MC ProPlus Hand

Prosthetist Manual

Fillauer®
Motion Control

MC ProPlus Hand

Prosthetist Manual

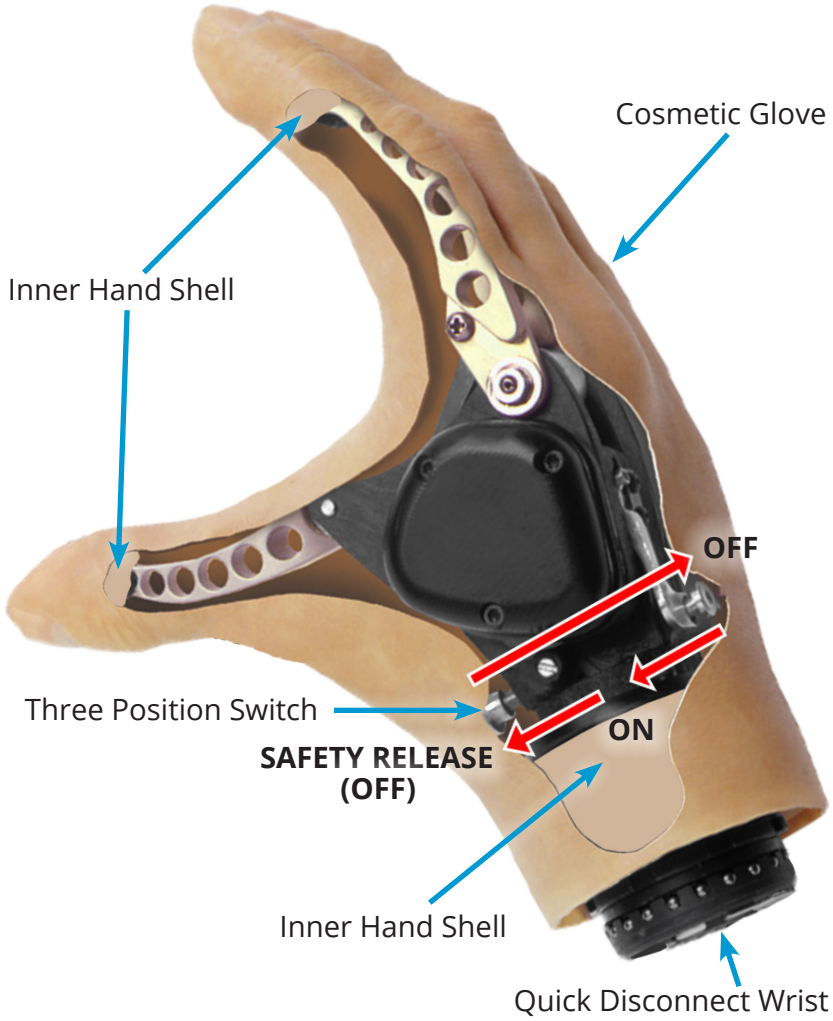
Introduction

The Motion Control (MC) ProPlus Hand is a high performance electric hand for persons with upper extremity limb loss. The MC Hand is available in three sizes and several lengths to accommodate a variety of individuals. It contains a battery-saver circuit for longer battery life, wide-opening fingers, heavy-duty machined frame and fingers, and a unique safety release. This results in a robust, efficient, high-speed terminal device for an upper extremity prosthesis.

The MC Hand motor drive is shorter than other hands, allowing the addition of two different types of Motion Control flexion wrists, the Flexion Wrist or Multi-Flex Wrist, without major increases in length. This shorter hand is an advantage in cases where the residual forearm length is rather long. Choose the short hand option (which includes the Quick Disconnect) or the Wrist Disarticulation version, which is shorter by 2.4 cm (1.0 in) by sacrificing the Q/D and fabricating directly to the forearm.

The MC ProPlus Hand has an ultra long-life brushless DC motor and on-board controller. This versatile microprocessor provides easy adjustability via wireless Bluetooth® communication to iOS devices (iPhone®, iPad®, and iPod Touch®), a variety of input sensors, and high performance. The MC ProPlus Hand can be used with other MC ProPlus components, such as the MC ProWrist Rotator, and easily interchanged with the MC ProPlus ETD, and other manufacturers' devices.

