

ProPlus, ProWrist, and ProControl 2

Quick Setup Guide

Fillauer[®]
Motion Control

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.



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.



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.



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.

Controller Quick Setup Guide

Introduction

The Motion Control ProControl 2 is a modular controller for use where precise, myoelectric control of hand or wrist is required. Inputs can be EMG (myoelectric), linear potentiometer, or touch pads. Choose from a wide range of battery options. The ProControl module is used with a Motor Direct (Standard) terminal device where a controller is not in the device, but is needed to process signals. Please be aware that the ProControl2 System is NOT compatible with the Myo/One Electrode System. Note: this system may also require a wrist feature (part #4010000). Please select Triad Electrodes for compatibility with ProControl.

ProPlus and ProWrist devices have a controller already integrated into the device. Information on configuration, installation and software setup for those devices is included here.

Step 1. Connect the System Parts

Choose the diagram on the next pages for your parts:

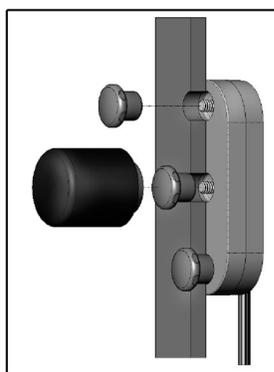
- A. ProPlus Installation
- B. ProWrist Installation
- C. ProControl 2 Installation (No Wrist Rotator)
- D. ProControl 2 Installation (MC Wrist Rotator)

Electrode Site Selection (Triad Preamp Style)

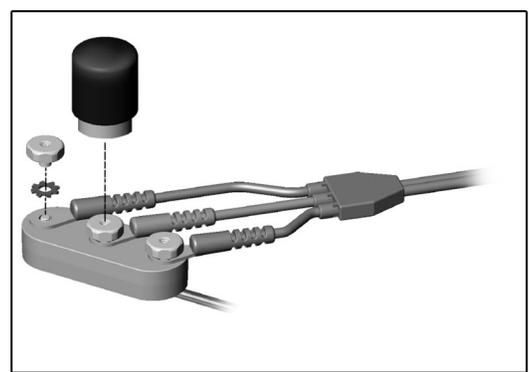
1. Begin EMG testing with the most distal of the remnant muscles.
2. For each potential control site, palpate the muscle as the patient contracts it, placing the electrode over the belly of the muscle.
3. Ask the patient to contract, hold, and relax, in about a three-second sequence. A smooth and even contraction is the goal, without strenuous effort, and with relaxation following each contraction.
4. Systematically move the electrode by about 1cm increments, testing the entire musculature of the remnant limb.



Grommet Method



Temporary Socket Method

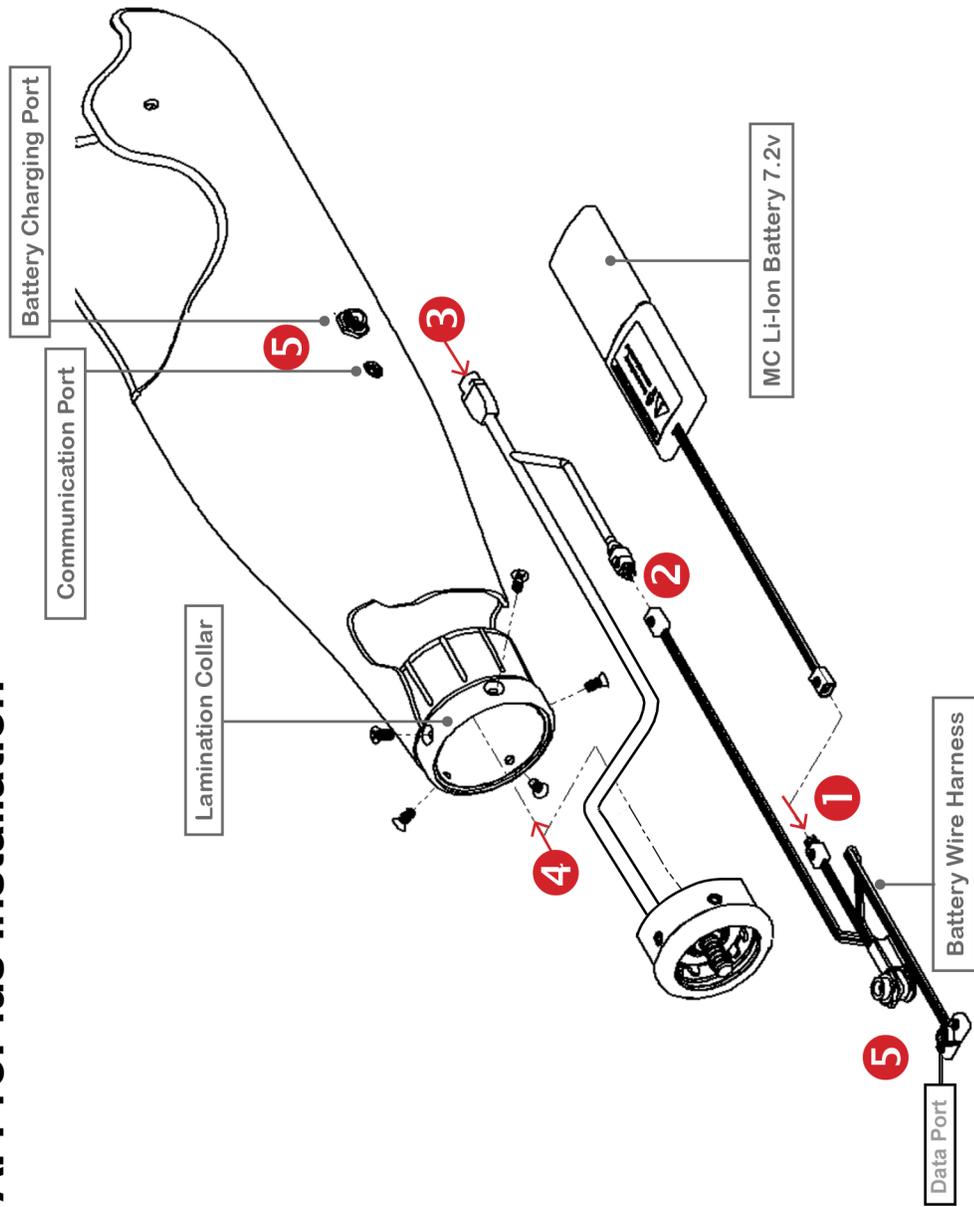


Remote Electrode Method

Electrode Mounting Methods:

For installation of the electrodes, see the instructions for mounting the Triad Preamps which come with that kit.

