KINOVA JACO™ *Prosthetic robotic arm*

User Guide

KINOVA

Achieve Extraordinary

Contents

About this document

⚠ Read all instructions before using this product.

⚠ Keep these instructions for future reference.

⚠ Read all warnings on the product and in this guide.

⚠ Follow all instructions.

This document contains information regarding product setup and the operation. It is intended for:

- Field service, customer support and sales employees of authorized Kinova distributors
- Kinova product end users

Symbols, definitions, and acronyms


Important information regarding the safety related to the product and the user.


Tip on the maintenance, operation and manipulation of Kinova's products.


Refer to accompanying documents.


Direct current.


Alternating current.


Operating temperature range.


Compliance with WEEE2 directive.

Compliance with ROHS3 directive.


Type BF Applied Part device.

Warranty

This section describes the Kinova warranty terms.

Subject to the terms of this clause, Kinova warrants to End User that the Products are free of defects in materials and workmanship that materially affect their performance for a period of two (2) years from the date Kinova ships the Products to the End User ("Delivery Date").

Kinova agrees to repair or replace (at Kinova's option) all Products which fail to conform to the relevant warranty provided that:

1. Notification of the defect is received by Kinova within the warranty period specified above.
2. Allegedly defective Products are returned to Kinova, at the End User's expense, with Kinova's prior authorization within thirty (30) days of the defect becoming apparent.
3. The Products have not been altered, modified or subject to misuse, incorrect installation, maintenance, neglect, accident or damage by excessive current or used with incompatible parts
4. The End User is not in default under any of its obligations under this Agreement.
5. Replacement Products must have the benefit of the applicable warranty for the remainder of the applicable warranty period.

If Kinova diligently repairs or replace the Products in accordance with this section, it will have no further liability for a breach of the relevant warranty.

Allegedly defective Products returned to Kinova in accordance with this contract will, if found by Kinova on examination not to be defective, be returned to End User and Kinova may a charge a fee for examination and testing.

The warranty cannot be assigned or transferred and is to the sole benefit of the End User.

Where the Products have been manufactured and supplied to Kinova by a third party, any warranty granted to Kinova in respect of the Products may be passed on to the End User.

Kinova is entitled in its absolute discretion to refund the price of the defective Products in the event that such price has already been paid.

Warnings

This section summaries important warnings and cautions related to use of the robotic arm.

⚠ It is not recommended to use the arm under heavy rain or snow.

⚠ Never use the HOME/RETRACTED function when carrying liquid. The HOME position is preset and the wrist may rotate and drop the liquid.

⚠ Do not manipulate cutting, very sharp or any dangerous tools or objects with the arm.

⚠ When the power is turned off, the arm will fall down and may cause damage to itself, depending on its position at the time of disconnection. Be sure to support its wrist before turning the power off.

⚠ Do not force the fingers beyond their maximal opening. This could damage some internal components.

⚠ Do not immerse any part of the arm under water or snow.

⚠ When lifting weight near the maximum load and reach, if the red lights of the controller blink, put down the object in the gripper, bring back the arm to HOME or RETRACTED position and wait until the warning goes away before using it again.

Disclaimer

KINOVA™ and Kinova's logo are trademarks of Kinova Inc., herein referred to as Kinova. All other brand and product names are trademarks or registered trademarks of their respective corporations.

The mention of any product does not constitute an endorsement by Kinova. This manual is furnished under a lease agreement and may only be copied or used within accordance with the terms of such lease agreement. Except as permitted by such lease agreement, no part of this publication may be reproduced, stored in any retrieval system, or transmitted, in any form or by any means, electronic, mechanical, recording, or otherwise, without prior written consent of Kinova.

The content of this manual is furnished for informational use only, is subject to change without notice, and should not be construed as a commitment by Kinova. Kinova assumes no responsibility or liability for any errors or inaccuracies that may appear in this document.

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

Address any questions or comments concerning this document, the information it contains or the product it describes to:

support@kinovarobotics.com

Kinova may use or distribute whatever information you supply in any way it believes appropriate without incurring any obligations to you.

General Information

The KINOVA JACO™ Prosthetic robotic arm is a light-weight robot composed of six inter-linked segments. Through the controller or through a computer, the user can move the robot in three-dimensional space and grasp or release objects with the gripper (if a gripper is installed).

⚠ Do not modify this equipment without authorization of the manufacturer.

⚠ The Normal Use Definition contains some fundamental information to the proper operation of the robotic arm. arm.

⚠ It is not recommended to use the arm under heavy rain or snow.

