

# Alt-Bi**o** nics



## Genesis Hand

### Quick Start Guide

**S.D.U. Version for Researchers**

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# Introduction

The Genesis Hand Quick Start Guide provides step-by-step instructions, safety information, and tips to help you quickly set up and begin using your Genesis Hand with the accompanying SDU (Sales Demonstration Unit), which replicates exactly how someone with an upper limb difference would control the hand.

Please read through the guide fully to ensure safe and effective use of The Genesis Hand.

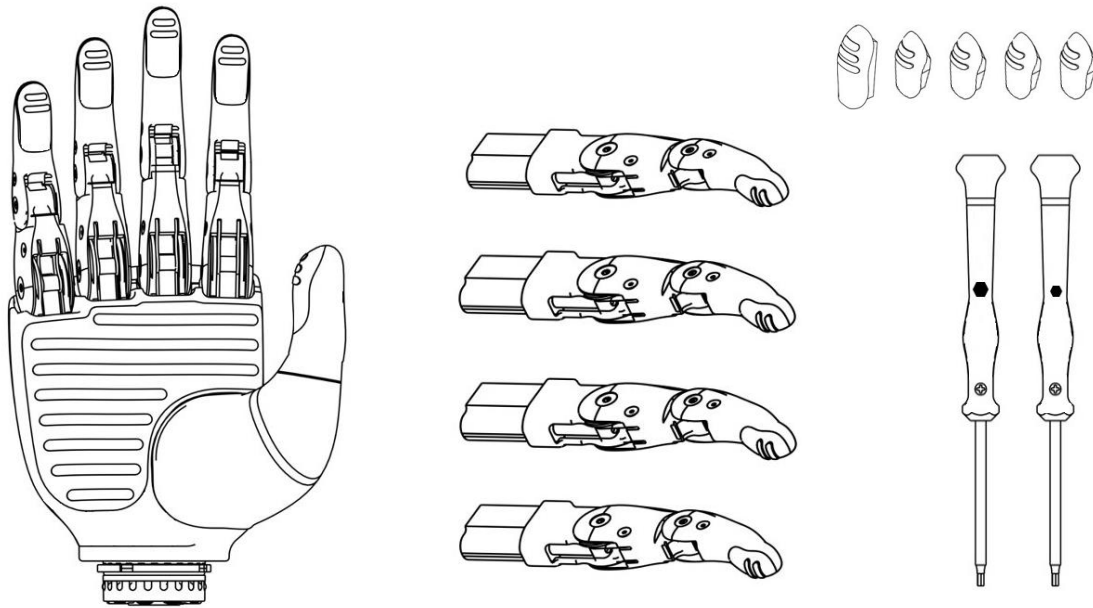
**Note:** This Quick Start Guide was exclusively developed for research purposes. Please read through this first. **Please see the official User Manual (also included) for a full and detailed walkthrough of The Genesis Hand.**

**Note:** There is an accompanying smartphone app that provides additional functionality to The Genesis Hand, but it is not required to use the Genesis Hand out of the box. Please refer to the Smartphone section in our complete User Manual if you'd like to download and use the app.

# Package Content

This section details all the parts and hardware included with The Genesis Hand.

Please refer to the list below and accompanying photos to ensure you have received all necessary components.

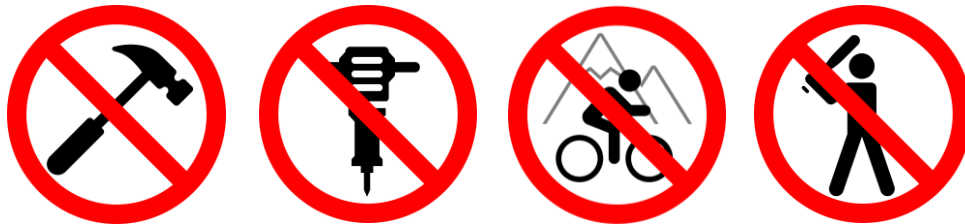


Item	Qty	Description
The Genesis Hand	1	The main device. A myoelectric hand designed for advanced prosthetic function.
Replacement Fingers	4	Spare fingers in case of damage or wear. Easy to replace using the included screwdriver.
Small Hex Screwdriver	1	Smaller tool for assembly and maintenance of the Genesis Hand
Large Hex Screwdriver	1	Larger tool for assembly and maintenance of the Genesis Hand.
Replacement Fingertips	5	Replacement fingertips for fingers and thumb.

## Indications for Use

Exercise caution when using the Genesis Hand under conditions that involve significant loads, vibrations, or impacts. The Genesis Hand is designed for daily activities but may not be suitable for activities that could strain the thumb, fingers, or attached wrist unit, such as extreme sports, and high-impact activities like:

- Hammering
- Using a jackhammer
- Mountain biking
- Baseball



If you would like to perform the above high-impact activities, please consider alternative prosthetic solutions or take extra precautions to protect the device.

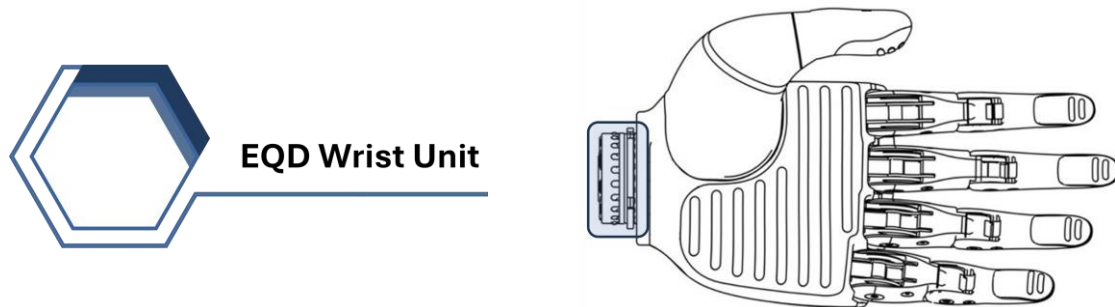
Refrain from using the Genesis Hand exclusively to operate any form of vehicle or machinery, including but not limited to cars, construction equipment, and industrial machinery. Engaging in these activities with the Genesis Hand may compromise safety due to the potential for unexpected reactions or lack of sufficient control.

