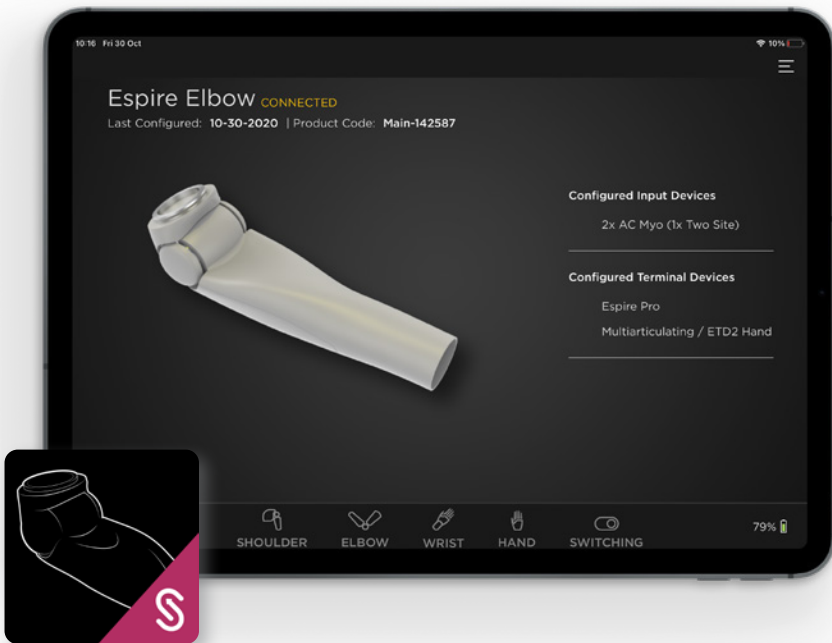


Espire™ Hub App

For iPad

Technical Manual



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SECTION 1 - SYSTEM OVERVIEW

An iPad will be provided to every clinic with their first purchase of an Espire Pro or Hybrid system.

The app used to program the elbow and modify its settings is called the Espire Elbow Hub. This app is not pre-installed and must be downloaded from the Apple App Store.



Note: For new Espire setup information, please refer to our **Espire Elbow Quick Set Up Guide - Pro and Hybrid**.

1.1 iPad Setup

Prepare for Setup

To make setup as smooth as possible, have the following items available:

- An internet connection through Wi-Fi network (you may need the name and password of the network).
- Your Apple ID and password; if you don't have an Apple ID, you can create one during iPad set up.

SYSTEM REQUIREMENTS

Hardware Minimum Requirements	iPad 5th generation or later with iOS 10.3 or later
Software	Download the Espire Hub App via the Apple App Store



Note: if your iPad is deployed or managed by a company, school or other organisation, see an administrator for setup instructions.

Download the Espire Hub App



Download the Espire Hub App from the App Store. The Espire Hub App is compatible with iPad and iOS only. It is not compatible with other devices.

Contact Steeper Group Customer Services for an Espire Hub App login

To obtain a password, you must provide a valid email address. You will receive an email with a link to the Espire Portal, where you can create a password.

UK/International Phone: +44 (0) 840 270 4133 or email customerservices@steepergroup.com

USA/Canada Phone: (+001) 210-481-4126 or email inquiries@steeperusa.com.



Note: Your username will be the email address supplied. Passwords are case sensitive. You can make a note of your username and password hint at the back of this document.

Enable Bluetooth on iPad

On the iPad, go to Settings  then tap Bluetooth.

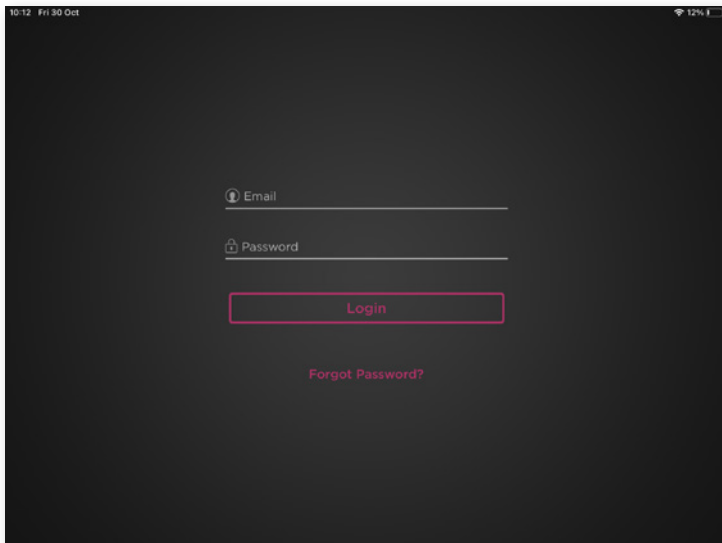
1.2 Logging In



Note: An internet connection through a Wi-Fi network is required to login and operate the app

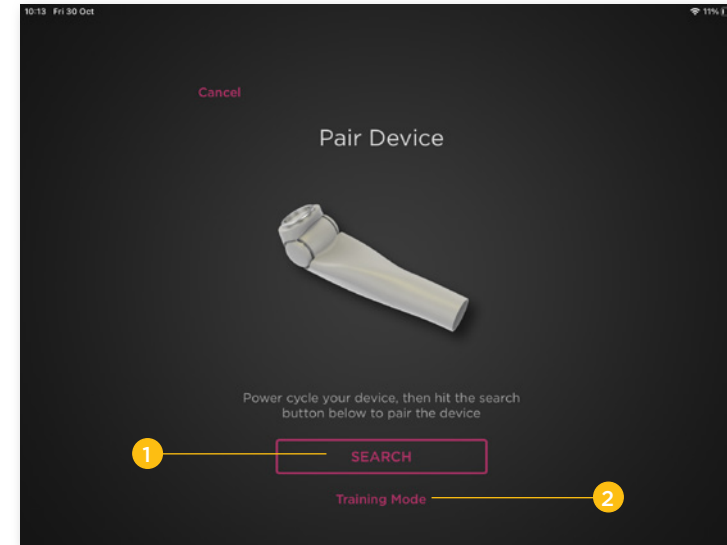


Whilst connected to the internet via Wi-Fi connection, tap to launch the Hub App and login.



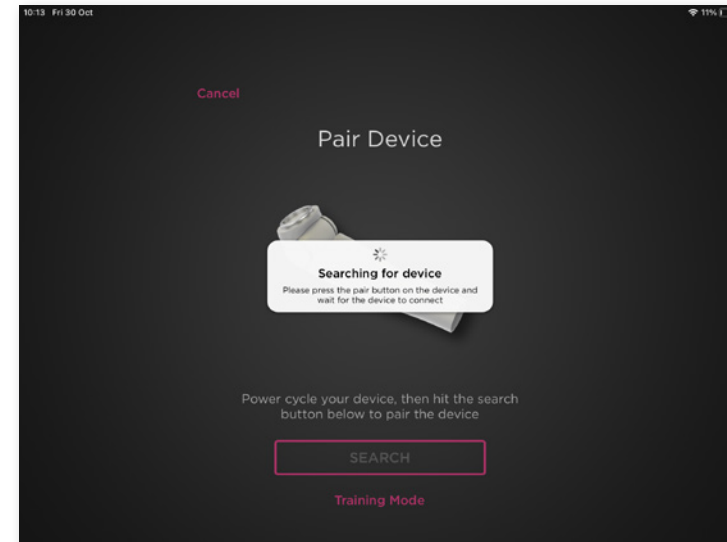
Tapping **'Forgot Password?'** will bring up a prompt to contact Steeper Customer Services to reset your password.

1.3 Pair Device Screen




- 1. Search** - Begins pairing the Espire Elbow to the iPad.
- 2. Training Mode** - Allows access to the application without connecting to an Espire Elbow. Its purpose is to train users on app function and does not save information or make alterations to the elbow.

Pair Espire Elbow to iPad



When the Espire Elbow is power cycled, it will automatically emit a Bluetooth signal for 2 minutes. Press the **'SEARCH'** button on the Hub App to begin pairing. Once a Bluetooth connection is established, the LED indicator will display a blue light during the pairing.

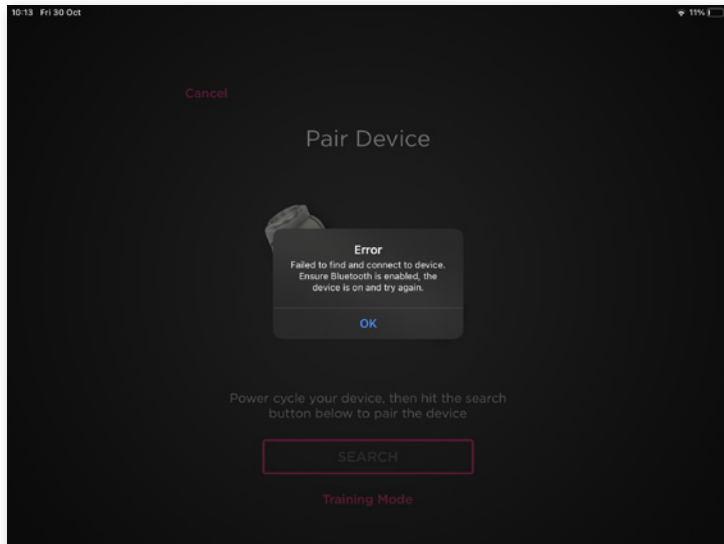
Elbow LED Indication - Bluetooth

Colour	Indicator	Status
Blue Solid		Bluetooth connection



Note: The iPad must be within 10 metres (33 feet) of the Espire Elbow

Troubleshoot Pairing Device



If no device is found, power cycle (remove and replace the battery) to re-send the Bluetooth signal. Press **'SEARCH'** again.

If you are still having trouble connecting, disconnect the battery, wait 5 seconds and reconnect the battery. Press **'SEARCH'** again.

1.4 Calibration Overview

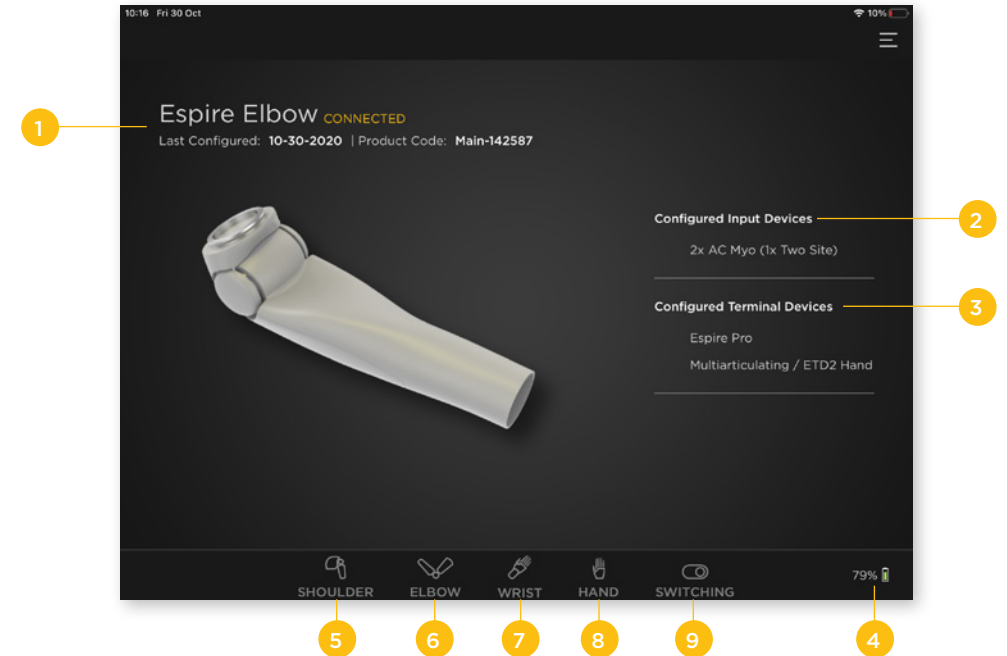
For setups that include TruSignal AC myoelectrodes

If this is the first time the Espire Elbow has been configured, you will be taken to the Device Calibration screen. If you have connected to this device before you will be taken directly to the Home screen. See section 5.2 Device Calibration for more information.