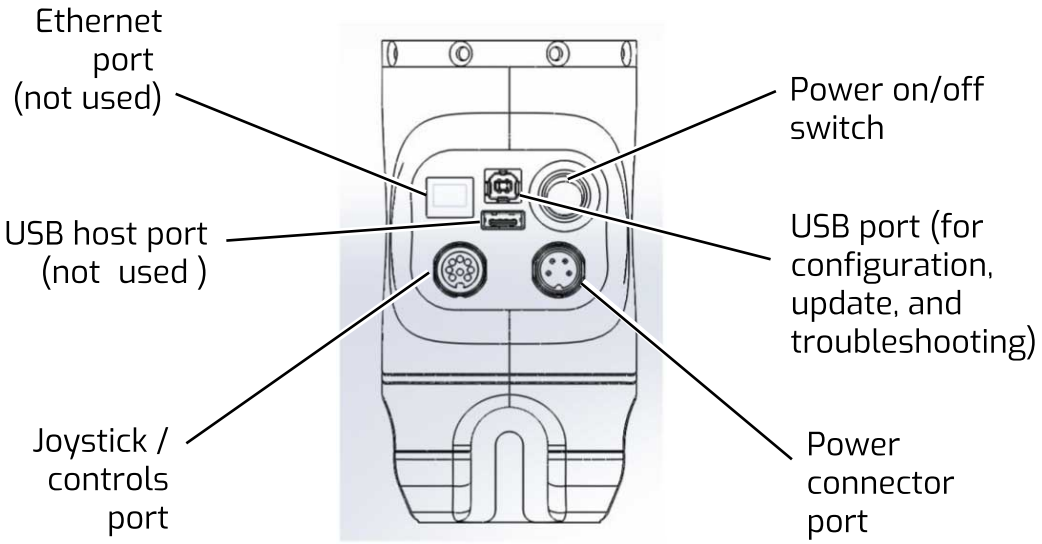
6 DOF Curved Wrist Components

This section shows the components of the 6 DOF curved wrist robotic arm.

External Connectors

This section describes the external connectors of the robotic arm controller base.

The following figure shows the external connectors located on the arm controller base.



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

The **power on /off switch** is used to power up or power down the robotic arm.

The **power connector** port is used to connect the robotic arm to electrical power.

The **joystick / controls port** is used to plug in controls for the arm.

The **USB port** is used to connect to a computer.

⚠ The control Port and Power Connector are intended to be connected only with a Kinova approved device. Connecting other devices may result in bad performance or even make your arm inoperable and void your warranty.

⚠ Do not override the safety purpose of the polarized or grounding type plug. If the provided cable does not fit in your outlet, consult an electrician for replacement of obsolete outlet.

⚠ To prevent risk of fire or electric shock, avoid overloading wall outlets and extension.

⚠ Protect the cords from being walked on or pinched.

JACO specifications

This section describes the specifications of the JACO robotic arm.

Table 1:

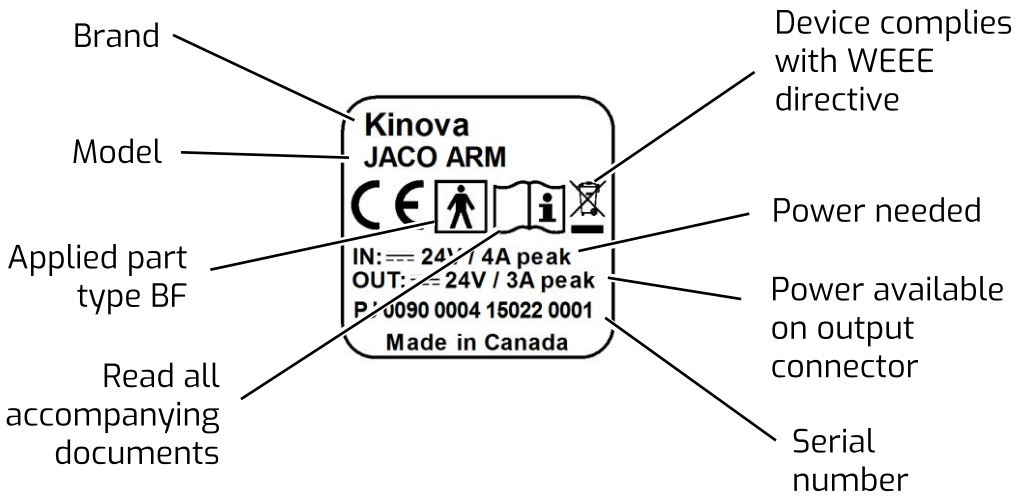
Total weight	5.2 kg
Reach	90 cm
Maximum payload	• 1.6 kg (mid-range continuous) • 1.3 kg (full-reach peak / temporary)
Materials	Carbon fiber (links), Aluminum (actuators)
Joint range (software limitation)	± 27.7 turns
Maximum linear arm speed	20 cm / s
Power supply voltage	18 to 29 VDC
Average power	25 W (5 W in standby)
Peak power	100W
Water resistance	IPX2
Operating temperature	-10 °C to 40 °C *

* The robotic arm may be used outside this temperature range, but only for a limited time. For more details, contact your local distributor.

