



# i-digits™ quantum Clinician Manual

MA01348, issue 2, April 2016



This document provides instruction for prosthetists in the fitting and servicing of i-digits<sup>TM</sup> quantum and should be read in full prior to fitting. It is highly recommended that the use of this manual is made in conjunction with instruction from a clinician experienced in upper limb and myoelectric prostheses.



This symbol signifies important information and is used throughout the manual.

Refer to [www.touchbionics.com/downloads/document-library](http://www.touchbionics.com/downloads/document-library) to ensure you have the latest copy of this document.

Refer to the i-digits<sup>TM</sup> component assembly guide (MA01349) for assembly instructions and fabrication.

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# 1.0 i-digits™ quantum

## 1.1 Product Description

### design. dexterity. intelligent motion.

i-digits™ quantum is a fully customized partial hand prosthesis with individually powered fingers. i-digits™ quantum fingers move independently and bend at the joint to work in conjunction with any remaining fingers to help significantly increase functional capabilities for users of the device. Based on the industry-leading design of our i-limb™ product range, i-digits™ quantum combines unsurpassed functionality with style. i-digits™ quantum incorporates gesture control via the patented and ground-breaking i-mo™ technology and is the first partial hand prosthesis that can change grips with a simple gesture.

Key features include:

- Smarter
  - gesture control powered by i-mo™ technology uses simple gestures to change grips
  - proximity control made available via grip chip technology
- Faster
  - adjustable speed boost increases speed up to 30%
- Stronger
  - up to 30% more power when needed
  - improved component design for easier and more reliable fabrication
  - 50% longer battery life
- Smaller
  - new form fitting design decreases device size in every dimension
  - smaller digits now available



i-digits™ quantum offers compliant grip through individually powered digits with stall out ability. A manually rotating thumb in conjunction with a pulsing, enhanced grip (vari-grip), an anti-drop safety feature (auto-grasp) and the wide range of automated grip patterns lead to broad functionality.

Users can choose from a wide selection of automated grips and gestures to help complete daily tasks. Grips can then be customized further for precise control.

## 1.2 Intended Use

i-digits™ quantum is intended to be used by patients with partial hand loss or deficiency. Devices are suited to patients with any 3, 4 or 5 digit loss, while patients with 1 or 2 digit loss are also indicated when the digits of loss are either the thumb or the main digits of opposition, namely the index and middle fingers.

## 1.3 User Selection

i-digits™ quantum is appropriate for users with partial hand loss or deficiency; where the level of loss or deficiency is:

- Distal to the wrist
- Proximal of the metacarpo-phalangeal joint

i-digits™ quantum is not indicated for users with:

- cognitive impairment, such that the device is unable to be controlled
- where skin integrity is insufficient to support a prosthetic device

## 1.4 Prosthesis Overview: Control Strategies

i-digits™ quantum can access automated grips using a range of control options.

### gesture control:

By enabling *i-mo™ technology*, gesture control allows an automated grip to be accessed through a smooth and natural motion of the prosthesis in 1 of 4 directions.

To access gesture control:

- Device must be in full open hand mode
- Hold arm parallel to ground (elbow bent to 90°)
- Maintain an open signal until finger twitches
- Move the hand (within maximum 1 second) in direction assigned to desired grip
- i-digits™ quantum will adopt the grip

### app control:

i-digits™ quantum can access a grip at the touch of an icon on the my i-limb™ app and biosim™ app, enabling all automated grips to be available. These are called *quick grips™*.

i-digits™ quantum will exit automated grip when icon is tapped again, or by selecting another grip icon.

Speed boost is also available on the app using a simple slider bar. This increased speed can provide benefits of a more responsive action, more natural appearance of motion and increased grip force.

### muscle control:

Triggers are specific muscle signals that you can use to instruct i-digits™ quantum to activate an automated grip. There are 4 potential triggers: hold open, double impulse, triple impulse and co-contraction.