For setups without TruSignal AC Myoelectrodes

You will be taken directly to the Home screen.

1.5 Home Screen



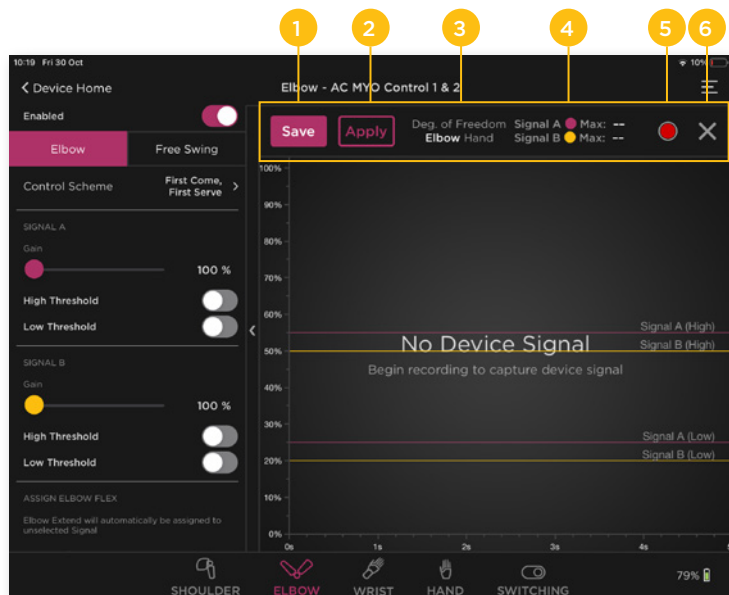
- 1. System Settings** - Displays product name, connection status, date last configured and the device's unique product code (serial number).
- 2. Configured Input Devices** - Displays the current control strategy. In this example the control is set up for 2 AC myo sites.
- 3. Configured Terminal Devices** - Displays the devices compatible with the current configuration. These are setup by Steeper Group prior to shipment, based on the information given during the order process.
- 4. Espire Battery Indicator** - Displays the Elbow's installed battery charge level. If the elbow is not paired to the Hub App, the indicator will display 0%.

Degrees of Freedom Control Screens

Individual screens for each degree of freedom are accessed via the device icons in the bottom row. The screen that displays will vary based on the control method that has been configured (ex: AC and DC myo, linear transducer, touch pads, etc.). If no device is configured, selecting the screen will display "Device not available".

- 5. Shoulder** - Configures settings for an electronic lock actuator for the Axis shoulder joint.
- 6. Elbow** - Configures settings for the Espire Elbow.
- 7. Wrist** - Configures settings for an electronic wrist rotator.
- 8. Hand** - Configures settings for a terminal device.
- 9. Switching** - Configures how the user will switch between the connected devices.

1.6 Degrees of Freedom Screens



Command Toolbar

Each degree of freedom will have a horizontal display at the top of the screen. All configurations display SAVE and APPLY. **Myo Control** and the **Linear Transducer** will display PLAY/STOP and CLEAR.

1. Save

Saves the configuration and uploads the data to the elbow. Select “Yes” to confirm upload and overwrite previous settings. Select “No” to prevent data upload.

2. Apply

Applies the current settings without uploading to the elbow.

3. Degree of Freedom

Highlights the device that is currently active.

4. Signal Maximum

Displays the maximum percentage each signal has reached.

5. Play/Stop

Begin or pause viewing myoelectric signals in real time.

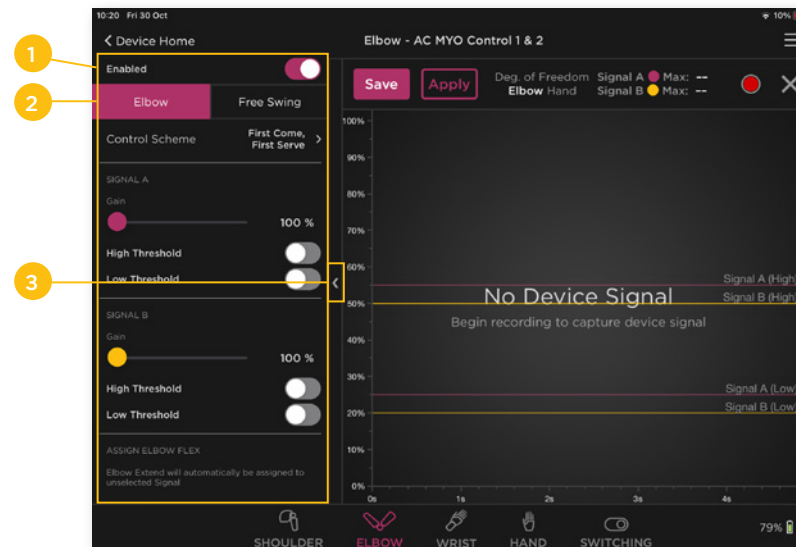
6. Clear

Clear the signal data from the main signal window.



Note: Adjustments will not take effect until you press “Apply”.

Configuration Toolbar



Each degree of freedom will have a vertical display of configuration tools to the left of the screen. Configurations vary based on the control method that is set up.

- 1. Enabled** - Toggles the degree of freedom (DOF) ON or OFF.
- 2. Tab** - Indicates the DOF and options for the DOF (free-swing).
- 3. Full Screen** - Enter/Exit myoelectric signal full screen mode.

Signal Screen



Each degree of freedom will have a main display screen to view the live action of the device being controlled. Configurations will vary based on the control method that is set up: **Myo Sites**, **a Linear Transducer**, **Physical Switches** or **Pattern Recognition** (example: 2-site Myo).

SECTION 2 - DEGREES OF FREEDOM - MOVEMENTS AND ACTIONS

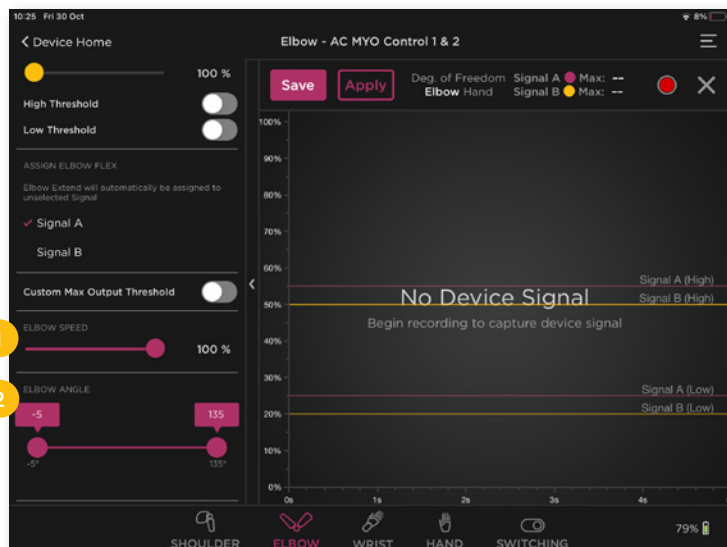
2.1 Adjusting Movements for Each Device

2.1.1 Elbow Flexion and Extension

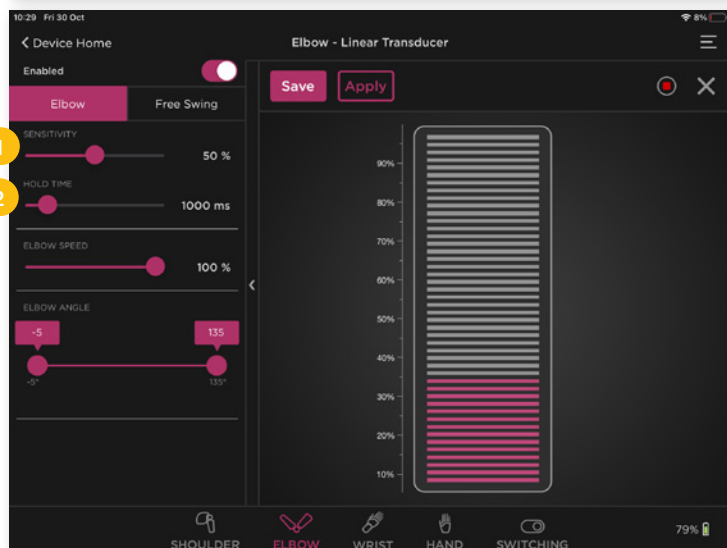
Elbow Control Screen > Configuration Toolbar



The Espire Pro has a powered motor that can flex and extend the elbow. This function can be controlled using **Myo Sites**, a **Linear Transducer**, **Physical Switches** or **Pattern Recognition** (example: Dual Site Myo).



- 1. Elbow Speed**
Adjusts the operating speed of the elbow.
- 2. Elbow Angle**
Adjusts the range of motion of the elbow.



- Powered elbow function controlled with a **Linear Transducer** has additional rotation features:
- 1. Sensitivity**
Adjusts the sensitivity of the linear transducer.
 - 2. Hold Time**
Adjusts the hold time of the linear transducer.

2.1.2 Wrist Pronation and Supination

Wrist Control Screen > Configuration Toolbar

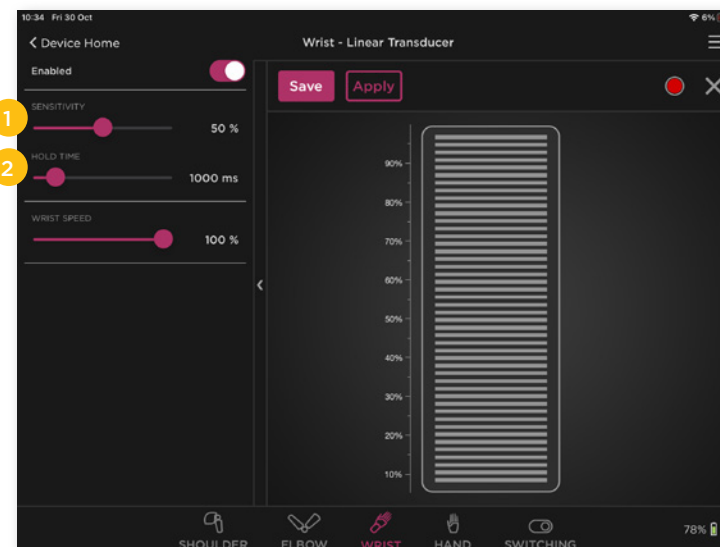


Powered wrist function can be controlled with **Myo Sites**, **Physical Switches**, **Touchpads** or **Pattern Recognition** (example: Dual Site Myo).



- 1. Wrist Speed**
Adjusts the rotation speed of the wrist.

Powered wrist function controlled with a **Linear Transducer** has additional rotation features:



- 1. Sensitivity**
Adjusts the sensitivity of the linear transducer.
- 2. Hold Time**
Adjusts the hold time of the linear transducer.