*Regular checks for signs of wear and tear should be performed as outlined in the "Maintenance" section of this guide. If you encounter any issues or damage, please refer to the "Troubleshooting" and "Maintenance" sections of this guide or reach out to Alt-Bionics customer support for assistance.*

# Setup

## Electronic Quick Disconnect (EQD) Wrist

The Genesis Hand is equipped with an electronic quick disconnect (EQD) wrist module, located at the base of the hand, that can be inserted into any standard Myoelectric / ETD wrist connector of a prosthetic socket.



## Sales Demonstration Unit (SDU)

The Genesis Hand relies on a rechargeable battery, that will be inside of an amputee's prosthetic socket, for power. This SDU contains a common battery pack used in most prosthetic sockets.

The Sales Demonstration Unit (SDU) is designed to replicate the exact control experience of an individual with an upper limb difference. With this device, you will be able to operate The Genesis Hand just as an amputee would.

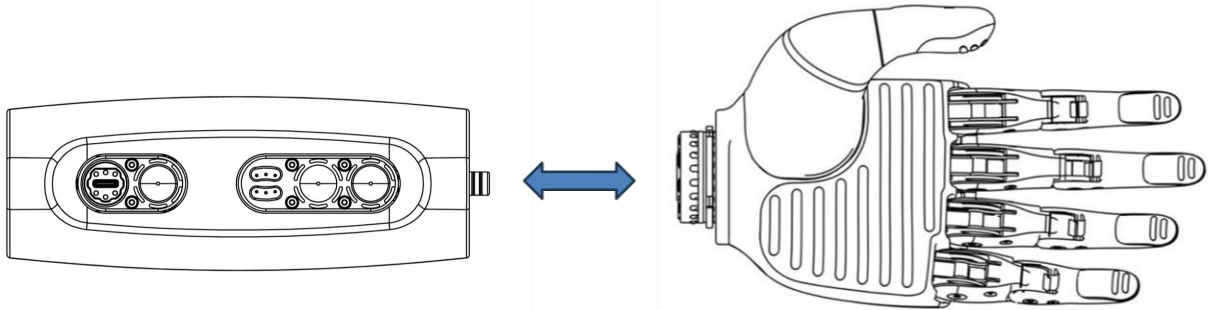


## Steps:

### 1. Align the EQD Module:

Position the Electronic Quick Disconnect (EQD) wrist (located at the base of the Genesis Hand) so that it aligns with the terminal end of the SDU.

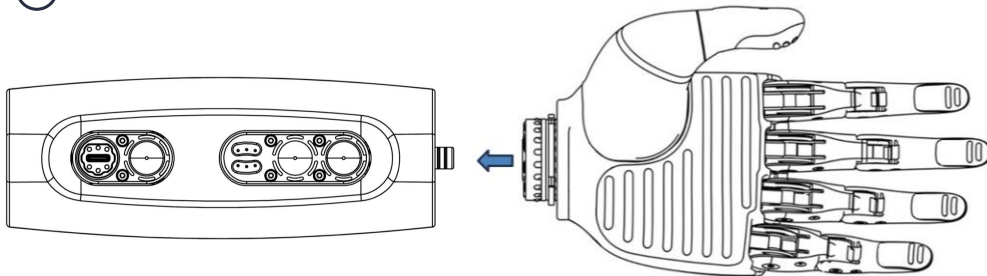
Ensure that the cavity / hole in the center of the EQD lines up with the socket's 6-pin core (coaxial plug).



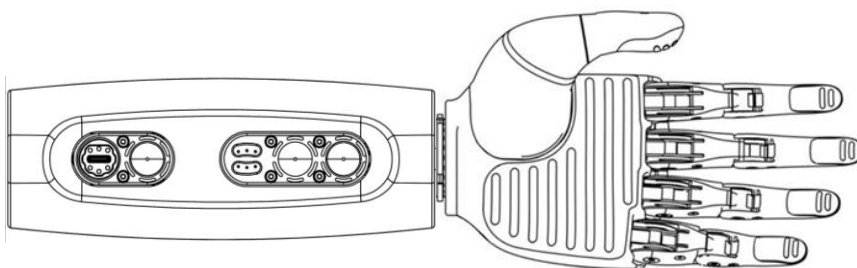
### 2. Insert and Lock

Insert the EQD into the SDU and push until the hand is locked into your socket. You should hear an audible click. There should be no wobbling or wiggling of the hand. If there is, please see and complete step 3 and repeat this step (2) until you have a secure connection. Make sure your hand is locked in before use.

①



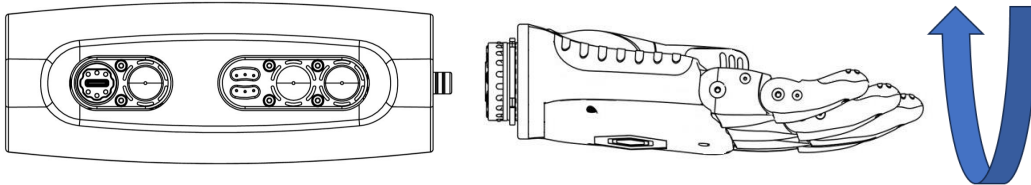
②



**Note:** Unsure of securement? Twist the hand back and forth firmly until you feel a click / ratcheting in either direction.

