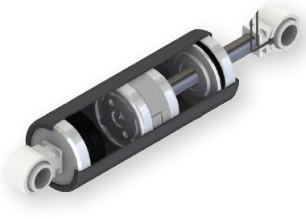
Electric Variable Damper

for Agriculture Applications



Parker

ENGINEERING YOUR SUCCESS.

Parker's Variable Damper For Agriculture Offers Enhanced Design, Functionality and Data Capture

Controlling input costs and improving productivity are key producer requirements today for the agriculture industry.

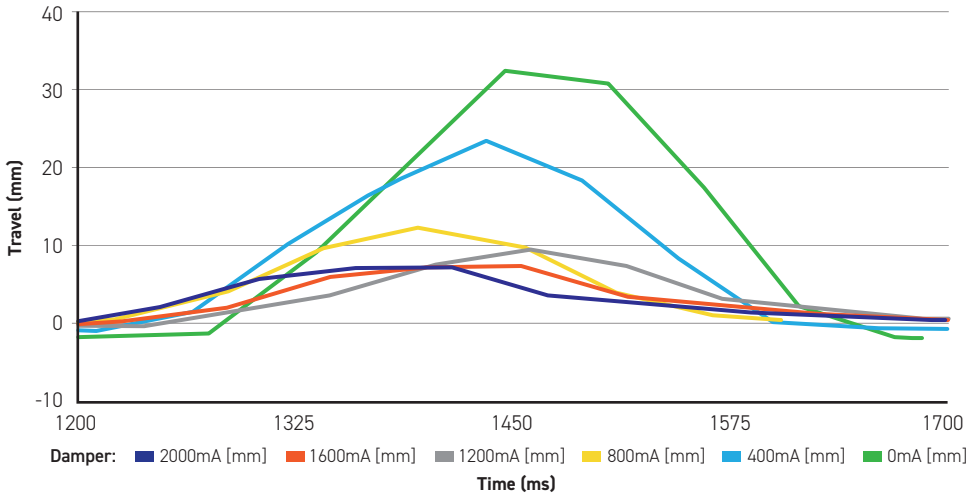
Damper with and without Integrated Spring

Maintaining seed depth continues to evolve. Planters started with springs to provide a downforce, then expanded to pneumatic and hydraulic systems into individual force control at each row. Parker now has an innovative new technology that utilizes an electric damper to control row unit motion in order to keep seed depth constant without the complexity of pneumatic and hydraulic systems.

By using an electric variable damper to control stiffness of each row unit independently. This level of freedom allows the planter or seeder control system to make adjustments in real time on a row-to-row basis. This reaction can be based on tractor speed, ground conditions or both.

When using feedback from the ground by using a direct force measurement, each row can precisely adjust stiffness to maximize ground contact and keep cutting disks at the prescribed depth.

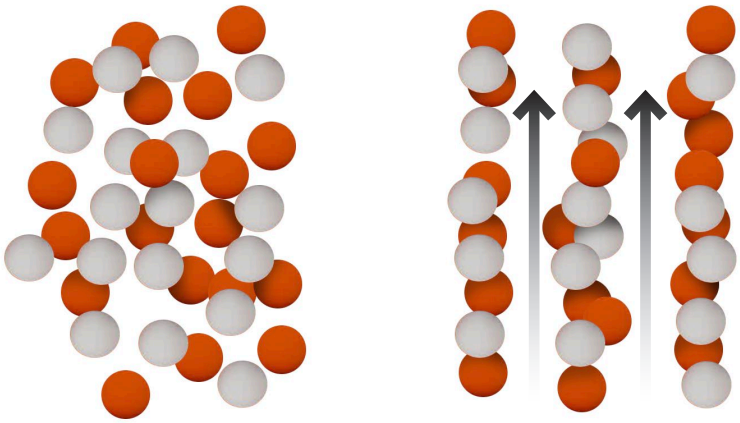
Row Unit Reaction 2kN Impact Force



How it works:

MR fluids consist of magnetic particles in a carrier fluid. When a magnetic field is applied, the fluid is transformed into a semi-solid state. When the magnetic field is removed, the fluid reverts to a free-flowing fluid. The viscosity of the particles is proportional to the magnetic field.

When the fluid is used in a damper, the piston contains a coil and the fluid passes from the rod to the piston side of the damper through an annular orifice.



MR Fluid particles aligning in a magnetic field

Potential benefits to using an Electric Damper for precision force control over other similar systems.