2.1.3 Hand Open and Close

Hand Control Screen > Configuration Toolbar

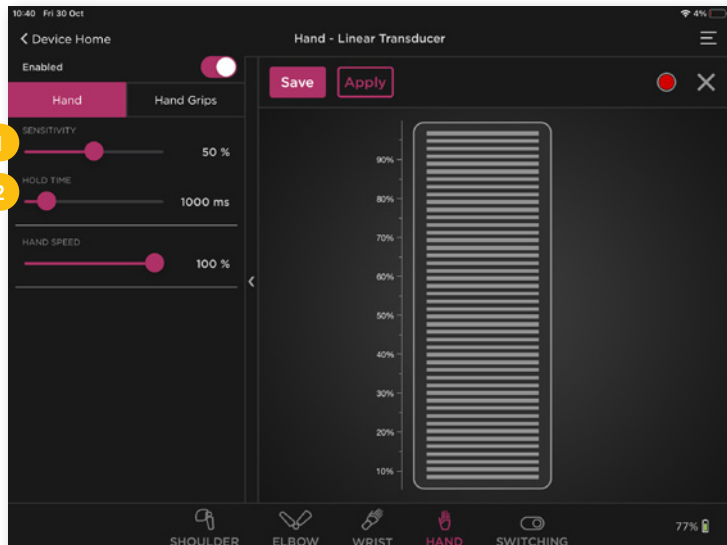


Basic hand functions can be adjusted using the Hub App without additional programming software. Hand function can be controlled with **Myo Sites**, **Physical Switches**, **Touchpads** or **Pattern Recognition** (example: Dual Site Myo).



- 1. Hand Speed**
Adjusts the movement speed of the hand.

Hand function controlled with a **Linear Transducer** has additional movement features:



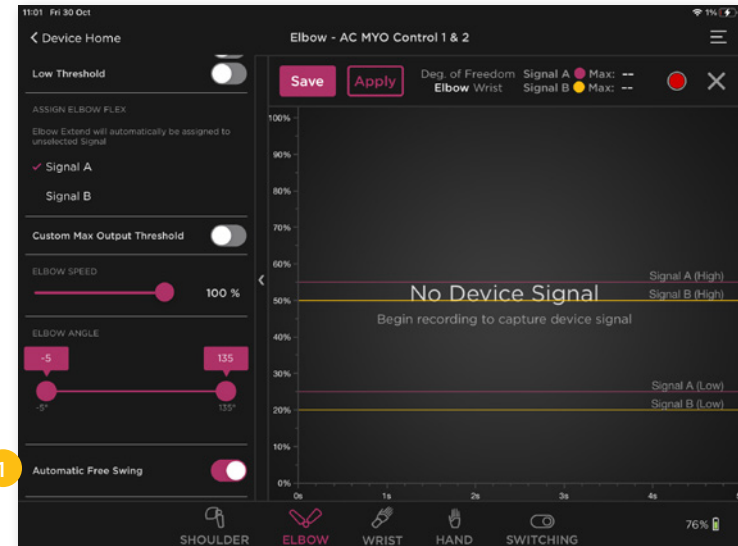
- 1. Sensitivity**
Adjusts the sensitivity of the linear transducer.
- 2. Hold Time**
Adjusts the hold time of the linear transducer.

2.2 Other Actions



2.2.1 Elbow Free-Swing (Pro Only)

Elbow Control Screen > Configuration Toolbar

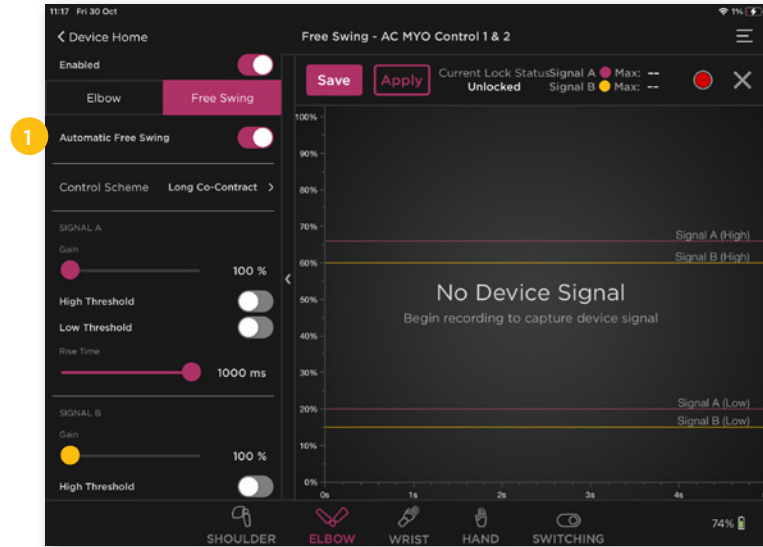


1. Automatic Free-Swing

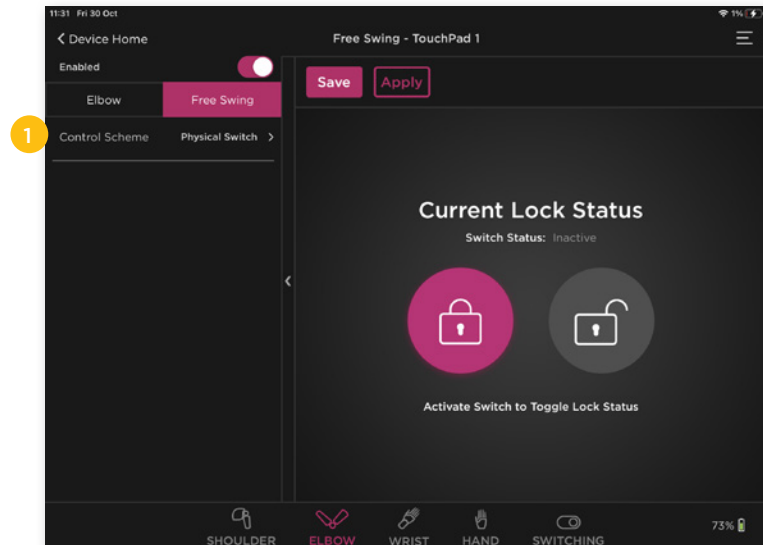
Automatic free-swing can be activated or deactivated from the elbow control screen. When automatic free-swing is on, the elbow will go into free-swing when it reaches full extension and is held there for one second. The elbow motor will not re-engage until a flexion signal is sent.



Note: If automatic free-swing is deactivated, the elbow will not enter free-swing unless control is assigned to a different input such as a physical switch or myoelectric event.



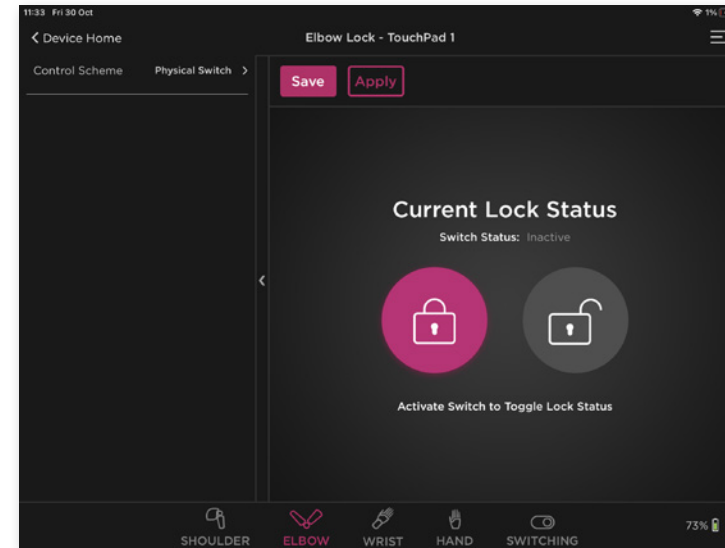
1. Free-swing Controlled by a Myo Event
 If Elbow free-swing is assigned to be controlled by a **myo event**, it will be located on the free-swing tab.



1. Free-swing Controlled by Physical Switch or Touch Pad
 If Elbow free-swing is assigned to be controlled by a **Physical Switch or Touch Pad**, it will be controlled by a physical actuation.

2.2.2 Elbow Electric Lock (Hybrid Only) Elbow Control Screen

The Espire Hybrid has a mechanical elbow joint with an electric lock feature.

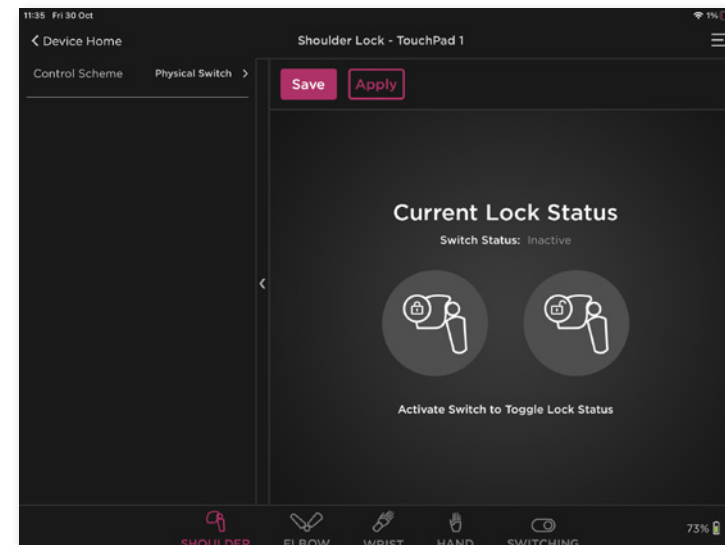


This function can be controlled using **Myo Sites, Physical Switches, Touch Pads** or **Pattern Recognition** (example: Physical Switch).

Elbow Electric Lock Control
 There is no need for lock adjustments (for actuation by myo event, see Section 4.1.6 Switching Events for Device Actions).

2.2.3 Shoulder Electric Lock Shoulder Control Screen

The Axis Shoulder joint has an electronic lock actuator that can be controlled by the Espire Elbow. This function can be controlled by using **Myo Sites, Physical Switches, Touch Pads** or **Pattern Recognition** (example: Physical Switch).



Shoulder Electric Lock Control
 There is no need for lock adjustments (for actuation by myo event, see Section 4.1.6 Switching Events for Device Actions).

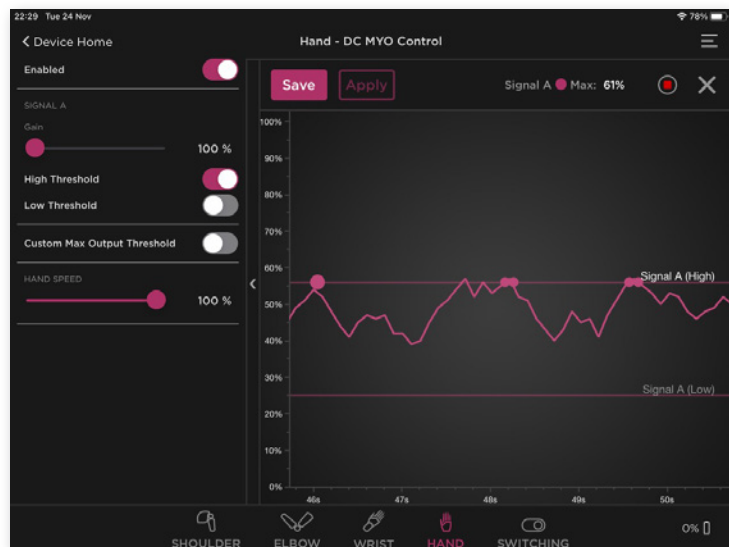
SECTION 3 - DEVICE CONTROL METHODS

3.1 Myoelectric Control



3.1.1 Single Site Myoelectric Control

One signal produced by **one** muscle site can be assigned to the Hand (open - close). Single Site Myoelectric events can also control actions such as Shoulder lock - unlock (see Section 4 Device Switching).



