



Mechanical and Fluid Systems

Magnetic Pressure Valves

A magnetically retained pressure relief valve

Inventors at NASA's Kennedy Space Center have developed a magnetically retained fast-response pressure relief valve that is designed to fully open at precise cracking pressures and that operates in a fully open/fully closed manner. The use of a magnetically controlled relief valve as opposed to a spring-based relief valve enables quick-open on/off relief operation when overpressure is reached. This is due to the rapid decay of the magnetic field as the fluid medium pushes the valve poppet to an open position. Spring-based relief valves require increasing pressure and force to continually compress the spring and open the relief valve. This requirement greatly complicates the design of a system relief mechanism. A magnetic relief valve reduces these design complexities by eliminating the spring.

The relief valve mechanism is fully sealed and is isolated from the flow path of the fluid/gas media. This may lead to lower maintenance than is currently required for pressure relief valves. Existing relief valve springs are exposed to corrosive environmental factors and system fluids. This environmental exposure leads to corrosion that can cause changes in the cracking pressure.

Status

- ➔ Free Technology

BENEFITS

- ➔ Fully on/fully off valve operation at design pressure
- ➔ Improved crack pressure accuracy at low operating pressure
- ➔ Reduced maintenance in corrosive environments
- ➔ Handles larger flow rates and larger range of pressure values

technology solution



THE TECHNOLOGY

The innovation was developed for low-pressure pneumatic testing of a vacuum chamber in the Kennedy Cryogenics Test Laboratory. Standard relief valves that utilize mechanical springs did not function adequately at the low pressure (16 pounds per square inch [psi]) required by the inventors during testing.

The technology is an improvement over current pressure relief valves using spring mechanisms. Typical pressure relief valves are normally held closed by a spring. After a relief valves cracking pressure is reached, the spring is compressed and the valve opens to relieve excess pressure. The NASA valve eliminates the need for a spring by instead incorporating magnets to hold the poppet relief valve in the closed position. The use of magnets in a pressure relief valve exploits the exponential decay of the magnetic field between two magnets as they are separated. This leads to a faster acting valve that does not require an increasing force to open the relief valve after cracking pressure has been surpassed, as is the case in standard pressure relief valves.

This technology has been exclusively licensed to MagPress Valves
{<http://magpressvalves.com>}



Inside the Relief Valve

APPLICATIONS

The technology has several potential applications:

- Pressure Vessels
- Vacuum Chambers
- Low Pressure Systems
- Basic Industrial Systems
- Gas and Liquid Systems

PUBLICATIONS

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