

Mechanical Hand

Technical Information



Basic information

The hand chassis and fingers are fabricated from high grade aluminium alloy. The finger and thumb assemblies are mounted on bronze bushes and attached via a linkage. The thumb is driven by a second link attached to a spring mounted pulley. This pulley is actuated via a pull cable and will positively lock in the fully closed position. The third and fourth fingers are contained within the inner glove.

Delivery instructions

- Fasten the desired handplate / wrist attachment (ordered separately) to the hand using the M3.5 screws provided.
- Lock the handplate into the wrist unit on the prosthesis.

If a complete prosthesis is being manufactured for use with this type of hand, it is important to position any external wrist controls so that they do not foul the operating cable when the hand is positioned in its desired range of wrist rotation.

Setting the operating cord length

With the amputee standing and the prosthesis held vertically downward against the side of the body, the operating termination will usually lie against the prosthesis at a point slightly above the wrist unit.

- First select method of cable attachment, this will be either a loop in the cable locked by a ferrule (UK) or a ball termination crimped onto the cable (USA & Europe).
- With the cable attached to the hand and the position of the prosthesis as previously described the cable is not quite in tension.
- Slide the protective sheath over the pull cord.
- The cable is now crimped into position using the appropriate tool.
- The amputee is then asked to operate the hand a few times to test operation of the hand.

When the hand is not normally to be detached from the prosthesis, the cable may be left long so that it can run under the cosmetic glove and terminate with the operating system high on the forearm. If however the hand is frequently interchanged with functional devices, then a small round hole should be punched into the cosmetic glove at the cable exit from the hand and the cable terminated as previously described.

Fitting the Elegance cosmetic glove

The Steeper mechanical hands have been designed exclusively to complement the class leading Steeper Elegance range of cosmetic gloves. These are available in PVC or Silicone with the option of a 'Standard' or 'True' Finish. Use of these cosmetic gloves will guarantee optimal performance of the mechanical hand.

Poor fitment of the inner and/or cosmetic glove will result in reduced performance. It is essential that the gloves and cable are situated such that they do not introduce any additional friction within the hand unit.

- Lightly lubricate the inner glove.
- Mount the hand vertically in a suitable jig.
- 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. 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. Take care not to damage the operating cable.

If an exit hole is required for the operating cable, it is important that this is punched cleanly. A ragged hole made by poor piercing or cutting will lead to premature failure.

Maintenance instructions

The hand design has been developed to minimise the requirement for any maintenance. However, to maintain performance it may become necessary to lubricate the internal mechanism. This procedure should be performed by a suitably qualified or experienced technician.

If in doubt, do not attempt to disassemble the unit.

- Carefully remove the cosmetic and inner gloves.
- Remove the retaining nut that secures the pulley axle
- Remove the 3 screws that secure the inner chassis plate.
- Remove the inner chassis plate (the plate that bears the Steeper logo).

The spring/pulley assembly will be under tension - to avoid potential injury take care when dismantling the internal mechanism.

- Remove the two 'Star-lock' retaining the link to the pulley.
- Slide the finger/thumb assembly off the bearing spindles.

- Before removing the pulley note the orientation of the wound spring and pulley in the free position.
- Slide the pulley assembly off the axle.
- Lightly lubricate/grease the wound spring.
- Ensure that a thread-lock compound is applied to all threaded fasteners before re-assembling the unit. **Maximum permissible fastener torque is 3.0 N-m (2.2 lbf-ft).**
- If the hand performs satisfactorily then the inner glove should be fitted.

The suggested method is to sparingly apply Vaseline to the inside of the inner glove. Ensure that the pull cord does not detach from the sprung pulley.

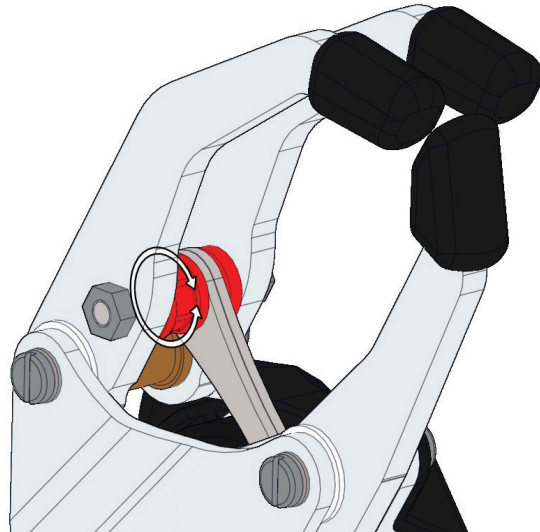
Adjustment of the spring closure force

The spring closure force has been factory-set to a pre-determined level deemed suitable to match the requirements of most users. However, in some circumstances it may be necessary to alter the spring closure force. Note that any change in spring closure force will result in an equal change to the operating force required upon the pull cord e.g. increased closure force will require increased force (pull) on the cord.

To adjust the spring closure force:

- Disassemble the unit as described in the previous section
- Place the pulley assembly on a bench or suitable work surface with the wound spring upward (facing you)
- Note the orientation of the wound spring in relation to the plastic pulley and carefully slide the spring off the square section bronze bush.
- Dependent upon the desired adjustment, rotate the spring by 90° clockwise or anticlockwise in relation to the pulley and refit it onto the square bush/pulley assembly.
- The unit may now be re-assembled. Ensure that a threadlock compound is applied to all threaded fasteners. **Maximum permissible fastener torque is 3.0 N-m (2.2 lbf-ft)**

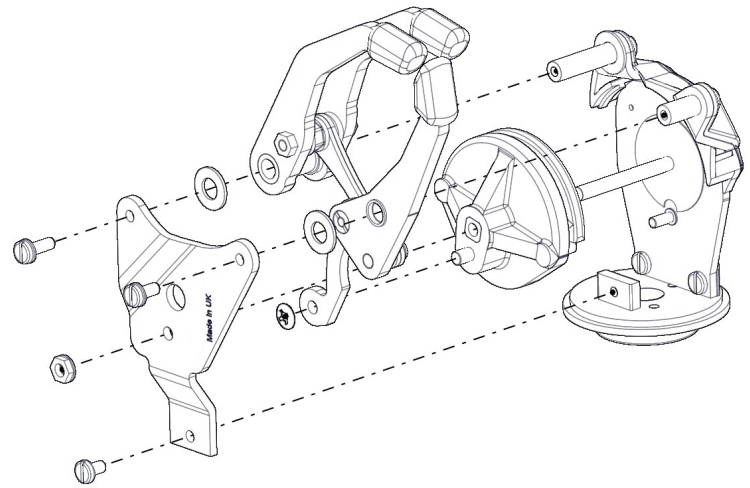
Adjustment of finger spacing



To allow for varying thicknesses of inner and cosmetic gloves it is possible to adjust the spacing between the finger tips.

Loosen the 6mm hex nuts on either side of the fingers and use an 8mm spanner to rotate the finger spacer until the fingertips are at suitable distance to allow space for the inner and cosmetic glove.

Tighten the 6mm hex nuts ensuring the finger spacer does not further rotate while doing so.





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