Markings and Labels

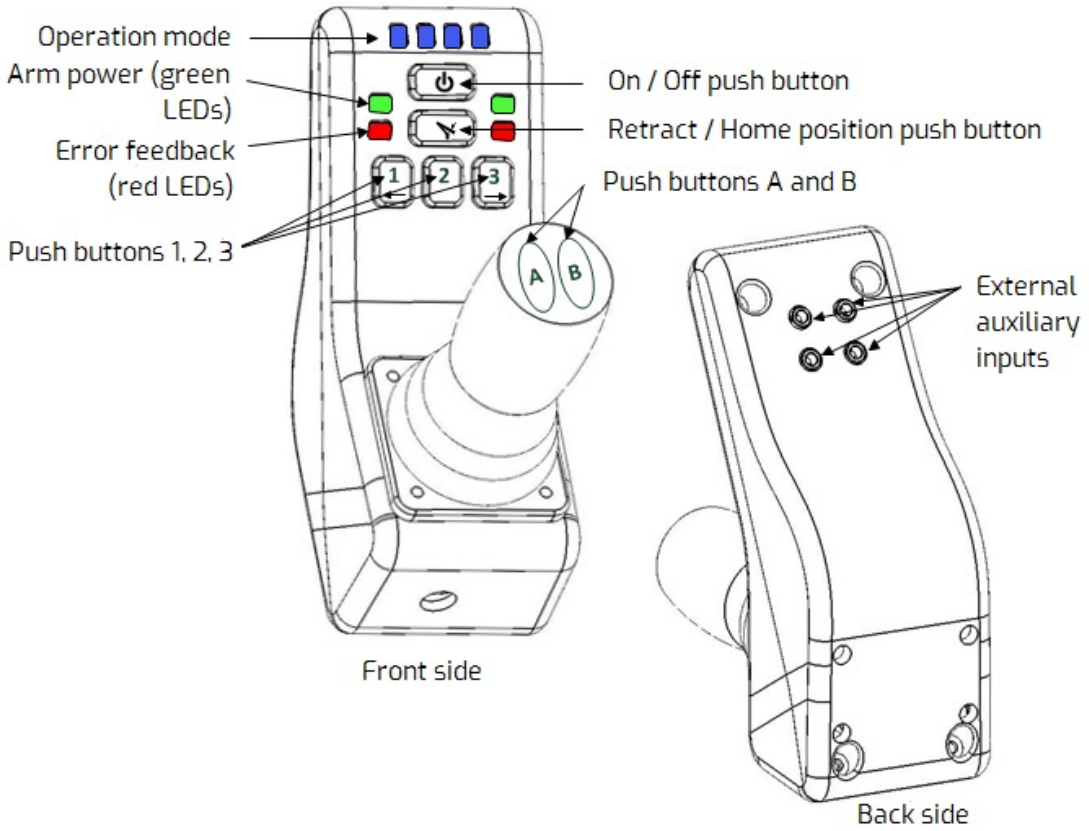
This section describes markings / labels on the robotic arm.

Please note that these labels may slightly differ from the ones accompanying your device depending of your country. The following figure depicts the information about the label affixed on the robotic arm controller.



Kinova joystick controller

The Kinova standard controller is a three-axis joystick mounted on a support. The controller iincludes five independent push buttons and four external auxiliary inputs (on the back side).



Joystick movements and modes

The Kinova joystick allows to control the arm in a “2-axis” or “3-axis” mode. The “2-axis” mode will disable the joystick twist rotation.

The following table shows the button default factory settings for using the joystick in a 2-axis and 3-axis modes.

