

Appendix: Comparison of Training Protocol by Level of DEKA Arm

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

	<p>powering on/off, standby, tactor, EMGs</p> <ul style="list-style-type: none"> ○ 4 movements of wrist ○ Hand open/close ○ 6 grips (appearance, detents) ○ foot movements for IMUs ○ IMU characteristics ○ wrist display and responses to error lights ○ how to check battery level ○ hand open button ○ safety warnings 	<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"> ○ Full ROM for each Endpoint movement ○ How VEP (elbow positioning) affects movements ○ Slow down zone for some movements near face ○ Arm FORWARD is usually the safe movement to get hand way from face or head ○ The end point refers to position of hand in space. ○ Endpoint movements are position-sensitive in relation to starting position of joints ○ There is a functional window in which Endpoint works and built-in stops which activate outside the functional window ○ How to release shoulder
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			manually when it freezes
Memory drills without controls activation	<ul style="list-style-type: none"> • 5-15 minutes guiding user to learn what each foot movement or other control site does. • Have user demonstrate with sound hand (if a unilateral amputee) 	<ul style="list-style-type: none"> • All activities included in RC training 	<ul style="list-style-type: none"> • All activities included in RC training
Controls drills operating the Avatar	<ul style="list-style-type: none"> • User activates controls to operate avatar for basic activities and grips 	<ul style="list-style-type: none"> • All activities included in RC training 	<ul style="list-style-type: none"> • All activities included in RC training • 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
Complex movements with the Avatar	<ul style="list-style-type: none"> • User activates controls to operate avatar for simulated scenarios including hand to mouth, raising arm overhead; uses foot controls with feet elevated 	<ul style="list-style-type: none"> • All activities included in RC training 	<ul style="list-style-type: none"> • All activities included in RC training r • Review using a spoon, drinking from a cup, and the ROM of SC (functional window)

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

Overview General	<ul style="list-style-type: none"> Review controls at the start of each day's session in sitting and standing. 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. OT must be aware of and ready to respond to risk of danger, especially when Arm is near user's head/face 	<ul style="list-style-type: none"> All activities included in RC training 	<ul style="list-style-type: none"> All activities included in RC training 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
Basic Arm Knowledge			
Basic Knowledge	<ul style="list-style-type: none"> User names all Arm components, identify off/on, standby, tactor, all prosthesis movements and all control movements (IMUs, EMGs, bladder) 	<ul style="list-style-type: none"> All activities included in RC training Identify mode select 	<ul style="list-style-type: none"> All activities included in RC training Identify mode select
Reinforce control schemes	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> All activities included in RC training Perform 4 movements of elbow Review manual release of elbow 	<ul style="list-style-type: none"> All activities included in RC training Perform 6 Endpoint movements and 2 VEP elbow movements Hand to mouth sequence Review safe operation near head Review manual release of elbow and shoulder

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

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

	<ul style="list-style-type: none"> • Perform unilateral ADLs from Training Activities checklist • OT attends to body posture and prosthetic positioning; coaches user to avoid compensatory movements whenever possible. 		
Bilateral ADL tasks	<ul style="list-style-type: none"> • OT reinforces use of DEKA Arm as a “functional assist”; perform bilateral ADLs from Training Activities checklist; • OT attends to body posture and prosthetic positioning; coaches user to avoid compensatory movements. 	<ul style="list-style-type: none"> • All activities included in RC training 	<ul style="list-style-type: none"> • All activities included in RC training
Advanced Training	<ul style="list-style-type: none"> • Include performance of short term projects, vocational and recreational tasks, such as games, cooking, eating, sports • Include activities chosen by user; • Allow some time in each session for user to operate Arm without instruction. 	<ul style="list-style-type: none"> • All activities included in RC training 	<ul style="list-style-type: none"> • All activities included in RC training
Community Outings	<ul style="list-style-type: none"> • 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. 	<ul style="list-style-type: none"> • All activities included in RC training 	<ul style="list-style-type: none"> • All activities included in RC training
Home Use Preparedness	<ul style="list-style-type: none"> • Assure that user demonstrates 	<ul style="list-style-type: none"> • All activities included in 	<ul style="list-style-type: none"> • All activities included in RC training

	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"> • 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. • Allow user to troubleshoot independently if needed in these activities for at least 10 minutes prior to OT intervention. 	<ul style="list-style-type: none"> • All activities included in RC training 	<ul style="list-style-type: none"> • All activities included in RC training