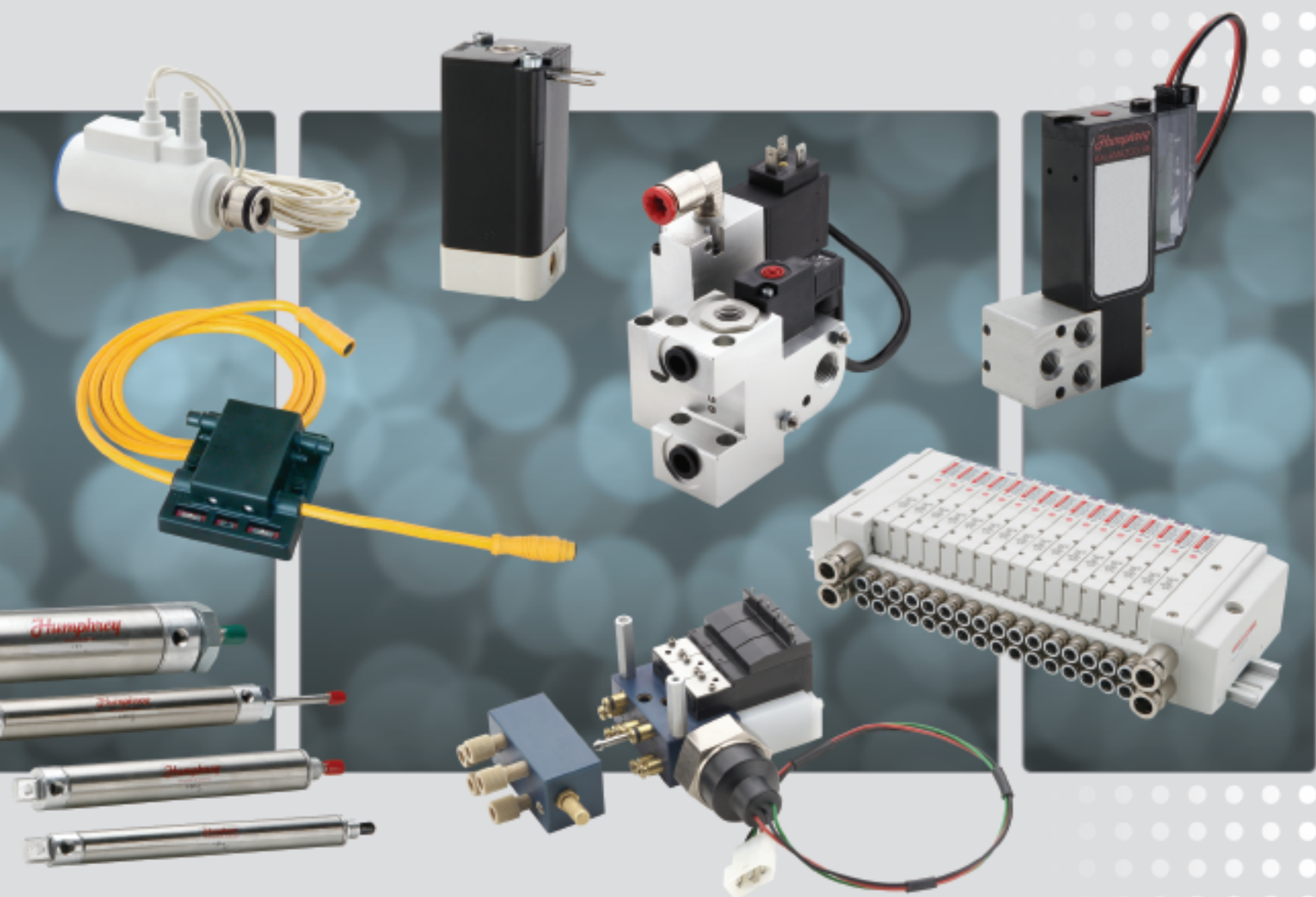






Solenoid Valves – Direct Acting

- Broad range of single and double solenoid valves with poppet and diaphragm poppet designs for reliable, quiet operation
- Direct acting design permits operation at high or low pressure and vacuum
- Micro to maxi sizes with flow rates from 0.01 Cv to 1.0 Cv to meet a wide variety of pneumatic applications from precision instrumentation to heavy-duty actuator control
- Unique micro Spider® Wafer Solenoid valve for high cycle-rate reliability
- Valves available to meet many specific requirements, including low current consumption, high/low temperature operation, low leakage, media compatibility and no lubrication
- In-line, subbase and manifold options
- Various electrical options, including connectors, lead lengths, LEDs and surge suppression



