

**Appendix: Comparison of Training Protocol by Level of DEKA Arm**

<b>TRAINING COMPONENT</b>	<b>Radial Configuration</b>	<b>Humeral Configuration</b>	<b>Shoulder Configuration</b>
<b>PROSTHEFTIC FITTING/BASIC CONTROLS TRAINING</b>			
<b>Setup and intro to controls</b>	<ul style="list-style-type: none"> <li>• Prosthetist configures and explains controls to user; user demonstrates activation of each control</li> <li>• OT provides user a visual picture of control set-up and encourages review of it daily</li> <li>• Number of controls = 8 to 12</li> </ul>	<ul style="list-style-type: none"> <li>• All activities included in RC training</li> <li>• Number of controls = 9 to 16</li> </ul>	<ul style="list-style-type: none"> <li>• All activities included in RC training</li> <li>• Number of controls = 16 to 20</li> </ul>
<b>VIRTUAL REALITY ENVIRONMENT(VRE) TRAINING</b>			
<b>General information</b>	<ul style="list-style-type: none"> <li>• 30 min. to 2 hours recommended. Up to 4 hours for users with cognitive deficits</li> </ul>	<ul style="list-style-type: none"> <li>• 30 min. to 2 hours recommended. Up to 4 hours for users with cognitive deficits</li> </ul>	<ul style="list-style-type: none"> <li>• 4 hours minimum recommended</li> </ul>
<b>Overall tips</b>	<ul style="list-style-type: none"> <li>• Arm should be de-activated during VRE with user focusing on VRE avatar, not the actual Arm</li> <li>• The Control Set-Up visual handout should initially be displayed, then removed if user is able to recall control scheme</li> <li>• Drills should be in standing and sitting positions</li> </ul>	<ul style="list-style-type: none"> <li>• All activities included in RC training</li> </ul>	<ul style="list-style-type: none"> <li>• All activities included in RC training</li> </ul>
<b>Vocabulary/Basic Knowledge of Arm Functions</b>	<ul style="list-style-type: none"> <li>• Name/explain: <ul style="list-style-type: none"> <li>○ all Arm components</li> <li>○ location and function of</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• All activities included in RC training</li> <li>• Name/explain mode select</li> </ul>	<ul style="list-style-type: none"> <li>• All activities included in RC training</li> <li>• Name mode select, 6 Endpoint</li> </ul>

	<p>powering on/off, standby, tactor, EMGs</p> <ul style="list-style-type: none"> <li>○ 4 movements of wrist</li> <li>○ Hand open/close</li> <li>○ 6 grips (appearance, detents)</li> <li>○ foot movements for IMUs</li> <li>○ IMU characteristics</li> <li>○ wrist display and responses to error lights</li> <li>○ how to check battery level</li> <li>○ hand open button</li> <li>○ safety warnings</li> </ul>	<p>and 4 movements of elbow</p>	<p>movements and 2 VEP elbow movements; explain Endpoint Control, including:</p> <ul style="list-style-type: none"> <li>○ Full ROM for each Endpoint movement</li> <li>○ How VEP (elbow positioning) affects movements</li> <li>○ Slow down zone for some movements near face</li> <li>○ Arm FORWARD is usually the safe movement to get hand way from face or head</li> <li>○ The end point refers to position of hand in space.</li> <li>○ Endpoint movements are position-sensitive in relation to starting position of joints</li> <li>○ There is a functional window in which Endpoint works and built-in stops which activate outside the functional window</li> <li>○ How to release shoulder</li> </ul>
--	--	---------------------------------	---

