Everyday life with the bebionic® hand
Therapy and rehabilitation

Quality for life
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Incredibly versatile
The bebionic® hand at a glance

Aesthetic aspects
- Rounded finger profile
- Natural appearance of the knuckles
- Natural transition to the wrist joint
- Anatomical design based on the bone structure of the human hand

Program switch
- On/off: press and hold for 3 seconds
- Primary and secondary grips: press and hold for less than 2 seconds
- Bluetooth: after switching on, press and hold for 4–5 seconds until 2 beeps are heard and vibration starts
- Glove donning mode: thumb in opposition, turn the hand off, press and hold the program switch for 6 seconds, the thumb automatically moves to the glove donning mode position

Smart thumb
- 8 grips in opposition
- 6 grips in lateral position

Opposition
Lateral position

Wrist options
- EQD wrist (quick-disconnect wrist unit)
- Flex wrist (three-stage joint)
- Short wrist
- Multi-flex wrist (only for bebionic medium and large)
# Hand control based on passive and active functions

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<th><strong>Passive functions</strong></th>
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<tr>
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<tr>
<td>Precision open grip</td>
<td></td>
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</tr>
<tr>
<td>Finger adduction</td>
<td></td>
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</table>

### Active functions:
- **Thumb in opposition**
  - Tripod grip
  - Pinch grip
- **Thumb in lateral position**
  - Mouse grip
  - Key grip
- Power or hook grip
- Hook grip
- Finger point
- Column grip
- Active index grip
- Precision open grip
- Precision closed grip
- Finger adduction

### Passive functions:
- Turning the prosthesis on and off
- Locking/unlocking the wrist
- Program switch functions
- Detaching the hand from/reattaching the hand to the prosthetic socket
- Manual thumb adjustment
- Charging the prosthesis
Individual adjustment based on the standard settings

<table>
<thead>
<tr>
<th>Primary grips</th>
<th>Secondary grips</th>
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<td><strong>Standard (grip 1 or 3)</strong></td>
<td><strong>Standard (grip 5 or 7)</strong></td>
</tr>
<tr>
<td>Grips used most often by the user</td>
<td>Grips for special situations</td>
</tr>
<tr>
<td></td>
<td><strong>Thumb in opposition</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Thumb in lateral position</strong></td>
</tr>
<tr>
<td>Tripod grip</td>
<td>Active index grip</td>
</tr>
<tr>
<td>Key grip</td>
<td>Column grip</td>
</tr>
</tbody>
</table>

| Alternative (grip 2 or 4)              | Alternative (grip 6 or 8)                 |
| Grips used frequently in daily life    | Grips for rare occasions                  |
|                                        | **Thumb in opposition**                   |
|                                        | **Thumb in lateral position**            |
| Power or hook grip                     | Finger adduction                          |
| Finger point                           | Mouse grip                                |

Switching (see next page) between standard and alternative grips requires a muscle signal (opening/closing or co-contraction). The pre-configuration of selected grips and also the switching mode can be changed individually by a muscle signal using the bebalance software.

Please note that the precision grips (open and closed) are not recommended if tripod grip has been programmed. The thumb will only be aligned correctly for tripod OR precision.
Switching options
Switching between eight different grips

Manually adjusting the thumb position
The thumb is moved manually from the lateral position to opposition and vice versa. This is used to choose between grips 1-4 or 5-8.

Switching between primary and secondary grips with the program switch
Press and hold the program switch (on the back of the hand) for less than 2 seconds.

Manually adjusting the thumb position

Thumb position: opposition

- **Primary grips:** Grips used frequently in daily life
  - Grip 1
  - Grip 2
  - Switching between grips with a muscle signal

- **Secondary grips:** Grips for special situations
  - Grip 5
  - Grip 6
  - Switching between primary and secondary grips with the program switch

Thumb position: lateral

- **Primary grips:** Grips used frequently in daily life
  - Grip 3
  - Grip 4
  - Switching between grips with a muscle signal

- **Secondary grips:** Grips for special situations
  - Grip 7
  - Grip 8
  - Switching between primary and secondary grips with the program switch

Switching between grips with a muscle signal
The muscle signals "open/open" or "co-contraction" are used to switch between the individual standard and alternative grips.
Training with the bebionic hand
Reaching the goal with the right training

Routine control of the bebionic hand in daily life requires specific training. We have summarized valuable tips for you on the following pages. The many years of experience with Ottobock prosthetic hands accumulated by our technicians, therapists and users are the basis for specific everyday training with the bebionic hand.

