

Technical Information

Select Myo Electric Hands

For use with systems in the range of 6-8.4V



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The design and manufacture of RSLSteeper equipment and components are subject to a policy of continuous reappraisal. The company therefore reserves the right to introduce changes and withdraw products without notice.

Select Myo Electric Hands information

Summary

RSLSTEEPER **Select** Myo Electric Hands are electrically operated devices designed to meet the needs of most upper limb amputees. Available in four sizes, they combine optimum control function with cosmetic restoration.

Electronics are housed within a moulded enclosure mounted within a high-grade aluminium alloy chassis. The finger and thumb assemblies are mounted on bronze bushes and attached via a linkage. The finger assembly is driven by an electric DC motor via a set of gears.

RSLSTEEPER **Select** Myo Electric Hands are controlled with **Select** Myo electrodes or switch inputs and the electronics equipped with patented Powerforce™ Supercapacitor technology (sizes 7¹/₄ – 8¹/₄) to provide efficient control and power conservation. The hands provide the following features:

- **Compatible with RSLSTEEPER Friction and Quick Disconnect wrist ranges**
- **Can be ordered with M12 or 1/2 x 20 TPI studs, compatible with third party wrists**
- **Compatible with the RSLSTEEPER and other 6-8.4V power systems**
- **Simple selection for one of nine system programs**
- **Soft and durable PVC inner cosmesis**
- **Integral ON/OFF switch**
- **Thumb-mounted safety release feature**
- **Auto battery voltage (ABV) selection**

IMPORTANT INFORMATION

- RSLSTEEPER **Select** Myo Electric Hands are not waterproof. Unless under the guidance of the prosthetist the user must always operate the hand with the inner PVC cosmesis fitted. Moisture must not enter the hand. If liquid does enter the hand it must not be operated and should be returned for safety checks and/or repair.
- The hand must be switched off when driving vehicles. If a quick disconnect wrist is fitted it is vital that it is not positioned such that rotation of the wrist will cause unintentional detachment of the hand from the prosthesis.

Batteries

The **Select** Myo Electric hand has been developed to employ the latest advances in battery technology. We recommend the use of RSLSTEPPER 7.4V Lithium Polymer Batteries (BLPA72) as this generation of batteries offers a far better power to weight ratio than traditional Lithium Ion packs. However, RSLSTEPPER Lithium Ion batteries (B23321 & B22606) are compatible.

The hand is not compatible with RSLSTEPPER Lithium Ion B22650 or Nickel Cadmium (Ni-Cad) batteries.

IMPORTANT INFORMATION

Electrodes D12839 and D12839A must NOT be used with these hands. The electrodes are not compatible with Lithium Polymer Battery part no. BLPA72 or with batteries with an output greater than 6.6V.

Electrodes

For optimum functionality we recommend that RSLSTEPPER electrode, part no. SEA200 is used with **Select** Myo Electric Hands.

Cables

RSLSTEPPER manufactures and supplies a range of cables for the **Select** Myo Electric system. These include: **Electrode cables** in three lengths, (ECA=300, ECA=600 or ECA=1000) made from a flat ribbon cable terminated in a three hole plug at one end. The cable is suitable for insulation displacement connections provided on the **Select** Electrode SEA200. **It is important to follow the installation instructions provided.**

A **Connector Block cable** is available for use when a Friction wrist or threaded stem interface is supplied with the prosthesis. This is CBBHA72 and is used with the BLPA72 Lithium Polymer battery system. If a quick disconnect wrist is used, the electrode cables and battery cables plug directly into the back of the co-axial plug.

Safety release feature

The hand is fitted with a safety release feature mounted upon the thumb. Should a system failure occur, the safety release is operated by pressing the spring mounted release pin from the flank of the thumb so that it slides downward. This will allow the thumb to hinge open. In high grip situations the release pin will require a firm push to operate.

On-off switch

An integral on/off switch is provided. This is operated by pressing downward through the cosmesis on the dorsal surface above the wrist. Pushing down will switch the hand on. Pressing on the palmar surface will switch the hand off for activities such as driving.

Selection of the system program

- **The system is pre-set at the factory to program 1.**
- **To alter the program it is necessary to adjust a small rotary switch located on the lateral flank of the chassis.**
- **To access the rotary switch the inner PVC cosmesis must be removed, taking care not to damage the cosmesis during removal.**
- **A circular label containing a set of numbers 0-9 is visible on the outer face of one of the chassis members.**
- **Using the adjustment tool (supplied with the hand), engage the slot in the red moulding. Carefully rotate the tool to the desired program on the label.**
- **Once the program has been selected, check the hand operation and replace the inner cosmesis.**

The suggested method is to sparingly apply a water-based surgical jelly to the hand chassis to aid fitment of the inner glove. The use of talc powder is not recommended.