Table 2: Default joystick button settings

Buttons	One click	Hold 2 sec (Hold until position is reached)
⏻	Deactivate / Activate Joystick	Change joystick operating mode (2-axis Vs 3-axis)
	---	Home / Retracted function
	3-Axis	
1	Deactivate / Activate Drinking mode	---
2	---	Set Position
3	---	Go to pre-set position
A	Reach Finger mode	Decrease speed
B	Reach Translation & Wrist mode	Increase speed
Ext1	Reach Finger mode	Decrease speed
Ext2	Reach Translation and Wrist mode	Increase speed
Ext3	--	Home / Retracted function
Ext4	Deactivate / Activate Drinking mode	--
	2-Axis	
1	Deactivate / Activate Drinking mode	---
2	Reach Wrist orientation & Finger mode	Decrease speed
3	Reach Translation-X/Y & Translation-Z / Wrist rotation mode	Increase speed
A	---	---
B	---	---
Ext1	Reach Wrist orientation & Finger mode	Decrease speed
Ext2	Reach Translation-X/Y & Translation-Z / Wrist rotation mode	Increase speed
Ext3	--	Home / Retracted function
Ext4	Deactivate / Activate Drinking mode	--

Kinova Joystick LED feedback

The Kinova joystick offers visual feedback:

- Blue lights : Feedback on control mode
- Green lights : Feedback on arm power
- Red lights : Feedback on error

Kinova joystick Blue LEDs feedback

This section describes the blue LED feedback on the Kinova controller.

The blue LEDs on the controller give feedback on the current control mode. The interpretation of the blue mode LED indicators is described in the following table.

Table 3: Control mode feedback

Blue LED indication		Control Mode
3-Axis		Translation (X-Y-Z)
		Wrist
		Fingers
		Drinking mode (to be used with wrist rotation mode)
		Disabled controller
2-Axis		Translation (X-Y)
		Translation (Z) / Wrist Rotation
		Wrist Orientation
		Fingers
		Drinking mode (to be used with wrist rotation mode)
		Disabled controller

When no blue lights are visible, the controller is disabled. To enable the controller, you must either proceed with the following options:

- The On/Off button must be pushed
- The arm must be set in its HOME position by holding the HOME/RETRACTED function until the arm stops moving.

Kinova joystick Green LEDs feedback

This section describes the green LED feedback on the Kinova controller.

The green lights offer visual feedback on the power status of the arm.

Table 4: Power status feedback

Green LED indication	Power Status
Flashing	The arm has just been turned on and the internal communication is synchronizing. The arm is not yet ready to use.
Solid	The arm is powered and ready to use.

Kinova joystick Red LEDs feedback

This section describes the red LED feedback on the Kinova controller.

The red lights offer visual feedback on possible errors that may occur while operating the arm:

Table 5: Error status feedback

Red LED indication	Cause of the Error Status	Action to resolve the situation
Flashing	The weight that is being lifted is too heavy or too much force is applied on the arm.	Safely put down the object, or release force applied on the arm, and wait until red lights turn off.
	The temperature of a section of the arm is too high.	The usage of the arm is excessive and doesn't respect the normal use definition. Safely put down any object that is in the gripper, bring back the arm to its RETRACTED position, and wait until red lights turn off.
	The input voltage to the arm (or batteries) is too low or too high.	Safely put down any object that is in the gripper, bring back the arm to its RETRACTED position. Ensure the power supply is appropriate, connections are secure and batteries are charged properly before using the arm again.
Solid	The arm is in fault	Turn off the arm and turn it back on. If the problem remains, contact your distributor or Kinova.

Operating principles and Cartesian mode

This section describes at a high level the control of the arm using the joystick in Cartesian mode.

Operating principles

The operating principles are very simple and intuitive. The robotic arm may be operated through several controllers. The following sections present the general control principles through Kinova's joystick.

Basic movements

The normal control of the robotic arm with the joystick is said to be Cartesian. The user commands the end-effector's translations (position variations) with respect to the base and the rotations (orientation variations) around the end-effector's reference point. The different joints are piloted automatically following the given command.

In "Translation mode", the user controls the position of the gripper in space. The gripper will always keep its parallelism with the arm's base. Translation X refers to left/right movements of the gripper. Translation Y refers to front/back movements of the gripper. Translation Z refers to up/down movements of the gripper.

In the "Wrist mode", the user controls the position of the gripper around its center point (reference point) which will not move (or move slightly) when operating in this mode. Lateral orientation refers to a thumb/index circular movement of the wrist around the reference point. Vertical orientation refers to a top/bottom circular movement of the wrist around the reference point. Wrist rotation refers to a circular movement of the gripper around itself.

The "Drinking mode" is to be used with the wrist rotation only. While operating the Jaco² arm in "Drinking mode", the reference point (normally set in the middle of the gripper), is offset in height and length to produce a rotation around another point in the space of the arm.

