Installation Guide

KINOVA®
Dynamic arm support 0540
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What is an arm support?

This section describes the concept of an arm support.

A dynamic arm support is an assistive technology product which allows people with limited arm and shoulder function to move their arms and hands more freely. This facilitates many kinds of daily activities, such as using a computer or eating. Arm supports use mechanisms to compensate for the weight of the user’s arm. Without having to expend energy to hold up the weight of the arm, people with limited function can then use what upper body strength they have to move their arm more easily. This can help maintain the muscles, joints and cognitive functions of the user.
Use of arm support and normal use definition

This section describes the normal use of the arm support.

The arm support device does not take over any arm function. The user makes the movements himself, using his own upper body arm strength. The device only supports part of the weight of the arm, making it easier to perform the movement. The device supports the arm through all movements within a 3D region. Actions performed while using the arm support are the responsibility of the user.

Limitations: The arm support is intended to be used to help support arm movements during typical, everyday activities at home, in public, or in a typical office environment. The arm support is **not** intended to be used while driving an automobile or operating other heavy equipment.
Symbols used in this guide

This section describes the meaning of symbols used in the guide.

The following symbols are used in this manual:

- Specialized disposal guidelines.
- Pinch point.
- Warning / Caution
KINOVA® Dynamic arm support 0540 specifications

This section describes the specifications of the KINOVA® Dynamic arm support 0540.

Specifications:

- Weight: 6600 g (14.5 lb)
- Weight compensation range: 600 g to 2300 g (1.3 lb to 5.0 lb)
- Housing size in upwards position (W x D x H): 17 cm x 10 cm x 85 cm
- Housing material: die cast aluminum and ABS plastic
Arm support safety

This section describes safety recommendations for use of the arm support.
The arm support works with a spring compensation mechanism. The tension in the springs provides the force for compensation. When the upper arm of the arm support is lowered, there will be tension on the springs. This tension will cause the support to spring upwards when you release the arm from the support. When removing the arm from the support, do so slowly and carefully and hold the upper arm of the support so that it doesn't spring up too suddenly.

When the arm support is in a locked position, make sure your arm is placed properly in the brace, with weight applied on the support, before releasing the brake or moving the arm support out of its locked position.

Hitting one of the compensation adjustment buttons while the Horizontal / Vertical (H / V) brake is activated will cause the brake to disengage. Only adjust compensation when your arm is in the brace.

When the arm support isn't used, always bring the upper arm segment of the arm support back into its most upwards position so that there is no tension on the springs.

Each day before using the arm support, it is recommended to give the arm support a quick check over to confirm that the brace is firmly attached and mechanisms are secure to hold up your arm.

The physical controller for the arm support provides the most reliable means of control. When wireless control with an Android app is used, make sure to keep the physical controller connected as a backup.

The arm support may only be used for the intended purpose. Any type of use which is not specified in this manual will be considered as improper use. The customer is solely responsible for material damage and injury of persons resulting from improper use.

Assembly, commissioning and maintenance should only be carried out by trained specialists.

Under no circumstance should you open the housing of the arm support. The warranty is void in such a case.

Do not use the arm support in environments exposed to corrosion hazards.

Do not immerse the arm support in water or use in heavy rain or snow. When cleaning the outside of the arm support, a moistened towel shall be used.

Protect the arm support against sand, vapours and dust. Do not use in sandy or dusty environments. Remove the arm support during haircuts as the small hairs can get into the support mechanisms. This can impair performance and reduce safety.

Be aware of finger pinching. There are potential pinch zones indicated on the support in two locations (identified on the support with stickers):

1. Hip joint
2. Shoulder joint

Never stick your fingers in any cavity of the product. Make sure people around you, particularly children, do not put their fingers near pinch points.
KINOVA® Dynamic arm support 0540 components

This section describes the main components of the KINOVA® Dynamic arm support 0540.

