

When a patient is immobilized for a period of time, fluids can “pool” in the lower legs, creating the potential for serious medical complications. The pressurizing foot cuff simulates the action of walking by sending pressure pulses to an inflatable pad under the arch of the foot. Both impulse length and intervals can be set to prescribed limits based on the patient’s needs.



- ❶ Three-position function with components combined in one module
- ❷ Three valves in one module
- ❸ Integral air passages virtually eliminate leakage
- ❹ Integral muffler
- ❺ Custom port locations
- ❻ Custom mounting hole locations

Virtually Leakproof Custom Manifold Assembly for
Compression Therapy



**HEALTHCARE
 REHABILITATION**
 SIC:3841

THE CUSTOMER’S PRODUCT

- The customer designed a compression therapy device to help prevent serious medical complications in patients who are immobilized for long periods of time.
- The equipment utilized a pressurizing unit to deliver precisely metered air pulses to a bladder in the foot cuff.
- Two outlet ports feed right and left cuffs, which can be set to pressurize alternately for each foot.
- Cuff pressure is limited to a preset maximum for patient safety, and the entire cuff automatically deflates if power is shut off.

THE REQUIREMENTS

- Design a valve assembly that would eliminate leakage, enabling the device to maintain the prescribed amount of cuff pressure.
- Provide precise metering of delivery pressure, length of the impulse and the interval between pulses.
- Minimize the complexity of the valve system.

THE HUMPHREY ENGINEERED SOLUTION

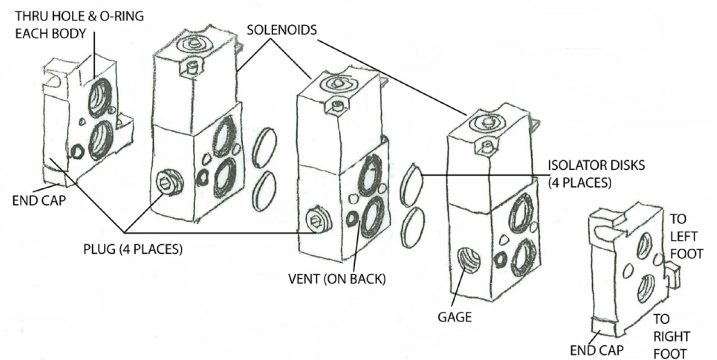
- Created a manifold with three integrated solenoid valves, eliminating multiple connection points to reduce possibility of leakage.
- Manifold made installation easier because size, port connections and mounting holes could be determined by the customer’s design requirements instead of being limited by standard stacking valves.

THE SOLUTION

The Engineered Solutions approach started with a Humphrey engineer working directly with the customer's engineering department to identify all the requirements and opportunities to improve the product. In this case, the customer had developed a pressurizing foot cuff that simulated the action of walking by sending pressure pulses to an inflatable pad under the arch of the foot. A series of 3-way stacking solenoid valve assemblies was employed to achieve precise metering. But the complexity contributed to less than optimal pressure integrity.

Humphrey engineers designed a solid manifold assembly with three integral Humphrey solenoid valves. This eliminated multiple connection points, greatly reducing the possibility of leakage due to improper assembly. Switching to a manifold also made installation easier. Now, size, port connections and mounting holes could be determined by the manufacturer's design requirements instead of being limited by the physical design of the standard stacking valves.

Original Stacking Valve Design



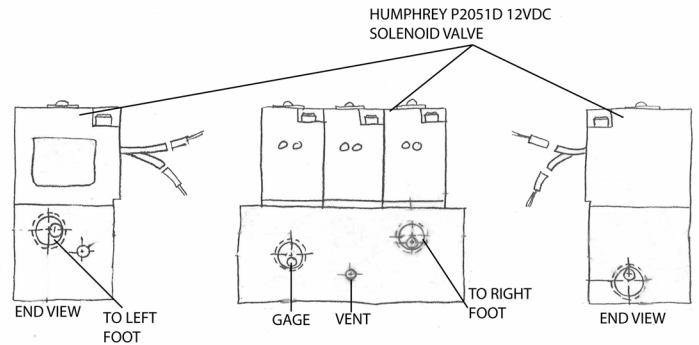
THE PROCESS

Responding to the customer's concerns about leakage the Humphrey Engineered Solutions team evaluated the existing system, which consisted of stacking valve assemblies with end caps, isolator disks and internal seals – all potential leak points. Since the system operates at very low pressure, and the set points are prescribed by a physician, pressure control can be critical.

Humphrey developed a custom manifold with three integral solenoid valves and integral air passages to achieve precise metering of the delivery air pressure, the length of the impulse and the interval between pulses.

The resulting Engineered Solution met the customer's performance expectations, and went beyond – the fully integrated assembly eliminated the complexity of the old stacking valves, and offered total design flexibility for location within the device. Plus, the customer now receives one standardized manifold that is 100% leak tested, instead of having to inventory and assemble different components.

Engineered Solution Manifold



Humphrey

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