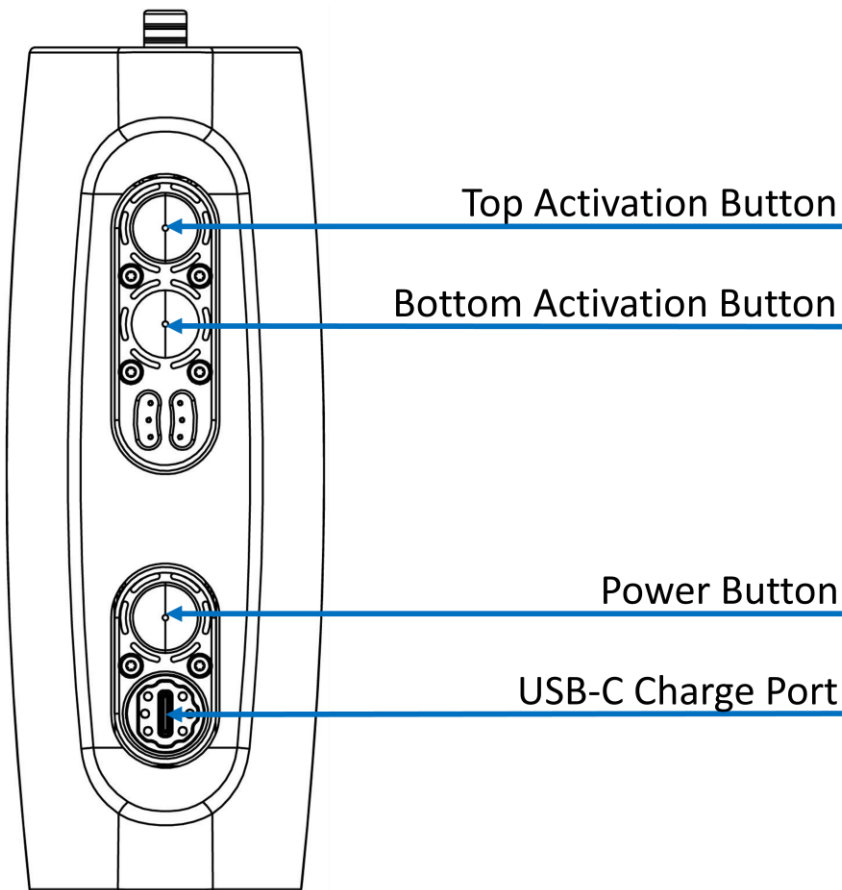
### 3. To Release the Hand

For any reason if you need to release the EQD from the socket, twist the hand in a counterclockwise direction until the EQD releases. If you feel as though you cannot turn the hand anymore, grab the hand firmly by the palm (not the fingers or thumb) and continue to twist through until the EQD releases.



## SDU Buttons

Please see below for a diagram of the SDU's buttons.

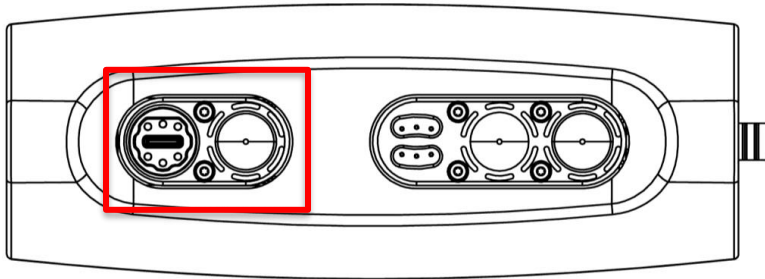




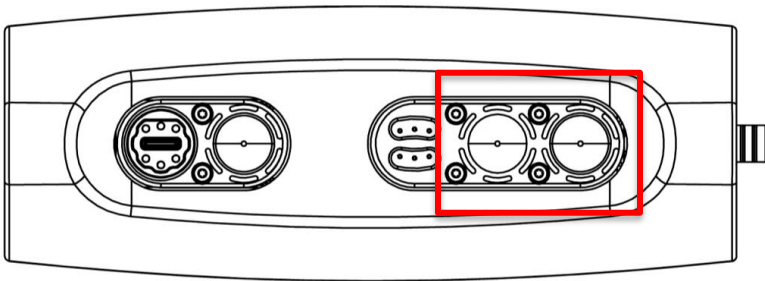
## Button Functionality

This section will briefly familiarize you with the SDU buttons before we dive into controlling the hand using these buttons. Please note that the SDU has two groups of buttons:

**Group 1 – Charging Port & Power Button:** The Charging Port and Power Button at the bottom of the SDU will both charge and turn on / off the hand (respectively).



**Group 2 – Control Buttons:** The Control Buttons at the top of the SDU will control the activation of grip patterns and The Genesis Hand's flexion and extension while in those grip patterns.