A. ProPlus Installation



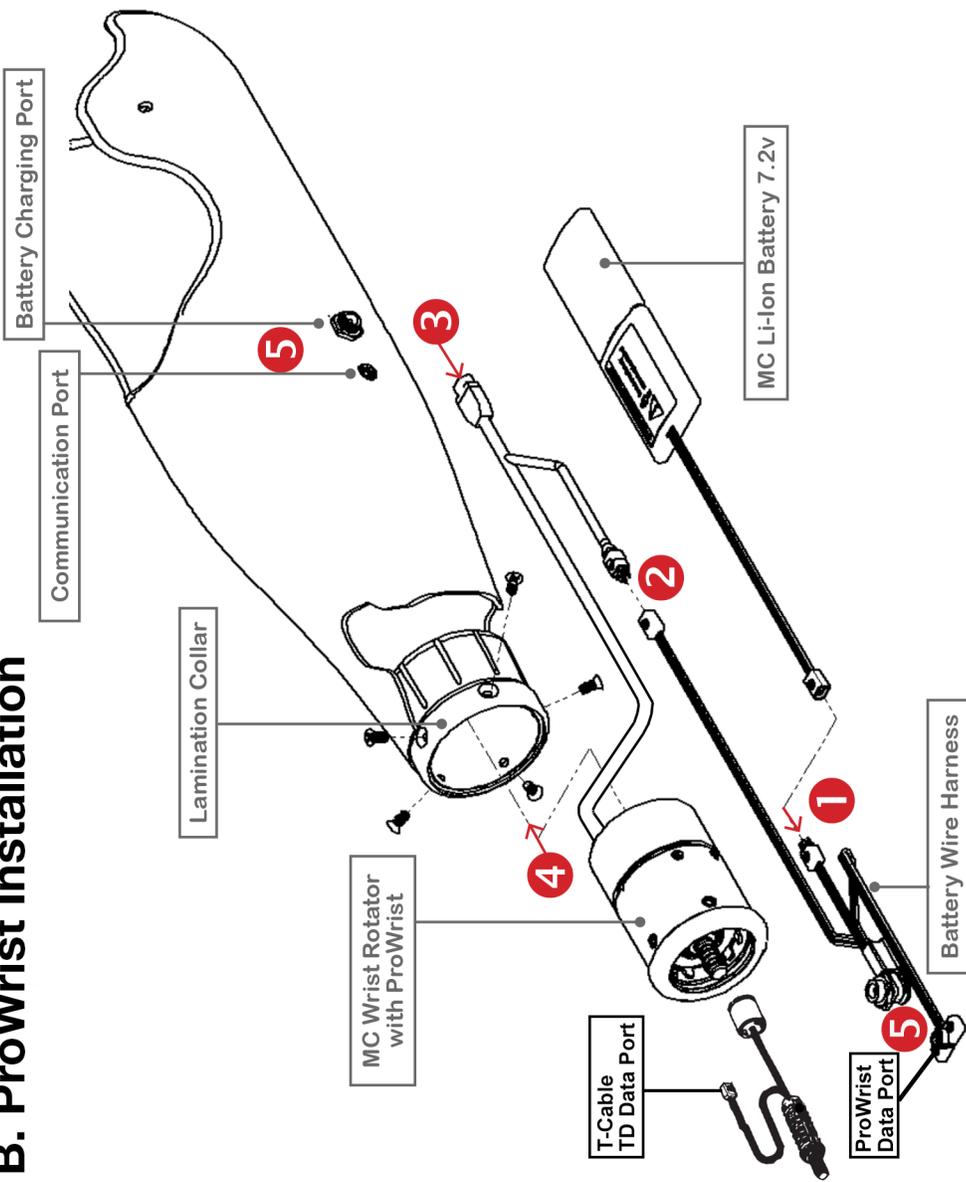
STEPS

- 1 - Connect battery to the Battery Wire Harness.
- 2 - Connect the Battery Wire Harness to the Coaxial Input (4 pin)
- 3 - Connect the Preamps to the Coaxial Plug (9 pin)
- 4 - Locate the position of the charging and communications port and drill holes accordingly. Secure the battery and preamps to the wall of the prosthesis with self adhesive Velcro.
- 5 - Attach the preamps to the socket.