Myoelectric Display Screen
Displays 1 EMG signal.



3.1.2 Dual Site Myoelectric Control

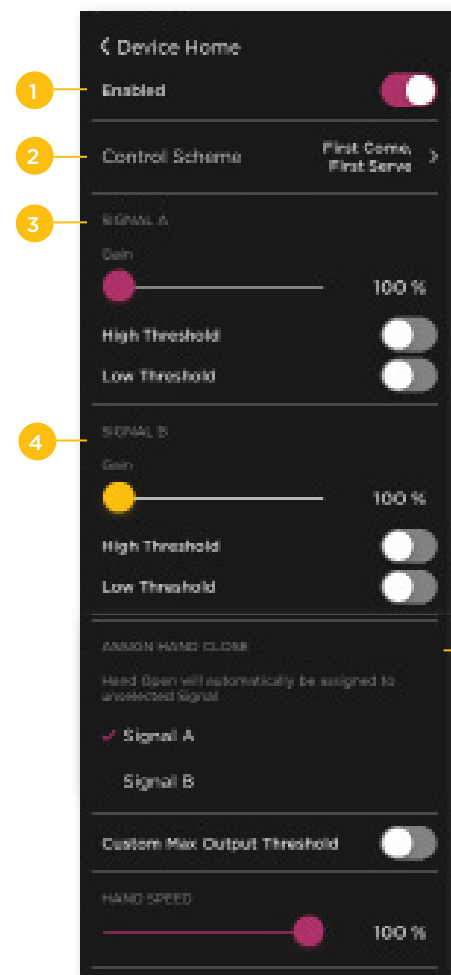
Two signals produced by **two** muscle sites can be assigned to the Elbow (flexion - extension), Wrist (pronation - supination), and Hand (open - close). Dual Site Myoelectric events can also control switching between devices and actions such as Shoulder lock - unlock (see Section 4 Device Switching).



Myoelectric Display Screen
Displays 2 EMG signals.

3.1.3 Control Configurations

Device Control Screen > Configuration Toolbar



- 1. Enabled** - Toggling between the switch allows for the chosen degree of freedom to be enabled or disabled.
- 2. Control Scheme** - First Come/ First Serve or Maximum. Allows the prosthetist to choose which signal takes control of the DOF, the first signal to hit the high threshold, or the highest signal over the high threshold.
- 3. Signal A** - Gain and Threshold settings for Signal A.
- 4. Signal B** - Gain and Threshold settings for Signal B.

Gain Adjustments

AC Electrodes

Adjust TruSignal myoelectrodes directly in the app.

DC Electrodes

Adjust the physical gain on the electrode case first, before adjusting the app.

5. Assign Elbow Flex/ Wrist Rotation/ Hand Close - For more information see next page.

6. Custom Max Output Threshold - For more information see next page.



5. Assign Elbow Flex/ Wrist Rotation/ Hand Close

When the device is controlled by two electrode sites, Signal A and Signal B can be assigned to the directional movement of the respective device:

Elbow Flex

The selected signal flexes the elbow. The unselected signal will automatically be assigned to extend the elbow.

Wrist Rotation

The selected signal rotates the wrist. The unselected signal will automatically be assigned to rotate in the opposite direction.

Hand Close

The selected signal closes the hand. The unselected signal will automatically be assigned to open the hand.

6. Custom Max Output Threshold

When enabled the maximum output threshold of the high signal can be adjusted. This provides maximum speed of movement when the set threshold is met. It may reduce the range of proportional control.

3.2 Advanced Myo Control

3.2.1 Single Site Advanced Myoelectric Control



Two signals produced by **one** muscle site are used for control (Signal A - Fast Rate Action, Signal A - Slow Rate Action).

The signals can be assigned to Elbow (flexion - extension), Wrist (pronation - supination), or Hand (open - close).

3.2.2 Dual Site Advanced Myoelectric Control



Four signals produced by **two** muscle sites are used for control (Signal A - Fast Rate Action, Signal A - Slow Rate Action, Signal B - Fast Rate Action and Signal B - Slow Rate Action).

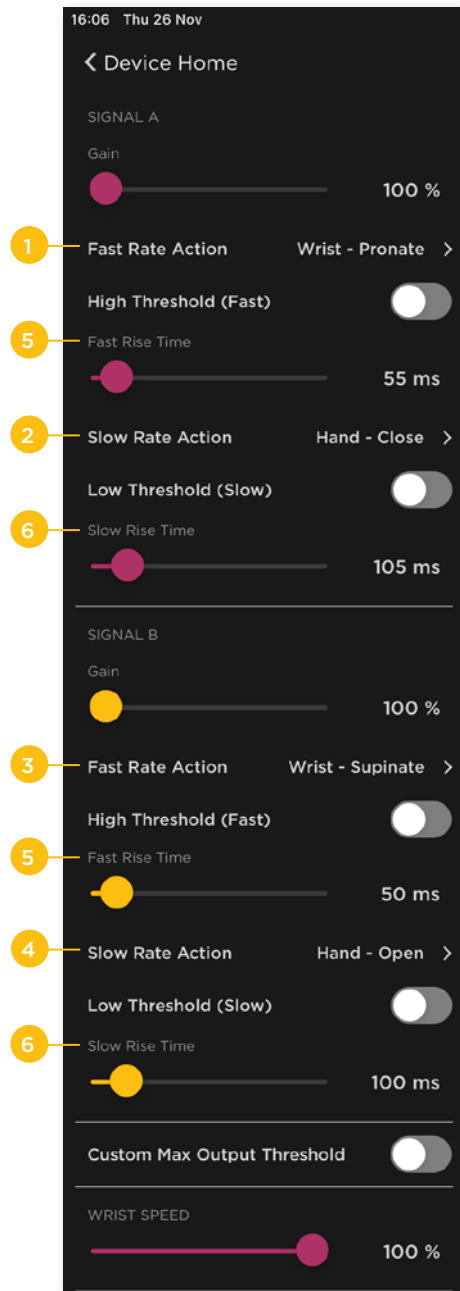
The signals can be assigned in pairs to Elbow (flexion - extension), Wrist (pronation - supination), and Hand (open - close).



Note: Switching cannot be used with an Advanced Myo control.

3.2.3 Advanced Control Configurations

Device Control Screen > Configuration Toolbar



1. **Signal A - Fast Rate Action**
Select which device is controlled and which function it performs (e.g. Wrist - Pronate).
2. **Signal A - Slow Rate Action**
Select which device is controlled and which function it performs (e.g. Hand - Close).
3. **Signal B - Fast Rate Action**
Select which device is controlled and which function it performs (e.g. Wrist - Supinate).
4. **Signal B - Slow Rate Action**
Select which device is controlled and which function it performs (e.g. Hand - Open).
5. **Fast Rise Time**
Time required (in milliseconds) for the fast rate action signal (A or B) to rise from the low to the high threshold to qualify for the action. Fast rise time must be less than slow rise time.
6. **Slow Rise Time**
Time required (in milliseconds) for the slow rate action signal (A or B) to rise from the low to the high threshold to qualify for the action. Slow rise time must be greater than fast rise time.

3.3 Myoelectric Control for Targeted Muscle Reinnervation

3.3.1 4-Site Myoelectric Control for TMR



Four signals produced by **four** muscle sites can be assigned in pairs to Elbow (flexion- extension), Wrist (pronation - supination), or Hand (open - close).

Myoelectric Display Screen

Displays 2 EMG signals (not shown). See section 3.1.3 for control configurations.

3.3.2 6-Site Myoelectric Control for TMR



Six signals produced by **six** muscle sites can be assigned in pairs to Elbow (flexion- extension), Wrist (pronation - supination), or Hand (open - close).

Myoelectric Display Screen

Displays 2 EMG signals (not shown). See section 3.1.3 for control configurations.

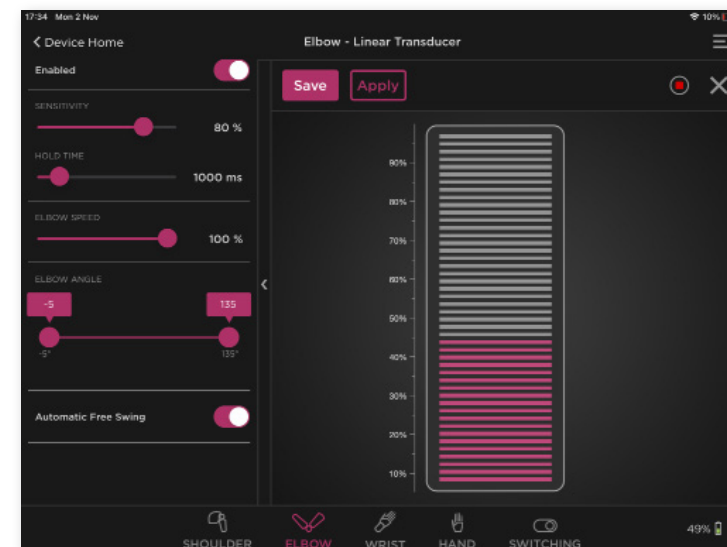


Note: Switching is not used with TMR control.

3.4 Linear Transducer Control



A linear transducer provides **proportional control** of a device's movements and **simultaneous control** between two devices (eliminates switching). It



can be assigned to Elbow (flexion - extension), Wrist (pronation - supination), or Hand (open - close).

Linear Transducer
Displays magnitude of signal.

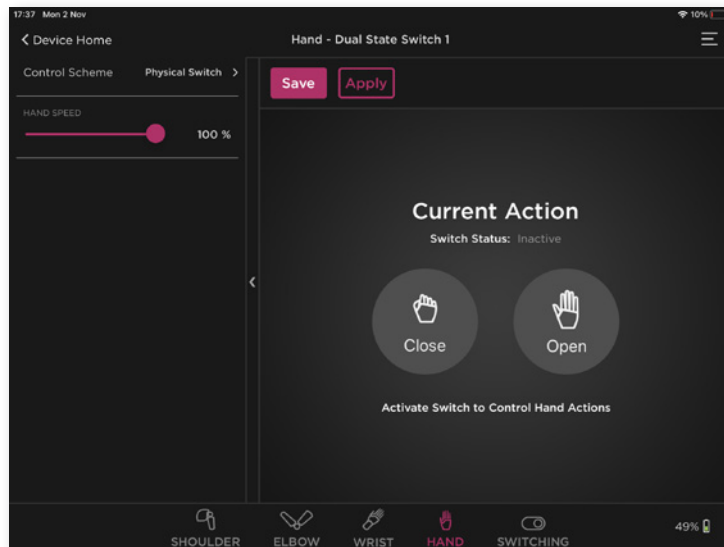
3.5 Physical Switch or Touch Pad Control



Physical switches and touch pads provide digital control to a device's movements and eliminate switching. They can be assigned to Elbow (flexion - extension), Wrist (pronation - supination) and Hand (open - close). Physical switches and touch pads can also control switching between devices and actions such as shoulder lock - unlock (see section 4 Device Switching).

Physical Switch or Touch Pad Movement

Displays directional movement of signal.



The following set ups are possible for movement control with switches or touch pads (example: Hand Open - Close):

- **One Dual -State Switch**
Pressing the switch in one direction OPENS the hand; pressing it in the other direction CLOSES the hand.
- **Two Single-State Switches**
One switch OPENS the hand; the other CLOSES the hand.
- **Two Touch Pads**
One touch pad OPENS the hand; one touch pad CLOSES the hand.