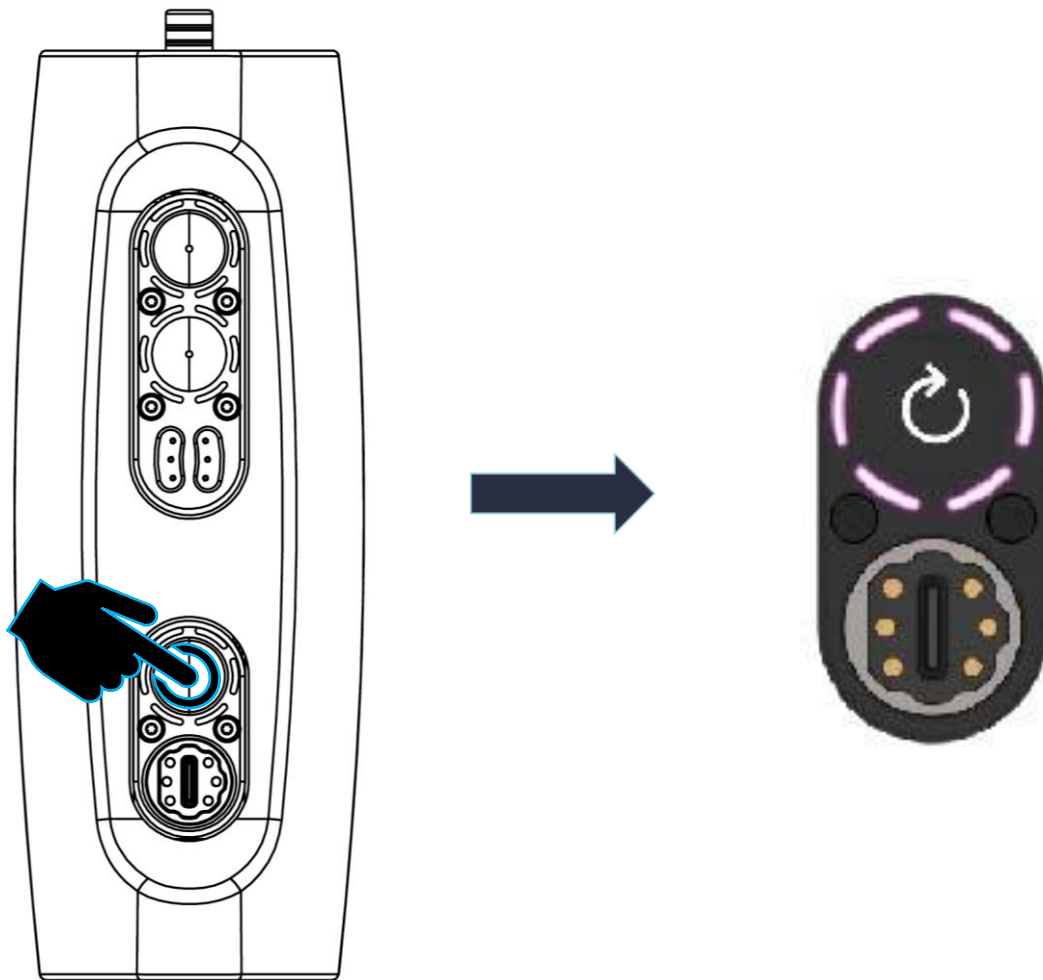
While the SDU is turned off, please feel free to press the Control Buttons at the top of the SDU to get a feel for the force required to press the button all the way down.

**Note:** These buttons work in two stages: when you press it lightly, about halfway down, it activates the first stage without clicking. If you press it all the way down, it reaches the second stage with a click. So, it has two activation points—one for a gentle press and one for a full press.

# Powering on The Genesis Hand

## Power on the SDU

To power on the SDU, fully press and hold the Power Button for 2 seconds until the LED illuminates purple while rotating clockwise. Once the SDU is powered on and The Genesis Hand is connected, The Genesis Hand will immediately begin its calibration sequence, which is detailed in the following section.



## Calibration

Always check that the hand is unobstructed when powering on / calibrating to prevent calibration interruptions or errors.

### Calibration Start

When you first power on The Genesis Hand, the Hex Ring LED on the back of the hand will illuminate the color Azure, indicating the start of the calibration sequence. During this process, the fingers and thumb will flex and extend to their full range of motion to identify their mechanical limits.



### Calibration Pass

The system will automatically check if the fingers and thumb reach their full extension and flexion. If successful, the Hex Ring LED will turn green, confirming that the calibration was completed without issues. Once the green light turns off, The Genesis Hand is fully calibrated and ready for use.



### Calibration Obstructed

If the calibration encounters an issue, such as an obstruction preventing full movement, the LED will turn yellow, signaling a failed calibration. In this case, ensure that nothing is blocking the hand and restart the calibration process by pressing the multi-function button on the back once.



### Calibration Failed

A **flashing** red LED indicates that there was an error during calibration unrelated to obstruction. If this happens, you can reset the hand by pressing the multi-function button on the back once. After the reset, the hand will restart, and The Genesis Hand will attempt to calibrate again.



# Grip Patterns

Once The Genesis Hand has passed calibration, it is ready to use and can now be controlled by the Control Buttons on the SDU.

There is no hand currently available that provides amputees with individual finger control. All bionic hands available today use grip patterns to provide enhanced independence to amputees. The Genesis Hand comes with several pre-configured grip patterns designed to assist with common tasks involved in daily living, such as grasping objects or holding utensils.

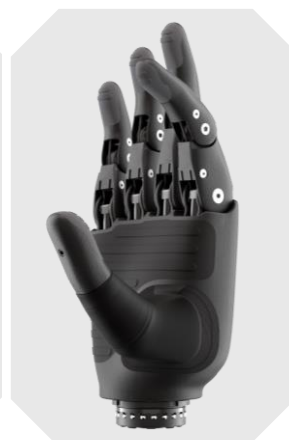
**Note:** Each grip pattern will have a **Relaxed Position** and a **Flexed Position** (see below).



**Power Grip  
(Relaxed)**



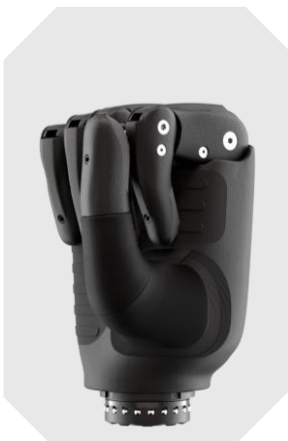
**Chuck Grip  
(Relaxed)**



**Fine Pinch  
(Relaxed)**



**Key Grip  
(Relaxed)**



**Power Grip  
(Flexed)**



**Chuck Grip  
(Flexed)**



**Fine Pinch  
(Flexed)**



**Key Grip  
(Flexed)**

# Controlling Your Hand

This section provides instructions on how to control your Genesis Hand using the two buttons at the top of your SDU. If this is your first time using a myoelectric hand, these instructions will guide you through the basic movements and how they translate into different grip patterns.