In the "Finger mode", the user controls the opening and closing of the fingers.

Note: The arm will sometimes respond differently to a given command than described in this section. This may be due to the singularity and collision avoidance algorithms embedded in the kinematics. It is a normal protective behaviour of the arm and is position dependent. Both these avoidance algorithms can be deactivated by the user.

Home / Retracted positions

This section describes the Home and Retracted positions of the robotic arm.

The arm comes with two factory default pre-set positions that may be configured in the Kinova Development Center:

- Home position and
- Retracted position.

The Home position refers to the position of the arm when it is ready to be used. In the Home position, the arm is awaiting a commands from the joystick.

The Retracted position refers to the position of the arm when it is not used. The user should always place the arm in the Retracted position when it is unused as it decreases the physical volume occupied by the arm. In the Retracted position, the arm is in standby mode; the joystick features are disabled and power consumption is much lower.

⚠ Never use the Home / Retracted function when carrying liquid. The Home position is pre-set and the wrist may have to rotate and will drop the liquid.

Operating the arm via joystick

This section describes operation of the arm using the joystick.

This section explains how to operate the arm with factory configuration. Contact your reseller for operation instructions in the case of an adapted configuration.

⚠ Before operating the arm, please make sure it is properly installed.

⚠ Do not manipulate cutting, very sharp or any dangerous tools or objects with the arm.

⚠ This equipment is not designed to act as a lift.

⚠ This equipment is not designed to be used in presence of flammable mixture. (Not AP or APG rated).

⚠ Do not install the arm near any heat sources, such as radiators. Do not use it to directly manipulate hot objects.

Joystick control quick start

This section describes how to get started using the Kinova joystick to control the arm in the default configuration.

About this task

Procedure

1. Turn ON the device by pushing the ON/OFF switch located on the arm base.
2. Wait until the green lights on the controller stop flashing.
3. Put the arm in its Home position by holding down the HOME/RETRACTED button. until the arm stops moving. The arm will slowly reach the Home position.

   Note: When starting the arm, you are in 3-Axis operation mode, "Translation control mode", meaning that any movement of the joystick will move the center of the gripper parallel to the floor.
4. You may move the 3 axes of the joystick to experience the Translation control mode.

   Note: To change the operating mode of the Joystick, hold the ON/OFF button for 2 seconds. At this point, you are in 2-axis mode and the stick rotation is deactivated.
5. One press of Button B will bring you in Wrist control mode meaning that any movement of the joystick will result in a rotation of the gripper around its center.

   Note: Another press of Button B will bring you back in Translation control mode.
6. One press of Button 1 will activate the Drinking mode which may be used only in Wrist mode. When rotating the joystick lever, you will see that the arm's wrist rotation now compensates for the height and radius of a virtual glass. This movement is ideal when trying to drink directly from a glass.

   Note: Another press of Button 1 will disable Drinking mode.
7. One press of Button A will bring you in Finger control mode. The fingers will move per a left/right inclination of the joystick.

   Note: At any time, you may use the Home / Retracted button until the arm stops moving to bring it back to its Home position.

   Note: If you hold the Home / Retracted button again, the arm will start to move toward the Retracted position.
8. Hold the On/Off Button for 2 seconds to change the operating mode. This will disable the stick rotation. You are now in a 2-Axis Translation control mode. Stick rotation won't have any effect and you will only be able to control the horizontal translation of the arm (X- and Y- axis).
9. One press of Button 3 will bring you to control the vertical translation of the gripper (Translation-Z) and Wrist rotation.

   Note: Another hit on Button 3 will bring you back in Translation-X and Translation-Y control mode.
10. One press of Button 1 will activate the Drinking mode which may be used only in Wrist mode. When rotating the joystick lever, you will see that the arm's wrist rotation now compensates for the height and radius of a virtual glass. This movement is ideal when drinking directly from a glass.
11. One press of Button 2 will bring you to control the wrist orientation (Lateral orientation and Vertical orientation).
12. Another press of Button 2 will bring you to Finger control mode. The fingers will move according to a left/right inclination of the joystick.

Note: Another press of Button 2 will bring you back in Lateral orientation and Vertical orientation control mode.

Default joystick motion settings - Cartesian three-axis mode

This section describes default motion settings in Cartesian three-axis mode.