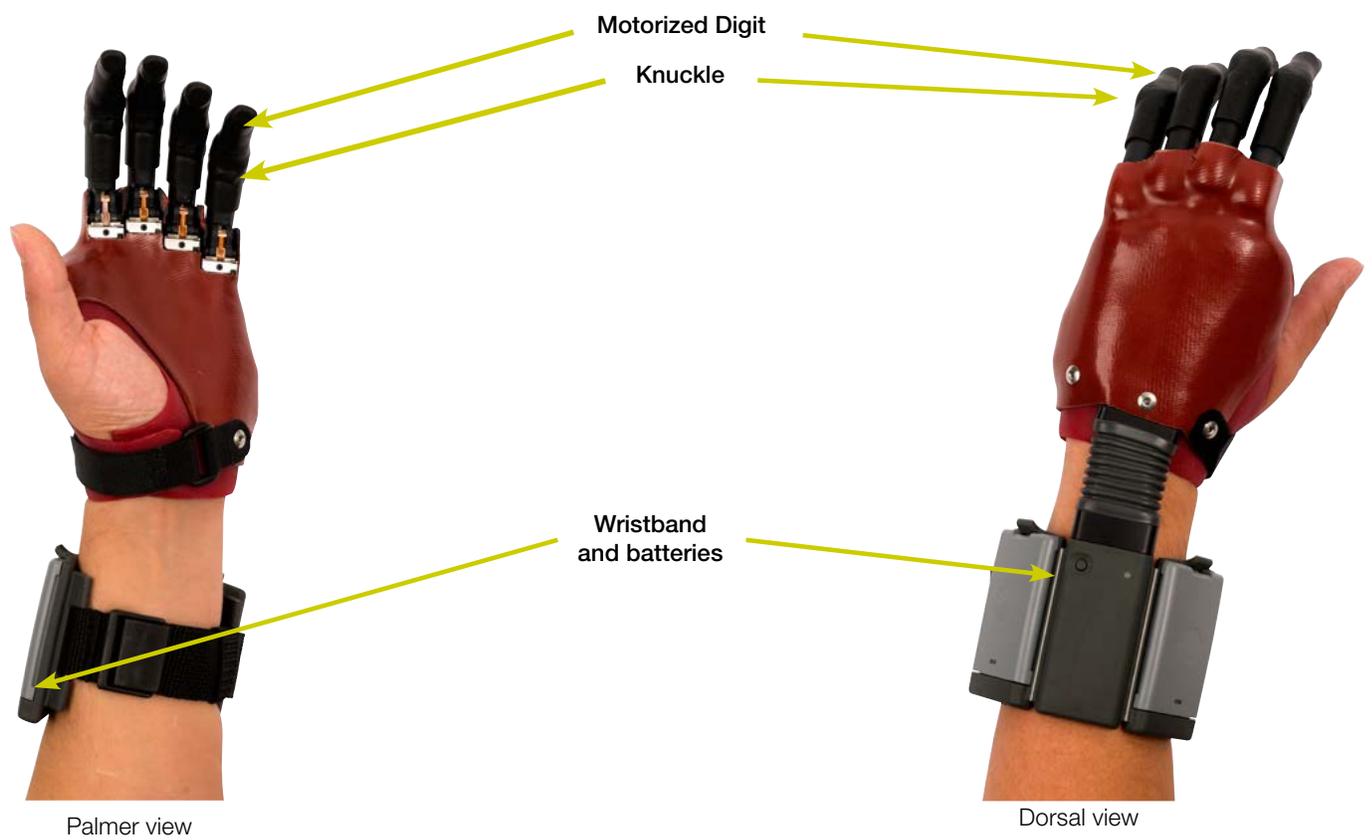


### proximity control:

*grip chips™* are small Bluetooth chips which can change the programming of the i-digits™ quantum when you position it near to the chip. The grip chips™ can be positioned around the user's environment in practical locations to allow access to the optimum grip for particular daily tasks. Individual grip chips can be programmed using the biosim™ or my i-limb™ app.

# 2.0 Componentry

Fig. 1: Prosthesis overview



This illustration above (fig.1) depicts an i-digits™ quantum for users with sound thumb and 4 i-digits.

## 2.1 Wristband componentry

The Wristband houses the microprocessor and the batteries unit. It is buckle fastened, designed to fit loosely around the distal forearm. The flexible covering (bellows) allows access to wiring during prosthesis assembly. To switch the device on, press the button and the LED light will illuminate. To switch it off, press the button again and the LED will light momentarily.



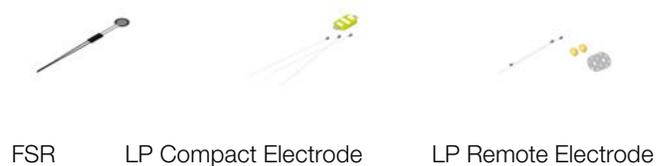
## 2.2 Input options and muscle control sites

i-digits™ quantum devices can be controlled using Low Profile (LP) Remote Electrodes, compact electrodes or Force Sensing Resistors (FSRs) which are all specifically designed for use in i-digits™ devices.