## Understanding EMG Sensors

The Genesis Hand is designed to respond to signals from sensors inside an amputee's prosthetic socket known as EMG (Electromyography) sensors. In simple terms, whenever you try to move a muscle, your brain sends a small electrical signal to that muscle group. EMG sensors detect these muscle signals and translate them into commands that control a prosthetic hand.

**Note:** The Control Buttons on the SDU replace and simulate these EMG sensors.

**Note:** The amputee's prosthetist will help ensure that the sensors are properly positioned and calibrated to their specific muscle activity levels, allowing for a seamless and intuitive experience.

## Turning Muscle Signals Into Hand Movements

Now that you know the basics of how EMG sensors pick up signals from muscles, let's dive into how those signals help control the Genesis Hand.

There are two ways to control the Genesis Hand:

### Two Muscle Site Control (2 EMG Sensors)

With Two Muscle Site Control, you will use one muscle group to close your hand and another muscle group to open it. This will be called **Dual Site**.

**Note:** This QuickStart guide will only cover Dual Site control.

**Note:** The default mode of The Genesis Hand is Dual Site.

### One Muscle Site Control (1 EMG Sensor)

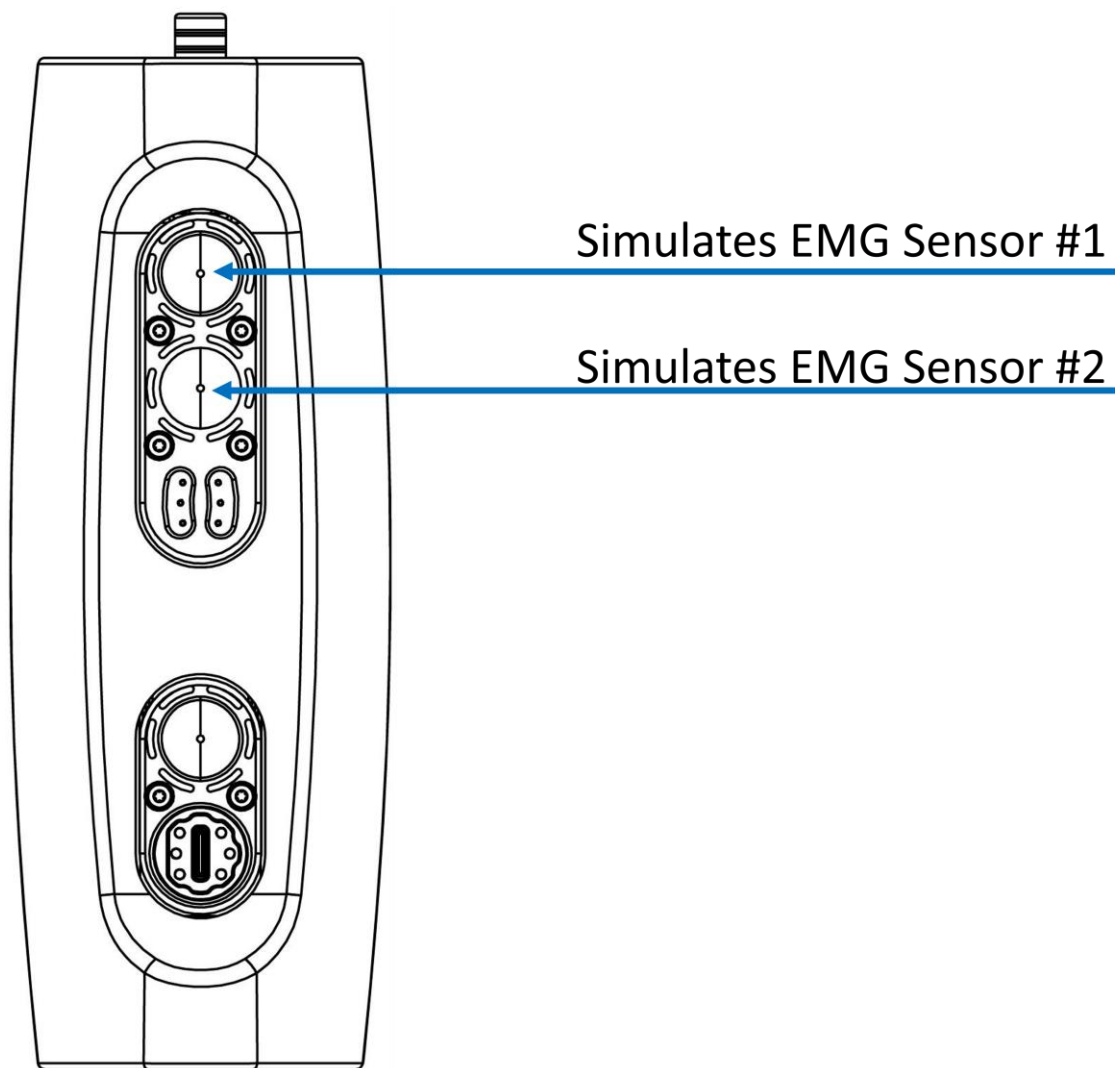
With One Muscle Site Control, you will only use one muscle group to handle both opening and closing, making it simpler for those who have fewer available or working muscle sites. This will be called **Single Site**.

## Dual Site Control

With Dual Site control, the Genesis Hand uses two EMG sensors that will both select, and control specific grips patterns. These sensors are placed on two separate muscle groups (typically on your forearm). Each muscle contraction is linked to a specific movement of the hand.

