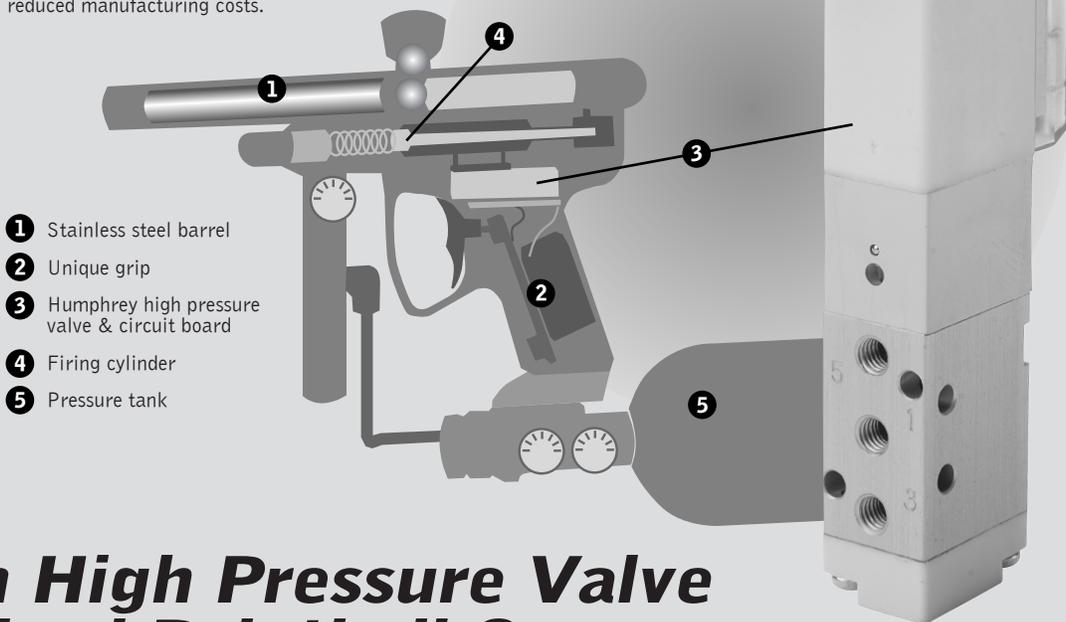


Humphrey



Humphrey's custom valve in the paintball marker (gun) delivered the higher pressure required for a faster firing rate, and significantly reduced manufacturing costs.



- 1 Stainless steel barrel
- 2 Unique grip
- 3 Humphrey high pressure valve & circuit board
- 4 Firing cylinder
- 5 Pressure tank

Custom High Pressure Valve Optimized Paintball Gun Response Time and Reduced Costs

THE CUSTOMER'S PRODUCT:

- A major manufacturer of pneumatically-powered paintball markers (guns) wanted to introduce a new product having a faster firing rate.
- In their market, a faster firing rate equated to a more desirable product, which could be priced accordingly.

SIC: 3484



THE REQUIREMENTS:

- The key to faster firing rate was a pneumatic valve that would operate at pressures in excess of 200 psi.
- The valve had to be backward compatible with the footprint of the existing valve they were using.
- The new valve had to perform better and be easier to maintain than the existing valve.
- The valve had to have an integral electronic connector.

THE HUMPHREY ENGINEERED SOLUTION:

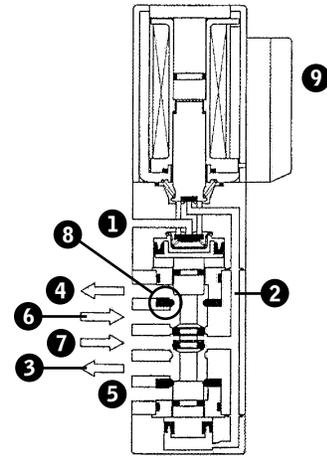
- Working in conjunction with Humphrey's Japanese partner, Koganei, the Engineered solutions team developed a 10 mm-wide miniature valve capable of operating at 225 psig.
- Response time of 6 to 7 msec, compared to 10 to 11 msec for a typical valve.
- The new valve had fewer working parts and weighs less than the customer's existing valve.
- The seals were compatible with compressed air, carbon dioxide and nitrogen.
- An all-aluminum pilot housing and valve body cover.
- Integrated electrical connector to mate with circuit board, eliminating soldering.
- Custom port locations to match the previous valve's footprint.

THE SOLUTION:

In pneumatically operated paintball markers the solenoid valve is integral to the operation. The airflow through the valve actuates the pneumatic cylinder, causing the marker to fire. The faster the cylinder cycles, the more balls per second that are fired.

Humphrey, working closely with its Japanese partner Koganei, modified a standard valve to operate at pressures to 225 psig, with a maximum rating of 300 psig. To achieve this extremely high pressure rating, Humphrey and Koganei engineers developed a patent pending solid seal located in the valve body instead of on the spool.

The new valve also offered the customer other significant benefits, including fewer parts, less weight, lower total manufacturing costs and more reliable operation. The reliability improvement came as a result of Humphrey supplying a 100% tested valve that was ready for insertion into the marker.



- 1 Pilot Exhaust
- 2 Pilot
- 3 Cylinder port B N/O
- 4 Exhaust A
- 5 Exhaust B
- 6 Cylinder Port A N/C
- 7 Supply
- 8 Patent Pending Solid Seal
- 9 Connector

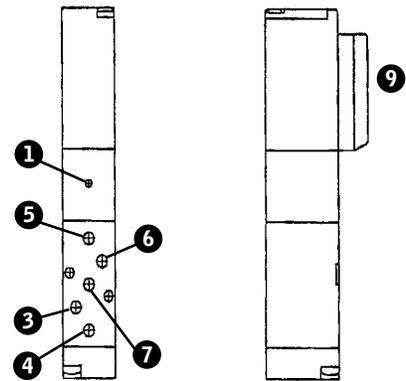
THE PROCESS:

During the development of the new paintball market, the customer's engineers attempted to modify a valve from another manufacturer. To achieve the higher pressure rating they had to disassemble the standard valve, make modifications and then reassemble it. But the modified valve did not provide the consistent performance required.

Working together with Humphrey and Koganei engineers the Engineered Solutions team established all the requirements and parameters, including seal compatibility, footprint, custom porting locations, high response time and an integrated electronic connector.

When the prototype was delivered, the valve appeared to misfire. Working closely with the customer's engineers, Humphrey determined that the length of time the coil is energized needed to be lengthened. This effectively matched the valve's response time to the customer's circuitry. The result was a smooth, uninterrupted firing rate that exceeded the customer's expectations.

Additional modifications to the new valve included a custom body and custom port configuration for backward compatibility, and a custom, integrated electronic connector to eliminate the need for soldering. Plus, Humphrey supplied 100% tested valves, ready for assembly. This significantly lowered the customer's total overall costs.



Humphrey[®]
BUILD ON OUR EXPERIENCE