CLOSE UP VIEWS

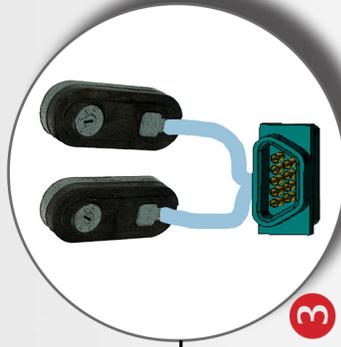


B. ProWrist Installation



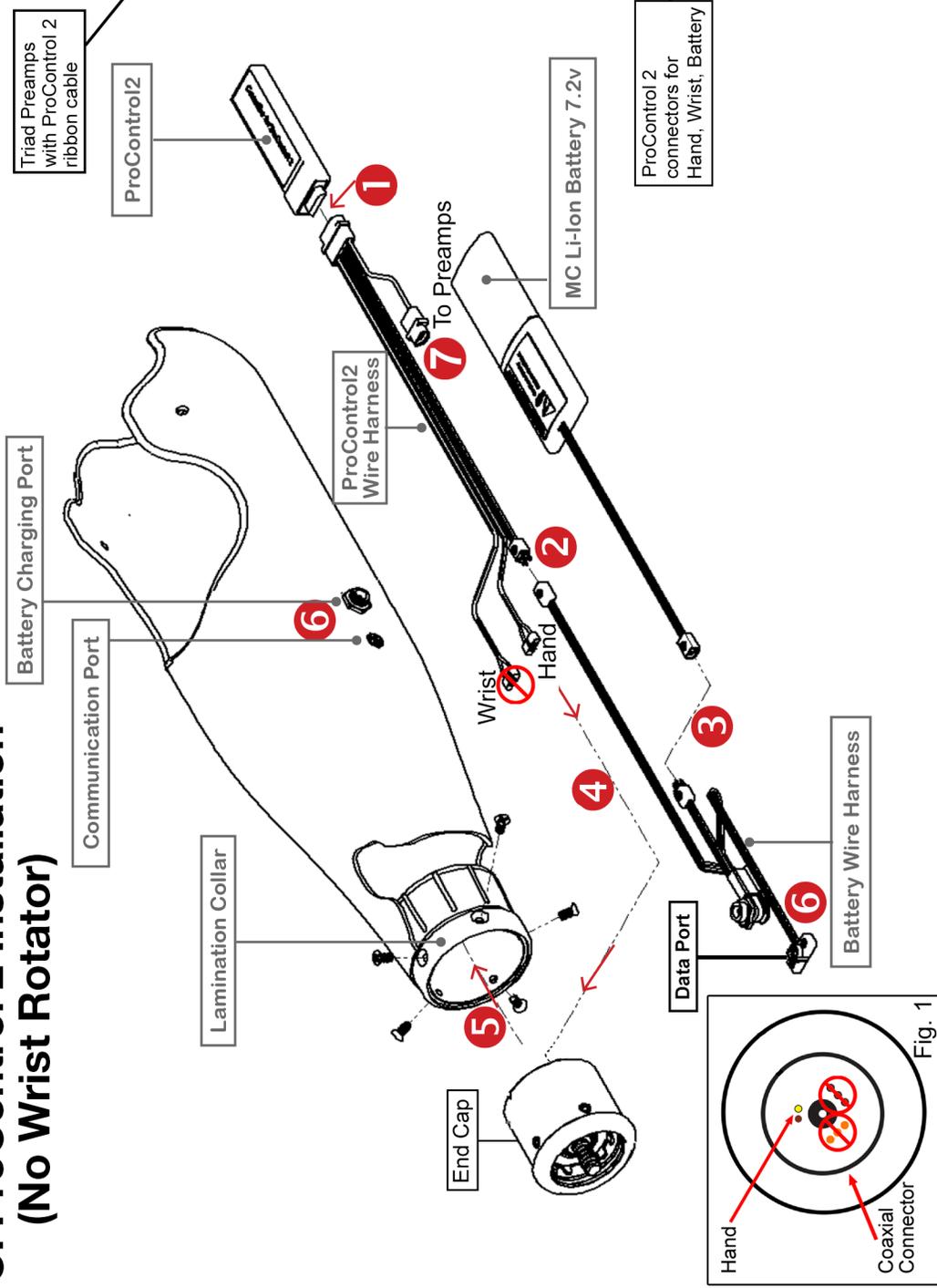
Triad Preamps with ProControl 2 ribbon cable

CLOSE UP VIEWS

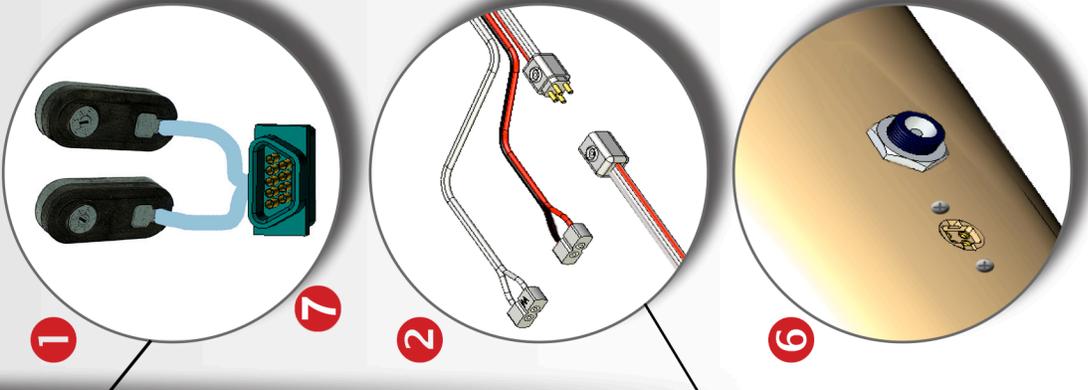


- STEPS**
- 1 – Connect battery to the Battery Wire Harness.
 - 2 – Connect the Battery Wire Harness to the ProWrist input (4-pin)
 - 3 – Connect the Preamps to the ProWrist input (9-pin)
 - 4 – Insert the entire assembly into the Lamination Collar, including the ProWrist Rotator. Align the screw holes and fasten the screws.
 - 5 – Locate the position of the charging and communications port and drill holes accordingly. Secure the battery and preamps to the wall of the prosthesis with self adhesive Velcro. Secure the charging and communications ports with the provided screws.
 - 6 – Attach the preamps to the socket.