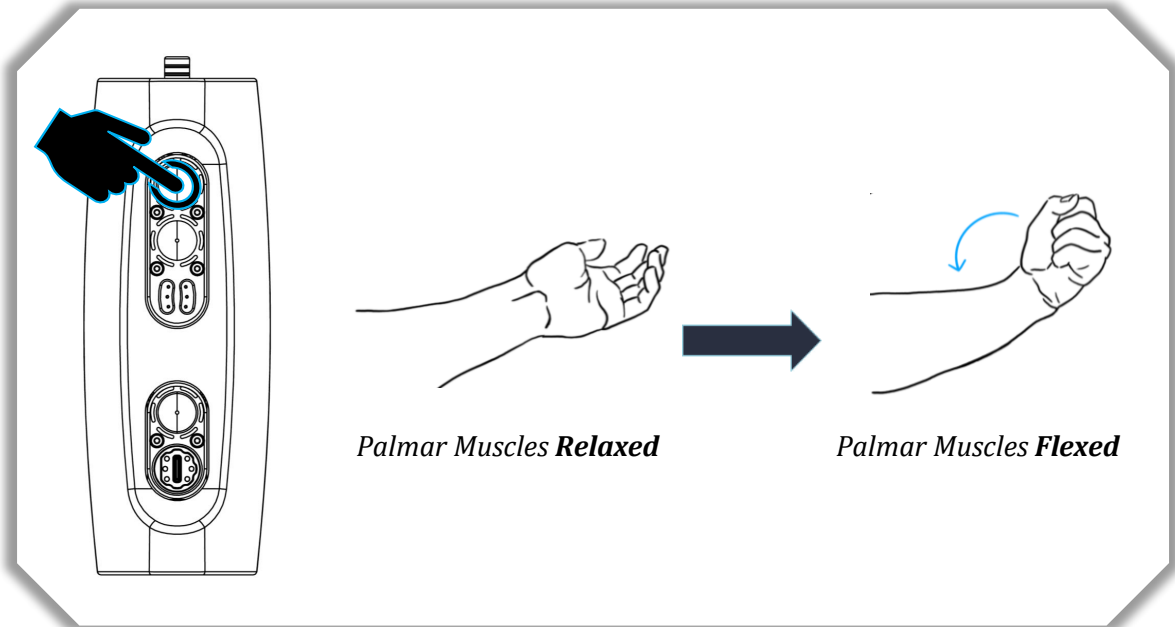
The two buttons at the top of the SDU will replicate these two separate muscle groups.

**Note:** When pressing either the top or bottom buttons, the LED ring of the opposite button illuminates to convey signal strength.



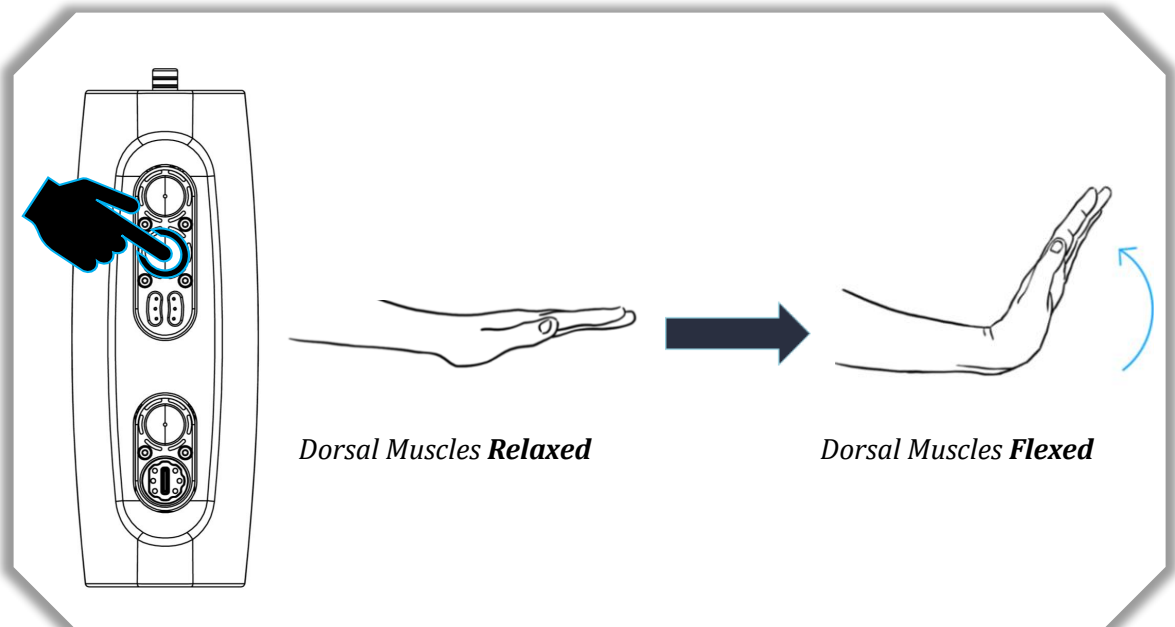
### Top Button (Flexion)

The palm side of your hand and forearm is called the “palmar” side. A typical motion to control a prosthetic would be to imagine that you are flexing your wrist towards your palm. We would call this a “Palmar Flex”. The top button on the SDU will simulate this palmar flexion and provide a corresponding signal.



### Bottom Button (Extension)

The back side of your hand and forearm is called the “dorsal” side. A typical motion to control a prosthetic would be to imagine that you are flexing your wrist backwards. We would call this a “Dorsal Flex”. The bottom button on the SDU will will simulate this palmar flexion and provide a corresponding signal.