The dynamic arm support consists of the following main components:

- Rotation frame - the frame at the bottom mounting point on which the arm support rotates around a vertical axis
- Main axle - the vertical rotational axle
- Hip joint - the middle rotational point (close to the hip)
- Shoulder joint - the uppermost rotation axis
- Upper arm - the connection between the shoulder joint and the brace mounting point
- Brace mounting point - where the brace is connected
- Brace - where the arm rests while the arm support is in use (not shown)
Arm support wheelchair mounting

This section describes how to attach the wheelchair connector for the arm support to a wheelchair.

Before you begin

You will need:

- KINOVA® Dynamic arm support O540 mounting kit (contents of kit will be specific to wheelchair model)
- Hex key set

About this task

The Dynamic arm support O540 can be mounted on a powered wheelchair. Kinova provides specialized wheelchair mounting kits for this task.

Note: Some details will depend on the particular wheelchair model.

Note: Final device positioning relative to the user shall always be performed according to clinical personnel guidance, in order to ensure compatibility with:

- Care protocol
- Seating / positioning requirements
- Specific user condition

Ensure that clinical personnel are present during the installation to help with ensuring these considerations are taken into account.

Note: Once the installer, clinical personnel, and user are certain that they are satisfied with the positioning of the arm support, Loctite locking compound or locking washers can be used on all fasteners to secure the hold.

![Diagram of wheelchair mounting kit components]

Figure 1: Wheelchair mounting kit components
**Figure 2: Sample wheelchair mounting**

**Procedure**

1. Connect the bases of the two mounting brackets to the side rail of the wheelchair using the screws provided. You will need to use rail inserts / rail adapters to provide a place to connect the screws on the rail. If necessary, use spacers to bring the mounting farther out from the side of the wheelchair for clearance.

   **Note:** The diameter and number of screws and the number of rail inserts / adapters needed to connect the mounting bracket base will depend on the model of the wheelchair.

   **Note:** If a spacer is used, longer screws will be required to connect the bases of the mounting brackets.

   **Note:** The mounting kit will include the screws and rail inserts / adapters needed for the installation.

2. The mounting arm passes through the rectangular hole of each mounting bracket. Loosen the two screws on the side of each mounting bracket slightly to allow space to slide the mounting arm through. Once you have the right positioning of the mounting arm horizontally, tighten the screws to hold the mounting arm in place.

3. At the rear end of the mounting arm is a box-like structure with a rectangular passage going through it vertically. This is to hold the support for the wheelchair connector mount. On the back of this structure are four screws. Loosen them slightly to allow you to slide the support through. With the screws loosened, you can place the support, and adjust the height of the wheelchair connector mount, and by extension, the height of the arm support to the needs of the user. For now, tentatively position the support vertically, and then tighten the screws to hold the support in place. You can come back to this later to make adjustments as needed.
Note: The support comes in three different lengths.

4. At the top of the support is the wheelchair connector mounting plate. The mounting plate has holes for affixing the wheelchair connector. The wheelchair connector has four corresponding mounting holes. Align the wheelchair connector on the mounting plate, so that the mounting holes on the wheelchair connector align with holes on the mounting plate. Attach the two pieces with four screws. The screws can be secured on the mounting plate side with hexagonal nuts.
What to do next

With the wheelchair connector mounted on the wheelchair, you can proceed to mechanically mount the arm support, as well as connect the electrical power and controls.
Wheelchair mounting configuration options

This section describes the options for configuring the wheelchair mounting of the arm support.

Configurable elements

The wheelchair mounting setup for the arm support has several elements that can be configured to more precisely adjust the height of the support for people with different heights. There are three elements of the mounting kit that can be adjusted:

- Mounting brackets - the mounting brackets can be installed in one of two configurations - brackets low, so that the mounting arm is lowered with respect to the wheelchair mounting rail, or brackets high, with the brackets turned around so that the brackets raise the mounting arm.
- Mounting arm bar - the mounting arm can be installed in one of two configurations - bar high, with the mounting arm turned so that the bar is close to the top of the mounting structure, or bar low, with the mounting arm turned around with the top of the mounting structure raised above the bar.
- Mounting plate support - the mounting plate support can either be installed with the mounting plate up (support up) or upside down, with the mounting plate down (support down)

By configuring these items, eight different height configurations are possible.