MC ProPlus Hand (cutaway)



MC ProPlus Hand green coax receptacle (replaces earlier red receptacle)

Special Precautions

Risk Management
To minimize the risk of device damage or injury to the user while maximizing the functions of this device, follow the instructions for installation, and use this device as described in this manual.

The MC Hand is not waterproof
Do not allow water to enter the cosmetic glove or inner hand shell. To minimize incidental moisture damage such as rain, or cleaning the hand with a damp cloth, maintain an intact cosmetic glove and inner hand shell. Damage to either, will allow moisture into the mechanism and cause damage. If water or other liquid should enter the hand, remove the hand at the quick disconnect (or turn the hand off if there is no quick disconnect) and take it to your prosthetist for disassembly and inspection.

Flammable Gases
Caution should be used when operating the hand around flammable gases. The hand utilizes an electric motor that can ignite volatile gases.

Do not bend fingertips
While the MC Hand is robust, body weight represents a great deal of force. Do not apply full body weight on the finger or thumb tips. Additionally, a fall with the force directed to the fingertips could cause damage. If the fingertips do become bent or out of alignment, remove the cosmetic glove and inner hand shell. If the index finger, middle finger and/or thumb are badly bent, broken, or out of alignment, return the hand to Motion Control for replacement of fingers.

Safety Release
Do not force the fingers and/or thumb opened or closed. This will result in serious damage to the device. The safety release will allow easy opening and closing of the hand. If the release mechanism does not allow motion, the device requires service by Motion Control.

Repairs or Alterations
Do not attempt to repair or alter any of the mechanical or electronic components of the MC Hand. This will likely cause damage, additional repairs, and void the warranty.

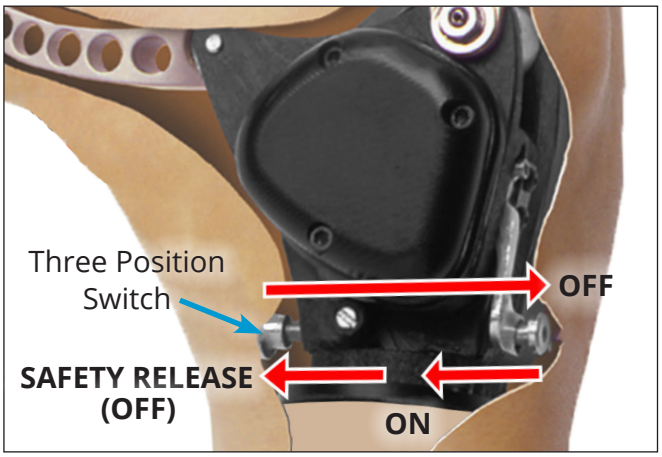
Setup Using the User Interface
While the default settings in the MC ProPlus Hand may allow the patient to operate the system, it is highly recommended the prosthetist utilize the User Interface to customize the settings for the wearer.

Safety Caution
Use caution when using this device in situations where injury to yourself or others may occur. These include but are not limited to activities such as driving, operating heavy machinery, or any activity where injury may occur. Conditions such as a low or dead battery, loss of electrode contact, or mechanical/electrical malfunction (and others) may cause the device to behave differently than expected.

Serious Incidents
In the unlikely event a serious incident occurs in relation to the use of the device, users should seek immediate medical help and contact their prosthetist at the earliest possible convenience. Clinicians should contact Motion Control immediately in the event of any device failure.

Three Position Switch

The MC Hand has a three position sliding switch located in the middle of the back of the hand. On the palm side, it is located at the base of the thumb. With the switch pushed all the way toward the back of the hand, the hand is OFF. Pushing from the back of the hand toward the palm, the first click turns the hand ON. Pushing completely toward the palm is the SAFETY RELEASE position, releasing the fingers. In the Safety Release position, the hand is also turned OFF.



MC ProPlus Hand showing Three Position Switch

Quick Disconnect Wrist

The Quick Disconnect wrist is a universal design that allows interchangeability with our other terminal devices, such as the MC ProPlus ETD and other manufacturers' devices.