Do not press hard upon the adjustment tool as this will result in damage to the electronics.

Summary of system programs

The hand can be easily configured for switch, on/off or proportional control with one or two inputs. Nine programs have been provided to optimise control for the individual user.

Notes:

Site: the position on an individual muscle belly giving the most reliable signal.

Threshold: means a signal level that, when reached by sufficient muscle contraction, causes an action. The Electrode Gain Control (EGC) is used to alter the amplification level that needs to be reached to cross the threshold and switch the hand on.

Proportional: means that the speed of the hand can be changed by varying the strength of the muscle contraction. Changing the EGCs alters the balance of the two muscle signals.

Co-contraction: means that both muscles are contracted together. Changing the balance of the EGC will reduce this effect.

0. One site: Muscle contraction opens the hand, relaxing the muscle allows it to close. A sustained signal opens the hand fully. The EGC can be set high to make this easy for the user. This is a threshold program.

1. Two sites: Tightening an individual muscle makes a signal that opens the hand at a speed in proportion to the strength of contraction. Another muscle, operated independently, closes the hand at a speed in proportion to its contraction. Both muscles operating together will always cause the hand to open (co-contraction). If there are no signals the hand will stop. This is the factory set program.

2. Two sites: The first muscle to contract (open or close site) takes precedence. After a brief period the individual muscles can be used, depending on their balance, to open or close the hand at a speed proportional to contraction. If there are no signals the hand will stop.

3. Two sites: The EGCs are used to set threshold levels on both electrodes, individual muscles contract until the threshold is reached and hand switches on to open or close. Co-contraction always opens the hand.

4. Two sites: EGCs on the two electrodes are used to set threshold switching levels. The first muscle signal to reach its threshold takes precedence, and opens or closes the hand. As the individual/thresholds are reached the hand switches on to open or close. In the absence of signals that are high enough the hand remains stationary.

5. One site: A short fast muscle pulse opens the hand fully. A second smooth contraction closes the hand proportionally to contraction. At any time the hand can be fully opened by relaxing and then giving a fast contraction. The hand can be stopped by relaxing the muscle.

6. One site: A large signal opens the hand; if the muscle tension is relaxed the hand stops. A small signal closes the hand at constant speed. Both signals must reach the threshold preset on the electrode (EGC).

7. One site: A quick signal opens the hand fully. A slow signal closes the hand at constant speed. Both signals must reach the threshold preset on the electrode.

8. One site: The hand control measures the rise and fall in signal and drives the hand open and closed accordingly. The speed is selected by the size of the difference in signal level from one of four speeds available.

9. Reset battery voltage to 6.6 volts

Typical applications of the programs 0-9

The program options can be used to address many different clinical applications. Whilst the majority of users will be able to operate a proportional two muscle (site) system others may need to experiment to find the best solution for them; it is for these users that we have included a number of one and two site options.

When an inexperienced user first encounters **Select** Myo Electric systems they may find operation difficult. This may be made worse by their skin condition or an inability to contract particular muscles. A Myo site tester is often used to display the signals that are generated and build the user's skill in control. However in many situations it is unnecessary to use an expensive tester when what the user actually needs is confidence that they can open and close the hand at will.

Program 0 is used for this early experience.

To test for useful muscle sites on the residual limb, ask the user to contract different muscles. Palpate these muscles and mark the places where strong muscle contraction is apparent. Only use sites where the electrodes will remain in contact with the skin during movement of the prosthesis. Initially it may be necessary to moisten the skin.

Switch the hand off and remove the inner cover. Set the mode control to 0. Assemble the system on a table in front of the user with a charged battery BLPA72 in its holder and an ECA=1000 cable fitted to a single SEA200 electrode. Switch the hand on and demonstrate muscle contraction and its effect on the hand. Search the marked areas for a suitable control site. Mark the optimum site and, using a tennis sweat band or surgical tape to hold the electrode in position, encourage the user to practice opening until they are proficient. Initially, it may be necessary to set the gain control high, so that the user can sustain the signal and hold the hand open as long as is desired. Have at least two half hour sessions using this technique. If it is possible to identify two antagonist sites alternate between them.

Once confidence has been established, move the switch to location 1 for two muscle control and rebuild the system to use two electrodes with their associated cables. Programs 1 and 2 are rather similar. With 1, if both muscles are contracted at once the hand will always open. The hand can then be opened or closed proportionally by contracting each muscle in turn. The speed of the hand will be controlled by the level of contraction.

With program 2, the first muscle to contract takes command and the hand will open and close accordingly. This is a useful option when trying to balance a strong muscle against a weak muscle or in cases where the user drops objects when first activating the hand. Programs 3 and 4 are switch (threshold) programs. By adjusting the gain control on each electrode the strength of the **Select** Myo Electric signal at which the hand will operate can be set.