Table 6:

Joystick movement	Arm movement	Availability
	Translation Mode	
Incline FRONT	Gripper moves forward	4 / 6 / 6 -S / 7 DOF-S
Incline BACK	Gripper moves backward	4 / 6 / 6 -S / 7 DOF-S
Incline LEFT	Gripper moves left	4 / 6 / 6 -S / 7 DOF-S
Incline RIGHT	Gripper moves right	4 / 6 / 6 -S / 7 DOF-S
Rotate stick CLOCKWISE	Gripper moves up	4 / 6 / 6 -S / 7 DOF-S
Rotate stick COUNTERCLOCKWISE	Gripper moves down	4 / 6 / 6 -S / 7 DOF-S
	Wrist Mode	
Incline FRONT	Vertical orientation – Top side	6 / 6 -S / 7 DOF-S
Incline BACK	Vertical orientation – Bottom side	6 / 6 -S / 7 DOF-S
Incline LEFT	Lateral orientation – Thumb side	6 / 6 -S / 7 DOF-S
Incline RIGHT	Lateral orientation – Index side	6 / 6 -S / 7 DOF-S
Rotate stick CLOCKWISE	Wrist rotation clockwise	4 / 6 / 6 -S / 7 DOF-S
Rotate stick COUNTERCLOCKWISE	Wrist rotation counterclockwise	4 / 6 / 6 DOF-S / 7 DOF-S
	Finger Mode	
Incline LEFT	Close Fingers (3 finger mode)	4 / 6 / 6 -S / 7 DOF-S
Incline RIGHT	Open Fingers (3 finger mode)	4 / 6 / 6 -S / 7 DOF-S
Incline FRONT	Open Fingers (2 finger mode)	6 -S/ 7 DOF-S
Incline BACK	Close Fingers (2 finger mode)	6 -S / 7 DOF-S

Default joystick motion settings - Cartesian two-axis mode

This section describes default motion settings in Cartesian two-axis mode.

Table 7:

Joystick movement	JACO arm movement	Availability
	Translation-X and Translation-Y	
Incline FRONT	Gripper moves forward	4 /6 / 6S / 7S DOF
Incline BACK	Gripper moves backward	4 /6 / 6S / 7S DOF
Incline LEFT	Gripper moves left	4 /6 / 6S / 7S DOF
Incline RIGHT	Gripper moves right	4 /6 / 6S / 7S DOF
	Translation-Z and Wrist Rotation	
Incline FRONT	Gripper moves up	4 /6 / 6S / 7S DOF
Incline BACK	Gripper moves down	4 /6 / 6S / 7S DOF
Incline LEFT	Wrist rotation clockwise	4 /6 / 6S / 7S DOF
Incline RIGHT	Wrist rotation counter-clockwise	4 /6 / 6S / 7S DOF
	Wrist Orientation	
Incline FRONT	Vertical orientation – Top side	6 / 6S /7S DOF
Incline BACK	Vertical orientation – Bottom side	6 / 6S /7S DOF
Incline LEFT	Lateral orientation – Thumb side	6 / 6S /7S DOF
Incline RIGHT	Lateral orientation – Index side	6 / 6S /7S DOF
	Finger Mode	
Incline LEFT	Close Fingers (3 finger mode)	4 /6 / 6S / 7S DOF
Incline RIGHT	Open Fingers (3 finger mode)	4 /6 / 6S / 7S DOF
Incline FRONT	Open Fingers (2 finger mode)	6S / 7S DOF
Incline BACK	Close Fingers (2 finger mode)	6S / 7S DOF

Normal use definition

This section describes the normal use of the robotic arm.

The definition of a normal use of the robotic arm includes that you can lift, push, pull or manipulate a maximum load of:

- **Continuously** 1.6 kg from minimum to middle reach (45 cm distance between actuator #2 and the load) for 6 DOF.
- **Temporary** 1.3 kg from middle to full reach (90 cm distance between the actuator #2 and the load) for 6 DOF.

The arm is designed to be able to hold objects in the environment of the user, but it is a manipulator that in some positions and loads near the maximum reach and maximum loads holds for a long period, it can heat. When this occurs, before overheating and being dangerous for either the user or the arm, red lights on the joystick will blink. This is a warning. Simply put down any object in the gripper, and bring back the arm to the HOME or RETRACTED positions and wait until the warning goes away before using the arm.

If you don't use a Joystick in your application, make sure to read all the error statuses and temperature of all actuators modules via the API to ensure that they do not go higher than recommended parameters. If this occurs, the arm should be held in an idle position near the base for a certain time without any object in the gripper to cool down the arm.

⚠ When lifting weight near the maximum load and reach, if the red lights of the controller blinks, put down the object in the gripper, and bring back the arm to HOME or RETRACTED position and wait until the warning goes away before using it.