Inner Hand Shell

This durable glove is installed at the factory and is not meant to be removed except by trained personnel. This shell provides protection for the hand along with some moisture resistance. If a hole or damage is discovered, the hand shell should be replaced. Some smaller sized hands do not have an inner hand shell, they have only a cosmetic glove. This requires a special order from Motion Control.

Cosmetic Glove

This glove should be chosen in conjunction with your wearer, examining the color swatches compared to the wearer's skin tone. Ideally, this should be done outdoors, under natural light, not under fluorescent lighting. The glove should remain intact to prevent damage to the hand. Holes or damage to the glove could allow liquids to enter the hand, and cause damage. Always maintain an intact glove.

Instructions for Use

Before attaching the MC Hand to the forearm, locate the switch on the palmar side of the hand at the base of the thumb. Ensure it is pushed completely to the back of the hand (the OFF position).

Insert the quick disconnect wrist on the hand into the wrist on the forearm. While pushing it in firmly, rotate the hand until an audible click is heard. It is advisable to rotate the hand both directions several clicks, then attempt to pull the hand off to ensure it has attached firmly.

Now, push the switch on the back of the hand toward the palmar surface to the second (middle) position and the hand is now ON and ready for use.

To disconnect the hand, first turn it OFF (by pushing the switch all the way to the back of the hand), then rotate it in either direction until a slightly more difficult click is felt. Overcoming this click will disconnect the hand from the forearm. This allows interchangeability with another terminal device, such as the MC ProPlus ETD.

Water Damage

The Motion Control Hand is not waterproof. If water or other liquid should enter the hand, remove the hand at the quick disconnect (or turn the hand off if there is no quick disconnect), then remove the cosmetic glove and inner hand shell. If the hand is only slightly wet (has not been submersed), dry it as much as possible, and attempt to power it up and operate. If it does not operate, or if the hand has been submersed, return it to Motion Control.

User Interface Adjustments

Each of the ProPlus family of Motion Control products contains a microprocessor that can be adjusted and set for a specific individual's needs. Wearers without EMG signals can also be accommodated, but some additional hardware may be necessary. The software needed to make these adjustments is provided at no charge to the prosthetist or end user.

Motion Control 5.3.1

Motion Control 5.3.1 is the Windows-based version of the User Interface which is available for download at:

http://www.utaharm.com/files/wl/?id=c&filename=UserInterfaceInstallation.exe.

Either a hard-wired USB cable (P/N 5010075) or Bluetooth® Firefly (P/N 5010037) is required to connect the MC ProPlus Hand to the Windows PC. The ProPlus Adapter T-Cable (P/N 3010444) may be necessary in some applications.

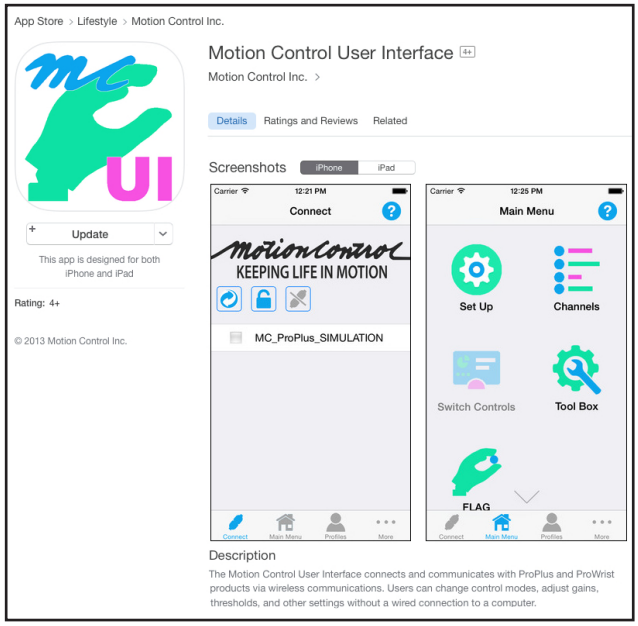
Motion Control 5.3.1 instructions can be found at:

http://www.utaharm.com/files/wl/?id=f&filename=1910010-QUICK-SET-UP-GUIDE-for-ProPlus-ProWrist-ProControl2-10-09-2019 EN.pdf.