C. ProControl 2 Installation (No Wrist Rotator)



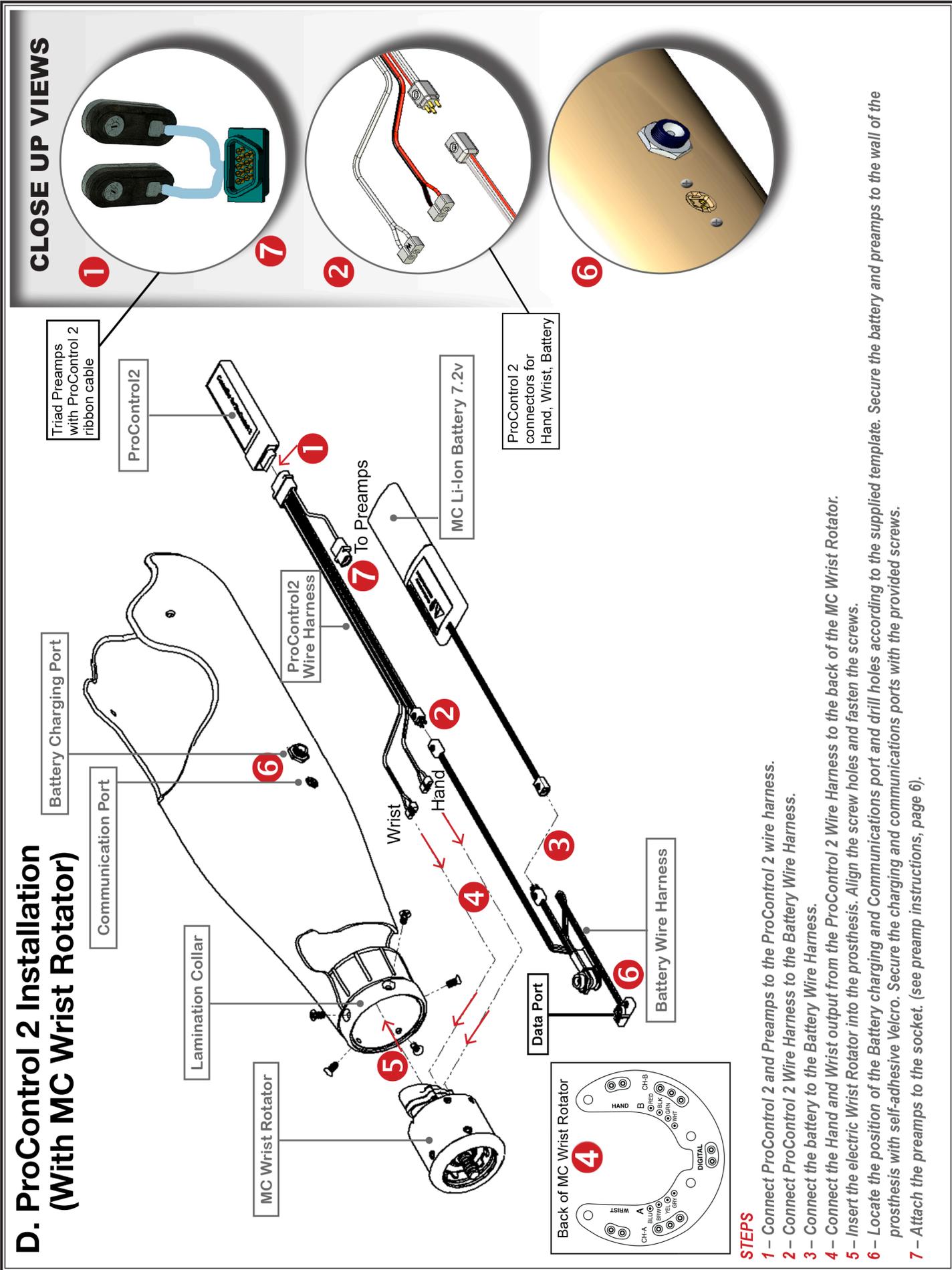
CLOSE UP VIEWS



STEPS

- 1 - Connect ProControl 2 and Preamps to the ProControl 2 Wire Harness.
- 2 - Connect ProControl 2 Wire Harness to the Battery Wire Harness.
- 3 - Connect the Battery to the Battery Wire Harness.
- 4 - Connect the Hand Output from the ProControl Wire Harness to the back of the Coaxial Connector inside the End Cap (see Fig. 1).
- 5 - Insert the End Cap into the prosthesis; align the screw holes and fasten the screws.
- 6 - Locate the position of the Battery Charging and Communications ports, and drill holes according to the provided template. Secure the Battery and Preamps to the wall of the prosthesis with self-adhesive Velcro. Secure the Charging and Communications ports with the provided screws.
- 7 - Attach the Preamps to the socket (see Preamp Instructions, page 6).

D. ProControl 2 Installation (With MC Wrist Rotator)



STEPS

- 1 – Connect ProControl 2 and Preamps to the ProControl 2 wire harness.
- 2 – Connect ProControl 2 Wire Harness to the Battery Wire Harness.
- 3 – Connect the battery to the Battery Wire Harness.
- 4 – Connect the Hand and Wrist output from the ProControl 2 Wire Harness to the back of the MC Wrist Rotator.
- 5 – Insert the electric Wrist Rotator into the prosthesis. Align the screw holes and fasten the screws.
- 6 – Locate the position of the Battery charging and Communications port and drill holes according to the supplied template. Secure the battery and preamps to the wall of the prosthesis with self-adhesive Velcro. Secure the charging and communications ports with the provided screws.
- 7 – Attach the preamps to the socket. (see preamp instructions, page 6).

Step 2. Connect the Computer Interface

Hardwire USB Connection

1. First Plug the Computer Interface cable into a USB port on your computer.
2. Plug the 4-pin connector into the device port, and turn on the device.



REMEMBER! The device must be turned ON for the User Interface to operate.



Bluetooth Connection

1. Plug the 4-pin connector into the device port on the device.
2. Follow the Bluetooth device setup instructions for your computer.

Step 3. Install the Software

Motion Control 5.3.1 is a legacy Windows-based version of the User Interface which is available for download on our website. Once downloaded, open the file and click Next.

The program will be automatically installed on your "C" drive unless you specify otherwise. When the operation is complete, you will see a message indicating the software has been successfully installed.