Conveyor System



Paintball Marker
CH-SM1: 225 PSI



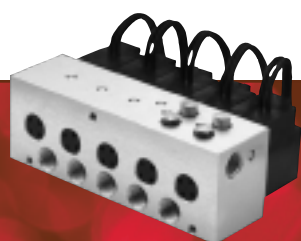
Bus Door Operator
CH-AMT-01

Custom Solutions from these valve series—see Case Histories inside back cover.



Solenoid Valves – Indirect (Pilot) Acting

- Range of single and double solenoid types that provide higher flow with minimum pressure requirements for the internal pilot function
- Available in diaphragm poppet design, which requires no lubrication, or poppet and spool designs
- Flow rates from 0.03 Cv to 2.2 Cv
- In-line and manifold mounting options, some with flow control options
- Various electrical connection options



Air Bed Mattress
CH-SP1



Heart Assist Device
CH-TH1



TAC/TAC²/TAC³

- Total Air Control system of miniature valves, actuators and accessories for pneumatic controls and logic systems to create time delay circuits, "one-shot" reset, and "ballpoint pen" functions
- Control options include pressure regulators, flow controls, speed controls, check valves, shuttle/quick exhaust valves
- Flow rates from 0.1 Cv to 0.4 Cv
- Manual/mechanical operators include ball, cam, cam with one-way actuation, fingertip, foot, knee or hand operators.
- Manual air valve options include pushbutton, push-pull, toggle and rocker
- Air pilot operators thread onto pushbutton valves to create snap action, reset, and snap action plus reset, or simply to amplify weak pilot signals
- Full range of miniature fittings and mounting brackets



Manual / Mechanical Air Valves

- Basic pneumatic valves for ON-OFF control, clamping, pilot signaling and logic signaling
- Diaphragm poppet design requires no lubrication
- Ultra low force palm button models
- Flow rates from 0.2 Cv to 2.4 Cv
- Available with palm actuator, foot actuator, levers, toggles, ball, plunger, roller cam and one-way roller cam operators
- Valves can be mounted in-line, body mounted and most can be base or panel mounted



Ultrasonic Welder
CH-BRA-01



Air Motor Control
CH-SAF-01



Truck Trailer Control
CH-WB1

Custom Solutions from these valve series—see Case Histories inside back cover.



Air Pilot Valves

- Pneumatic actuated valves for relay and/or amplification of smaller pilot signals
- Used in hazardous environments and demanding applications
- Available in diaphragm poppet types, which require no lubrication, or poppet and spool types
- Flow rates from 0.2 Cv to 2.4 Cv
- Valve options include single air pilot, ultra low pilot/interface for weak or erratic signals, momentary air pilot providing unique control methods and double air pilot for momentary signal with maintained position
- Poppet and spool valves can be mounted in-line, on a subbase, or on manifolds
- Accessories include exhaust port flow controls and manifold block-off plates



Cartridge Insert Valves

- Diaphragm poppet cartridge valves are designed specifically for incorporation into OEM products to become a proprietary and unrecognizable component
- The basic 3-way valve can function as a 2-way, 3-way or use two for 4-way valve function
- Available with manual/mechanical, piloted or solenoid actuators
- Flow rates from 0.01 Cv to 2.4 Cv
- These valves often are incorporated into a Humphrey Engineered Solution to provide a custom proprietary module that meets a customer's unique requirements for enhanced performance, reliability and total life cycle cost



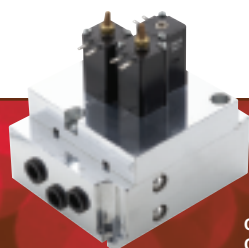
Vacuum Valves

- Unique diaphragm design requires no lubrication, is contamination tolerant for non-sticking performance
- Available with manual/mechanical, piloted or solenoid actuators
- Some direct acting solenoid models offer small size and low current consumption
- Flow rates from 0.01 Cv to 2.6 Cv



