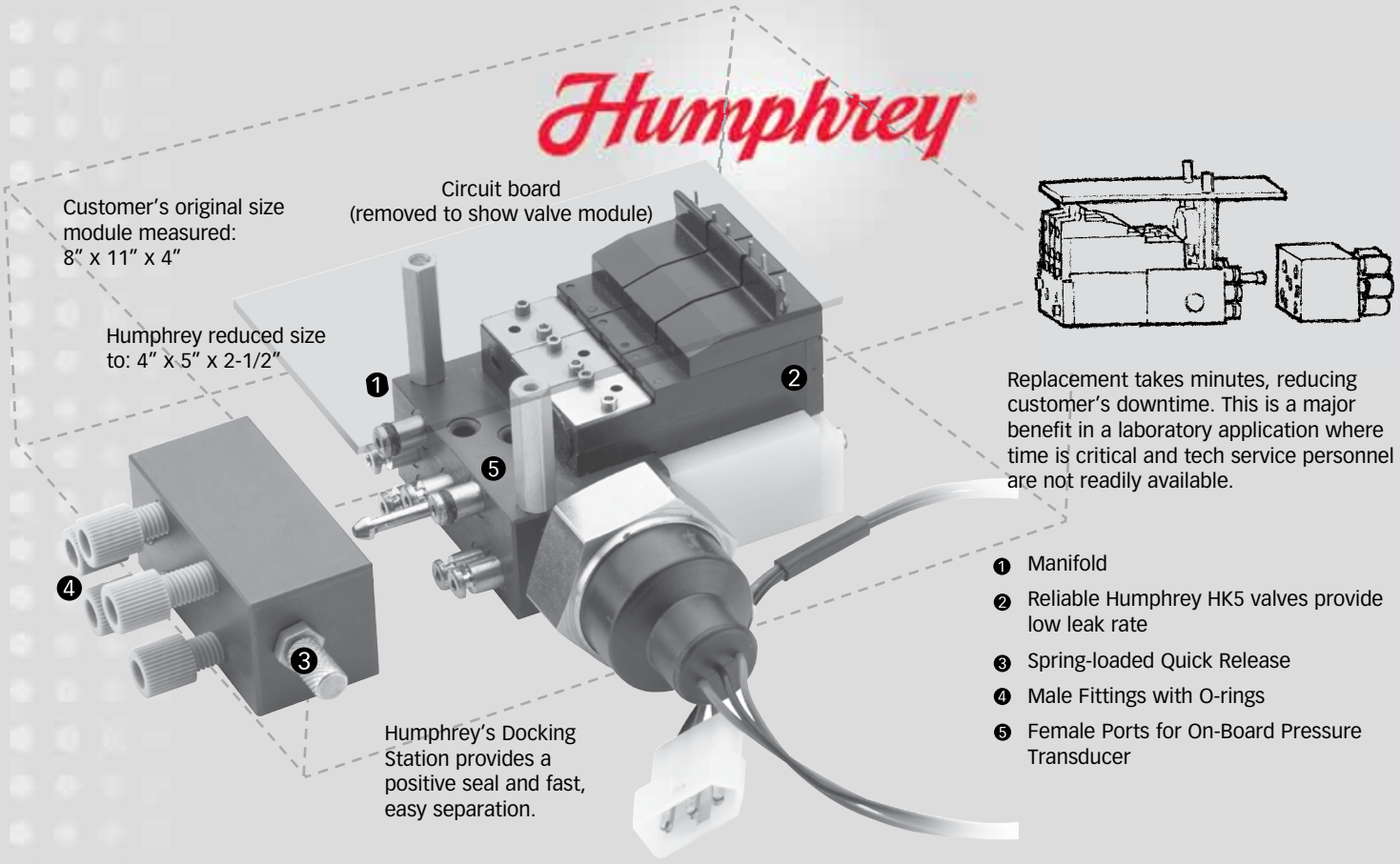


Replacement takes minutes, reducing customer's downtime. This is a major benefit in a laboratory application where time is critical and tech service personnel are not readily available.

1. Manifold
2. Reliable Humphrey HK5 valves provide low leak rate
3. Spring-loaded Quick Release
4. Male Fittings with O-rings
5. Female Ports for On-Board Pressure Transducer

Unique Miniature Custom Valve Module *Reduced Potential Costs and Improved Performance*

TESTING & MEASUREMENT
SIC:3826

THE CUSTOMER'S PRODUCT

- Valve/sensor module that bolted on a nitrogen/protein determinator.
- Customer's design eliminated the individual pneumatic components, but the sensors and control circuit board were still separate elements.

THE REQUIREMENTS

- Reduce the number of individual components to reduce the potential leak points.
- Valve module easily detachable from a plumbed docking station to reduce assembly costs and make field replacement easier and faster in the event the unit required service.
- Reduce the dimensions of the instrument from a desktop unit down to the size of a briefcase.

THE HUMPHREY ENGINEERED SOLUTION

- Humphrey reduced the module size from 8" x 11" x 4" down to 4" x 5" x 2-1/2".
- All components – pneumatics, sensors and circuit board – are in one, pre-tested unit.
- New design reduced manufacturing costs as well as potential warranty costs associated with troubleshooting a complex piece of equipment.

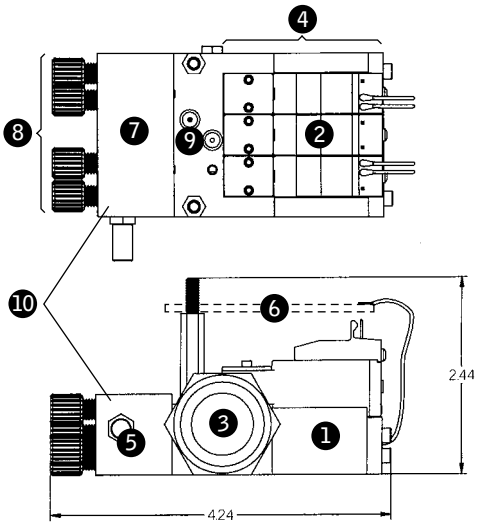
THE SOLUTION

Utilizing the Engineered Solutions approach where a Humphrey engineer works directly with the customer's engineering department, the team identified an opportunity to integrate both pneumatics and electronics into a single module and reduce its size. In addition, Humphrey designed a docking station with a spring-loaded quick disconnect, allowing the unit to be removed easily and a new one connected in minutes -- all without removing fittings or hard plumbing. As a direct result of miniaturizing the module and docking station, the customer saw the opportunity to reduce the footprint of the product from a desktop unit down to one about the size of a briefcase.

THE PROCESS

The customer had been using Humphrey's HK5 valves in their equipment because of the valve's reliability and exceptionally low leak rate. Both of these features were important to this analytical instrument manufacturer, but the low leak rate was critical because the unit utilizes compressed gas cylinders having a finite supply rather than an air compressor.

Initially, the customer developed the prototype and contacted Humphrey with the expectation of simply securing a manufacturing source. But the Engineered Solutions team quickly identified a number of opportunities to reduce the size, enhance the functionality and reduce costs. Some of these solutions involved incorporating as many components as possible into a single sub-assembly. This reduced the number of individual parts in the customer's inventory and reduced installation time and costs.



1. Removable Valve Module-Control Unit
2. Reliable Humphrey HK5 valves provide low leak rate
3. Sensors
4. Manifold
5. Spring-loaded Quick Release
6. Circuit Board
7. Receiver Block
8. Male Fittings with O-Ring
9. Female Ports (on-board pressure transducer)
10. Docking Station attached to unit

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