

Humphrey's custom valve manifold assembly enhanced the safety and reliability of fuel delivery by tanker trucks serving retail gas stations and bulk fuel transfer tanks. A single 3-position pilot valve performs multiple functions that previously required two separate valves.

- ① Modified Humphrey 3-position detented TAC pilot valve
- ② Single push-pull valve eliminated multiple valves
- ③ Pneumatic indicator "wink" signals minimum system charging pressure
- ④ Individual toggle valves select flow from different compartments.
- ⑤ Integrated assembly simplified plumbing and installation

## Custom Valve Manifold Provides Greater Reliability *for Fuel Delivery Trucks*



**TRANSPORTATION**  
SIC: 3715

### THE CUSTOMER'S PRODUCT

- The customer manufactures a wide range of bulk liquid and fuel transport tankers, and fuel delivery vehicles.
- The fuel delivery systems used on their fuel transport tankers was considered too large and complex, with many potential reliability issues.
- The customer wanted to simplify the circuit containing two control valves plumbed to separate unloading valves controlling the gravity delivery from the individual compartments in the tanker to the underground storage tanks.

### THE REQUIREMENTS

- Design a simpler valve assembly incorporating pilot valves for charging and shutting down the unloading circuits, and a pneumatic indicator "wink" to signal when minimum charging pressure is present.
- Pilot valves must have a push function, while the individual unloading valves were to be activated by toggle switches.
- Assembly must be capable of accepting from four to eight unloading valves.

### THE HUMPHREY ENGINEERED SOLUTION

- Modified Humphrey TAC valve to create single 3-position valve with lift up and hold, release to detent position and push to shut off. This valve, which replaced two separate valves, functions as both a master and a sourcing valve, supplying pilot pressure to the individual unloading valves.
- The single valve functions to charge the pneumatic circuit feeding the separate unloading valves, open the compartment vents and shut off the system.
- Both the pilot valve and the individual unloading valves are stacked, eliminating the potential leakage associated with plumbing separate components. The valve assembly is significantly smaller than the customer's original system.

## THE SOLUTION

Working with the customer's engineering department, the Humphrey Engineered Solutions team developed a single valve that could perform the functions of the existing dual valves. They modified the proven, standard Humphrey TAC valve by extending the stem, adding a garter spring and created an external collar to provide for a detent function. The valve was contained inside a manifold that could accept a stack of four to eight individual toggle unloading valves.

In operation, the driver lifts and holds the single push-pull knob to initially charge the system. This opens all the atmosphere vents in the various cargo compartments, breaking any potential vacuum. When the system pressure reaches 15 psig, a pneumatic indicator "wink" signals minimum system pressure. From experience the driver knows to release the knob when the desired system pressure is shown on a gauge. At that point, the driver releases the knob, which then drops the valve into the detent position.

Having already connected the discharge hoses to the underground storage tanks, the driver flips the appropriate toggle switches on the unloading valves to begin delivery. After delivery the driver pushes the knob down to shut off the fuel flow.

## THE PROCESS

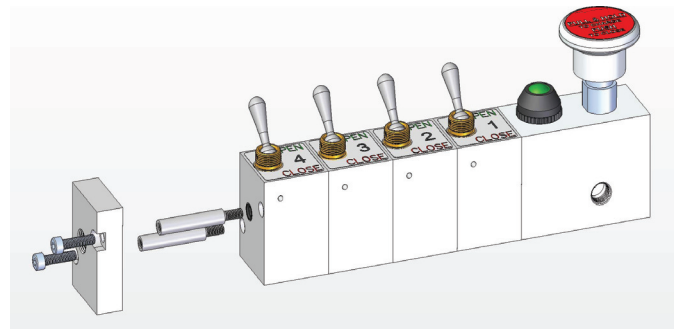
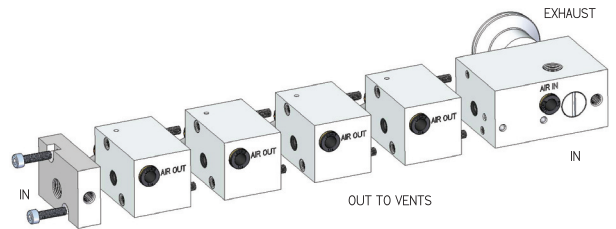
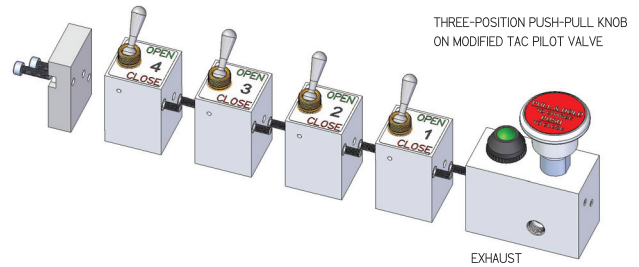
Responding to the customer's concerns about leakage, reliability and enhanced safety, the Humphrey Engineered Solutions team evaluated the existing system. Working peer-to-peer with the customer's engineering department, Humphrey identified a number of opportunities to improve the system.

Instead of incorporating two separate valves -- one to charge the system and the other to shut it off, Humphrey engineers modified their TAC valve by extending the stem, providing an external collar and enclosing a garter spring.

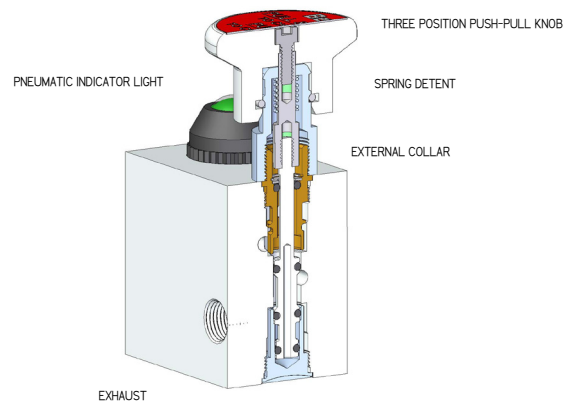
Now, one valve would perform three functions. Lifting the knob up against the spring permitted charging the system, which opened the atmospheric vents to each compartment. Releasing the knob and then switching the appropriate toggle switches activated the gravity discharge of fuels from the selected compartments. Pushing the knob down shut off the airflow, closing both the unloading valve and the vents.

Humphrey engineers designed a custom manifold assembly consisting of the pilot valve assembly and from four to eight individual toggle-operated unloading valves, which could be stacked together. This eliminated any plumbing, which could become a source of leakage.

CUSTOM UNLOADING TOGGLE VALVES



THREE POSITION TAC VALVE SHOWN IN DETENT MODE



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