Note: During normal operation, the joints are subject to heating. The joints are normally covered with plastic rings which will protect the user from any danger that may be occurred by the heating of the metal parts.

The fingers of the arm are made flexible in order to protect the internal mechanism. When using the fingers to push on objects, the user must take special care not flex the fingers beyond their maximal opening as this could damage the internal mechanism.

⚠ Do not force the fingers beyond their maximal opening as this could damage some internal components.

Electromagnetic interference from radio wave sources

This section describes electromagnetic interference considerations for the JACO robotic arm.

Even if the product complies with all relevant standards, your arm may still be susceptible to electromagnetic interference (EMI), which is interfering electromagnetic energy (EM) emitted from sources such as radio stations, TV stations, amateur radio (HAM) transmitters, two way radios, and cellular phones. The interference (from radio wave sources) can cause the product to stop moving for a period of 10 seconds. In this case, the device will simply re-initialize and you will be able to continue to use it. In extremely rare case, it can also permanently damage the control system.

The intensity of the interfering EM energy can be measured in volts per meter (V/m). The product can resist EMI up to certain intensity. This is called “immunity level”. The higher the immunity level is, the greater is the protection. At this time, current technology is capable of achieving at least a 20 V/m immunity level, which would provide useful protection from the more common sources of radiated EMI.

There are a number of sources of relatively intense electromagnetic fields in the everyday environment. Some of these sources are obvious and easy to avoid. Others are not apparent and exposure is unavoidable. However, we believe that by following the warnings listed below, your risk to EMI will be minimized.

The sources of radiated EMI can be broadly classified into three types:

1. Gripper-held portable transceivers (e.g. transmitters-receivers with the antenna mounted directly on the transmitting unit, including citizens band (CB) radios, walkie-talkie, security, fire and police transceivers, cellular phones, and other personal communication devices). Some cellular phones and similar devices transmit signals while they are ON, even if not being actively used.
2. Medium-range mobile transceivers, such as those used in police cars, fire trucks, ambulances and taxis. These usually have the antenna mounted on the outside of the vehicle.
3. Long-range transmitters and transceivers, such as commercial broadcast transmitters (radio and TV broadcast antenna towers) and amateur (HAM) radios. Other types of gripper-held devices, such as cordless phones, laptop computers, AM/FM radios, TV sets, CD players, cassette players, and small appliances, such as electric shavers and hair dryers, so far as we know, are not likely to cause EMI problems to your device.

Because EM energy rapidly becomes more intense as one move closer to the transmitting antenna (source), the EM fields from gripper-held radio wave sources (transceivers) are of special concern. It is possible to unintentionally bring high levels of EM energy very close to the control system while using these sorts of devices. Therefore, the warnings listed below are recommended to reduce the effects of possible interference with the control system.

⚠ Do not operate gripper-held transceivers (transmitter’s receivers), such as citizens band (CB) radios, or turn ON personal communication devices, such as cellular phones, while the device is turned ON.

⚠ Be aware of nearby transmitters, such as radio or TV stations, and try to avoid coming close to them.

⚠ Be aware that adding accessories or components, close to the device may make it more susceptible to EMI.

⚠ Report all incidents of unintended shut down to your local distributor, and note whether there is a source of EMI nearby.

Maintenance and Disposal

This section describes maintenance and disposal considerations.

Cleaning instructions

Only the external surfaces of the product may be cleaned. Cleaning may be done using a damp cloth and light detergent. The following described the steps for the cleaning the product:

- Prepare a water/soap preparation using a proportion of about 2ml of dish soap for 100ml of water
- Immerse a clean cotton cloth in the preparation
- Take out the cloth and wring out thoroughly
- Gently rub the external surface to be cleaned

⚠ Do not wash more than three times per day.

⚠ Do not immerse any part of the product under water or snow.

⚠ The product is not intended to be sterile. No sterilization process should be applied to the product.

⚠ Do not rub the external surfaces with abrasive materials.

Preventive Maintenance

The product requires no maintenance. Fingers should be cleaned and lubricated every 6 months.

⚠ Refer all services to qualified service personnel. A service is required when the apparatus has been damaged in any way, for example if the power-supply cord or plug is damaged, if the product does not operate normally or has been dropped.

⚠ There is no “home serviceable” part inside the product. Do not open..

Disposal

The product contains parts that are deemed to be hazardous waste at the end of their life. For further information on recycling, contact your local recycling authority or local Kinova distributor. In any way, always dispose of product through a recognized agent.