LP Remote Electrodes and compact electrodes both pick up muscle activity from the remaining muscles within the residual hand to control the movements of the digits. LP Remote Electrodes have dome contacts which can improve comfort to the user.

FSRs rely on physical movements of the residual hand to press against the FSR to control the digit movements. FSRs are ideally used in situations where there is a remnant finger present on the affected hand which can flex and extend.

**Fig. 3: Input options**



Do not rely on previous myo-electrical testing.

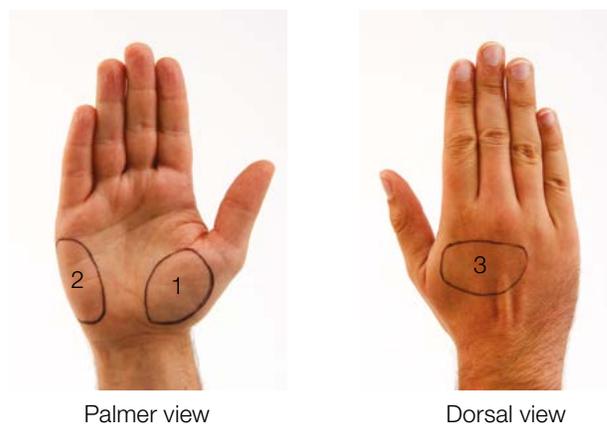


Use anatomical sites where the electrode will maintain constant, even contact with the skin. Avoid placing electrodes near socket interface trimlines, bony areas, skin grafts or fatty tissue.

When using LP Remote Electrodes or compact electrodes, the three muscle groups within the hand are:

1. **Thenar compartment**
2. **Hypothenar compartment**
3. **Dorsum of the hand**

**Fig. 4: Electrode sites**



## 2.3 Battery Charging

Touch Bionics provides four batteries, two for the wristband and two spares. Each battery is equipped with a LED display (see page 7) alerting you when the battery is low on charge. If the battery is low on charge the LED will illuminate RED. The LED will remain illuminated until the battery is adequately charged.

i-limb™ power pack allows users to easily replace batteries.

Batteries for i-digits™ quantum should only be charged using the Touch Bionics powerpack and battery charger supplied. Place the batteries in the charger as illustrated (fig. 6). Insert the charger lead from the battery powerpack into the charge port. Insert the charger into the power outlet.

Charging time from full discharge is approximately 2 hours.

On the base plate (fig.7) of the charger you will see the various light sequences:

- Middle light on: Charger is plugged in
- 2nd and 5th lights blinking Green: Batteries are charging
- 2nd and 5th lights solid Green: Batteries are charged
- 1st and 4th Red lights on: Battery fault, unplug and try again. If lights continue to illuminate, contact Touch Bionics Customer Support.



Only use the plug to disconnect the charger, never pull the cable to remove the lead.

Fig. 5: powerpack



UK



Europe



USA and Japan



Fig. 6: Battery charger



Fig. 7: Base plate



## 3.0 Covers

### 3.1 Cover Options

Silicone digit covers will be provided for i-digits™ quantum device. Digit covers will be ready to fit and are designed to cover each digit.

Touch Bionics' approved digit covers must be used with each digit of the device. The warranty will become void if the device is used without an approved cover.

i-digits™ quantum covers do not provide full protection from moisture, oil, dust and dirt ingress. Caution should be observed.



# 4.0 Grip Review

i-digits™ quantum has 20 different grip options available and 12 customizable my-grips (not shown). These grips can be accessed and programmed through the software package called biosim™ -pro and the biosim™ app as all i-limb™ devices are fitted with a Bluetooth® receiver. The following features catalogue reviews the various available grips and provide a functional description of each.

The range of grips available is dependent on the i-digits™ quantum device configurations and the level of amputation. The range of grips are represented below as per a 5 digit device.

## 4.1 Grip Options

### Precision Pinch Grip Options

#### Standard Precision Pinch Opened

middle, ring and little finger remain fully opened and switch off. Index finger and thumb provide grip.



#### Standard Precision Pinch Closed

middle, ring and little finger automatically close and switch off. Index finger and thumb provide grip.



#### Thumb Precision Pinch Opened

middle, ring and little finger remain fully opened and switch off. Thumb automatically moves to a partially closed position. Index finger will move to provide grip against a fixed thumb.



#### Thumb Precision Pinch Closed

middle, ring and little finger automatically close and switch off. Thumb automatically moves to a partially closed position. Index finger will move to provide grip against a fixed thumb.