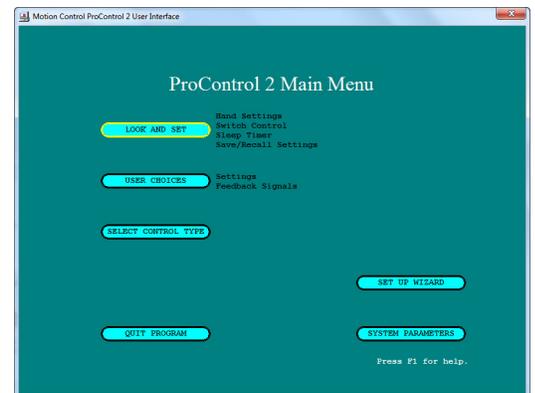
You should now see two new icons on your desktop labeled "Motion Control 5.3.1" and "MC 5.3.1 Simulation". Choose the Simulation if you want to see a demonstration version of the software, otherwise, choose "Motion Control 5.3.1" to start using the software.



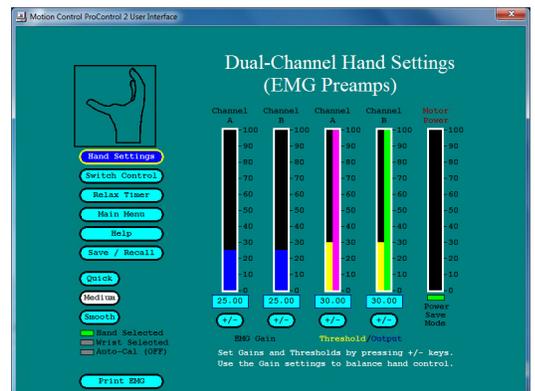
User Interface Welcome screen.

Setting up Dual Channel Control

1. Once the welcome menu opens, Select "ProControl 2", then click "Next". That will take you to the ProControl Main Menu.
2. Choose "**Control Type**" to go to the next screen.
3. **There are three options for Dual Channel Control:** Dual Channel EMG (Differential), Dual Channel EMG First Over, and Dual Channel Alt. Input. Select the appropriate one for your device. See Definitions at the end of this manual for info.
4. Click "Leave this screen" to return to the Main Menu.
5. From the **ProControl Main Menu** click "Look and Set".
6. From here you will manage the Dual-Channel hand settings including the **Gains, Thresholds, and Filtering**.
7. Select "**Switch Control**". Note Switch Control is only available if Wrist is present or with a ProWrist.
8. Select "**Hand-to-Wrist switching**". Choose Fast Access, or Co-Contraction. See Definitions at the end of this manual for info. NOTE: When you switch one on, you must switch the other off, otherwise both will be enabled and performance will be erratic.



From the ProControl Main Menu screen you can set preferences for the device.



Choosing "Look and Set" will allow you to manage the Dual-channel settings.

9. **Auto Switch to Hand** may be turned On or Off.
10. **Set Target Rate** for ease of switching.
11. **Set Switch Window** adjustment if using Co-Contraction.
12. Click **“Relax Timer”** and set. This is the time a patient needs to relax before Hand/Wrist switching. Note: Option is only available if Wrist is present.
13. Click **“Main Menu”** to return to the previous screen. Before you can return to the Main Menu, the system automatically opens the Store and Recall Settings window, prompting you to save (to the ProControl 2) any changes you have made during the session.
14. **Store and Recall Settings.** Choose one of the options listed. When the action is complete, you will automatically return to the Main Menu. The options are explained below:

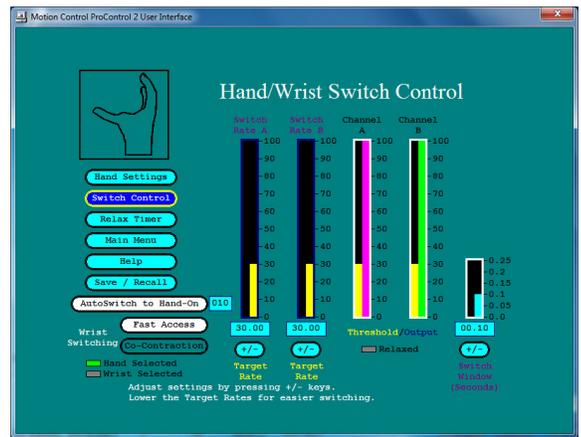
SAVE adjusted settings and proceed saves the changed settings to the ProControl 2, then opens the Main Menu window.

PROCEED without saving adjusted settings opens the Main Menu window without saving any adjustments you made during the session. All adjustments you made will be lost.

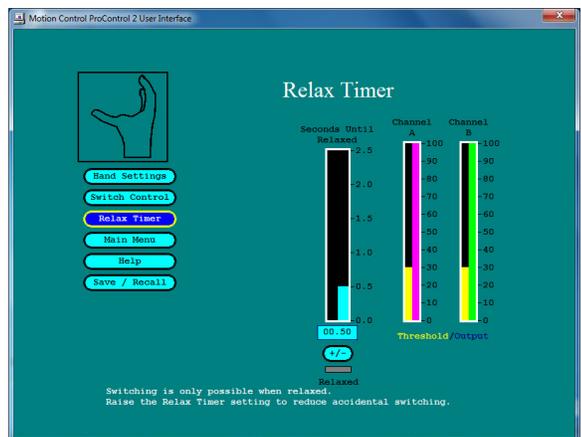
RECALL starting settings restores the settings from the last SAVE.

SAVE then go to Computer file operations saves the changes to the ProControl 2, then opens a File Operations window allowing you to save a file of the adjusted settings on your computer. This should be done at the conclusion of the fitting session.

You can also RECALL settings from a prior SAVE from the File Operations window. (See the File Operations section in this document for more information).



The Switch Control screen allows you to choose Fast Access vs. Co-Contraction, set the Auto Switch to hand, target rate, and timing of the switch rate.



The Relax Timer is the time the patient needs to relax before Hand/Wrist switching.



Choose between one of the four SAVE options for your setup.