Packing Materials

The product packing material can be disposed as recyclable material.

Metal parts

Metal parts can be disposed as recyclable scrap metal.

Electrical parts, circuit boards, and carbon fiber

Please contact your local distributor to have information regarding disposal of such parts. You can also address questions directly to Kinova through our website (see Contacting Support).

Contacting support

If you need help or have any questions about this product, this guide or the information detailed in it, please contact a Kinova representative at support@kinovarobotics.com.

We value your comments!

To help us assist you more effectively with problem reports, the following information will be required when contacting Kinova or your distributor support:

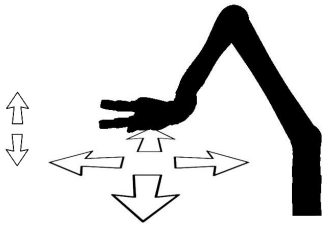
- Product serial number (This will allow the support agent to have all the information regarding your product as the software version running in the device, the part revisions and characteristics, etc.)
- Date/Time of the problem
- Environment where the problem occurred
- Actions performed immediately before the problem occurred

3-axis mode joystick controls reminder

This section is a visual reminder of the joystick controls in 3-axis mode.

Interface Display

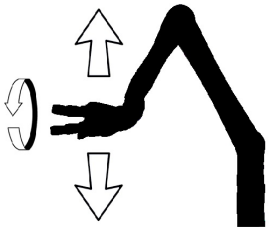
Translation Mode



Joystick control	Hand movement
Joystick forward	Forward
Joystick back	Backward
Joystick left	Left
Joystick right	Right
Stick rotation CW	Up
Stick rotation CCW	Down

Interface Display

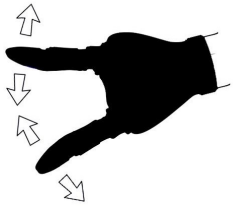
Wrist Mode



Joystick control	Wrist movement
Joystick forward	Top orientation
Joystick back	Bottom orientation
Joystick left	Thumb side orientation
Joystick right	Index side orientation
Stick rotation CW	Rotation of wrist
Stick rotation CCW	Rotation of wrist

Interface Display

Finger Mode



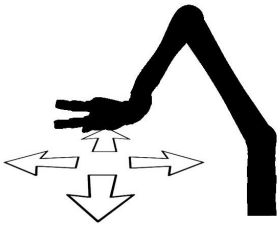
Joystick control	Finger movement
Joystick forward	Open 2 fingers
Joystick back	Close 2 fingers
Joystick left	Close 3 fingers
Joystick right	Open 3 fingers
Stick rotation CW	N / A
Stick rotation CCW	N / A

2-axis mode joystick controls reminder

This section is a visual reminder of the joystick controls in 2-axis mode.

Interface Display

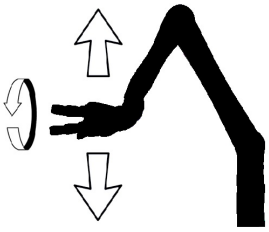
Translation X-Y



Joystick control	Hand movement
Joystick forward	Forward
Joystick back	Backward
Joystick left	Left
Joystick right	Right

Interface Display

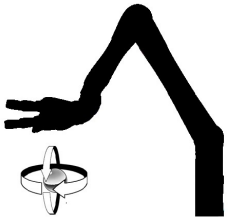
Translation Z / Wrist rotation



Joystick control	Movement
Joystick forward	Up
Joystick back	Down
Joystick left	Wrist rotation
Joystick right	Wrist rotation

Interface Display

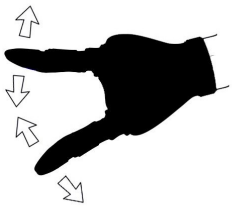
Wrist Orientation



Joystick control	Wrist orientation
Joystick forward	Top
Joystick back	Bottom
Joystick left	Thumb side
Joystick right	Index side

Interface Display

Finger Mode



Joystick control	Finger movement
Joystick forward	Open 2 fingers
Joystick back	Close 2 fingers

Kinova Inc.
(Headquarters)

4333 Boul. de la Grande Allée
Boisbriand, Qc, Canada
J7H 1 M7

+1 (514) 277 – 3777
www.kinovarobotics.com
info@kinovarobotics.com

Kinova Europe GmbH

Friedrich-Ebert-Allee 13
53113 Bonn, Deutschland

+49 (0) 228-9293-9148
www.kinovarobotics.de
support@kinovarobotics.de

PS-PRA-JAC-UG-INT-EN 201804-1.0