Proportional Valves

- The variable flow rate is controlled by varying the electronic signal to the valve
- Models available for true proportional flow control and pulse width modulation flow control, which uses extremely rapid switching to produce current pulses
- Flow rates from 0.13 Cv to 0.31 Cv



Oxygen Concentrator
CH-CH1



Pendant Control
CH-PE1



Respiratory Care
CH-V11

ACTUATORS



Miniature Pen Cylinders

- Finger size pneumatic actuators in single & double acting types
- Bore sizes from 2.5mm to 16mm
- Non-rotating rod and/or adjustable stroke models available
- Various mounting and electrical position sensors available



Mini Bit Cylinders

- Small/Low profile-rectangular shape; Single and Double Acting types
- Easy mounting with thru holes; Bore sizes 4.5 mm to 10 mm
- Clean Systems models & position sensors available



Stainless Steel Cylinders

- Round pneumatic actuators in single and double acting types with stainless steel barrel and rods, aluminum heads and pistons
- Bore sizes from 1/2 inch to 2-1/2 inches
- Lightweight models available
- Various mounting and electrical position sensors available



Stainless Steel Twin Port Cylinders

- Double acting pneumatic actuators with both ports at one end to simplify plumbing connections
- Innovative dual barrel design eliminates dead space
- Bore sizes from 16mm to 40mm
- Various mounting and electrical position sensors available



Cartridge Insert Cylinders— Knock Type

- Single Acting pneumatic actuators designed specifically for insertion into OEM products to become a proprietary and unrecognizable component
- Exceptionally short body, very compact design and ultra lightweight minimize the size and weight
- Bore sizes from 6mm to 16mm
- The design and versatile mounting can simplify any mechanical device



Custom Solutions from these actuator series—see Case Histories inside back cover.



Multi-Mount Cylinders

- Pneumatic actuators with a rectangular low profile shape that is easy to mount
- Available in single and double acting types
- Bore sizes from 6mm to 16mm
- Non-rotating rod and/or electronic positions sensors are available



Block Cylinders

- Pneumatic actuators with a short, compact body that saves space
- Extruded body provides easy mounting
- Available in single and double acting types
- Non-rotating rod and/or electronic positions sensors and/or position locking features are available
- Bore sizes from 6mm to 100mm



Twin Rod Cylinders

- Pneumatic actuator with two units in one creates a non-rotating cylinder having the force of a larger bore actuators in a compact body
- Low profile design is easy to mount; bore sizes from 6mm to 32mm
- Available in single and double acting types
- Electronic position sensors and/or position locking features are available



Guided Block Cylinders

- Ideal for conveyor stops and lifts. Two rod bearing options
- Double Acting type only
- Adjustable stroke, End Keep and Clean Systems models available
- Bore sizes 6 mm to 63 mm
- Position sensors available



Mini Guide Cylinders and Z Sliders

- Compact, High Precision. Double Acting only
- Side Mounting version
- Adjustable stroke, Shock Absorber/Buffer, End Keep and Clean Systems models available
- Bore sizes 4.5 mm to 25 mm
- Z type Twin Rods increases force/thrust



Slide Units

- Twin Rod non-rotating cylinder mounted into a frame, which creates a slide table that provides accurate performance with low profile
- Table, rail, or end mount styles for various applications
- Bore sizes from 10mm to 25mm
- Electronic position sensors and/or position locking features are available
- Shock Absorber option or standard



Swing Cylinders

- Dual function pneumatic actuators that extend/retract and also rotate, either simultaneously or alternately
- Double acting only in 25mm and 40mm bore sizes
- 45°, 90°, 135° and 180° swing angles
- Electronic position sensors available

ACTUATORS



Rodless Cylinders

- Pneumatic actuator with oval piston creates a low profile, compact design that saves space
- Three Designs; Available only as double acting type
- Bore sizes from 16mm to 50mm
- Electronic position sensors available
- Shock Absorber option or standard



Rotary Actuators

- Pneumatic rotary actuators convert the energy of compressed air into rotary motion and force
- Available in double acting piston and vane types
- Torque ratings from 0.078 N*M to 5.197 N*M
- Swing angles from 90° to 360°
- Electronic position sensors available
- RAT & RAG offer higher precision/rigidity bearing and shock absorber option