			manually when it freezes
<b>Memory drills without controls activation</b>	<ul style="list-style-type: none"> <li>• 5-15 minutes guiding user to learn what each foot movement or other control site does.</li> <li>• Have user demonstrate with sound hand (if a unilateral amputee)</li> </ul>	<ul style="list-style-type: none"> <li>• All activities included in RC training</li> </ul>	<ul style="list-style-type: none"> <li>• All activities included in RC training</li> </ul>
<b>Controls drills operating the Avatar</b>	<ul style="list-style-type: none"> <li>• User activates controls to operate avatar for basic activities and grips</li> </ul>	<ul style="list-style-type: none"> <li>• All activities included in RC training</li> </ul>	<ul style="list-style-type: none"> <li>• All activities included in RC training</li> <li>• Emphasize safe movements: (hand away from face/head - FORWARD Command) and VEP (elbow positioning) in UP/DOWN commands to keep Arm away from head and face</li> </ul>
<b>Complex movements with the Avatar</b>	<ul style="list-style-type: none"> <li>• User activates controls to operate avatar for simulated scenarios including hand to mouth, raising arm overhead; uses foot controls with feet elevated</li> </ul>	<ul style="list-style-type: none"> <li>• All activities included in RC training</li> </ul>	<ul style="list-style-type: none"> <li>• All activities included in RC training r</li> <li>• Review using a spoon, drinking from a cup, and the ROM of SC (functional window)</li> </ul>

<b>TRAINING WITH DEKA ARM</b>			
<b>Overview Training Time</b>	<ul style="list-style-type: none"> <li>• 20-40 hours of training</li> </ul>	<ul style="list-style-type: none"> <li>• 20- 40 hours of training</li> </ul>	<ul style="list-style-type: none"> <li>• Up to 50 hours of training</li> </ul>

<p><b>Overview</b> General</p>	<ul style="list-style-type: none"> <li>Review controls at the start of each day’s session in sitting and standing.</li> <li>Sessions progress from basic knowledge review and pre-task training to simple grasp/release activities, to more complex unilateral and bilateral tasks, including user-requested activities, to supervised community outings.</li> <li>OT must be aware of and ready to respond to risk of danger, especially when Arm is near user’s head/face</li> </ul>	<ul style="list-style-type: none"> <li>All activities included in RC training</li> </ul>	<ul style="list-style-type: none"> <li>All activities included in RC training</li> <li>OT must remember additional safety precautions with SC users: Arm FORWARD will in almost all cases assist the user to move away from potentially dangerous positions near face/head</li> </ul>
<p><b>Basic Arm Knowledge</b></p>			
<p>Basic Knowledge</p>	<ul style="list-style-type: none"> <li>User names all Arm components, identify off/on, standby, tactor, all prosthesis movements and all control movements (IMUs, EMGs, bladder)</li> </ul>	<ul style="list-style-type: none"> <li>All activities included in RC training</li> <li>Identify mode select</li> </ul>	<ul style="list-style-type: none"> <li>All activities included in RC training</li> <li>Identify mode select</li> </ul>
<p>Reinforce control schemes</p>	<ul style="list-style-type: none"> <li>OT reviews wrist display, IMU LEDs, characteristics of IMUs, walk detect, safety cautions/warnings, safe use, manual release of hand, check battery levels, battery charging and changing, perform each wrist control, open/close hand and</li> </ul>	<ul style="list-style-type: none"> <li>All activities included in RC training</li> <li>Perform 4 movements of elbow</li> <li>Review manual release of elbow</li> </ul>	<ul style="list-style-type: none"> <li>All activities included in RC training</li> <li>Perform 6 Endpoint movements and 2 VEP elbow movements</li> <li>Hand to mouth sequence</li> <li>Review safe operation near head</li> <li>Review manual release of elbow and shoulder</li> </ul>