3.6 Pattern Recognition Systems



Pattern Recognition provides a unique method for operating multiple devices by 'learning' a user's muscle signal patterns and producing natural movements (eliminates switching between devices). It can be assigned to Elbow (flexion - extension), Wrist (pronation - supination) and Hand (open - close).

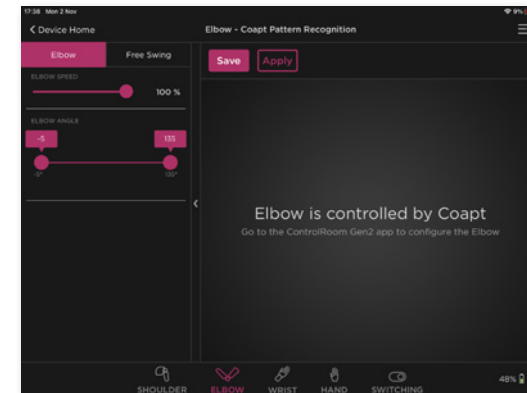
Pattern Recognition can also be configured for advanced grip control with compatible multi-articulating hands. Control actions such as shoulder lock - unlock can also be programmed (see Section 4 Device Switching).

Pattern Recognition Systems

Two systems are compatible with the Espire Elbow:

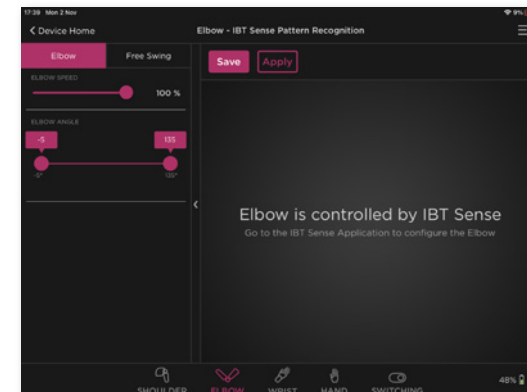
Coapt COMPLETE CONTROL Gen2

rNo signal to display - refer to manufacturer.



IBT Sense

No signal to display - refer to manufacturer.



SECTION 4 - DEVICE SWITCHING


4.1 Switching by Myoelectric Event

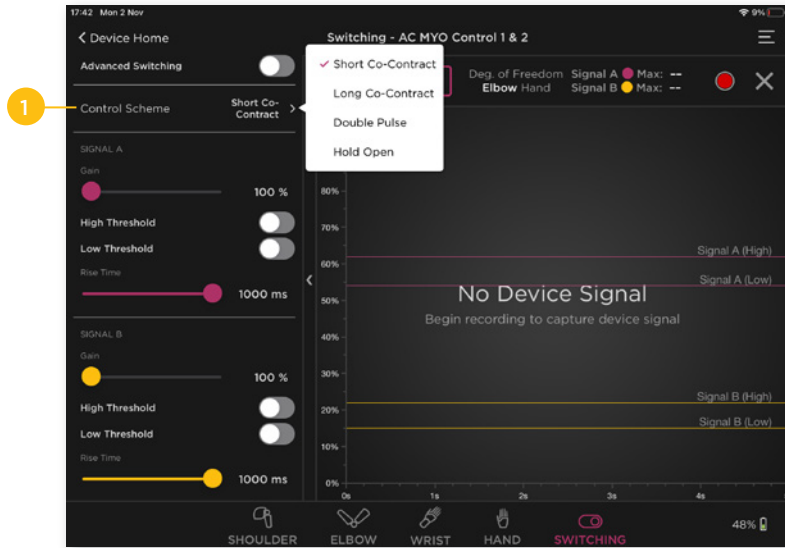


When two or more devices are controlled by dual site myoelectric control, both devices cannot move at the same time (simultaneously); there must be a way to switch from one device to the next. Myoelectric switching events are an option that allows **sequential switching** between three devices or back and forth between two devices.

Two signals produced by **two** muscle sites can be assigned to control switching between devices

Notification of a Successful Switching Event

When a successful myo switching event occurs, a short tone will be heard from the elbow and a vibration will occur (this can be configured in device settings - see Section 5). The signal screen displays an orange diamond shape  for each successful switching event.



1. Control Scheme

When myo switching is assigned to two or three devices, choose between Short Co-Contract, Long Co-Contract, Double Pulse or Hold-Open.



4.1.1 Switching by Short Co-Contract or Long Co-Contract

Switching Screen > Configuration Toolbar > Control Scheme > Short Co-Contract or Long Co-Contract

Short Co-Contract

Both muscles contract at the same time.

Long Co-Contract

Both muscles contract at the same time, but over a longer period.

The control display is the same for both Short and Long Co-Contract.



1. Rise Time

The amount of time it takes for the signal to go from the low to the high threshold.

2. Short Co-Contraction Time

The total time for both signals to cross above the high threshold and fall below the high threshold to qualify for Co-Contraction. **Short Co-Contraction must be less than the Long Co-Contraction time.**

3. Long Co-Contraction Time

The total time for both signals to cross above the high threshold and fall below the high threshold to qualify for a Co-Contraction. **Long Co-Contraction time must be greater than the Short Co-Contraction time.**

4.1.2 Switching by Double Pulse

Switching Screen > Configuration Toolbar > Control Scheme > Double Pulse



1. Double Pulse

One muscle contracts two times.

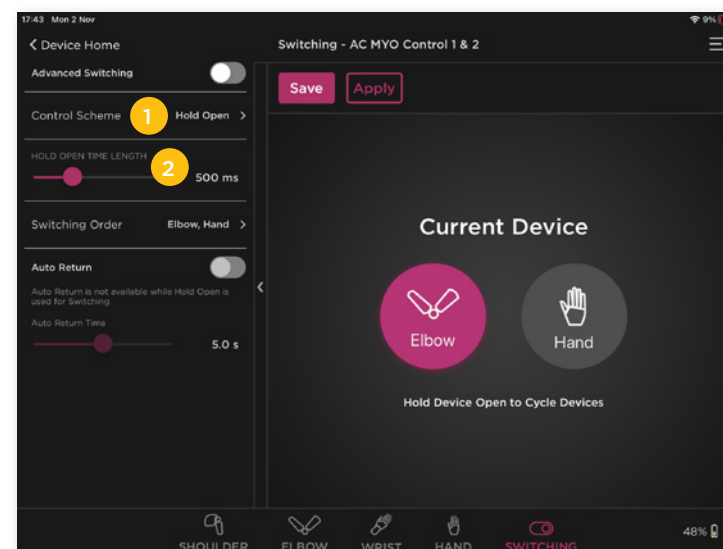
2. Double Pulse Time Length

The total time (listed in milliseconds) for one signal to cross above the high, below the high, above the high, above the high again, and finally drop below the high to qualify as a double pulse.

4.1.3 Switching by Hold Open

Switching Screen > Configuration Toolbar > Control Scheme > Hold Open

In standard switching, Hold Open can only be assigned to switch between the elbow and hand.



1. Hold Open

One muscle contracts and holds.

2. Hold Open Time Length

The total time (in milliseconds) for the OPEN signal to remain open to qualify as a hold open.

4.1.4 Switching Order

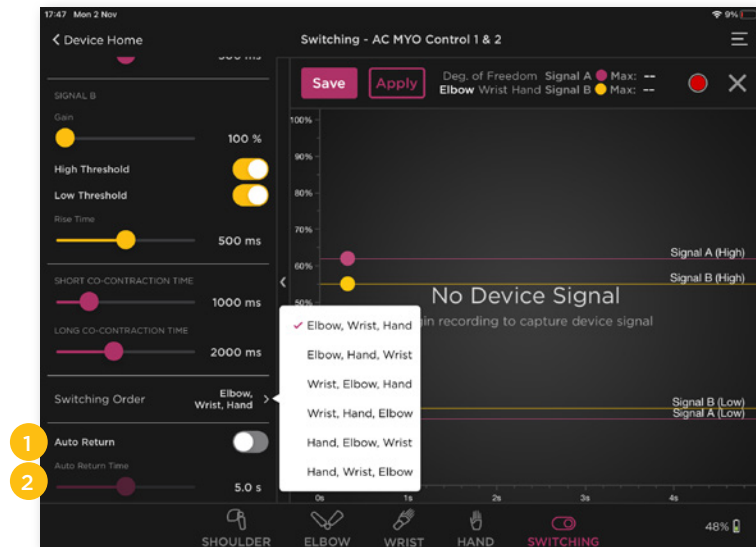
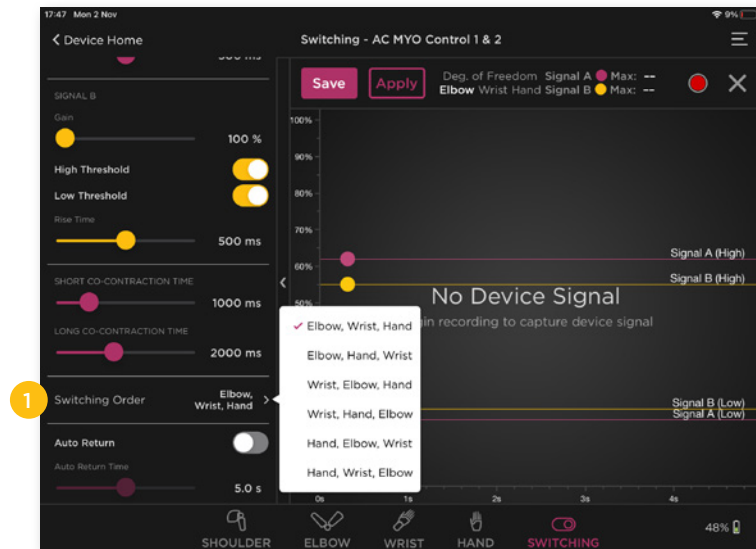


Select the sequence that each device switches in:

- 3 devices = Sequential
- 2 devices = Back and Forth

1. Switching Order

Determines the order in which devices are cycled through. The checked device is the first one in the sequence.



1. Auto Return

Enable or disable Auto Return.

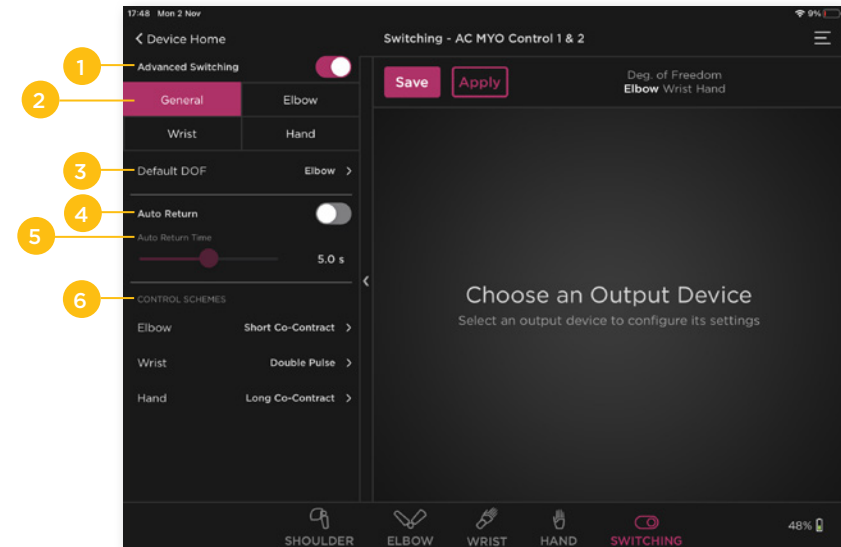
2. Auto Return Time

Amount of idle time (without receiving a signal) before prosthesis returns to the first device in the switching sequence. Not available with Hold Open scheme.