Grippers

- Pneumatic actuators with either straight or angled jaws for pick & place applications
- Light weight is ideal for end-of-arm placement
- Bore sizes from 10mm to 25mm
- Single and double acting types
- Versatile mounting
- Electronic position sensors available
- NHC offers close chucking/handling
- CHDU offers larger size/load capacity

ACCESSORIES



Cylinder Joints

- Flexible unit attaches to cylinder rod to compensate for misalignment between actuator and workpiece
- Available in various thread sizes



Flow Controls

- Controls adjust the flow of compressed air to control the speed of air cylinders and actuators and/or their pneumatic timing
- Available in sizes from M3 to RC 3/4



Quick Exhausts

- Used to accelerate the venting of air from air cylinder and/or chambers
- Unique shuttle design
- Low pressure differential to shift
- Available in sizes from 10-32 to 3/4 inch



Regulators

- Single diaphragm
- Precise control
- Push-Locking knob
- No lubrication
- Select air or vacuum models



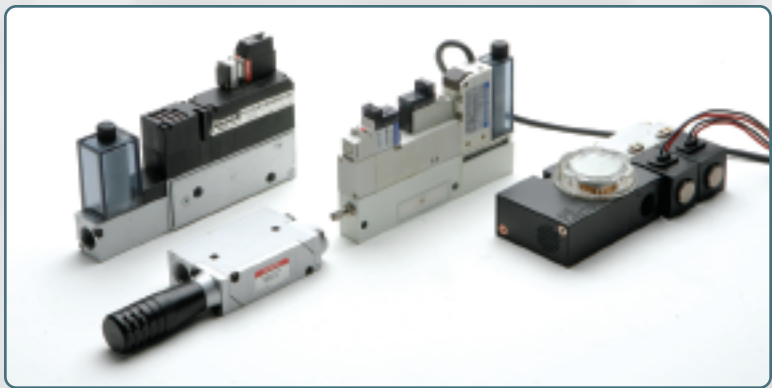
Mufflers

- Reduces the sound (noise) of exhausting the vented air
- Available in sizes and types from M3 to RC1



Shock Absorbers

- Absorbs shock and noise produced as pneumatic actuators or other mechanical devices function
- Available for shock absorption from 0.1 J to 8.0 J



Vacuum Generators

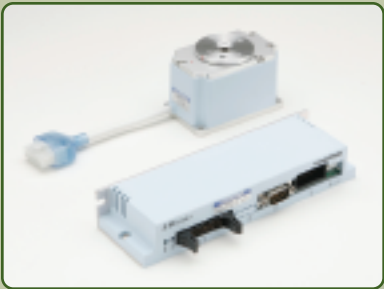
- Compressed air flowing through the device generates a vacuum
- Designed for high speed handling of the workpiece without damage
- Vacuum flow from 3 L/min to 58 L/min
- Vacuum regulator controls vacuum pressure in vacuum line/panel or bracket mounting

ELECTRONIC ACTUATORS & ACCESSORIES



Sensors/Actuators

- Electronic sensors that determine actuator positions are available for most actuators
- Available in reed switch and solid state sensing technologies



Rotary Actuator

- Compact electric table type actuator with high resolution/precision
- Table and encoder provide shockless stop and start without acceleration or deceleration



Electric Grippers

- Electric grippers with a linear guide provide precision and rigidity, while the encoder provides soft sensing of grip position
- Soft touch with free speed control
- Free stroke settings

IONIZERS & ACCESSORIES



Ionizers and Accessories

- Blow and fan types provide pinpoint or a blanket removal of static electricity

Proven Reliability In Custom Solutions

When standard valves can't get your product where you want it to be, the Humphrey Engineered Solutions team can help. As a pioneer in the pneumatic industry, we can bring over half a century of in-depth knowledge, experience across multiple industries and countless innovations to your project.

Each project starts with our engineers working directly with your engineers to determine your needs. Then we refine the concept and incorporate the right Humphrey valve or valve components to achieve your design objectives. Utilizing proven standard Humphrey valve technology contributes to the highest possible performance—and product reliability.

THE ENGINEERED SOLUTIONS PROCESS

Challenge

We begin working closely on a peer-to-peer basis with your engineers early in the design process to understand your needs.

