

Modern anesthesia equipment consists of complex pneumatic circuits used to supply various gases, including oxygen. Because safe anesthesia is vital, the clinician must always have precise control over the gas metering, especially the flow of oxygen.

To achieve maximum reliability, Humphrey developed the P0156 valve with the proven diaphragm design that uses no sliding seals. This assures reliable, precise action over millions of cycles without any lubrication.

- 1 Precisely designed and assembled valve with integral pilot operator.
- 2 One-piece design simplifies customer's assembly process.
- 3 Proven diaphragm poppet design assures millions of cycles without lubrication (see back page).
- 4 Zero leakage at 50 psig



## Custom Valve Assembly Enhanced Reliability of Anesthesia Gas Delivery

### THE CUSTOMER'S PRODUCT:

- The customer, a major manufacturer of anesthesia equipment, wanted to improve the reliability of its gas delivery valves.
- The existing two-piece valve assembly with sliding seals and push-button actuation was prone to go out of calibration easily.

### THE REQUIREMENTS:

- Design a valve assembly that would give the anesthesiologist reliable control over the gases, especially oxygen.
- No lubrication would be permitted.
- Special test fixtures, documentation and separate dedicated assembly area required to ensure highest level of quality manufacturing.

### THE HUMPHREY ENGINEERED SOLUTION:

- Humphrey developed a custom valve utilizing the proven diaphragm design for reliable action over millions of cycles without lubrication.
- Valve had a special brass body with integral pilot actuator.
- Valve operated with zero leakage at 50 psig.
- One-piece design simplified the customer's equipment assembly procedures.
- Each valve module was assembled and 100% tested at Humphrey in a separate, dedicated facility.
- Humphrey's special procedures ensured the level of quality required to achieve medical equipment certification.

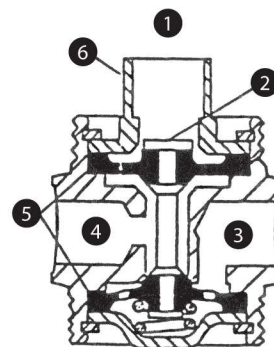
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## THE SOLUTION:

The Engineered Solutions team approach began 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 goal was to improve the reliability of the valve as well as establish the procedures necessary to achieve a high level of quality.

Starting with a proven reliable Humphrey diaphragm valve, the engineered solutions team enhanced the design to create the P0156 valve. This new, one-piece valve had a special brass body incorporating an integral pilot actuator for reliable precise operation in O<sub>2</sub> service without lubrication. The valve performed as required, with zero leakage at 50 psig. An added benefit was the one-piece design, which simplified the manufacturer's equipment assembly procedures.



- 1 Pilot
- 2 Stem
- 3 IN
- 4 Cylinder
- 5 Diaphragm
- 6 Brass Body

## THE PROCESS:

The customer is a world leader in anesthesia technology and wanted to enhance the reliability of its gas delivery valves -- a two-piece valve assembly with sliding seals. The push-button valve and its air pilot operator had to be assembled and adjusted precisely to assure proper operation without any chance of overstroke. In addition, the sliding seals in the valve created a reliability problem because no lubrication was permitted.

Since correct metering of anaesthetic gases is vital to patient safety, the company asked its supplier to redesign the valve. When the supplier declined, the manufacturer contacted Humphrey for help in developing a finished product that would meet the critical requirements and specifications.

Concurrent with the design process, Humphrey worked closely with the manufacturer to establish special test fixtures and documentation, and to setup a separate dedicated assembly area. This would ensure that every valve assembly was manufactured to the level of quality required for medical equipment certification.

**Humphrey**<sup>®</sup>  
*Build On Our Experience*