Our recommendation
For the best possible training results, always monitor body posture and correct and harmful compensatory movements.

❖ The focus is on the optimal use of the hand in daily life
❖ The training objective is to become familiar with and accustomed to the prosthesis
❖ The user gets a feel for controlling the prosthesis in order to reliably perform everyday activities with one or both hands.
Training recommendations for successful prosthesis control

1. Upright posture
2. Balanced stance
3. Avoid rotation in the spine
4. Relaxed shoulder position

- Adapt to the abilities of the user
- Give simple instructions & take breaks
- 10–15 repetitions per exercise
- Vary exercises and positions

GIVE SIMPLE INSTRUCTIONS & TAKE BREAKS
10–15 REPETITIONS PER EXERCISE
VARY EXERCISES AND POSITIONS
Full body training
Achieving optimal physical conditioning

Physical conditioning should focus on increasing balance, coordination, stability, strength, and endurance. All of these factors will lead to successful use and control of the prosthesis.

ADAPT TO THE ABILITIES OF THE USER

The following exercises are easy to complete and very well suited for performing at home.

- Prior to the prosthetic fitting
- Without the prosthesis
- With the prosthesis
- During rehabilitation
Sample exercises for full body training

10–15 seconds per exercise

**Basic exercises**

- Start position
- End position

**Advanced exercises**

- On an uneven surface
- With the eyes closed

**One-legged stance** – balance training

**Lifting the arms** – shoulder and trunk strengthening

**Bridge** – strengthening the back, hips and thighs
Controls training

Hand control training encompasses passive and active functions.

**Passive functions**
- Switching on and off
- Program switch
- Manual thumb adjustment
- Locking/unlocking the wrist
- Detaching the hand from/reattaching the hand to the prosthetic socket
- Charging the prosthesis

**Active functions**
- Open/close hand
- Rotate wrist
- Movement sequences

**Before starting**
Discuss and understand the passive functions

**GIVE SIMPLE INSTRUCTIONS & TAKE BREAKS**

**See pages 18-19 for specific controls training sequences.**

- In this phase, the focus is on the optimal practical value of the prosthesis
- The user becomes familiar with all prosthesis functions during this training
- The user gains confidence in controlling the prosthesis without objects

**Objective**
User can follow explicit commands without any random movements of the hand occurring.
Controls training: active functions

A. Opening and closing the hand – in lateral and opposition

B. Rotating the wrist in both lateral and opposition.

C. Vary the speed and control during the exercises
   - Slow/fast
   - Full and partial grip closure/opening
   - With/without visual feedback

D. Combining hand and wrist movements
   Examples for a movement sequence:
   - Open the hand ▶ rotate inwards ▶ rotate outwards ▶ close
   - Open the hand quickly ▶ close slowly ▶ open halfway ▶ open fully ▶ close fully

Start position (sitting)

Training the active functions is carried out in various positions.

Standing   Behind the body   Over the head   In motion

Continue to the next phase as soon as the user feels confident in controlling the prosthesis independently.
Controls training: repetitive drills

See pages 18-19 for specific repetitive drills training sequences.

- Gripping, holding and releasing objects of various sizes, textures and firmness
- Variations, repetitions and combinations of the exercise improve the success of training

Objectives
- Confidently and reliably handling objects in various situations with optimal gripping force, speed and precise opening width.
- Master proportional control.

10–15 REPETITIONS PER EXERCISE
A. Indirect grasping*
First the object is grasped with the sound hand and passed to the prosthetic hand. The information perceived this way helps the user control the prosthetic hand as effectively as possible, regardless of the type of object.