Note: Adjustments for the optional FLAG feature (discussed later) are ***not*** available in the Windows version of the User Interface.

iOS User Interface

MC ProPlus Hands produced since 2015 communicate via Bluetooth® directly with Apple® iOS Devices. The MCUI app is available at no charge from the Apple® App Store*. No additional hardware or adapters are necessary with the iOS Interface.



Instructions for loading the MCUI application onto your Apple® device, and pairing the device using Bluetooth®, can be found on page 8.

The first time the application is opened, a tutorial is offered. This overview will take 10 to 15 minutes and is recommended. Additionally, located throughout the application is a context-sensitive information icon. ⓘ Tapping this icon will briefly explain the function of that adjustment.

Note:** The MCUI app is ***not available for Android devices.

Patient/Prosthetist Controls

Upon opening the iOS Application, the user responds as "Patient" or "Prosthetist". If "Patient" is chosen, many of the adjustments are grayed out. EMG Signals are visible for training purposes. Several adjustments such as buzzers, some FLAG adjustments, and Auto-Cal are accessible to the wearer. Familiarize your patients with these adjustments.

If "Prosthetist" is chosen, a code is requested (located on page 8 with iOS instructions). This allows access to all the adjustments of the device.

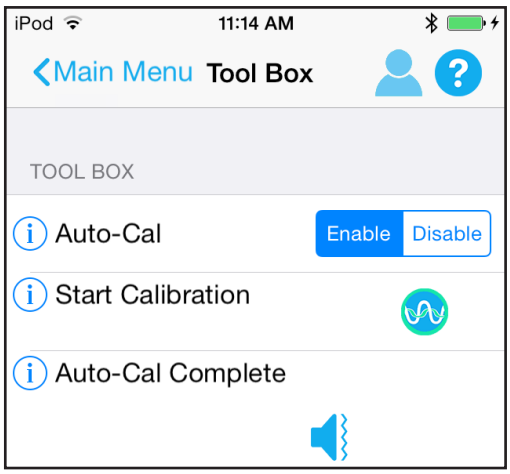
User Profiles

User Profiles can be saved on your Apple® device. It is advisable to save the settings not only on the prosthetist's device as a part of the wearer record, but also on the wearer's Apple® device so they can reset their Hand if the settings are lost.

Auto-Cal

Auto-Cal is a useful feature in every ProPlus device. By triggering an "Auto-Cal event" via the iOS User Interface, the wearer can readjust the gain settings throughout the day. Auto-Cal does have limitations:

- Auto-Cal is only available in Dual Channel control
- Auto-Cal automatically sets Control Type to First Over
- Thresholds are automatically set at 21% (adjustable by the prosthetist)



Auto-Cal will automatically save the previous settings and ask the wearer if they would like to return to previous settings. Performing multiple Auto-Cal events will delete custom settings. Wearers should be advised to ***not*** Auto-Cal if you have customized the settings.

FLAG (Optional)

FLAG (Force Limiting, Auto Grasp) is an optional feature for the MC ProPlus Hand and ETD terminal devices. FLAG provides two functions:

- **Force Limiting,** to prevent crushing objects due to excessive pinch force
- **Auto Grasp,** which slightly increases the grip on an object if an inadvertent open signal is detected by the controller

Turn FLAG On/Off

Upon power up, FLAG is turned off. The TD should be closed, then opened, before using FLAG. To turn FLAG on, give the device a "Hold Open" signal (for ~ 3 sec.)**. When FLAG turns on, the wearer will feel one long vibration. A "Hold Open" signal (for ~ 3 sec.)** will turn FLAG off, and two short vibrations will be felt by the wearer.

Note: If a series of **5 vibrations** is felt upon a "Hold Open", it could indicate a malfunction in the FLAG sensor. Turn the device off, and back on, then completely open and completely close the device. Retry the "Hold Open" signal to activate FLAG. If 5 vibrations are felt again, the device will still function but FLAG will be disabled. The device must be returned to Motion Control for the FLAG sensor to be repaired.