Setting up Single Channel Control

1. Once the welcome menu opens, Select "ProControl 2", then click "Next". That will take you to the ProControl Main Menu.
2. Choose "Control Type" to go to the next screen.
3. **There are two options for Single Channel Control: Single Channel EMG, and Single Channel Alt. Input.** See the Definitions at the end of the manual for more info. on the difference.
4. Select the appropriate Single Channel Control type.
5. Click "Leave this screen" to return to the Main Menu.
6. **Single-Channel Hand Settings.** Choose between Midpoint or Alternating Direction Control, for Hand and Wrist.
7. From here you will manage the **Filtering, EMG Gain, Output Gain, Home Threshold.**
8. Select "**Switch Control**". Note Switch Control is only available if Wrist is present or with a ProWrist.
9. **Hand/Wrist Switch Control.** Auto Switch to Hand may be turned On or Off.
10. **Target Rate** is adjusted for easier switching.
11. Click "**Sleep Timer**".
12. Adjust the length of relaxation time required for Hand/Wrist Switching under **Hand Sleep Delay** and direction change in **Alternating Control**.
13. Click "Main Menu" to return to the previous screen. Before you can return to the Main Menu, the system automatically opens the Store and Recall Settings window, prompting you to save (to the ProControl 2) any changes you have made during the session.
14. **Store and Recall Settings.** Choose one of the options listed. When the action is complete, you will automatically return to the Main Menu. The options are explained below:

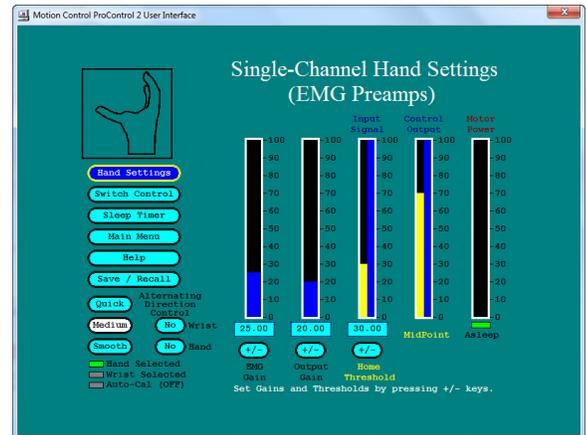
SAVE adjusted settings and proceed saves the changed settings to the ProControl 2, then opens the Main Menu window.

PROCEED without saving adjusted settings opens the Main Menu window without saving any adjustments you made during the session. All adjustments you made will be lost.

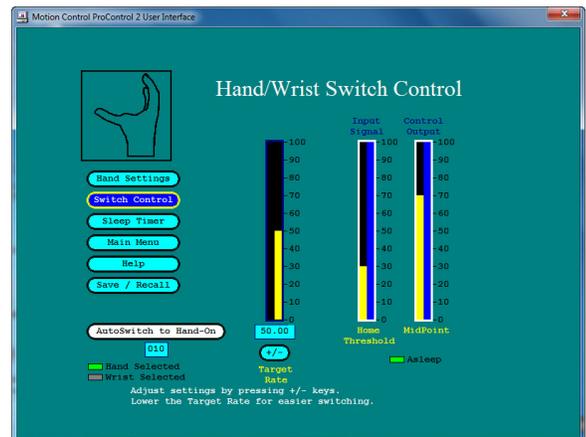
RECALL starting settings restores the settings from the last SAVE.



Hand Control Type screen.



This screen manages Alternating Direction Control, Filtering, EMG Gain, Output and Threshold.



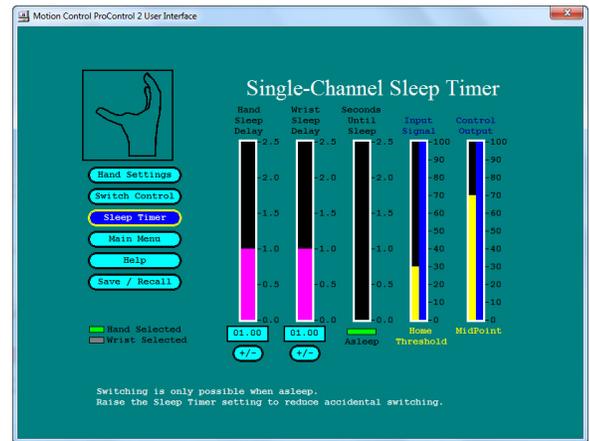
Switch Control screen for Target Rate and Input Threshold.

SAVE then go to **Computer file operations** saves the changes to the ProControl 2, then opens a File Operations window allowing you to save a file of the adjusted settings on your computer. This should be done at the conclusion of the fitting session.

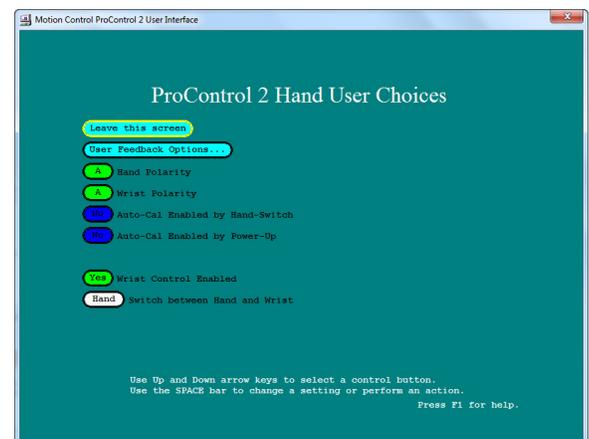
You can also **RECALL** settings from a prior **SAVE** from the File Operations window. (See the File Operations section in this document for more information).

