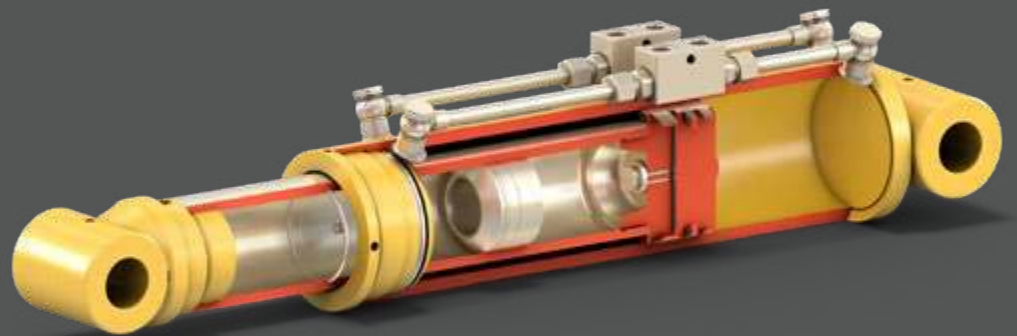




HYDRAULIC CYLINDER

with integrated damping



HYDRAULIC CYLINDER WITH INTEGRATED DAMPING

FUNCTIONAL PRINCIPLE

based on a hydraulic cylinder with integrated gas accumulator and damping mechanism.

The nitrogen gas accumulator is integrated in the piston rod. The damping mechanism controls the flow of hydraulic oil to reduce pressure peaks.

The hydraulic cylinder with integrated damping is patented..

ABSORBING OR DAMPING?

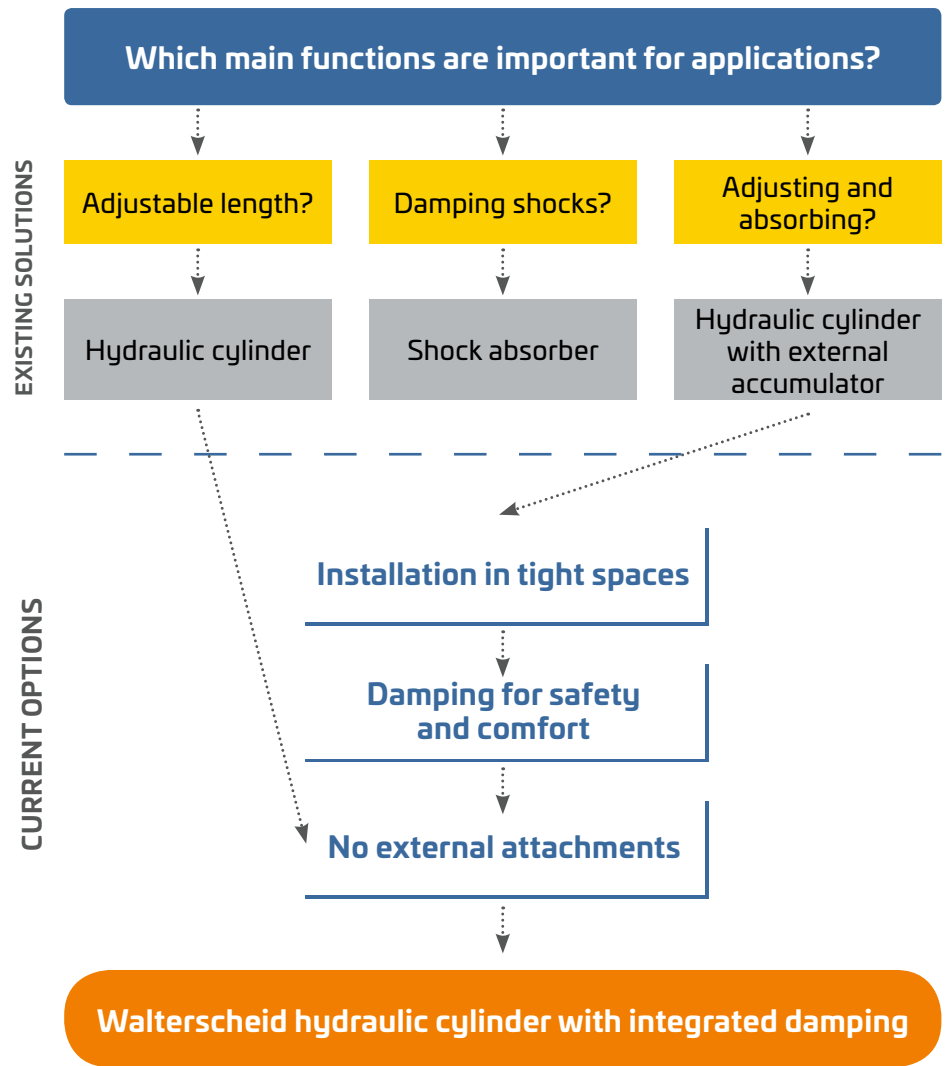
Any mechanical impact on the hydraulic element causes the pressure in the connected system to rise. A gas accumulator is able to absorb the extra pressure. The hydraulic fluid taken in due to the extra load is returned to the system evenly, and there is no risk of a rebound stroke.