Dual Channel FLAG

Force Limiting

1. With FLAG on, closing is still proportional, with maximum speed lowered by 50%**.
2. On closing, when the fingers contact an object, force will be limited to ~ 2 lbs/9N of grip force – then the wearer feels one short vibration.
3. To increase force, the wearer relaxes below threshold, followed by a strong close signal** for a short effort** and the grip force "pulses" up.
4. Grip force can be pulsed up to 10 times to a maximum of ~ 18 lbs/80N of pinch force**.
5. An open signal will open the terminal device proportionally.

Auto Grasp

With FLAG on, a quick, inadvertent opening signal will result in a single "pulse" increase in grip force to prevent dropping an object.**

Single Channel FLAG

With Single Channel Control, FLAG is best used in Alternating Direction Control Mode.

Force Limiting

1. With FLAG on, the terminal device will close at approximately 50% speed**, proportionally.
2. When the device contacts an object, force will be limited to ~ 2 lbs/9N.
3. A quick and strong signal** above the threshold, then relaxation below the threshold, will create one pulse in the force**.
4. This can be repeated up to 10 times for ~ 18 lbs/80N of pinch force.
5. A sustained signal of about 1 second will open the terminal device.

Auto Grasp

With FLAG on, any quick, inadvertent signal will result in the terminal device closing, preventing the object from being dropped.

Using FLAG with Alternate Inputs *(including Touch Pad, Linear Potentiometer or Force Sensor)*

In the User Interface, set Control Type to Alternate Input, and choose Single or Dual Channel. The Gain settings must be set so the wearer's output signal is high enough to exceed the Hold Open Threshold** necessary to turn FLAG on or off.

****Note**: These settings are adjustable in the iOS MCUI application

Single Patient Use

Each amputee is unique. The shape of their residual limb, the control signals each generates and the tasks an amputee performs during the day require specialized design and adjustment of the prosthesis. Motion Control products are manufactured to be fit to one individual.

Disposal/Waste Handling

This device, including any associated electronics and batteries should be disposed of in accordance with applicable local laws and regulations. This includes laws and regulations regarding bacterial or infectious agents, if necessary.

Limited Warranty

Seller warrants to Buyer that the equipment delivered hereunder will be free from defects in materials and manufacturing workmanship, that it will be of the kind and quality described and that it will perform as specified in Seller's written quotation. The limited warranties shall apply only to failures to meet said warranties that appear within the effective period of this Agreement. The effective period shall be one year (12 months) from the date of delivery to the fitting center that has purchased the components. Refer to the shipping receipt for the date of shipment.

For more information regarding the Limited Warranty, see the MC FACT SHEET - Limited Warranty.

Return Policy

Returns are accepted for a full refund (not including any repairs that may be required) for up to 30 days from date of shipment. Returns 31-60 days from date of shipment will be accepted, subject to a 10% restocking fee. Returns 61-90 days from date of shipment will be accepted, subject to a 15% restocking fee. Returns must be in re-saleable condition. Beyond 90 days, returns are not accepted.

Technical Specifications

Operating Temperature: -5° to 60° C (23° to 140° F)

Transport & Storage Temperature: -18° to 71° C (0° to 160° F)

Pinch Force: At 7.2 volts nominal: 10 kg (22 lbs, or ~ 100N)