4.1.5 Advanced Switching

Advanced switching allows a different control scheme to be assigned to each device. The configuration is split into 3 or 4 tabs (depending on 2 or 3 assigned devices).

Switching Screen > Configuration Toolbar > Enable Advanced Switching



1. Advanced Switching

Toggle the switch allows Advanced Switching to be enabled or disabled.

2. General Tab

Assign the switching order for each device.

3. Default DOF

The degree of freedom the prosthesis returns if Auto Return is active.

4. Auto Return

Enable or disable Auto Return.

5. Auto Return Time

Amount of idle time (without receiving a signal) before the prosthesis returns to the first device in the switching sequence.

6. Control Schemes

Myo event assigned to each degree of freedom.

1. Elbow/Wrist/Hand Tabs

Adjustments for the assigned control scheme for each device (Short Co-Contract, Long Co-Contract, Double Pulse or Hold Open).



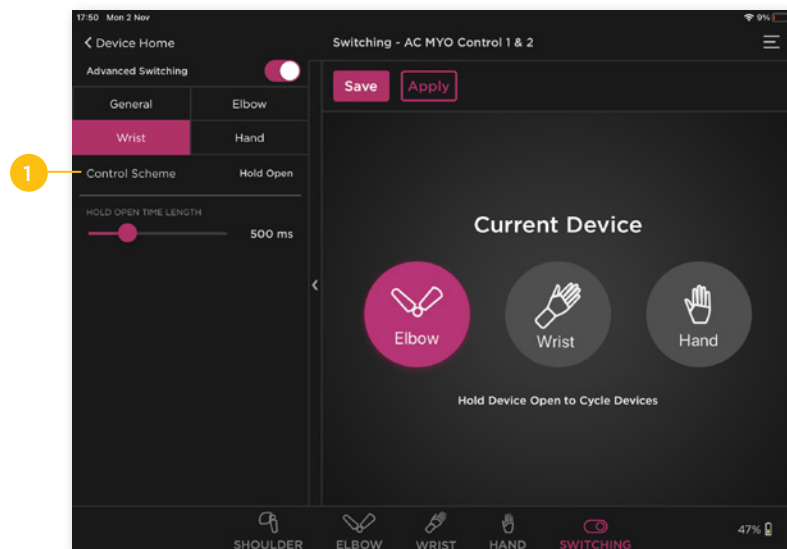
4.1.6 Switching Events for Device Actions

Switching events can be assigned to the following device actions: Shoulder Lock-Unlock, Elbow Lock-Unlock (Hybrid only), and Free-Swing (Pro only) when Auto Free-Swing is disabled.



1. Hold Open Control Scheme

Hold Open can only be assigned when a powered wrist is configured. If Auto Return is enabled, the wrist must be the default Degree of Freedom.

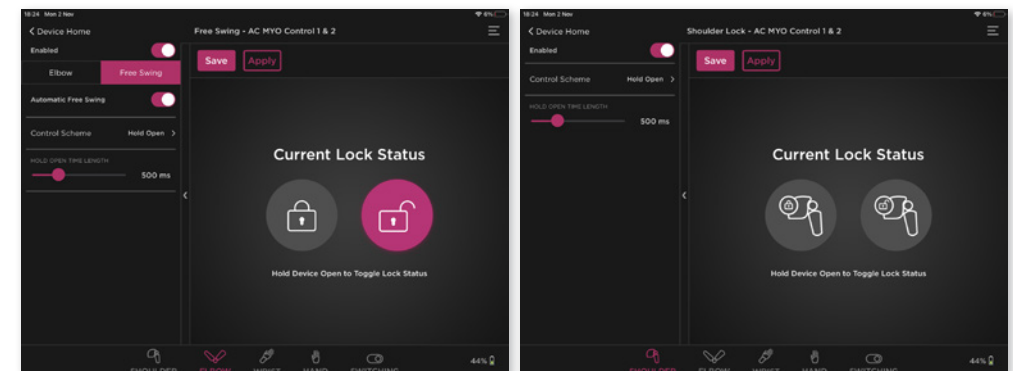


4.2 Switching by Physical Switch or Touch Pad

Physical switches or touch pads can be used to control a device's movement independently, in which case switching is not necessary. They can be used to perform the following device actions: Shoulder Lock-Unlock, Elbow Lock-Unlock (Hybrid only) and Free-Swing (Pro only) when Auto Free-Swing is disabled.

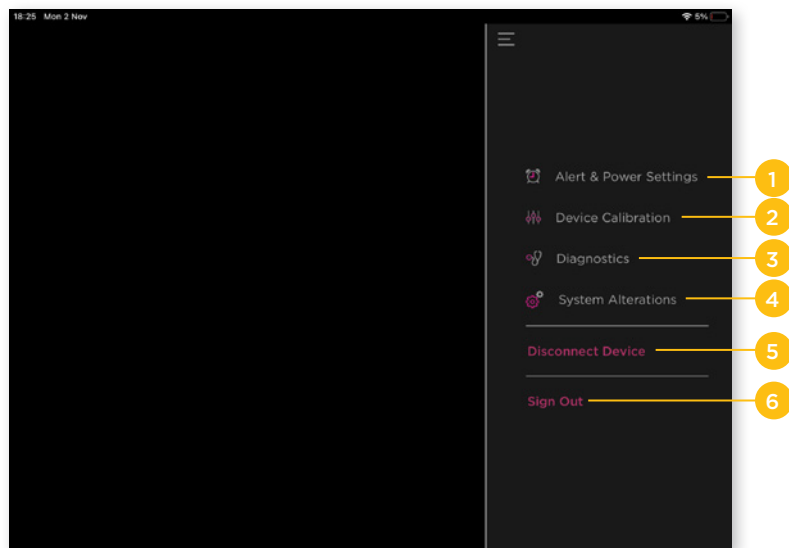
Physical Switch or Touch Pad Lock

Displays lock status in real-time.



SECTION 5 - SYSTEM SETTINGS

The icon in the upper right of the screen will allow you to navigate to the different system setting menus available in the app.



1. Alert and Power Settings

Modify the various notification feedbacks when operating the Espire.

2. Device Calibration

Calibrate the Espire (TruSignal AC myoelectrodes only).

3. Diagnostics

View the elbow's diagnostic information.

4. System Alterations

Make advanced alterations to the system settings. An access code is required from Steeper.

5. Disconnect Device

Disconnect the Espire from the app.

6. Sign Out

Sign out of the app and return to the login screen. It is not necessary to sign out unless a different user (prosthetist) needs to login. It is OK to stay logged in to the Espire Hub App.

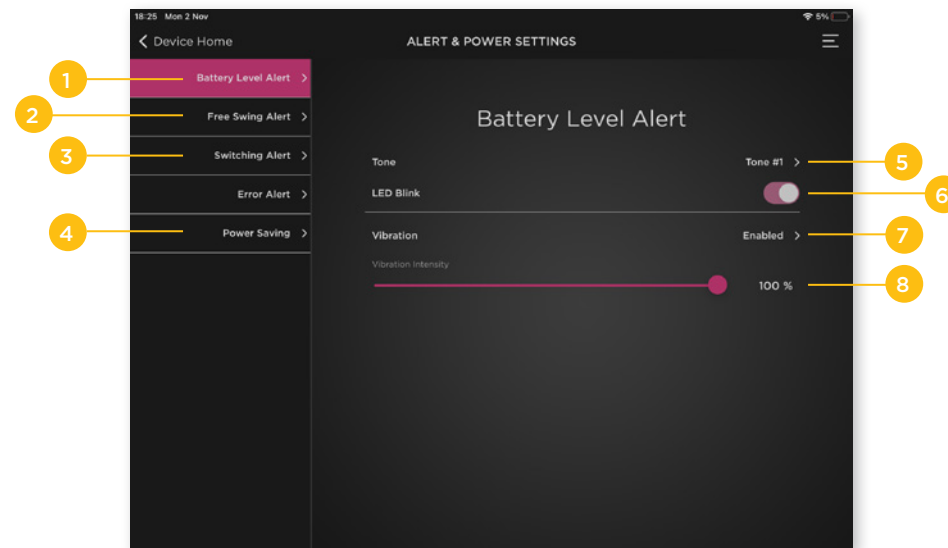
5.1 Alert and Power Settings

5.1.1 Alert Feedback

There are three methods for the elbow to send alerts to the user:



They can be adjusted depending on the alert type:



1. Battery Level Alert

Indicates low battery level.

2. Free-Swing Alert

Indicates when free-swing has been activated.

3. Switching Alert

Indicates when the prosthesis has successfully switched from one device to the next.

4. Error Alert

Indicates when an error has occurred.

5. Tone

Choose from None, Tone #1, Tone #2 or Tone #3.

6. LED Blink

The LED Blink can be enabled or disabled for **Free-swing** or **Switching** only.

7. Vibration

Choose None or Enabled to set the vibration signal.

8. Vibration Intensity

Adjusts the intensity of the vibration.

5.1.2 Alert Settings

Tone Descriptions

A unique tone can be assigned to play for each DOF when switching:

Elbow

None, Tone #1, Tone #2, Tone #3

Wrist

None, Tone #1, Tone #2, Tone #3









Hand

None, Tone #1, Tone #2, Tone #3

LED Blink Descriptions

Pressing the power button on the Espire will display the remaining battery life through a series of LED blinks:

Espire Elbow All LED Indications

Colour	Indicator	Status
4 Green Blinks		Battery 100% Charged
3 Green Blinks		Battery Less Than 75%
2 Green Blinks		Battery Less Than 50%
1 Green Blink		Battery Less Than 25%
Yellow Solid		Critically Low - Charge Battery
Red Blinking		Minor System Error (Battery Overpowered, Object Too Heavy)
Red Solid		Critical Error (Contact Steeper Group)
Blue Solid		Bluetooth Connection



Note: The LED Blink for **Battery Levels** and **Errors** cannot be disabled.

Vibration Descriptions

Vibration #1

1 short vibration

Vibration #2

2 short vibrations

Vibration #3

3 short vibrations

A unique vibration can be assigned to play for each DOF when switching:

Elbow

None, Vibration #1, Vibration #2, Vibration #3

Wrist

None, Vibration #1, Vibration #2, Vibration #3

Hand

None, Vibration #1, Vibration #2, Vibration #3

Other Vibration Alerts:

Enter Free-swing

1 long vibration

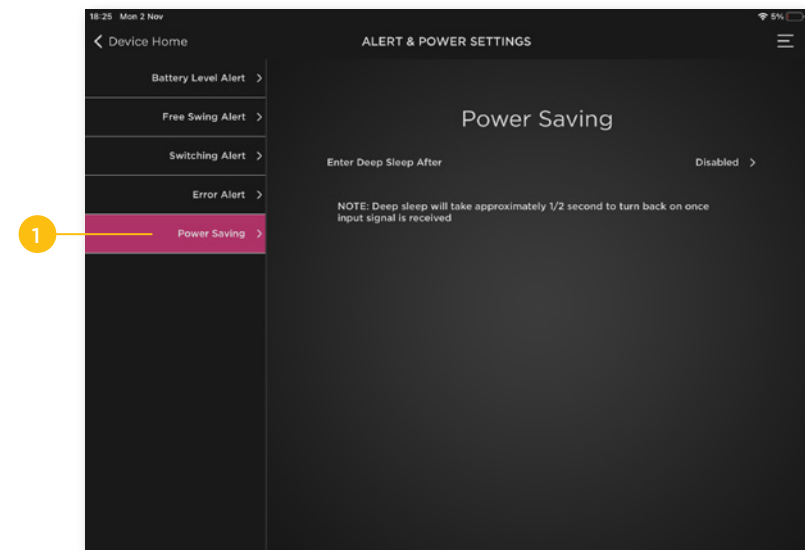
Low Battery

3 long vibrations

Error

5 quick vibrations

5.1.3 Power Settings



1. Power Saving

Allows the practitioner to enable or disable Deep Sleep Mode after a set amount of time (Disabled, 3 minutes, 5 minutes, 10 minutes). Deep Sleep will take approximately ½ second to turn back on once input signal is received.