- Reduced maintenance
- Reduced energy consumption
- Enhanced row-by-row control
- Simplified installation
- Environmentally friendly
- Increased efficiency

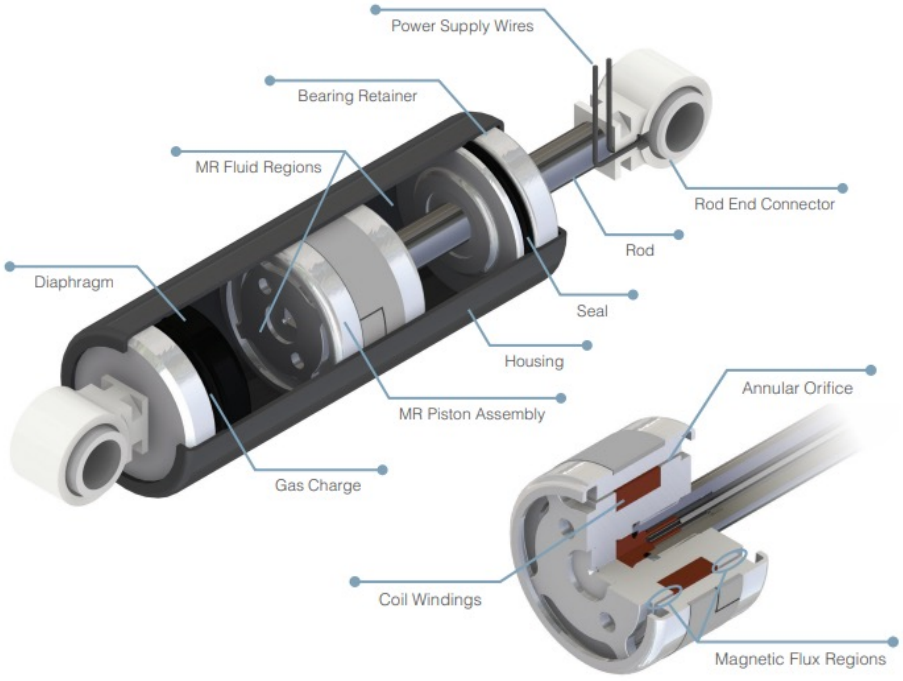


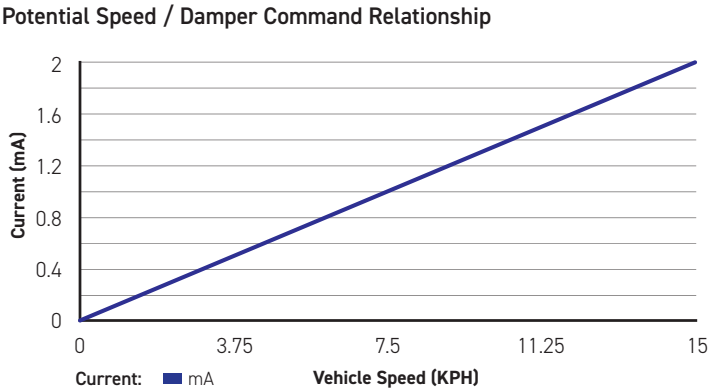
Figure 3: A typical MR piston assembly

Potential Control Strategies

Speed Dependent Damping

TGSS – True Ground Speed Sensor

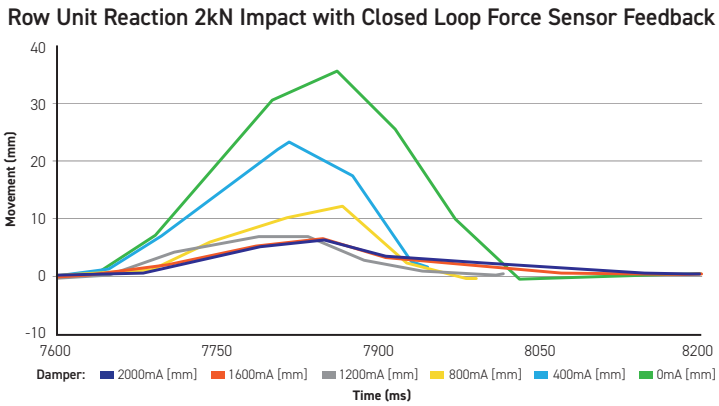
Based on a vehicle speed input, the damper stiffness can be increased or decreased and varied across the planter. This is vital when a machine is not moving in a straightforward direction.



Force Feedback

CDS125 – Force Feedback Sensor

Using a force feedback sensor would allow the system to increase the damper based on an impact force. If a high force is sensed due to compacted soil or debris, the system can increase the damper command proportionally to keep the row unit on the ground.



Parker's Innovative Damper Technology for the Agriculture Industry

On the road, at a construction site or in the field, an electronic damping system for cab suspension has been revolutionizing everyday working life in commercial vehicles, whether it's in agricultural and construction vehicles or in trucks. That same technology can be used within planters for enhanced seeder control. Parker's oil-free electric variable damper enhances planter or seeder control while reducing power consumption per row, maintenance costs and environmental impact. Also, thanks to integrated sensors, it opens up unlimited possibilities for digitalization and connectivity, with which efficiency can be significantly increased.

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