

## Bidirectional Check Valve

**A high-speed, high-flow active bi-directional check valve increases digital pump and motor efficiency and allows electronic control over performance parameters like pressure, flow, and torque.**

The valve manufacturing industry in the US experienced 1.9% average annual decline in revenue from 2006 to 2011. IBISWorld experts estimate that the industry will experience 3.0% average annual growth over the next five years reaching \$31 billion in 2016. Growth is expected to be driven by increasing demand from chemical manufacturing, water and sewage systems, petroleum refining, electric power generation and transmission, and construction. Therefore, the industry could greatly benefit from technology that increases pump efficiencies and performance.

Researchers at Purdue University have developed a high-speed, high-flow active bi-directional check valve for use in a digital pump or motor. These are fluid machines that accept or reject fluid much like conventional pumps and motors. However, bi-directional check valves are used to control fluid into and out of the pumping or motoring chambers instead of a valve plate or a passive check ball like in conventional machines. Elimination of the valve plate reduces pump/motor losses and increases efficiency. Also, pump or motor function can be controlled via electronic control of the bi-directional check valves. Any number of parameters could be controlled such as pressure, flow displacement, power, torque, speed, noise (fluid and structure bourn), pressure ripple, flow ripple, torque ripple, acceleration, and so on by simply changing the control algorithm.

### **Advantages:**

- Reduced pump/motor loss
- Behavior can be controlled electronically
- Many parameters can be manipulated for better performance

### **Potential Applications:**

- Bi-directional check valve

### **Technology ID**

65550

### **Category**

GreenTech/Water & Resource  
Management  
Energy & Power Systems/Power  
Generation  
Robotics &  
Automation/Automation &  
Control

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