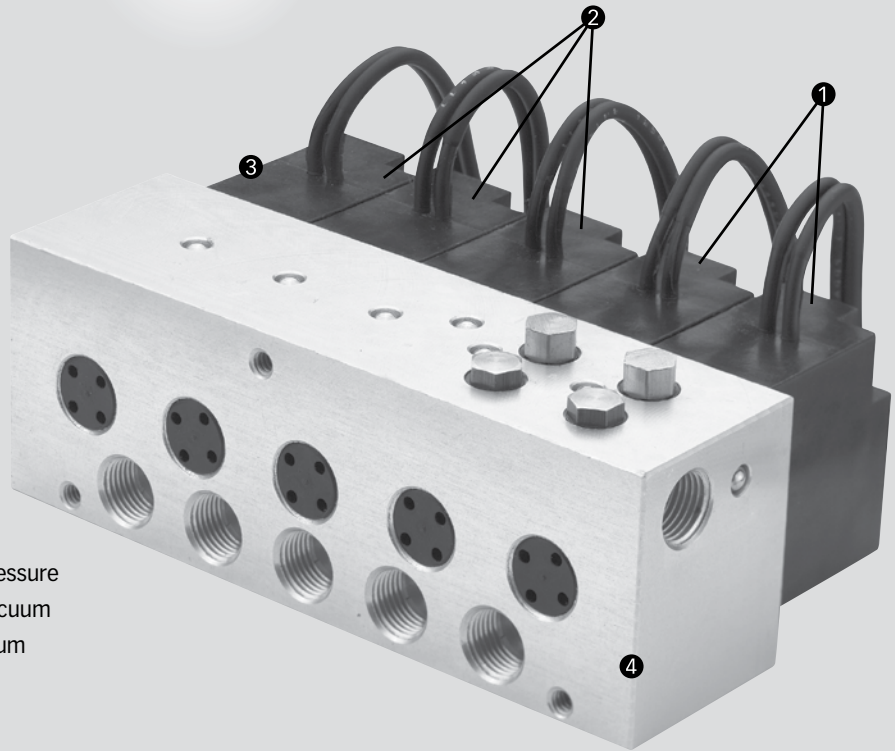
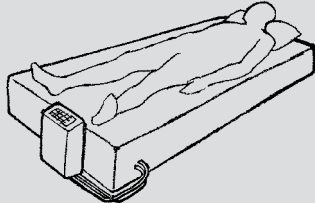




Humphrey's custom valve module continuously changes the mattress pressure at different locations to help prevent bedsores from forming during hospital convalescence when patients are immobile.



- ① Humphrey 310 valves for pressure
- ② Humphrey 310 valves for vacuum
- ③ Dump valve to release vacuum immediately
- ④ Custom manifold

Critical Care Pressure Mattress System *Custom Valve*

Reduced Potential Leaks, Easier Installation



**HEALTHCARE
REHABILITATION**
SIC:3841

THE CUSTOMER'S PRODUCT

- The customer designs and manufactures a range of special mattress systems for pressure management and patient repositioning to help prevent the formation of pressure ulcers.
- One of the systems incorporates a pneumatic manifold assembly into the control system to deflate and inflate the vinyl chambers that make up the bed.
- The deflation/inflation cycles (roll rate) transfer pressure points on a patient's skin in a precisely controlled manner, and the rate can be tailored to the individual patient.

THE REQUIREMENTS

- Valve manifold system had to fit inside the electronic control box of the mattress.
- Direct-acting valves with 0.10 Cv flow rate, two for low pressure and three valves for vacuum.
- Leak rate not to exceed 4cc/min @ 100 PSIG.
- Vacuum and pressure must be isolated on the manifold.
- 4.5 Watt maximum current draw per coil.
- Manifold ports and bolt hole patterns to customer specifications.

THE HUMPHREY ENGINEERED SOLUTION

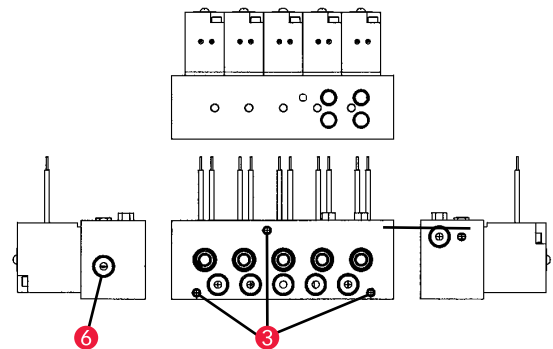
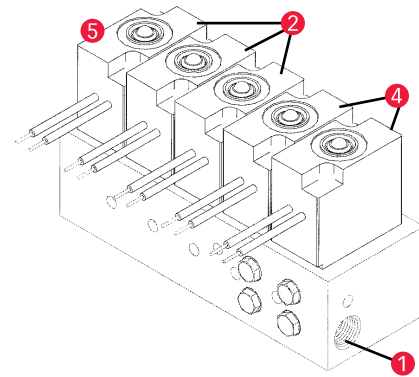
- Utilized Humphrey 310 Series valves and custom manifold.
- Valve assembly passed continuous duty cycle tests.
- Quiet operation and exceptionally low heat generation.
- All valve assemblies 100% tested prior to shipping.

THE SOLUTION

Humphrey had established a relationship with the customer previously, so the Engineered Solutions approach was completely familiar – a Humphrey engineer works directly with the customer's engineering department. This process is designed to identify all the customer's requirements and discover opportunities to improve the product and reduce total costs. In this case, the customer was experiencing component delivery problems, and was also concerned about potential leak rates.

Humphrey started with the 310 Series valves and created a custom manifold to meet the customer's size and porting specifications. After thorough cycle testing, the customer was satisfied that the product would meet the leak rate and life cycle specifications. Allowing Humphrey to supply the complete assembly provided additional benefits – every unit is pre-tested, and Humphrey optimized the module to make installation into the customer's control housing easier and faster, reducing assembly costs.

The customer was using similar manifolds for two different beds, with the only difference being that in one instance, valves four and five were normally open, and in another, they were normally closed. Humphrey Engineering devised a set of plugs, which could be changed to either normally open or normally closed, reducing the overall SKUs for the customer and reducing their total inventory requirements.



- 1 Pressure 1/8" Port
- 2 Vacuum Valves 1, 2, 3
- 3 10-32 Mounting Holes
- 4 Pressure Valves 4, 5
- 5 Exhaust/Dump
- 6 Vacuum 1/8" Port
- 7 Isolator Plug (not shown, between 3 and 4)

THE PROCESS

Responding to the customer's concerns about potential leakage, the Engineered Solutions team worked to identify all the potential causes. In this case leaks could occur between the valves and the manifold body, the isolator plug separating the manifold into pressure and vacuum sides, and around the fittings. Humphrey's design was thoroughly tested and passed with absolutely no leakage. In addition, the Humphrey 310 Series valves met the leak rate requirement of less than 4cc per minute.

The customer also discovered that the Humphrey design was significantly quieter in operation and generated less heat than those previously supplied by another company. To make installation into the customer's control housing easier and faster Humphrey supplied the assemblies with electrical connectors.

Humphrey