Figure 3: Mounting configuration options

More details are available in the product installer training.
Mounting the arm support

This section describes how to mechanically mount the KINOVA® Dynamic arm support O540 on a powered wheelchair.

Before you begin
The bottom support on the wheelchair connector will need to be lowered before mounting the arm support.

About this task
The Dynamic arm support O540 is mounted to a wheelchair, work chair, floor base or an individual solution through the wheelchair connector. The wheelchair support provides an interface to controls and power for the arm support, and also provides mechanisms to secure the arm support in place mechanically. The wheelchair connector includes a quick release mechanism. This mechanism makes it possible to remove the arm support relatively quickly.

Note: Never put anything between the connector pins in the wheelchair connector when the arm support is not mounted. This may cause electrical problems.

Note: There is a fuse compartment on the wheelchair connector face labeled “FUSE.” The compartment contains the active fuse as well as a spare. The compartment can be opened and closed with a screwdriver.

Procedure
1. Lift the arm support and align the rotation frame with the wheelchair connector so that the corresponding electrical and control interfaces are facing each other.
2. Tilt the arm support slightly away from yourself and bring it towards the wheelchair connector.

3. Place the rod on the upper part of the rotation frame into the corresponding slot on the upper part of the wheelchair connector.

4. With the rod in the slot, and while supporting the weight of the rotation frame, allow the rotation frame to rotate downwards gently until the electrical interfaces between the rotation frame and wheelchair connector come together.
5. Flip up the bottom support on the wheelchair connector so that it latches in place over the bottom of the rotation frame. This provides additional support and stability for the arm support.

What to do next

You can now connect power and controls to the wheelchair connector.
Unmounting the arm support

This section describes how to unmount the KINOVA® Dynamic arm support O540 from the wheelchair connector.

About this task

The arm support is designed to be easily and quickly unmounted from the wheelchair connector while leaving the wheelchair connector mounting in place. This makes it convenient to take off the arm support for transport.

Procedure

1. Press in the quick release button on the wheelchair support bottom support. This will release the latch holding the bottom support in place.

2. Lower the wheelchair connector bottom support off the rotation frame of the arm support.
3. While holding the arm support, tilt the arm support forward to disconnect the electrical interface of the rotation frame from that of the wheelchair connector.

4. Lift the arm support fully off the wheelchair connector.
Connecting the arm support controls and power

This section describes how to connect the controls and power of the KINOVA® Dynamic arm support O540.

The wheelchair connector has two connector ports on the bottom side:

- one for connecting the arm support to battery power
- one for connecting the arm support controls cable

The power and controls signals are then transmitted to the arm support via the wheelchair connector electrical interface.

Figure 4: Wheelchair connector interfaces

The connector ports are distinct, preventing connection of the incorrect cable. The male connector port on the wheelchair connector accepts the female power cable connector, while the female connector port accepts the male controls cable connector.
The wheelchair mounting kit includes a cable to connect from the wheelchair battery to the power connector of the wheelchair connector.

**Controller placement**

Initial commissioning will generally include placing the controller in a convenient location and securing the controller cable so that it is not in the way during use. The controller and cable do not need to be removed for any reason, except during a complete dismounting of the product. The arm support can be removed from the wheelchair connector without disconnecting either of the cables.
Attaching the brace

This section describes how to attach the brace to the arm support.

About this task
All the braces are exchangeable between all the arm supports. You can easily attach and detach them.

Procedure
1. The upper arm of the support has to slide into the slot of the hook of the brace.

2. Pull the clip on the brace inwards. Slide the hook of the brace so that it goes between the two washers on the end of the upper arm.
3. Release the clip, and make sure that the clip locks over the head of the bolt on the end of the upper arm. The head of the bolt should be visible through the clip.
Placing the arm in the brace

This section describes guidelines for placing the arm in the brace.