	each grip, practice grip detents, grips of hand, quizzes on grip order, quizzes on best grip for specific activities.		
Drills	<ul style="list-style-type: none"> <li>User verbalizes each control as s/he performs all movements; quiz user on controls</li> </ul>	<ul style="list-style-type: none"> <li>All activities included in RC training</li> </ul>	<ul style="list-style-type: none"> <li>All activities included in RC training</li> </ul>
Grasp and release training	<ul style="list-style-type: none"> <li>User grasps and releases objects midline on table using different grips; using form board; stacking plastic cups/cones/blocks; shadow boxing</li> </ul>	<ul style="list-style-type: none"> <li>All activities included in RC training</li> </ul>	<ul style="list-style-type: none"> <li>All activities included in RC training plus explore functional window during activities such as shadow boxing</li> </ul>
Donning and Doffing	<ul style="list-style-type: none"> <li>User performs with assistance in early sessions, independently as soon as possible, with assistive devices if needed.</li> </ul>	<ul style="list-style-type: none"> <li>All activities included in RC training</li> </ul>	<ul style="list-style-type: none"> <li>All activities included in RC training</li> </ul>
Responding to Arm Stoppages	<ul style="list-style-type: none"> <li>User learns what to do when error lights appear on wrist display or if Arm stops.</li> </ul>	<ul style="list-style-type: none"> <li>All activities included in RC training</li> </ul>	<ul style="list-style-type: none"> <li>All activities included in RC training</li> <li>Experiment with Arm stops at end of ROM (functional window)                             <ul style="list-style-type: none"> <li>Learn what to do when this occurs, including using alternative movements, manual release button, and manual adjustment.</li> </ul> </li> </ul>

<b>Training Activities</b>			
Unilateral ADL tasks	<ul style="list-style-type: none"> <li>Begin after user can control prosthetic movements in a natural way, usually by 3<sup>rd</sup> session</li> </ul>	<ul style="list-style-type: none"> <li>All activities included in RC training</li> </ul>	<ul style="list-style-type: none"> <li>All activities included in RC training</li> </ul>

	<ul style="list-style-type: none"> <li>• Perform unilateral ADLs from Training Activities checklist</li> <li>• OT attends to body posture and prosthetic positioning; coaches user to avoid compensatory movements whenever possible.</li> </ul>		
Bilateral ADL tasks	<ul style="list-style-type: none"> <li>• OT reinforces use of DEKA Arm as a “functional assist”; perform bilateral ADLs from Training Activities checklist;</li> <li>• OT attends to body posture and prosthetic positioning; coaches user to avoid compensatory movements.</li> </ul>	<ul style="list-style-type: none"> <li>• All activities included in RC training</li> </ul>	<ul style="list-style-type: none"> <li>• All activities included in RC training</li> </ul>
Advanced Training	<ul style="list-style-type: none"> <li>• Include performance of short term projects, vocational and recreational tasks, such as games, cooking, eating, sports</li> <li>• Include activities chosen by user;</li> <li>• Allow some time in each session for user to operate Arm without instruction.</li> </ul>	<ul style="list-style-type: none"> <li>• All activities included in RC training</li> </ul>	<ul style="list-style-type: none"> <li>• All activities included in RC training</li> </ul>
Community Outings	<ul style="list-style-type: none"> <li>• When OT assesses user as adept enough to utilize the Arm in public with minimal coaching and supervision, begin supervised community outings; three activities must be included: eating a meal in public; riding in a car or public transportation; shopping.</li> </ul>	<ul style="list-style-type: none"> <li>• All activities included in RC training</li> </ul>	<ul style="list-style-type: none"> <li>• All activities included in RC training</li> </ul>
Home Use Preparedness	<ul style="list-style-type: none"> <li>• Assure that user demonstrates</li> </ul>	<ul style="list-style-type: none"> <li>• All activities included in</li> </ul>	<ul style="list-style-type: none"> <li>• All activities included in RC training</li> </ul>

	comprehension of all safety info, independence in changing and charging all batteries, troubleshooting and maintenance, storing Arm, packing it for shipment.	RC training	
Demonstration of Independence	<ul style="list-style-type: none"> <li>• When user has good mastery and training appears near completion, allow the user to attempt complex activities without any cueing/ feedback from OT, except for safety intervention if needed.</li> <li>• Allow user to troubleshoot independently if needed in these activities for at least 10 minutes prior to OT intervention.</li> </ul>	<ul style="list-style-type: none"> <li>• All activities included in RC training</li> </ul>	<ul style="list-style-type: none"> <li>• All activities included in RC training</li> </ul>