Concept

Often we present multiple concepts and will recommend a design that provides maximum benefits to you.

Solution

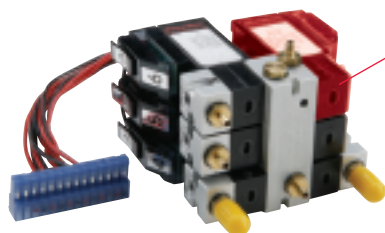
We finalize the design using proven reliable Humphrey valve technology and assist you in moving quickly from prototype, through pilot production, to production.

Results

We implement your solution, measuring results through our proprietary *Value Model Tool*, and continue to explore ways to help you further reduce your costs.

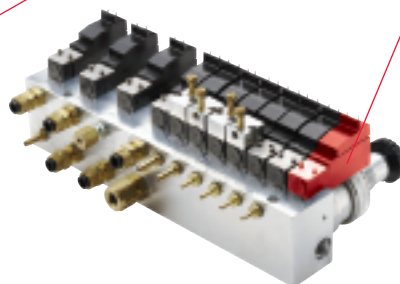


Example:
Humphrey HK5 Solenoid Valve was the key to numerous Engineered Solutions successes.



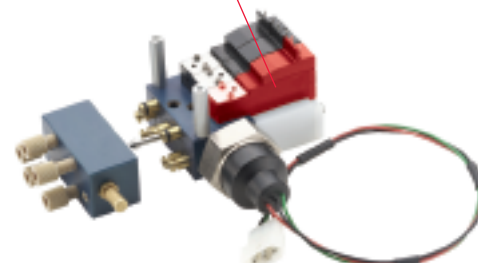
Case History CH-BK1: Ultra-Low Leakage Custom Manifold Assembly

Humphrey engineers utilized the proven HK5 valve to achieve virtually zero leakage to meet the customer's critical specifications. Then they designed a custom valve assembly to fit inside an extremely small envelope. The special manifold design interconnects certain valves.



Case History CH-LE1: Custom Manifold Assembly Improves Performance

To improve the performance and reduce costs in a portable test unit, Humphrey engineers integrated separate components into a single package. Utilizing the proven HK5 valve that functions with a wide range of gases enabled Humphrey to reduce the size and complexity of the pneumatic control valve manifold.



Case History CH-LE2: Unique Miniature Dockable Valve Module

Utilizing the proven HK5 valve, to achieve ultra-low leak rates, Humphrey engineers developed the unique docking station design that provides a positive seal and fast, easy separation. This turned a four-hour service call into a ten-minute replacement process. Humphrey reduced the overall size by 75%, enabling the customer to shrink the product from a desktop unit down to the size of briefcase.

Case History: Conveyor System

A major manufacturer of accumulation conveyor systems wanted to replace its existing mechanically actuated pneumatic valve controls system with a photoelectric sensor-actuated valve control. Humphrey designed a valve assembly that incorporated DIP switches to enable a user to also manually change the conveyor logic mode.

Case History CH-SM1: Paintball Marker

A major manufacturer of pneumatically-powered paintball markers wanted to introduce a new product having faster firing rate. Working in conjunction with Japanese partner, Koganei, Humphrey was able to offer a new valve with fewer parts, less weight, lower manufacturing costs, more reliable operation and a standard operation pressure at 225 psig.

Case History CH-AMT-01: Bus Door Operator

A school bus manufacturer needed a compact manifold assembly for the door operator on a new vehicle design. Humphrey utilized their proven 310 & 410 valves and created a special manifold that was simple and easy to install in the restricted space.

Case History CH-SP1: Air Bed Mattress

A manufacturer of special mattress systems for pressure management and patient repositioning to help prevent the formation of pressure ulcers had a concern about leak rates. Humphrey designed a custom valve assembly utilizing its proven 310 valves to create a unit that not only reduced the leak rates, but made installation easier thus reducing assembly costs.

Case History CH-TH1: Heart Assist Device

A manufacturer of a range of Ventricular Assist Devices need a valve manifold system that was reliable. Humphrey designed a complete assembly that greatly improved reliability by utilizing the proven 320 valve. Humphrey also accelerated the development process, delivering functioning products in an exceptionally short period of time.