5.2 Device Calibration - Users with TruSignal AC Myoelectrodes Only

Device calibration through the Hub App is required for TruSignal AC myoelectrodes the first time the Espire is configured. Subsequent recalibration is optional and can be performed by either the practitioner using the Hub App, or by the user by pressing the 'Reset' button on the elbow.

When to Recalibrate

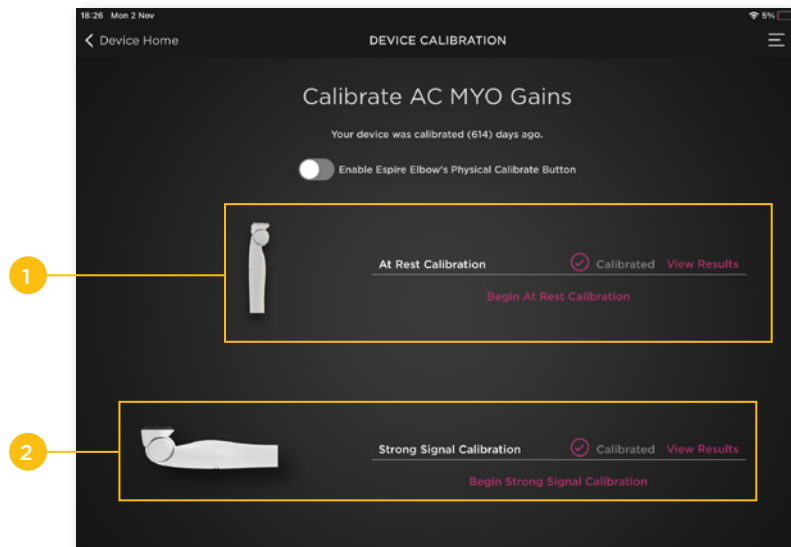
Recalibration may occur several times during the fitting process. However, once the configuration has been established and the user has taken delivery of the prosthesis, recalibration should generally not be needed.

Changes in volume throughout the day may lead to decreased contact with the myoelectrodes in the socket. This decreased contact may cause the Espire Elbow system to respond more slowly or erratically. If this occurs, it may help to recalibrate the system.



Note: Recalibrating the Espire Elbow will overwrite the previous calibration settings and should be performed only when necessary.

5.2.1 Calibration Using the Hub App



There are two processes to be followed to recalibrate:

1. At Rest Calibration

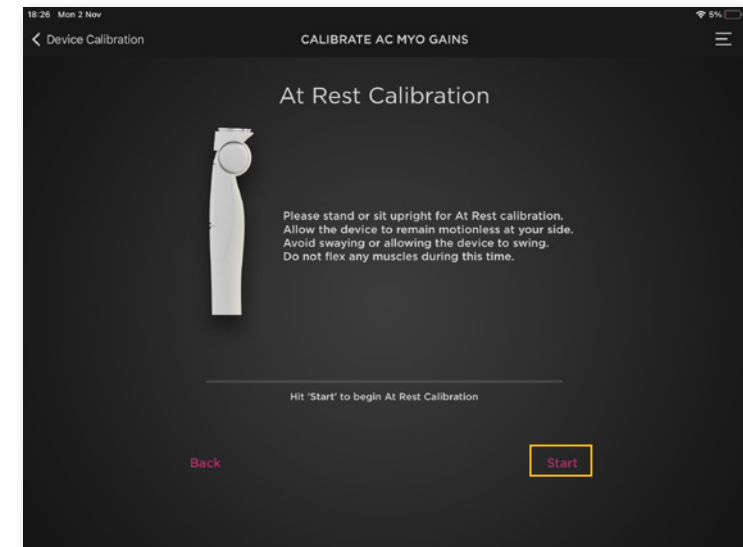
2. Strong Signal Calibration

At Rest Calibration



Caution: Powering the elbow on before donning or leaving the elbow on before doffing can cause unintended movement of the prosthesis.

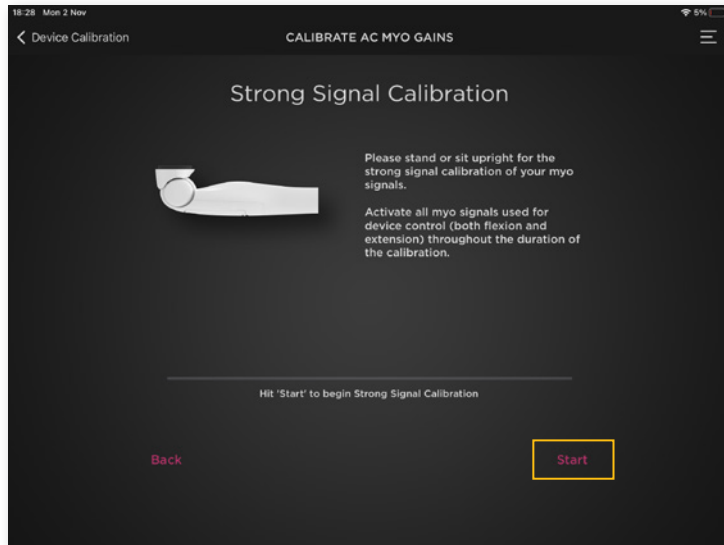
1. Users should always don their prosthesis before powering the elbow on.
2. Pair the elbow with the Espire Hub App.
3. If the elbow has not been calibrated before you will be taken to the Device Calibration Screen. Otherwise, navigate to System Settings > Device Calibration.
4. Initiate the calibration process by selecting "Begin At Rest Calibration".
5. Instruct the user to sit or stand upright, relax their muscles and hold the Espire Elbow straight down in an extended position. Select "Start" in the lower right corner to "Begin At Rest Calibration".



6. A **tone** will play, and a message will appear asking the user to "Please Remain Still". Follow the on-screen instructions until the progress bar is filled and a second tone is heard.
7. If successful, a message will appear that says "Complete!", and a success tone (ascending) will play. If unsuccessful, a message will appear that says "Failed!" and a failure tone (descending) will play and you should repeat "At Rest Calibration".
8. When finished, select "Done".

Strong Signal Calibration

1. Initiate the process by selecting "Begin Strong Signal Calibration".
2. Instruct the user to stand upright, activate all myo signals used for device control (both flexion and extension) at a comfortable but deliberate level. Select "Start" in the lower right corner to "Begin Strong Signal calibration"
3. A **tone** will play, and a message appear asking the user to "Hold Position". Follow the on-screen instructions until the progress bar is filled and a second **tone** is heard.



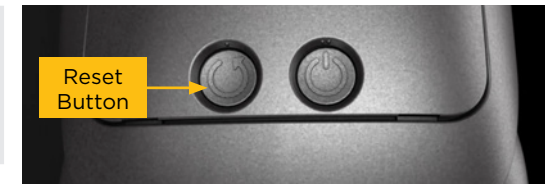
4. If successful, a message will appear that says "Complete!" and a success tone (ascending) will play. If unsuccessful, a message will appear that says "Failed!" and a failure tone (descending) will play and you should repeat "Strong Signal Calibration".
5. When finished, select "Done".

5.2.2 Calibration Using the Reset button


Recalibration can also be performed by enabling the Espire Elbow Physical Calibrate Button.



Note: To prevent accidental resets, the Physical Reset Button can be disabled in the Device Calibration Screen. The Reset Button is always located on the **Lateral Side** of the elbow.



Using the Reset Button Calibration

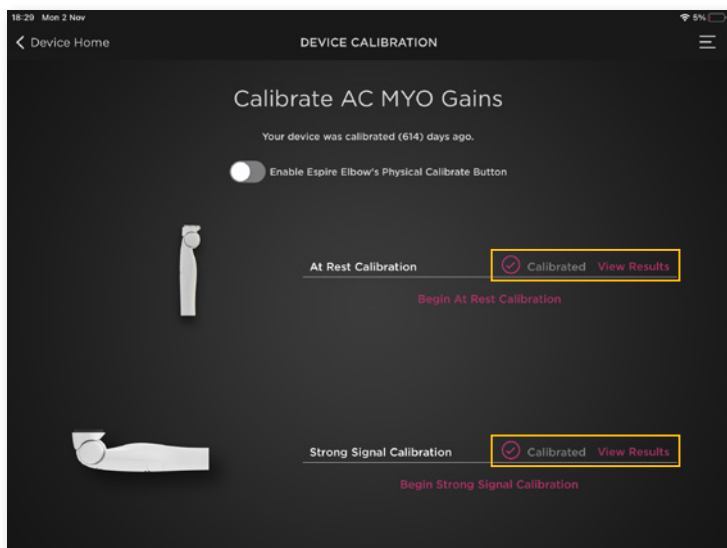
Feature	Description
 Reset Button	Press and hold for 1 second to begin "At Rest" calibration

1. Users should always don their prosthesis before powering the elbow on.
2. Press and hold the Reset button for 1 second to begin "At Rest" calibration.
3. A tone will play to signify the start of the calibration.
4. Instruct the user to sit or stand upright, relax their muscles and hold the Espire Elbow straight down in an extended position. If successful, a success tone (ascending) will play to signify the end of the "At Rest" calibration. If unsuccessful, a failure tone (descending) will play and you should repeat "At Rest" calibration.

Feature	Description
 Reset Button	Press and hold for 4 seconds to begin "Strong Signal" calibration

1. Press and hold the Reset button for 4 seconds to begin "Strong Signal" calibration.
2. A tone will play to signify the start of the calibration.
3. Instruct the user to stand upright, relax their muscles and hold the Espire Elbow straight down in an extended position. If successful, a success tone (ascending) will play to signify the end of the "Strong Signal" calibration. If unsuccessful, a failure tone (descending) will play and you should repeat "Strong Signal" calibration.
4. The Espire Elbow system has now been re-calibrated.

5.2.3 Calibration Results and Troubleshooting

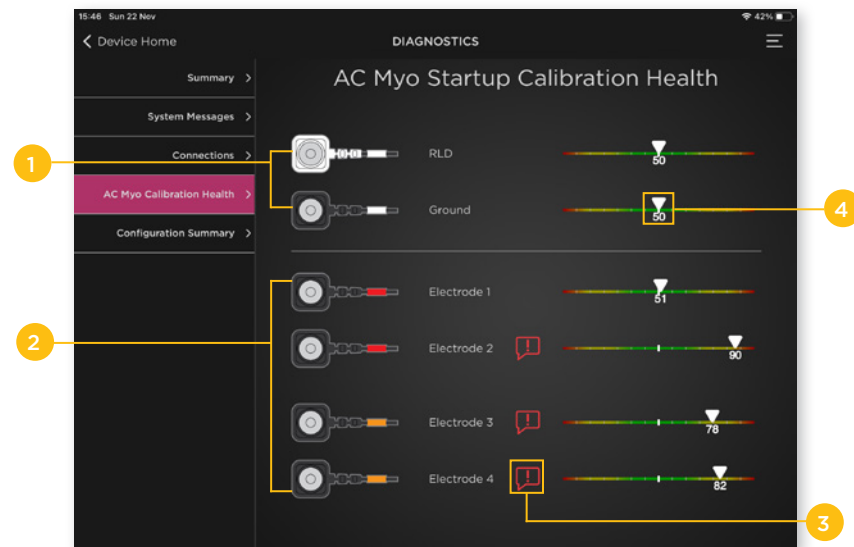


After performing At Rest or Strong Signal Calibration, you can view the results for each. This is especially helpful if calibration has failed more than once.