User Choices and Feedback Settings

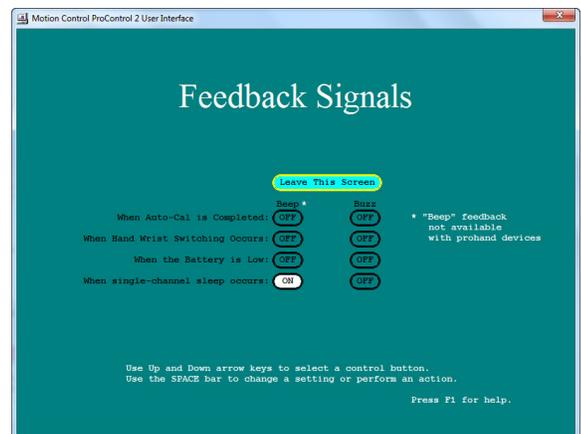
1. From the ProControl 2 Main Menu, select “USER CHOICES”.
2. **ProControl 2 Hand User Choices.** You can set hand and wrist polarity and manage Auto-Cal settings from this screen.
3. From here you can switch **Hand Polarity**, (A/B—reversing Open and Close).
4. Switch **Wrist Polarity**, (A/B—reversing pronation and supination).
5. Set how and when to enable **Auto-Cal** (next section).
6. Turn On or Off **Wrist Control**.
7. Switch between Hand and Wrist.
3. From here choose “User Feedback Options.”
4. From the **Feedback Signals** screen you can set user preferences for audible and haptic feedback.
5. Click “Leave this screen” to return to the menu.



The Sleep Timer screen allows you to set the relax time required for Hand/Wrist switching and direction changes.



The User Choices screen allows for user preferences on device polarity, Auto-Cal settings and wrist control.



The Feedback Signals screen allows setting user preferences for audible and haptic signals.

Using AutoCal[®]

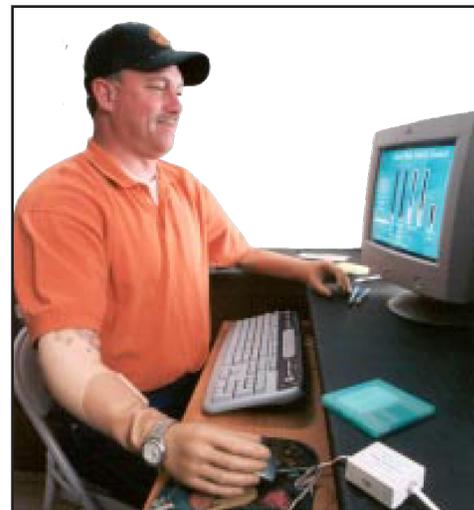
Automatic adjustment feature

AutoCal automatically sets Gains based on the wearer's signals. After AutoCal is triggered, the wearer's EMG is measured for seven (7) seconds. Gains are adjusted automatically so that the Range is 0-100% of measured EMG signal. Thresholds are set automatically to 15% above relaxed EMG; Minimum Threshold equals 31%. Settings may be changed manually by the prosthetist, if necessary, by disabling AutoCal.

Three ways to start AutoCal:

1. By Hand Switch – Turn the Hand off – then on again, twice within 7 seconds.
2. By Power Up – when the system is first turned on by Hand switch or removing the interrupter plug.
3. By pressing Alt + A on your keyboard (while connected to the computer).

(These options are enabled / disabled by the "AutoCal" buttons on the Settings screen.)



AutoCal Instructions to the wearer

1. Put on the prosthesis, and let the electrodes warm up to the temperature of your skin. Depending upon the pressure of the electrode on the skin, this could take up to 10 minutes.
2. If ProControl 2 is set for AutoCal Enabled on Power Up, turn on the Hand Power Switch, then contract the opening muscle, without straining. Then follow steps 3-6. If AutoCal is set for AutoCal Enabled by Power Switch, when the hand switch is in the ON position, turn the hand off, then on twice within seven (7) seconds. Then follow steps 3-6.
3. Relax briefly, then contract the closing muscle, without straining, so that the Hand closes.
4. Open again, and close again, without straining.
5. Relax—try to feel the light vibration generated in the Hand at the end of the AutoCal seven-second period. A short "beep" will sound. (See Feedback Signals on the User Settings screen)
6. After AutoCal, test your hand control—open and close the Hand slowly, then quickly. You should be able to vary the speed of the hand by the strength of your contraction. Your maximum speed should be controllable and not jittery. If you have an Electric Wrist, try to co-contract quickly, or fast access, then relax, and operate the wrist with the same muscles.

Computer File Operations

Full Feature-Set Store and Recall

This allows you to Save to your computer, a file containing the adjusted ProControl 2 settings. This should be done at the conclusion of every fitting session. You can also Recall settings from a prior Save (or session).

Following your selection, the Main Menu window will open. Click QUIT PROGRAM to Exit.



This screen saves or recalls your ProControl settings to a computer for backup or storage.

Troubleshooting

Contact Information

When there is a problem with the product, approach it logically, with the help of the “Basics” section below and the Flowchart on the following pages. For help from Motion Control technicians, call us at (801) 326-3434, or email motioninfo@fillauer.com

Basic Checks

- 1. Check the Battery.** Make sure the battery in the device is charged. Inspect the battery contacts on both battery and holder. Clean with alcohol and cotton swab if needed.
- 2. Check the Power Switch.** Check the switch for the Hand or Wrist used. Consult the individual instructions for all devices.
- 3. Check the integrity of all connections.** Check all of the cables and attachments including the USB or Bluetooth adapter connections and the serial port connection to computer.
- 4. Check for Proper Electrode Contact in the Socket.** Confirm location of the electrodes over the optimal muscle sites—retest if needed. Look for impressions of the electrodes in the skin. Make sure the skin does not pull away during the muscle contraction. Have the patient operate the Hand or Elbow and observe the muscle signals on the Computer Interface (if the electrodes pull away from the skin, the EMG “jumps” suddenly). Use the Hand in all positions.
- 5. Restart the computer and power cycle the device** by turning it off and on again. Be sure to follow instructions of which items to turn on first in the sequence.

Additional Tips for a USB Connection

Message: “Unable to communicate with the controller via the serial port” or “serial Com Port is not available”.

1. Click OK. The Auto Scanner will appear.
2. Click “Start Scan”. If the Com Port is located it will show up in the screen.
3. Select the Com Port. A simple dialog box will display “Valid Device Found”, click “OK” and you’ll connect. It may take a few seconds.
4. If the Auto Scanner returns the message “No devices were found...” Follow the instructions in the message. Double check your connections, Power-cycle the device, or close and reopen the software.