The arm should be placed in the brace in the following way:

- The underarm should lay in the brace
- The upper arm should be placed against the upper arm support, not far above the elbow

  Note: The upper arm support consists out of non allergic rubber with a stainless steel frame. The brace is flexible and can be adjusted to the arm so that it is as comfortable as possible for the user

- The elbow should be free

If you are not comfortable or sure how to properly place your arm into the brace, please contact your local supplier. If available (depending on the type of brace) it's necessary to secure the upper strap of the brace which goes over the under arm so that it's secured and can't fall out of the brace.
KINOVA® Dynamic arm support 0540 functionalities and controls

This section describes the functionalities and controls of the KINOVA® Dynamic arm support 0540.

The following functionalities are available for the Dynamic arm support 0540:

- Compensation force
- Tilt (forward and backward)
- Horizontal / vertical (H / V) brake
- Rotation brake

The arm support comes with a controller to adjust these settings electronically. The controller has six buttons. With the controller you can activate the different functions.

The buttons are especially designed for people with little strength.

The six button control setup is as follows:

- more compensation
- less compensation
- tilt function forward
- tilt function backward
- rotation brake
- horizontal/vertical brake

Note: Do not activate multiple controls at once or rapidly click the buttons. This may cause improper functioning of the arm support.
Adjusting the compensation force

This section describes how to adjust the compensation force on the Dynamic arm support O540.

You can adjust the level of compensation (force) of the arm support steplessly, to compensate for various arm weights. This can be done by pushing the [and +] buttons. It is possible to hold down the buttons to keep changing the compensation.

When the arm support is connected to the power supply and used for the first time, you need to hold down one of the compensation buttons for at least 5 seconds. This will make an initial connection. After this, the functions will react without delay as soon as the button is pressed. This has to be repeated every time the arm support is disconnected from the power supply.

When the the compensation level reaches the minimum or maximum compensation point, the compensation motor will emit an auditory signal indicating that a limit has been reached. It is not possible to compensate beyond this point, so the button can be released.
**Adjusting the tilt**

This section describes how to adjust the tilt of the *Dynamic arm support 0540*.

With the tilt function you can tilt the base of the arm support forward and backward. The tilt function has three functions:

1. Enlarge the working range forward and backward.
2. Make it easier for the user to reach forward or pull the arm backward (toward the mouth).
3. Keep the arm support in a perfect vertical position when the wheelchair is on an incline.

The tilt function can be activated by pushing the (forward tilt) or (backward tilt) button. It is possible to hold down the buttons to continuously increase or decrease the tilt up to the minimum or maximum limits.

When the tilt reaches the minimum or maximum tilting point, you will hear a beep. It is not possible to tilt any further, so the button can be released.
Horizontal / vertical brake

This section describes the function of the horizontal / vertical brake of the Dynamic arm support 0540.

The horizontal/vertical (H / V) brake makes it possible to lock the vertical and horizontal movements. When applied, only rotational movement around the main axle is available.

The H / V brake is activated by pressing the button once. After pressing this button, immediately (within 2 seconds) move the arm a bit in any direction to engage the brake mechanism. You will know the H/V brake is engaged when you hear a click. It will then be impossible to move the arm.

To disengage the H / V brake, hold the button down for 2 seconds.
If for some reason the H/V lock isn't engaged within 2 seconds, the H/V lock will deactivate. You will need to push the button again to reactivate.

⚠️ The H / V brake is designed to hold a maximum force of 4.5 kg. If a larger force is applied, the H / V brake will disengage automatically. This is a safety feature to prevent you from injuring your arm when running into an obstacle, for example, a door frame, while driving the wheelchair. Once the H / V brake has been disengaged in this matter, it is necessary to hold the button down for 2 seconds first, before being able to engage it again.