These results do not change (unless re-calibrated) and can be reviewed at any time. They serve as a 'baseline' reading of the user's muscle signals.

A second set of readings is taken each time the elbow is powered on and can be viewed at **System Settings > Diagnostics > AC Myo Calibration** (see section 5.3.4).

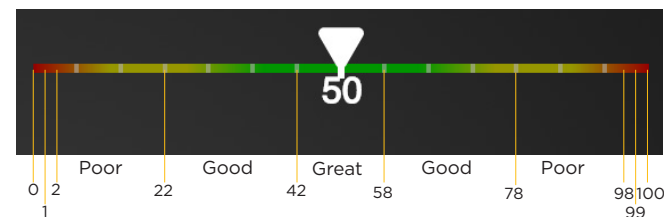
At Rest/Strong Signal Calibration Results



Displays the signal quality for the ground electrodes and each signal electrode.

1. **Ground Electrodes** - Location of each ground pair.
2. **Signal Electrodes** - Location of each electrode pair.
3. **Info Button** - Displays a message about the signal at that location.
4. **Range Value** - The number associated with the signal range.

Range Value Scale

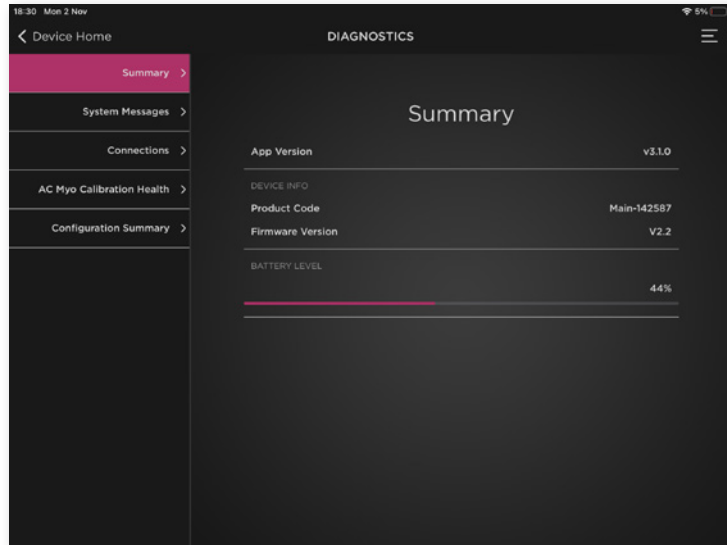


- 0 Cannot read from Input Connector Board
- 1 Signal is too low
- 2 - 22 Poor, signal is lower than expected
- 22 - 42 Good, signal is a little low
- 42 - 58 Great
- 58 - 78 Good, signal is a little high
- 78 - 98 Poor, signal is higher than expected
- 99 Electrode is disconnected
- 100 Ground is not connected

5.3 Diagnostics

5.3.1 Summary

The Summary Screen displays information about the connected Espire Elbow system. This includes the Hub App version, the device's unique Product Code, the current Firmware Version installed on the device, and the current Battery Level of the elbow.



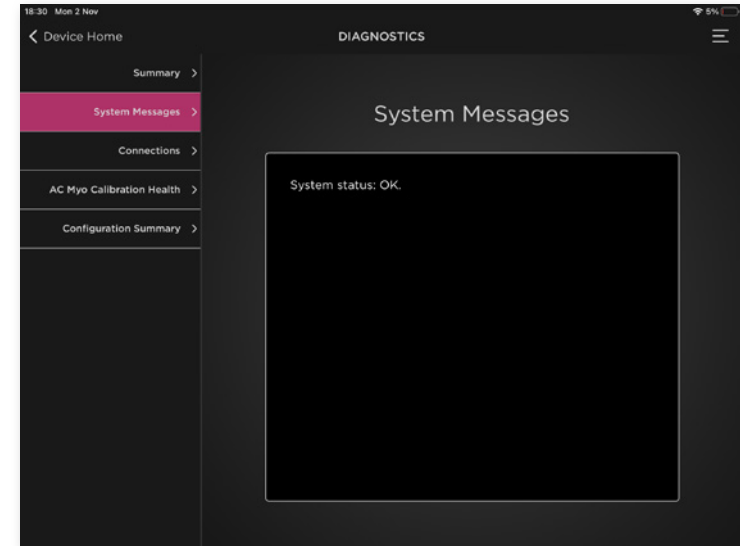
5.3.2 System Messages

If a system error occurs with the Espire Elbow, an error code and description will be viewable in the System Messages Screen. If there are any problems with the system, be ready to provide the error code to Steeper Customer Services.

Contact

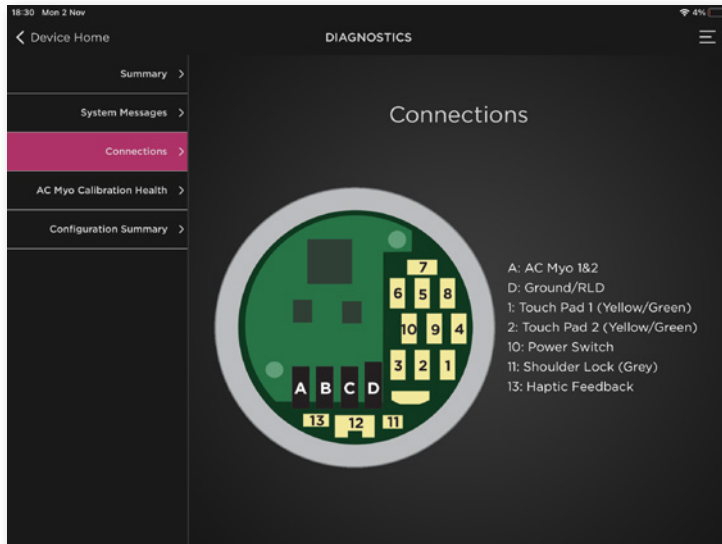
UK/International Phone: **+44 (0) 840 270 4133** or email **customerservices@steepergroup.com**.

For USA/Canada Phone: **(+1) 210-481-4126** or email **inquiries@steeperusa.com**.



5.3.3 Connections

The Connections Screen displays an image of the Espire Elbow's input connector board. Plugs that can accept input cables are labeled with either a letter or a number. To the right of that image is the device's current control strategy. This screen will update if the control strategy is modified in System Alterations.

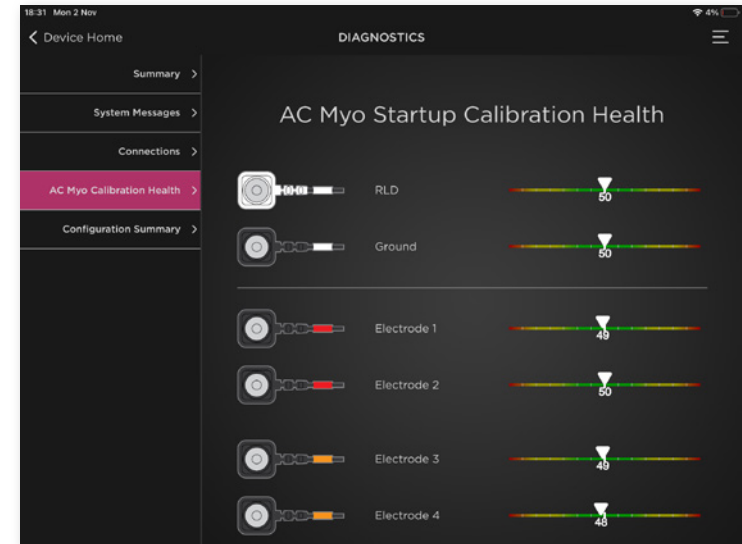


5.3.4 AC Myo Calibration Health

Post-Fitting Troubleshooting

If any electrode signal problems develop after initial fitting, you can check the current myo signal status by viewing the Myo Calibration Health Screen.

This displays the results of a reading of the user's muscle signals that were taken at elbow power-on.

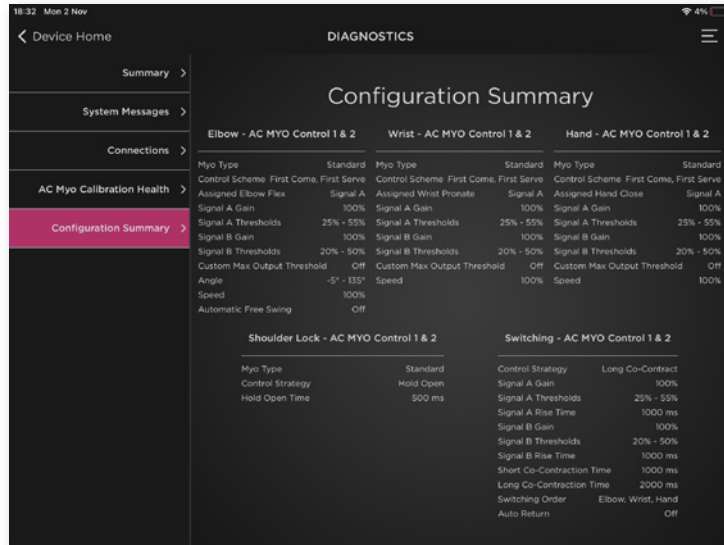


5.3.5 Configuration Summary

The Configuration Summary Screen displays all connected and assigned input types as well as the configured settings for each.

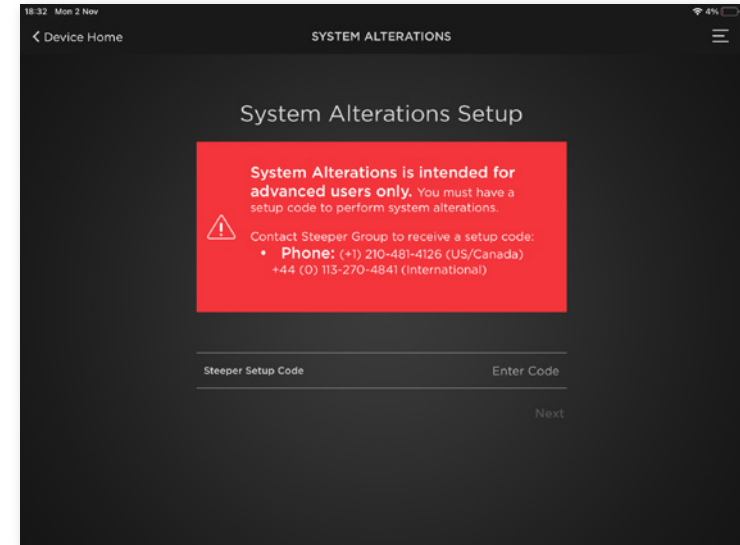


Note: You can save a user's settings profile by taking a screenshot of this screen with the iPad. Save it with the user's information.



5.4 Systems Alterations

The Systems Alterations Screen is intended for experienced customers only. When attempting to access this menu, a notification will appear instructing you to contact Steeper Customer Services for a temporary set up code which allows access to the System Alterations section.



USER DETAILS

User Name (email address)

Password Hint



Note: Passwords are case sensitive and must contain an upper case letter, lower case letter, a number and special character.



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