Message: “Shutting Down...Select Active Controller: Firmware version is not recognized.

1. Reinstall the Motion Control software. It can be downloaded from the website.

Identify USB/Serial Port Adapter Com Port: Your USB may not be installed properly.

1. On your Windows computer find your Device Manager.
2. Scroll down to “Ports (COM & LPT) and expand the option by clicking the “+”.
3. If the USB Adapter is installed properly, you will see “Belking Serial or USB Port (Com X). If the error continues it’s possible that another program in your computer is keeping you from connecting. Consider uninstalling that program or trying another computer for the setup.
4. If no USB Serial port is found, reinstall the USB Adapter Driver, then reconnect the USB Adapter software. Don’t forget to restart your PC.
5. You may need to run the basic checks again after you reinstall the driver.

Installing the Belkin Bluetooth Adapter

1. Insert the Belkin Driver CD into the CD drive.
2. The Belkin driver program should start automatically.
3. Select "Install Bluetooth Software".
4. Follow the instruction given by the Install Shield Wizard instructions:
 - Select "Next" at the welcome Screen,
 - Accept the terms and conditions, then click "Next" again, and again,
 - Click "Install".
 - Click "OK", when it warns you about certification.
5. When prompted, connect the USB Adapter into the USB port.
[Remember the physical USB port you use the first time – always use the same one]
6. Installation should continue automatically. This may take a few minutes. Click "Finish".

Tips for a Bluetooth Connection

- **Symptom 1:** "Com Port not found" message: When installing the Belkin USB adapter, note which physical USB port you use and try to use the same port each time you plug in the adapter. If you use a different USB port than the original installation, the Windows System may need to install the Belkin Software again. If this happens, it will state, "Found New Hardware." Simply follow the directions given in the New Hardware Wizard (have the system automatically search for the files) which will pop up when you insert the USB Bluetooth Adapter. This should not require the CD again, but will merely find the proper driver files on your hard drive.
- **Also try:** If your computer already has Bluetooth capability, you may be able to use the current installation. However, some existing Bluetooth systems do not have sufficient performance to be used with the Motion Control System due to latency issues. If your internal Bluetooth does not communicate with the FireFly, please use the Belkin USB Bluetooth adapter provided, (see steps below) or follow the "Found New Hardware Wizard". If there are conflicts with your existing Bluetooth, it may be necessary to uninstall or disable your current Bluetooth.
- **Symptom 2:** " ANYCOM serial adapter software previously installed" (or similar) and your computer currently has ANYCOM installed, for the Otto Bock C-Leg, it may need to be uninstalled prior to the Belkin Bluetooth installation. C-Soft and Otto Bock Bluetooth should work with the Belkin adapter. Computers with built in Bluetooth capability should also work if the most current Bluetooth driver is installed.
- **To Remove Programs interfering with the Com Port:** Go to the Control Panel from the Start Menu, Select "Add/Remove Programs", Find the (O.B. software or other Program) Select "Remove. Install Belkin Adapter (see steps below).

Definitions

Definition of Control Types

Alternating Direction: With Control Type set for Single Channel (EMG or ALT Input), the direction changes after each relaxation (sleep cycle).

Co-Contraction: An EMG trigger where both EMG signals must cross the threshold at the correct switch rate within the switch window.

Differential: In an EMG control system, calculates $A - B = \text{motion}$. If $A > B$, the difference is positive, and the device goes one direction; if $A < B$, the difference is negative, and the device goes in the opposite direction. Speed is proportional to the difference between A and B. This results in very fine control.

Dual Channel Control: Input signals $A - B = \text{proportional motor power}$ (if $A > B$, TD opens; if $B > A$, TD closes). Note: "Differential Control".

Dual Channel First Over: Controller output signal is whichever channel crosses the threshold first, ignoring the other channel. This is useful for wearers with unintentional co-contraction.

Fast Access: An EMG trigger in which just one EMG signal must cross the threshold at the correct rate.

First-Over: In an EMG control system, whichever channel signal crosses the threshold first, the opposite channel is ignored. Useful when there is unwanted crosstalk between the channels.

Gain: Essentially a volume control for EMG. Turn up for weak signals, turn down for strong signals.

Hand/Wrist Switching in Single Channel Control: Like it is in Dual Channel Control, switching is accomplished by a fast input signal. Switching is easier with low target rate settings. accomplished by adjusting the Target Rate in the Switch Control screen of the User Interface. The higher the target rate, the more difficult to switch.

Midpoint Control (default): Increasing the signal opens the hand with proportional control. A decreasing signal closes the hand at full speed. The hand will hold the same position when the when held steady for a period of time adjusted by the sleep timer. This could also be called "voluntary opening".

ProPlus (or Microprocessor Control): A system where the microprocessor is in the device (i.e., TD, Wrist or Elbow) and the system can "read" the input device directly.

Sequential Control: Elbow and hand may operate from a single input, i.e., one pair of electrodes. The arm begins in elbow mode. When elbow locks, control switches to hand/wrist. Unlock switches back to elbow control. The action can be reversed by switching A/B polarity (voluntary closing).

Simultaneous Control: Elbow and hand can operate at the same time. Requires two input devices, e.g., Linear Potentiometer for elbow function, EMG for hand function.

Single Channel Alternate Input : Useful when no muscle EMG is available. Provides Proportional Hand and/or Wrist control.

Single Channel EMG: Useful when only one muscle channel is available. Provides Proportional Hand and/or Wrist control.

Standard (or Motor Direct): A drive system where a Terminal Device, wrist or elbow (such as the Hosmer E2) operates from input of a direct voltage. A microprocessor must be upstream to convert the EMG signal to voltage.

Switch Rate (aka Target Rate): The speed (rate) at which the EMG signal crosses the threshold. This speed is measured and adjustable. Increasing switch rate makes switching more difficult.

Switch Window: The adjustable time frame at which both EMG signals must hit the correct switch rate to trigger a co-contraction switch.

Threshold: The point at which an EMG signal above it generates an output signal. Below it, no output signal is generated.

Customer Support

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