# Grip Modes

The Genesis Hand offers two modes for activating and changing grip patterns:

- **Easy Grip Mode** – Mode which contains only 4 grip patterns that can each be individually activated by EMG signals. These 4 grip patterns can all be changed to custom grip patterns that best suit your individual needs.
- **Sequential Mode** - Mode which contains 5 grip patterns that can only be cycled through sequentially. These 5 grip patterns can also all be changed to custom grip patterns that best suit your individual needs.

For testing purposes, we suggest that you control the hand using Easy Grip Mode (the default mode that will already be active when you turn on the hand).

## Home Position

The Genesis Hand will arrive in the box in the “Home” position (pictured below). The Home position is a neutral, relaxed state with the fingers fully extended, designed to protect the internal mechanisms during shipping and handling, and to serve as the end point for calibration once the hand is powered on.



**Home Position  
(Palmar View)**



**Home Position  
(Dorsal View)**





## Easy Grip Mode



The Easy Grip mode (see above picture) consists of 4 grip patterns that can each be navigated to individually ***from the home position***. This grip mode is the recommended mode, as you can quickly navigate to your preferred grip. *Easy Grip Mode is only available with Dual Site Control.*

### Activating / Selecting Grip Patterns In Easy Grip Mode

In Easy Grip Mode, The Genesis Hand recognizes both single and double flexion and extension events to navigate to grip patterns, depending on the timing of your movements. Do not hold down the buttons unless instructions indicate to do so.

**Note:** The hand must be in the home (extended) position to change grips. See page 20 for instructions on returning to the home position.

<p><b>Top Button (1x)</b></p> <p>Single Full Press Full LED Illumination</p>		<p><b>Activates Grip Pattern 1</b></p> <p>Chuck Grip by Default.</p>
<p><b>Top Button (2x)</b></p> <p>Double Full Press Full LED Illumination (<i>second button press must be within 0.7 seconds of first</i>)</p> <p><b>Note:</b> You must wait for the blue LED to return to empty before activating the next signal.</p>		<p><b>Activates Grip Pattern 3</b></p> <p>Key Grip by Default.</p>



<p><b>Bottom Button (1x)</b></p> <p>Single Full Press Full LED Illumination</p>		<p><b>Activates Grip Pattern 2</b></p> <p>Fine Pinch by Default.</p>
<p><b>Bottom Button (2x)</b></p> <p>Double Full Press Full LED Illumination</p> <p><i>(second button press must be within 0.7 seconds of first)</i></p> <p><b>Note:</b> You must wait for the blue LED to return to empty before activating the next signal.</p>		<p><b>Activates Grip Pattern 4</b></p> <p>Power Grip by Default.</p>

**Note:** Please remember that these are not normal buttons. If you press them fully, too quickly and the LEDs do not have a chance to light up all the way, the signals will not register.

## Controlling Grip Patterns In Easy Grip Mode

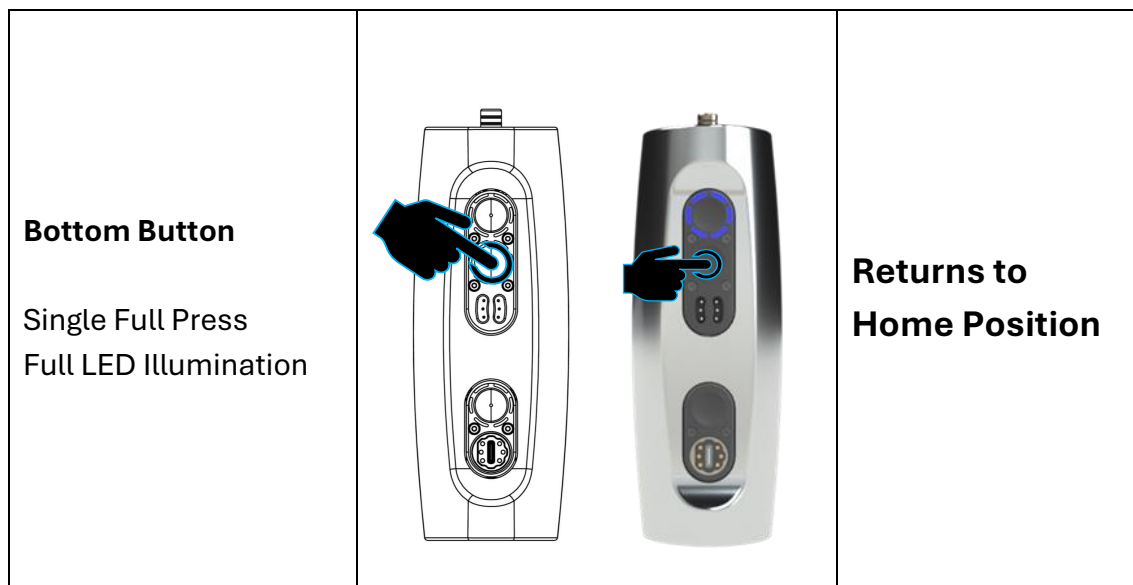
Once you activate a grip pattern, the grip pattern will move into a fully extended position. From there, any movement from your palmar muscle group (top button in this example) will begin to flex the hand. Additionally, any movement from your dorsal muscle (bottom button) will begin to extend the hand (move it backwards).

See below for an example of both flexion and extension control using the buttons.

<p><b>Top Button</b></p> <p>Single Half Press Half LED Illumination</p> <p><b>Note:</b> Half illumination</p>		<p><b>Flexes</b></p> <p><b>Active</b></p> <p><b>Grip</b></p>
<p><b>Bottom Button</b></p> <p>Single Half Press Half LED Illumination</p> <p><b>Note:</b> Half illumination</p>		<p><b>Extends</b></p> <p><b>Active</b></p> <p><b>Grip</b></p>

## Returning to the Home Position

To exit an activated grip pattern, you will need to make sure the hand is in its fully relaxed / extended position (within that grip). To do this, you can hold the bottom button until the hand is in its fully extended position within the selected grip pattern. Once you confirm this, you'll be able to follow the below step to exit a grip and from there, select a new grip.