Once triggered, the hand will run open or closed but when the signal drops below the threshold the hand is switched off and will remain stationary. Program 3 will always open if a co-contraction signal is received first; this means that the thresholds are usually set high. With program 4, the first signal received decides the level of initial movement; it is possible therefore to set the close electrode control high to ensure held objects are always retained.

Position 5 is used when only one control signal can be generated reliably. This is a sequential program. The user tightens the muscle quickly and the hand opens fully. The muscle is relaxed then the next signal closes the hand smoothly and with speed proportionally to signal level. To open the user generates another fast signal. This is a difficult program to master but is useful for people with limited muscle control. Program 7 is similar but is a threshold type of program. A quick signal opens and a smooth signal closes. Both signals will operate the hand at a constant speed but the signals have to reach a threshold, set on the electrode to trigger action. It is suitable for switch control.

Programs 6 and 7 are possibly the most useful for a user with a well controlled single muscle.

With program 6, a large signal opens the hand. If the muscle is relaxed the hand stops and a second smooth contraction closes the hand proportionally.

Program 8 measures the difference in signal level over a set time. If the difference is positive the hand opens, if negative the hand closes. Depending on the size of the difference the hand will select from one of four speeds. To the user this feels like a proportional control in both directions.

Auto Battery Voltage selection

The Select hands are preset in the factory to run on 6.6 volt batteries. They are therefore fully functional with the RSL Steeper Li 2+ and Compact batteries. If these batteries are chosen for the initial system, no change is required.

Most systems will use a 7.4 Volt Select BLPA72 battery as these give a significantly higher capacity. When a Select hand is fitted to this configuration of system the hand detects the higher voltage and resets automatically for optimum performance. When the battery is discharged the hand will run open and stop. The battery must be recharged before it is reused. We recommend that the battery is always recharged overnight.

In rare cases, it may be necessary to change from a 7.4 V system to a 6.6 V system. To do this, before inserting the battery, remove the PVC inner hand cover. Switch to position 9 on the dial switch and insert the battery. This reconfigures the hand to 6.6 Volts. The hand will confirm the reset by automatically opening and closing. It is ready for use once the dial switch has been used to select the system program as desired and the inner cover has been replaced.

Maintenance instructions

The RSLSTEEPER **Select** Myo Electric Hand design has been developed to minimise the requirement for any maintenance. However, to maintain performance it is good practice to lubricate the internal mechanism periodically. This procedure should be performed at least once a year by a suitably qualified or experienced technician.

If in doubt, contact RSLSTEEPER. We will be happy to provide advice and assistance.

- **Carefully remove the cosmetic and inner gloves**
- **The internal gearing mechanism of the hand will be visible**
- **Lightly lubricate/grease the gear teeth with a suitable compound (we recommend Molykote DX)**
- **Remove the plastic cover which protects the bevel gears. Using a pipette apply a few drops of low viscosity lubricating oil inside the side walls of the motor housing below the bevel gear. The oil will disperse when the hand is operated and lubricate the internal anti-backdrive mechanism**
- **Replace the plastic bevel gear cover**
- **Operate the hand several times to check for correct function**
- **If the hand performs satisfactorily then the inner glove should be fitted**

We recommend the sparing use of a water-based surgical jelly to the hand chassis to aid fitment of the inner glove. The use of talc powder is not recommended.

Spare parts

Refer to the RSLSTEEPER Upper Limb Prosthetic Components Catalogue or the company website found at www.rslsteeper.com. A full list of spare parts and illustrations will be available. Alternatively, please contact us to discuss your requirements.

Fitting the Elegance™ cosmetic glove

The RSLSTEEPER **Select** Myo Electric Hands have been designed to be complemented by the Elegance™ range of cosmetic gloves. These are available in PVC or Silicone. We recommend the TrueFinish™ shade option for best appearance. Use of these cosmetic gloves will allow optimal hand performance.

To fit the cosmetic glove:

- **Lightly lubricate the outer surface of the PVC inner glove using surgical jelly**
- **Fix the hand in a vertical jig or mount vertically in the prosthesis**
- **PVC only – warm the glove for about three minutes, using either a domestic hair dryer, a hot air gun or an oven set on minimum (less than 100°C). Take care to avoid localised overheating**

DO NOT USE A NAKED FLAME.

- **With the hand in the closed position pull the glove over the hand, manipulating it carefully to avoid excessive stretching**
- **When the tips of the fingers have entered the palm of the glove, the hand should be partially opened. This will allow the glove to be pushed down over the fingers and thumb**
- **The cosmetic glove should fit closely over all fingers and the thumb. It should cover the hand and when fitted to the prosthesis, extend up the forearm without wrinkles, folds or bridging**
- **PVC only – areas of stretch formed during the fitting process can be removed by careful application of local heating**
- **The glove can now be trimmed to the desired length**