Case History CH-BRA-01: Ultrasonic Welder

A manufacturer of ultrasonic welding equipment needed a custom flow control to improve product performance. Humphrey developed a compact custom valve assembly to meet the exacting design and performance specifications.

Case History CH-SAF-01: Air Motor Control

A manufacturer of automotive parts cleaning systems wanted a rugged, dual-function control valve. Humphrey engineers designed a valve assembly with a single shaft for both on/off control and pressure regulation.

Case History CH-WB1: Truck Trailer Control

A manufacturer of trailers that can operate on the highway or be coupled together on wheelsets to make up a train wanted to reduce the time and cost of the process. Humphrey redesigned their valve module utilizing the proven Cartridge Insert valves to lower the unit cost, increase air flow to speed up the process and make the module far more robust.

Case History CH-CH1: Oxygen Concentrator

A manufacturer of O₂ concentrators for in-home oxygen therapy wanted a design that would increase flow rate. Starting with Humphrey's proven 320 and Mizer valves, Humphrey engineers designed a low pressure pilot valve that increased the flow rate by 20%.

Case History CH-PE1: Pendant Control

A manufacturer of air balancing equipment wanted to enhance its existing control handle. Using Humphrey's proven pendant control valve, Humphrey engineers designed a modular system that could scale to virtually any control requirement.

Case History CH-VI1: Respiratory Care

A manufacturer of respiratory care and critical care products wanted to introduce a portable rebreather for emergency medical treatment of victims of toxic gas or smoke inhalation. Humphrey designed a valve/manifold assembly using pilot-operated 310 valves that met the critical response time and desired size requirements for portability.

Case History CH-AB1: Heart Assist Valve/Pump

Humphrey developed a custom valve manifold assembly to power and control the operation of a critical medical device. Humphrey engineers also developed a special hand pump with a unique tube-inside-a-tube design. The hand pump can be used when the patient needs to be untethered from the powered unit.

Case History CH-FA1: Firearm Simulator

A manufacturer of simulated firearms training systems wanted to provide the same recoil ("kick") that the trainee would experience firing a real weapon. Humphrey designed a custom valve manifold/cylinder assembly that fits in the stock of laser-emitting firearms. Humphrey engineers utilized a proven 310 valve on a custom manifold and modified a Humphrey air cylinder to reduce friction.

For the complete case histories of these and all our other Engineered Solutions in healthcare, factory automation & process control, material handling/conveyors, transportation, and testing/measurement visit our website:

www.humphrey-products.com/engineered_solutions/index.htm

Humphrey[®]

A HISTORY OF INNOVATION

Founded more than 100 years ago, the Humphrey's innovations date back to the commercialization of gaslight products in 1901. Today, Humphrey is recognized as a leading producer of pneumatic products, serving organizations worldwide. Our expertise in a wide range of industries is based on technologies proven in our standard products, enabling us to create truly customized solutions for unique commercial and industrial applications.

Headquartered in Kalamazoo, Michigan, we have an experienced staff of more than 500 associates to serve you in locations throughout the United States and Canada. We also have a long-standing alliance with Japan-based Koganei Corporation, one of the largest pneumatic companies in the world.

We work to solve not only your fluid control challenges, but to also improve the ease and efficiency of your manufacturing process. This comprehensive approach offers you tremendous outsourcing advantages, significantly reducing your product development cycle and creating vital cost efficiencies. You gain access to our advanced manufacturing technologies, reduced time-to-market, and the ability to reassign critical internal resources to focus on your core competencies.

OUR COMMITMENT TO QUALITY



Our Quality Management System (QMS) exceeds the requirements of ISO 9001:2000. Our Gage Calibration System is the best the 3rd Party Auditor had seen in auditing ISO QMS's. Our Internal Audit Process is very comprehensive, with a large cross-functional Auditing Pool of Internal auditors. Our Electronic Document Control and Corrective Action Database has automatic escalation that updates the QMS. Our software system from IBS America is comparable to systems in much larger companies with much greater resources. Most important, our competent team-focused workforce has a great attitude, with highly motivated, caring and proud employees.



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All technical and safety requirements of your specific application, including the consequences of any possible failure, should be analyzed prior to selecting and applying the product.

These products are not suitable for all applications, such as applications related to or connected with aviation, aircraft or aerospace.

Humphrey

BUILD ON OUR EXPERIENCE