Once you have mastered these movements, you can efficiently control the various grip patterns available in Easy Grip Mode to achieve common activities of daily living.

Please feel free to play around with the grip patterns and manipulate objects around your office. If you'd like to pick up something and then lock the hand so there is no risk of dropping that object, you can press the button on the back of the hand (Multifunction Button) once. You should see a solid red light indicating the hand is locked and will not move from that position.

Other features of the button can be found below.

# Multi-Function Button

The multi-function button on the back of your hand is designed to give amputees more independence by allowing them to adjust settings or check important information about your hand without needing to use your phone.

Below is an easy-to-follow guide on how the button works and the actions it controls.

Easy Grip Mode		Sequential Mode	
Action	Result	Result	Action
<b>1x Press</b>	Current Grip Pattern Locks & EMG signals are blocked	Current Grip Pattern Locks & EMG signals are blocked	<b>1x Press</b>
<b>2x Press</b>	N/A	Hand Switches to Next Grip Pattern	<b>2x Press</b>
<b>3x Press</b>	Hand Changes to Sequential Mode	Hand Changes to Easy Grip Mode	<b>3x Press</b>
<b>4x Press</b>	Hand Enters or Leaves EMG Live View	Hand Enters EMG Live View	<b>4x Press</b>
<b>5x Press</b>	Enables the Hex Ring's Flashlight Mode.	Enables the Hex Ring's Flashlight Mode.	<b>5x Press</b>
<b>6x Press</b>	N/A	N/A	<b>6x Press</b>
<b>7x Press</b>	Hand Recalibrates	Hand Recalibrates	<b>7x Press</b>
<b>1s-4s Hold</b>	Displays Battery Life via Hex Ring	Displays Battery Life via Hex Ring	<b>1s-4s Hold</b>
<b>5s-10s Hold</b>	Disconnects Bluetooth & Begins Pairing / Searching	Disconnects Bluetooth & Begins Pairing / Searching	<b>5s-10s Hold</b>

# Hex Ring (LED) Glossary

The Hex Ring LED located on the back of The Genesis Hand serves as a visual indicator, providing valuable information regarding various status states of the hand.

This section will detail the different LED colors and patterns, along with their corresponding meanings, along with how to activate them if relevant.



## Azure (Solid)

**Meaning:** Indicates the hand is either calibrating, switching primary grip modes, or changing grip positions.

**Additional Notes:** While the Hex Ring displays a solid Azure color, the button should not be pressed, and open/close commands should not be sent.



## Green (Solid)

**Meaning:** Indicates the has successfully finished calibrating.

**Additional Notes:** This solid green color should only ever appear following a successful calibration.



## Yellow (Solid)

**Meaning:** Indicates the hand has failed calibration.

**Additional Notes:** Press the button once to retry calibration. If this continues to fail, hand must be power cycled.



## Azure (Rotating)

**Meaning:** Indicates that the hand is switching to/from EMG live view. After completion, the Hex Ring will display live EMG signals from either one or two sites.

**Additional Notes:** This rotating color only indicates the activation of EMG live view. See below for EMG Live View.



## Red (Solid)

**Meaning:** Indicates the hand is locked and will not respond to EMG signals from the user.

**Additional Notes:** Toggled by pressing the button 1 time in any mode, at any time. The hand turns solid red only after a single button press. If seen otherwise, power cycle the hand.



## Red (Flashing)

**Meaning:** Indicates the hand has encountered a critical error. The hand must be power cycled to resolve

**Additional Notes:** To power cycle the hand, press the button 7 times in a row. The hand will recalibrate and attempt to resolve the error automatically.



## Dark Blue (Rotating)

**Meaning:** Indicates the hand has entered Bluetooth pairing mode and is searching for a new device to pair with.

**Additional Notes:** To enter Bluetooth pairing mode, press and hold the button until you see this blue rotating ring.



## Red, Yellow, Green (Dynamic) - Battery

**Meaning:** Indicates battery. The battery level is represented in segments by a gradient; Green for high (66-100%), Yellow for medium (33-66%), and Red for low (0-33%).

**Additional Notes:** Toggled by pressing and holding the button for more than 1 second (not to exceed 4 seconds). The battery indication will turn off after 5 seconds.



## White (Solid)

**Meaning:** Indicates the hand is in “Flashlight Mode”. May it be a light to you in dark places, when all other lights go out.

**Additional Notes:** Activated by pressing the button 5 times in any mode. This mode will automatically deactivate after 60 seconds to conserve battery. Color can be customized via app.



## Red, Yellow, Green (Dynamic) – EMG

**Meaning:** Indicates the hand is in “EMG Live View” mode. EMG signals will display in a gradient similar to the battery life gradient. Red indicates a weak signal, while green indicates a very strong signal.

**Additional Notes:** Toggled by pressing the button 4 times in a row, in any mode. This EMG live view will persist until cancelled by pressing the button 4 times again in a row. Splits for Dual-Site control.



## **Regulatory Compliance**

Alt-Bionics' Genesis Hand is registered with the U.S. Food and Drug Administration (FDA) by the Center for Devices and Radiological Health (CDRH) registration and listing office.

## **Technical Support**

If you're experiencing issues with the Genesis Hand, we encourage you to contact your prosthetist first. For further support, feel free to reach out to us via email at [Ryan@altbionics.com](mailto:Ryan@altbionics.com) or by phone at +1(210)-854-6392. Our support hours are from 10:00 AM CST to 6:00 PM CST.