Recommended training objects
- Building blocks
- Soft balls
- Plastic cups
- Bottle
- Clothespins
- Plate/bowl/cutlery
- Playing cards

B. Direct grasping*
Grasping an object directly with the prosthetic hand.

Training variations
- Training various hand modes
- With/without visual feedback
- Focus on precise grip force
- Integrate movements and coordination

* Hanneke Bouwsema, Learning to handle a myoelectric upper-limb prosthesis, 2014
Prosthesis training related to daily life (ADL training)
Confidently mastering daily activities

Make sure that you are familiar with the user's daily routine and incorporate the associated activities into the training.

**Objective**
To promote independence, have the user perform functional activities learned with both hands using objects of daily life.
Examples of activities

- Opening a screw cap jar
- Packing a backpack
- Holding a pen
- Folding laundry
- Dressing and undressing
- Filling a glass
- Tying shoelaces
- Eating with a knife and fork
- Using a pen
- Opening/lifting a lid
- Carrying a bag/shopping bag
- Using cutlery
- Slicing a salami or cucumber
- Using a spray bottle (e.g., deodorant)
- Using a blow dryer
- Taking a tissue from the package
- Picking up a coin
- Holding a CD
- Leafing through a newspaper/magazine
- Using a computer mouse
- Holding a jacket
- Carrying a tray
- Using a keyboard
- Pressing buttons on a remote control
- Pressing a button
- Buttoning a jacket
- Hooking the hand or thumb in the trouser pocket
- Carrying or passing a plate

Grips in opposition

- Tripod grip or pinch grip
- Power or hook grip
- Precision open grip
- Precision closed grip
- Finger adduction
- Finger point (no active finger movement)
- Column grip
- Relaxed hand position
- Open palm grip

Grips in lateral position

- Mouse grip
- Key grip

Grips in opposition

- Tripod grip or pinch grip
- Power or hook grip
- Precision open grip
- Precision closed grip
- Finger adduction
- Finger point (no active finger movement)
- Column grip
- Relaxed hand position
- Open palm grip
## Recommendations for training with the bebionic hand

### Training the primary grips

Please note: the primary grips (1 through 4) are used very often in everyday life.

<table>
<thead>
<tr>
<th>Step</th>
<th>Training phase</th>
<th>Objectives</th>
<th>Procedure</th>
</tr>
</thead>
</table>
| I Manually changing the thumb position | Control training | Using standard grips 1 and 3 in opposition and lateral position of the thumb | • The thumb is in lateral position  
• Open the hand in the lateral grip and close it in grip 3  
• The thumb is moved manually from lateral position to opposition  
• Now the hand is opened and closed in opposition |
|  | Repetitions | Grasping, holding and releasing objects in the two standard grips 1 and 3 in lateral position and in opposition |
| II Switching with a muscle signal in lateral position | Control training | Switching between the primary grips 3 and 4 in lateral position  
Active using these primary grips 3 and 4 in lateral position | • The thumb is moved manually to lateral position  
• Grip 3 in lateral position is active during opening/closing  
• Switch to grip 4 with muscle signal (opening/closing or co-contraction)  
• Grip 4 is active during opening/closing  
• Switch back to grip 3 with muscle signal |
|  | Repetitions | Grasping, holding and releasing objects in the two standard grips 3 and 4 in lateral position and in opposition |
| III Switching with muscle signal in opposition | Control training | Switching between the primary grips 1 and 2 in opposition  
Active using these primary grips 1 and 2 in opposition | • The thumb is moved to opposition manually  
• Grip 1 in opposition is active during opening/closing  
• Switch to grip 2 with muscle signal (opening/closing or co-contraction)  
• Grip 2 is active during opening/closing  
• Switch back to grip 1 with muscle signal |
|  | Repetitions | Grasping, holding and releasing objects in opposition grasp 1 and 2 |
| Combine steps I-III | Control training | Switching between the four primary standard and alternative grips 1 and 2 or 3 and 4 in lateral position and opposition |
|  | Repetitions | Include objects suitable for the chosen grips 1 and 2 or 3 and 4 in lateral position and opposition (see list on page 17) |
|  | Everyday training | Include activities of daily life for the chosen grips 1 and 2 or 3 and 4 in lateral position and opposition (see page 17 for everyday examples) |

Now combine steps I through III to practice confident and reliable control of the chosen grips.