### Tripod Grip Options

#### Standard 3 Jaw Chuck (Tripod) Opened

ring and little finger remain fully opened and switch off. Thumb, index and middle fingers move to provide grip.



#### Standard 3 Jaw Chuck (Tripod) Closed

ring and little finger move to terminal close. Thumb, index and middle fingers move to provide grip.



#### Thumb 3 Jaw Chuck (Tripod) Opened

ring and little finger remain fully opened and switch off. Thumb automatically moves to a partially closed position. Index and middle fingers move to provide grip against a fixed thumb.



#### Thumb 3 Jaw Chuck (Tripod) Closed

ring and little finger move to terminal close. Thumb automatically moves to a partially closed position. Index and middle fingers move to provide grip against a fixed thumb.



## Additional Grip and Gesture Options

### Thumb Park Continuous

all four fingers remain open and switch off, only the thumb will move.



### Thumb Park Quick

all four fingers remain open and switch off, for 1.5 seconds the thumb will close and then automatically return to an open position.



### Lateral Grip

all four fingers fully close and switch off. Only thumb will move.



### Index Point

thumb, little, ring and middle fingers close and switch off. Only the index finger will move.



### Custom Gesture

all fingers automatically move to a user defined fully opened or fully closed position and switch off.



### Custom Grip

all fingers automatically move to a user defined position. The user can choose to keep certain digits active and switch others off.



### Grasp

hand forms a shape appropriate for grasping an object. Fingers flex rapidly when any user signal is applied



### One Finger Trigger

hand forms a shape appropriate for using a spray bottle with the index finger active



### Handshake

hand forms a shape appropriate for shaking another persons hand



### Thumb Trigger

hand forms shape appropriate for using an aerosol spray can with thumb active



### Mouse

hand forms shape appropriate for using a computer mouse



### Trigger Two Finger

hand forms a shape appropriate for using a spray bottle with the index and middle finger active



# 5.0 Support Information

## 5.1 Storage and Maintenance

Always turn off the i-digits™ quantum device when not in use.

Aim to charge the battery each day after use.

Replace the batteries every 12 months.

Ensure i-digits™ quantum is serviced every 12 months.

## 5.2 Troubleshooting

Problem	Action
Prosthesis does not operate	<ul style="list-style-type: none"> <li>Ensure the prosthesis is switched on</li> <li>Ensure the battery is connected</li> <li>Ensure the battery is charged</li> <li>Check the electrodes have good contact</li> </ul>
One digit does not operate	Check if the digit operates correctly using the Hand Health Check in <i>biosim</i> <sup>TM</sup>
Device stops halfway during an action	<ul style="list-style-type: none"> <li>Electrode settings may need to be adjusted</li> <li>Check the electrode cable is not damaged</li> <li>Check that the i-digits<sup>TM</sup> quantum screws are not loose</li> <li>Ensure that electrodes have good contact</li> </ul>
User complains that the prosthesis is difficult to operate	<ul style="list-style-type: none"> <li>Electrode settings may be too low</li> <li>Ensure the battery has good charge</li> <li>Ensure the electrodes are well grounded</li> <li>Check electrode placement and wiring</li> </ul>
Battery charge does not last as long as expected	<ul style="list-style-type: none"> <li>Fully charge the battery overnight. Check the battery connection</li> <li>Ensure electrodes are not set above 5.5</li> <li>Check user is not holding a sustained signal to the hand by reviewing on real time graph, or excessive signal counts in usage statistics</li> <li>Replace with a spare i-digits<sup>TM</sup> quantum battery</li> </ul>
	<ul style="list-style-type: none"> <li>Check the electrode cables are attached and are making good contact</li> <li>Switch the open and closed channels via <i>biosim</i><sup>TM</sup></li> </ul>
Battery is not working	<ul style="list-style-type: none"> <li>Check the battery is connected</li> <li>Check the battery is charged</li> <li>Check the wiring for signs of damage</li> <li>Check the device using one of the spare i-digits<sup>TM</sup> quantum batteries</li> </ul>

At any time, contact Touch Bionics for further troubleshooting or questions.

## 5.3 General Safety, Warnings and Precautions

### i-digits™ quantum

Do not use without an approved cover.

Do not use under water.

Do not use to operate heavy / industrial machinery.

Do not use with machinery with moving parts that may cause personal injury or damage.

Users must comply with local regulations on the operation of automobiles, aircraft, sailing vessels of any kind and any other motorized vehicle or device.

Do not use for extreme activities that may cause injury to a natural hand.

Do not expose to excessive moisture, liquid, dust, vibration or shock.