⚠️ When driving the wheelchair, ensure that the arm is in the brace and the H / V brake activated to avoid unintended arm movement.
Rotation brake

This section describes the rotation brake of the Dynamic arm support O540.
The rotation brake makes it possible to lock the rotational movement of the main axle of the arm support. When applied, only horizontal and vertical movement is available.

The rotation brake is activated by briefly pressing the button once.
To disengage the rotation brake, briefly press the button once.

⚠️ The rotation brake is designed to provide resistance hold the user's arm in place in normal use. If a large enough force is applied, however, the rotation brake will slip. This is a safety feature to prevent you from injuring your arm when running into an obstacle, for example, a door frame, while driving the wheelchair. Please inform your caregivers should this occur.
Wireless control via Android phone app and Bluetooth (optional)

This section describes wireless control of the arm support over Bluetooth using an Android phone app.

Overview

The KINOVA® Dynamic arm support O540 can also be controlled wirelessly using an Android app. The app connects over Bluetooth to the arm support and allows users access to the same controls as the physical wired controller, but using touch screen controls on the Android device.

Note: When the app is connected to the arm support, the physical controller will still be available and active.

Note: Only one Android device can connect to the arm support using the app at a time.

The app, titled “Armon,” can be downloaded onto an Android device in the Google Play marketplace.

Note: The app is compatible with the Dynamic arm support O540, but is not designed or provided by Kinova.

Pairing the Android device with the arm support

Before using the app with the arm support, you will need to first pair the Android device with the arm support. This will only need to be done once; after that the Android device will remember the connection details. To pair the device to the arm support, make sure that the arm support is connected to electrical power, and then do the following:

Note: The precise details of some steps carried out on the Android device may vary from device to device and between different versions of Android. Consult the documentation for your device and for Android if you need guidance on how to carry out these steps.

1. Turn on Bluetooth on the Android device. Make sure the device is within range of the arm support (within a few meters).
2. Look for the arm support ID in the list of available Bluetooth devices. The ID will depend on the particular arm support, but will be in the format "KIN_abcd", where abcd is a four digit number.
3. Select the arm support to try to pair the device to the arm support.
4. You will be prompted for a PIN code. Use 2766. The device will then attempt to pair with the arm support. You should receive a confirmation within a few seconds if the process was successful. If not, try again.

Connecting with the app
To connect to the arm support with the app:

1. Open the app on your device by tapping the Armon app icon.
2. If the Bluetooth is not turned on, you will be prompted to allow Bluetooth to be enabled.
3. You will be presented with a list of IDs for any arm supports to which you have paired before. Select the appropriate arm support from the list to connect and enable wireless control.

For more information on this app, contact your Kinova distributor.
Replacing the arm brace

This section describes how to replace the arm brace.

About this task

Any of the available arm brace models can be used with the arm support. It is relatively straightforward to switch in a different model of brace.

Note: Braces are either left arm or right arm but not both. While it is possible to swap in a different model of brace, it has to be the right arm side for the particular setup.

Procedure

1. Pull back the clip on the original brace so that it is pulled away from the hook.
2. Slide the hook on the brace out from between the washers on the end of the upper arm. The original arm is now removed.
3. Follow the normal procedure to attach the new brace.
The braces

This section describes the different brace options.

The brace is the part where the arm lies. It is the connection between the arm support and the user. Kinova offers different types of braces and every type is available in different sizes. The braces are exchangeable between different KINOVA® Dynamic arm support models.

Kinova offers four different brace models:

- Basic Brace
- O110 Brace
- Standard Brace
- Premium Brace

**Figure 6: Brace options**

The more advanced the brace, the more functionality that can be achieved with the brace. Several components of the brace are adjustable to achieve a perfect personal fit. The right individual adjustment of the brace should only be done by properly trained specialist.

Different brace models will be more appropriate for different users. A proper analysis of the user's needs carried out by a trained specialist is recommended to get the brace that is most appropriate for a user's needs.

**Note:** An improperly fitted brace increases the risk that the arm can come loose from the brace and potentially lead to injury.

**Note:** Brace selection and adjustment shall always be performed under the guidance of clinical personnel.