Please continue with step 4 only when reliable control of the bebionic hand in primary mode is assured.

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## Training the secondary grips

Please note: the secondary grips (5 through 8) are more likely to be used in special situations.

<table>
<thead>
<tr>
<th>Step</th>
<th>Training phase</th>
<th>Objectives</th>
<th>Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prerequisite</td>
<td>Press the program switch to access the secondary grips</td>
<td>To do so, press the program switch on the back of the hand for less than 2 seconds</td>
<td></td>
</tr>
</tbody>
</table>
| IV Manually changing the thumb position | Control training | Actively using the standard grips 5 and 7 in lateral position and opposition | • The thumb is in lateral position  
• Grip 7 in lateral position is active during opening/closing  
• The thumb is moved to opposition manually  
• Grip 5 in opposition is active during opening/closing |
| Repetitions | Grasping, holding and releasing objects in the two standard grips 5 and 7 in lateral position and in opposition |
| V Switching with muscle signal in opposition | Control training | • Switching between the secondary grips 5 and 6 in opposition  
• Actively using grips 5 and 6 in opposition | • The thumb is moved to opposition manually  
• Grip 5 in opposition is active during opening/closing  
• Switch to grip 6 with muscle signal (opening/closing or co-contraction)  
• Grip 6 in opposition is active during opening/closing  
• Switch back to grip 5 with muscle signal |
| Repetitions | Grasping, holding and releasing objects in grip 5 and 6 in opposition |
| VI Switching with a muscle signal in lateral position | Control training | • Switching between the secondary grips 7 and 8 in lateral position  
• Actively using these secondary grips 7 and 8 in lateral position | • The thumb is moved manually to lateral position  
• Grip 7 in lateral position is active during opening/closing  
• Switch to grip 8 with muscle signal (opening/closing or co-contraction)  
• Grip 8 is active during opening/closing  
• Switch back to grip 7 with muscle signal |
| Repetitions | Grasping, manipulating and releasing objects in grips 5 and 6 in opposition |
| Combine steps IV–VI | Control training | Switching between the secondary grips 5 and 6 or 7 and 8 in lateral position and opposition |
| Repetitions | Include objects suitable for the chosen grips 5 and 6 or 7 and 8 in lateral position and opposition (see page 6 for grip examples) |
| Everyday training | Include activities of daily life for the chosen grips 5 and 7 as well as 6 and 8 in lateral position and opposition |

Please note: when the thumb is moved to a new position while the hand is in the secondary grips, the hand will be transferred directly to the secondary grips of the new thumb position. To move from the secondary grip of one thumb position to a primary grip of the other thumb position, the thumb must be moved and the program switch must be pressed.
Successful training with the bebionic hand
The most important therapy components at a glance

<table>
<thead>
<tr>
<th>Objectives</th>
<th>Structure</th>
<th>Motivation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gaining independence, boosting self-confidence, preventing overuse.</td>
<td>Segmentation into four training phases with simultaneous individual adaptation of the degree of difficulty.</td>
<td>Design exercises individually based on personal interests or hobbies.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Variation</th>
<th>Empathy</th>
<th>Coordination</th>
</tr>
</thead>
<tbody>
<tr>
<td>Static and dynamic exercises with various objects in different positions.</td>
<td>Gaining an understanding of the user’s situation in order to assess their abilities and willingness to perform.</td>
<td>Training muscles for strength, endurance and speed.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Repetition</th>
<th>Feedback</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Repetitive exercises offer a time for troubleshooting, experience building, and confidence enhancement for the user.</td>
<td>Visual and audible feedback, along with proprioceptive awareness of the phantom hand, improve training success.</td>
<td>Focused training requires frequent breaks for physical and mental rejuvenation.</td>
</tr>
</tbody>
</table>

Ottobock is a partner of the Handsmart Group, an international and publicly accessible therapist platform to support rehabilitation in case of congenital malformations or loss of an upper limb.

www.handsmartgroup.org
Embrace the Everyday

Quality for life