Do not expose to high temperatures.

Do not expose to flames.

Do not use or expose to explosive atmospheres.

Do not disassemble componentry or modify in any way.

Maintenance, repairs and upgrades may only be performed by qualified Touch Bionics technicians and technical partners.

Do not use with a damaged cover.

Damaged covers must be replaced or repaired by a qualified Touch Bionics technician or technical partner.

Only approved Touch Bionics accessories and tooling may be used with i-digits™ quantum.

Do not use an i-digits™ quantum device to operate your mobile device whilst it is connected to a mains outlet, as this can affect EMG signal.

Failure to comply with the above guidelines will invalidate the warranty.

### Batteries

Do not bend or exert excessive pressure on the battery.

Do not pierce the battery.

Do not disassemble.

Do not expose to high temperatures.

Do not incinerate batteries.

Do not short circuit the battery.

Do not store batteries inside a vehicle.

Dispose of batteries in accordance with US, European or local regulations.

Only use the appropriate Touch Bionics charger to charge Touch Bionics batteries.

If the battery has visibly ballooned or swelled:

- discontinue the charging process immediately
- disconnect the battery
- remove to a safe area
- leave and observe for 15 minutes
- replace with new battery
- do not re-use
- dispose of any leaking batteries in an appropriate manner

Failure to comply with the above guidelines will invalidate the warranty.



**If you experience technical problems with i-digits™ quantum contact Touch Bionics as follows:**

#### **North America (Canada, Mexico & US)**

Tel: +1 855 MYILIMB (694 5462)

#### **Germany/Europe:**

Tel: +49 6221 357 9060

#### **France:**

Tel: 0805 110478

#### **UK/International**

Tel: +44 1506 438 556

# 6.0 User Information

## 6.1 User Details

Provision of the following information will enable easy identification of your patient's device, should it be returned to customer service. Please forward to Touch Bionics as per the contact information on the back page of this manual.

User Name: .....

Fitting Date: .....

Device Purchase Date: .....

Device Serial Number: .....

Prosthetist Name & Contact Information: .....

Therapist Name & Contact Information: .....

It is recommended that the above information is also included in the user notes.

# 7.0 Appendix

## 7.1 Technical Information

i-digits™ quantum	
Voltage	7.4 V (nominal)
Max. Current	5 A
Battery Capacity	Rechargeable lithium polymer 7.4 V (nominal); 800 mAh capacity
Max device load	20kg
Finger Carry Load (static limit)	5kg
Time from full open to full close	0.8 seconds

## 7.2 i-digits™ quantum Information

Hazardous Area Classification	
i-digits™ quantum device is not intended for use outside the boundaries of the environments listed below. The user of i-digits™ quantum device should assure that it is not used in such environments.	
Condition	Level
Maximum temperature	+70°C
Minimum temperature	-40°C
Hazardous Area Classification	Non Hazardous

## 7.3 Component Compatibility

Please refer to [www.touchbionics.com/downloads/document-library](http://www.touchbionics.com/downloads/document-library) for Electro Magnetic Compatibility (EMC) and Electrical Information for i-digits™ quantum products.

## 7.4 Warranty

Refer to [www.touchbionics.com/downloads/document-library](http://www.touchbionics.com/downloads/document-library) to review warranty information.

	<p>Consult instructions for use</p>
	<p>Class II equipment – provides double Isolation to protect against electric shock</p>
<p><b>IP40</b></p>	<p>Degree of protection – IP40</p> <p>Protection against penetration by solid particles with diameters larger than 1 mm. No special protection against penetration by water</p>
	<p>Serial Number</p>
	<p>For i-digits™ quantum devices: The unique serial number for i-digits™ quantum devices is a “DM” with a 4 digit alpha / numeric number.</p>
	<p>WEEE Compliance</p>
	<p>Catalogue number</p>
	<p>Manufacturer/Date of Manufacture</p>
	<p>European Conformity</p>



### **North America**

Touch Bionics Inc.  
35 Hampden Road  
Mansfield MA 02048  
USA  
+1 855 MY iLIMB (694 5462)

### **Europe**

Touch Bionics GmbH  
Langer Anger 3  
69115 Heidelberg  
Germany  
+49 6221 357 9060

### **International**

Touch Bionics Ltd.  
Unit 3, Ashwood Court  
Oakbank Park Way  
Livingston EH53 0TH  
UK  
+44 1506 438 556  
info@touchbionics.com



For address details and further information  
please visit **[www.touchbionics.com](http://www.touchbionics.com)**

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