

Below Knee Prosthesis

Vacuum Assisted Socket System (VASS™)

General Description:

The goals of the VASS™ system are to control volume fluctuation of the residual limb, reduce forces to the limb, and to improve both suspension and proprioception without restricting vascular flow.

With the VASS™ system, a cushion liner is placed directly against the skin and a suspension sleeve is used to create a seal between the prosthesis and the residual limb. A vacuum pump is placed below the socket. The pump evacuates air from the system with each step. There are two different types of pumps available: electric or mechanical. An electric pump is a separate component that works by maintaining a desired socket pressure. Once the pressure level inside the socket falls below a certain threshold, the pump is engaged to draw air out of the socket. A mechanical pump can either be a separate component or integrated into the prosthetic foot. It removes air from the socket by compressing the pump during each step. The advantage of an electric pump is that after sitting for a long period of time, a patient can get up and walk immediately. With a mechanical pump, the patient may need to take a few steps to draw the air out before they feel a tight fit and are ready to walk. An advantage of the mechanical pump is that it is durable and does not need to be charged. An electric pump will need to be charged every night and cannot get wet. Both styles of pump will add weight to the prosthesis, but incorporating the mechanical pump into the foot will be a lighter weight system.



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Below knee prosthesis with an electric pump



Below knee prosthesis with a mechanical pump



Prosthetic foot with mechanical pump incorporated

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Application:

- 1) First, rub a small amount of lubricant, such as A&D Ointment or lotion, onto the residual limb (See Figure 1). It is important to rub it into any creases or invaginations on the residual limb. Discuss with your prosthetist the best lubricant for your needs.
- 2) Roll the liner onto the residual limb. Be sure to work any air bubbles up and out of the liner (See Figures 2, 3, and 4).
- 3) If a non-fabric lined polyurethane liner is used, pull a nylon sock on top of the liner (See Figure 5). The nylon sock must end below the edge of the liner – do not pull above the liner. If the liner being used has fabric on top of the liner this step is not necessary, though the top edge of the liner will need to be folded to expose 2" of the gel.
- 4) Gel spots (See Figure 6) or socks may need to be added to obtain a correct fit in the socket. Your prosthetist will work with you to achieve the correct fit.
- 5) Insert the residual limb into the socket (See Figure 7).
- 6) Fold the nylon sock over the top edge of the socket. Or, if provided, pull the "mini" sleeve over the edge of the prosthesis (See Figure 8).
- 7) Roll the suspension sleeve up onto the thigh (See Figure 9). Make sure the suspension sleeve is 2-3 inches above the edge of the liner, onto the skin of the thigh. If there is no fabric on the liner, the sleeve should seal at the top edge of the liner.
- 8) If using a mechanical pump, stand up and push up and down on the prosthesis to ensure that the pump is pulling the air out of the socket. This may take 10-20 pumps. If using an electric pump, turn on the pump and wait until it stops buzzing.



Figure 1



Figure 2

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Figure 3



Figure 4



Figure 5



Figure 6

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Figure 7



Figure 8



Figure 9

Removal:

- 1) Unroll the suspension sleeve down the thigh and onto the socket.
- 2) Lift residual limb out of the socket.
- 3) Remove the nylon and roll the insert off of the limb.
- 4) When not wearing the prosthesis, roll the sleeve back to its original position to prevent dust build-up or damage to the sleeve

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Care and Maintenance:

Check the liner and suspension sleeve for signs of damage and clean daily. Any holes in the sleeve will need to be reported to your prosthetist as this will affect the suspension of the prosthesis. Use a mild or non-allergenic soap and warm water. Clean the inside of both the liner and sleeve. The fabric does not need to be cleaned daily. Do not use bleach or perfumed soaps. Towel dry and let air dry overnight.

Inspect and clean the vacuum pump once a week. Check that the clamps and tubes are all securely attached to the pump and that there are no visible cracks or holes. To clean the pump, pour 1-2 tablespoons of rubbing alcohol into the bottom of the socket and hand compress the prosthesis to push the alcohol through the system. Your prosthetist will show you the proper technique. It is not uncommon for the alcohol to squirt out during the first couple steps after donning.

Tips and Problem Solving:

The limb should be cleaned daily, using a mild soap. Be sure to rinse all soap residues off the skin before donning the liner. Do not use any deodorants or perfumes on the residual limb.

If the prosthesis feels heavy or you hear air exiting on every step, there may be a leak in the system. See your prosthetist as soon as possible.

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