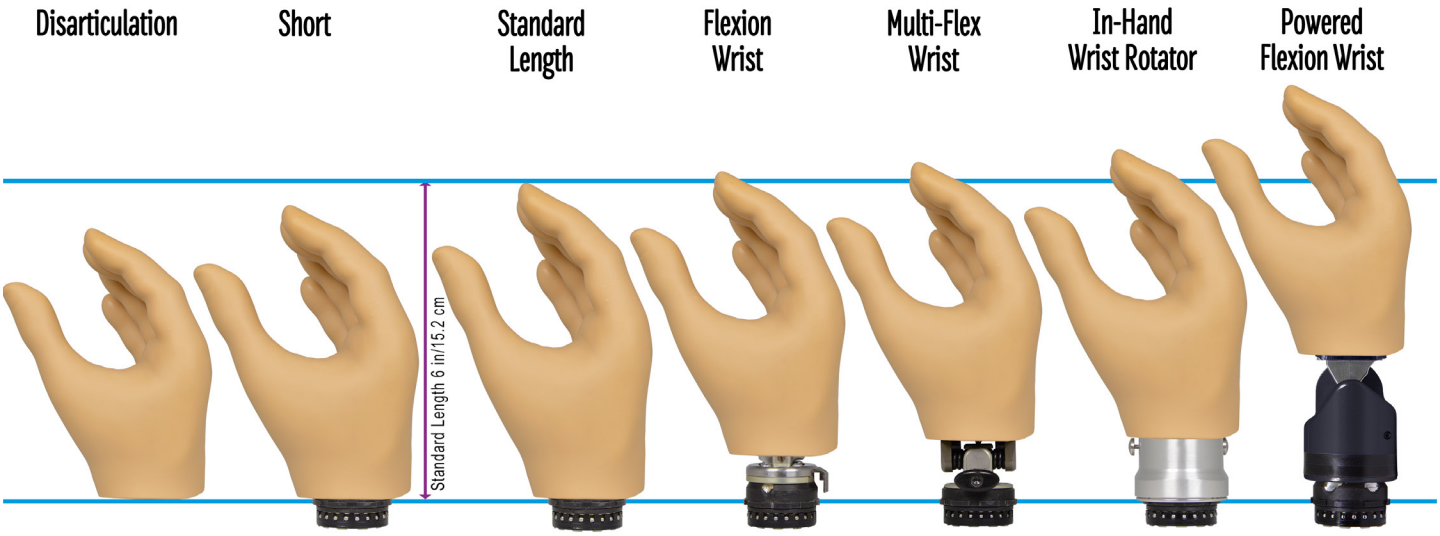
Operating Voltage Range: 6 to 8.2 Vdc - MC ProPlus Hand

Load Limit: 22 kg / 50 lbs in all directions (+/- 10%)

Declaration of Conformity

The product herewith complies with Medical Device Regulation 2017/745 and is registered with the United States Food and Drug Administration. (Registration No. 1723997)

MC Hand Size and Weight Chart



Disarticulation	Short	Standard Length	Flexion Wrist	Multi-Flex Wrist	In-Hand Wrist Rotator	Powered Flexion Wrist
7 ¾ Hand: 4 ½ in/11.4 cm	7 ¾ Hand: 5 ½ in/14 cm	7 ¾ Hand: 6 in/15.2 cm	7 ¾ Hand: 6 ⅛ in/15.6 cm	7 ¾ Hand: 6 ⅜ in/16.2 cm	7 ¾ Hand: 6 ⅝ in/17 cm	7 ¾ Hand: 8 in/20.3 cm
Weight: 15.2 oz/431 gm	Weight: 16.3 oz/462 gm	Weight: 16.9 oz/479 gm	Weight: 17.1 oz/485 gm	Weight: 17.1 oz/513 gm	Weight: 21.5 oz/610 gm	Weight: 23.2 oz/654 gm

Note: 8 ¼ Hand is ⅛ in/0.3 cm longer • 7 ¼ Hand is ⅛ in/0.3 cm shorter

MCUI User Interface for iOS

Quick Setup Guide

Quick Setup for Motion Control User Interface for Apple® iOS (MCUI)

1. From the Apple® App Store download and install the MCUI.
2. Enter the Prosthetist Code: **PR-MCAK**. *Patients do not require a code.*
3. Open the App and follow the Tutorial.
4. Go to the Connect screen and tap Scan.
5. Input the Pairing Key. *This key should be kept in the Patient's record.*
6. The device is now connected to the MCUI.
7. To disconnect, tap the Connect icon in the lower left corner, then tap Disconnect.

System Requirements

Apple® App Store account, and any of the following devices:

- iPad® (3rd gen and later)
- iPad mini™, iPad Air®, iPad Air® 2
- iPod touch® (5th gen and later)
- iPhone® 4S and later.

Troubleshooting

- Make sure the battery on the device is fully charged
- Check connection of the device in the quick disconnect wrist
- Confirm the device is turned on
- Verify that you are not in "Tutorial Mode" by double tapping the Home key, then swiping MCUI off the screen, and reopening MCUI
- Bluetooth® must be turned on in Settings on the iOS device
- The Information icon provides information about a function
- To repeat the tutorial, go to and tap Reset on Reset Guided Tutorial

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EC REP

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