

an entity that integrates devices or equipment with other equipment to create a larger system

interpolate

insert, incorporate, fill in

IOM

a device that sends directional output from the wheelchair drive control through a digital DE-9 connector; a DE-9 connector is commonly called a DB9 connector

disambiguation: Input/Output Modules (IOM)

synonym: [IOM](#)

laterality

the preference to use one side of the body over the other

LCD

a flat panel display that uses liquid crystals to operate

disambiguation: liquid crystal display (LCD)

LED

a semiconductor device that emits light

disambiguation: light-emitting diode (LED)

Lift Arm mode

a mode of operation that controls the up and down movements of Kinova® Lift Arm

Lowered position

the position of Lift Arm when it is not in use, or when the user needs to reach something that is low or near the ground

main menu

a menu, or list, of operations that can be performed; most often accessed in the banner of an software or from a [hamburger menu](#)

Major error mode

mode of operation that indicates there is a major error; Jaco does not move and can shut down



Trouble: Possible causes:

- Something inside Jaco becomes disconnected
- An error repeatedly occurs in close succession
- Temperature of Jaco exceeds its limit temperature

mapping

the result of assigning one value to another value or to an object to create a configuration

synonym: configuration

maximum reach

synonym: maximum range, [maximum reach](#), effective reach

Memory position

synonym: [Go to position](#)

menu

a list of actions that can be taken in an application

middle reach

position of the robotic arm that is the mid-point between the [minimum reach](#) and the [maximum reach](#) where the robotic arm can continue operating

synonym: medium range, medium reach

minimum reach

the minimum distance the robotic arm can retract and continue operating

synonym: minimum range

mode

a way of operating or using a system

Mode button

a wheelchair control button used to cycle through different modes of operation, including moving the robotic arm between *Ready* and *Retracted* positions; a wheelchair control button that redefines the use of the input device

MPDG

disambiguation: *Medical Device Law Implementation Act (MPDG)*

MRADLs

activities performed on a daily basis that require assistance to be completed

Examples of activities: feeding, toileting, dressing, grooming, and bathing

Examples of tools (non-exhaustive): fork, spoon

disambiguation: *Mobility-related Activities of Daily Living (MRADLs)*

No-go zone

restricted zone around the user that the robotic arm cannot enter

Normal mode

mode of operation in which Jaco operates normally

synonym: *Standard mode, Standby mode*

Organic Light-Emitting Diode

a technology in which each pixel of a display produces light when electric current passes through it

disambiguation: *Organic Light-Emitting Diode (OLED)*

orientation movement

rotational movement; *wrist* movements

Parked position

physical position of Jaco when it is not in use to decrease the amount of space it takes; control features are disabled; power consumption is reduced

synonym: *Retracted position*, stowed

PC

a desktop computer, laptop computer, tablet, or touchscreen using the Microsoft operating system

disambiguation: *personal computer (PC)*

pending configuration

a configuration defined in a software, but not yet applied to the robot

possible movement

a movement that is possible to make in the current mode

synonym: *available movements*

pre-certified module

a module that is already certified and is integrated into the product

Profile button

a wheelchair control button used to change the overall characteristics of the wheelchair, such as different driving capabilities indoors or driving capabilities outdoors

Protection zone

the area around the user in which the robotic arm is prohibited from entering; the safety zone around the user that is made of a *No-go zone* and a *Slow zone*

PSU

disambiguation: *Power Supply Unit (PSU)*

Raised position

the maximum upward position of Lift Arm that causes Jaco to be in the field of vision of the user and in which the user can move Jaco in all directions

synonym: *Starting position*

range of motion

horizontal, vertical, and rotational movement defined by the degrees of freedom of the robotic arm

disambiguation: *range of motion (ROM)*

Ready position

physical position of the robotic arm in which it is waiting for input; control features are enabled; power consumption is normal; Jaco is in *Standby mode*; the starting position in which Jaco can start receiving directional commands

synonym: *Home position, Starting position*

recorded position

a Cartesian point with (x, y, z) coordinates saved to a switch or joystick; point that can be reached without cycling through modes; point that can be reached by holding the mapped input

synonym: *Go to position*

restart

to stop a software or device, and start them again, usually through a menu item

Retracted position

physical position of Jaco when it is not in use to decrease the amount of space it takes and to move it out of the field of view of the user; control features are disabled; power consumption is reduced

synonym: *Parked position*, *stowed*

R-net

software communication protocol and proprietary electronic hardware used in some powered wheelchairs

role

a type of user with a specified set of tasks that they can do, frequently in the realm of software

Safety zone

synonym: *Protection zone*

seat rail adapters

slot nuts, spacers, and threaded strips used to secure equipment to a wheelchair

singularity

a position beyond the range of motion (ROM) of the robotic arm in which it is unable to move the end effector in a given direction no matter how it moves its joints

Sleep mode

mode of operation in which Jaco senses a lack of activity and uses less energy while it waits for further input

Slow zone

a secondary [Protection zone](#) that is immediately outside the [No-go zone](#); a zone in which the robotic arm can move, but only at pre-defined reduced speeds

Standard mode

mode of operation in which Jaco operates normally

Standby mode

a mode of operation in which the device waits for input

Starting position

the position in which Jaco can start receiving directional commands

synonym: [Ready position](#), [Home position](#)

TPC

materials made with properties of polyesters and polyethers

disambiguation: *Thermoplastic Copolyester Elastomer (TPC)*

TPE

materials made with properties of thermoplastics and elastomerics

disambiguation: *Thermoplastic Elastomer (TPE)*

trajectory

the path taken by a moving object; path for the robot gripper to take; path defined with software with a starting point, an end point, and several intermediate points along the path

The software [interpolates](#) the points to make one smooth motion along the defined points.

synonym: [Advanced Go to](#)

Translation mode

a mode of operation that describes left and right, forward and backward, and up and down movements

tremor

an involuntary, rhythmic, oscillatory movement caused by a neurological condition

USB

industry computer bus standard that makes it easier to transfer data between devices

disambiguation: *Universal Serial Bus (USB)*

synonym: *flash drive, thumb drive, [USB key](#), USB stick*

USB controller

a controller, or device, that connects with a [USB](#) cable

USB device

a device that uses the industry computer bus standard that makes it easier to transfer data between devices

disambiguation: *universal serial bus (USB) device*

USB key

a portable storage device that plugs into [USB](#) ports

synonym: *flash drive, thumb drive, [USB](#), USB stick, [USB storage device](#)*

USB storage device

a portable storage device that plugs into [USB](#) ports

synonym: *flash drive, thumb drive, [USB](#), USB stick*

WEEE

compliance directive for handling electrical waste and electrical equipment

disambiguation: *Waste Electrical and Electronic Equipment (WEEE)*

wheelchair drive controls

any accessible input used to operate any function of a wheelchair, including driving, motorized seating functions, and control of accessories like a computer mouse and robotic arms

Wheelchair mode

in general, an output mode of operation that indicates that the wheelchair controls are in use

wrist

the section between the robotic arm and the robotic hand

Wrist mode

a mode of operation that helps the user orient the gripper



Note: Default for Wrist mode is B3.

TOGETHER IN ROBOTICS



THERE IS NO NEED TOO SMALL.
NO TASK TOO GREAT.

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