Rebound strokes are damped via a system which controls the energy release phase by adjusting the return flow rate.

COMPONENTS

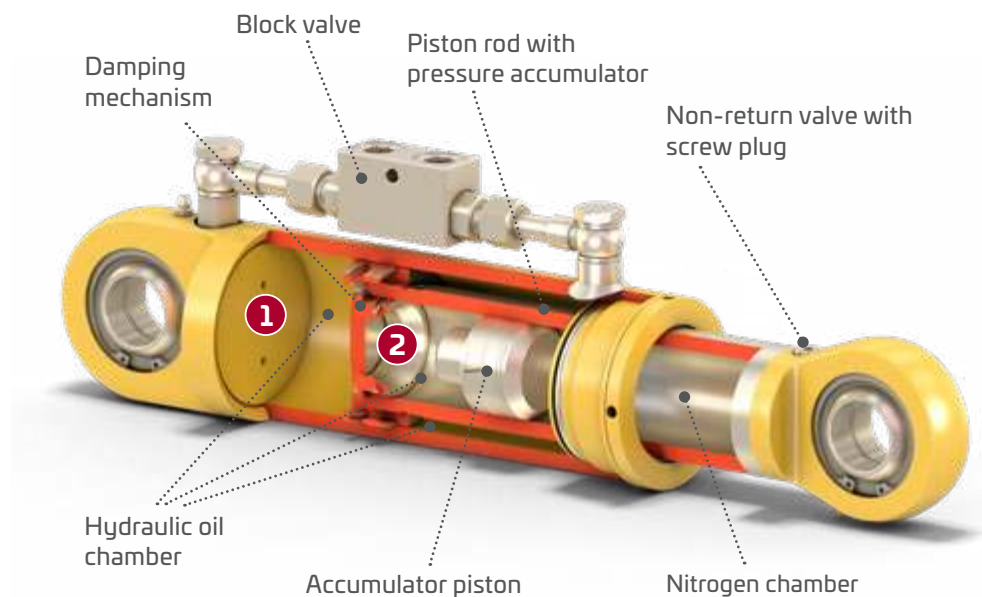
The block valve protects the fluids inside the cylinder. The valve for refilling gas is easily accessible at the end of the piston rod. A screw plug protects the valve against dirt and acts as an additional seal.

The accumulator piston is made of aluminium. It features low-friction seals designed to withstand high temperatures. The damping valve is located inside the cylinder piston.



DESIGN

FIGURE 1



CYLINDER OPERATION

MOTION:

The movement required for positioning the cylinder is the same as with standard processes. It prevents the cylinder from being positioned too close to the end of a stroke, which would prevent any adjustment of the cylinder length and thus any absorption of excessive loads.

ABSORPTION:

Figure 1 – The oil pressure in chamber 1 rises rapidly in case of any overload in the direction of pressure. Once the pressure rises above the set gas pressure, nitrogen in the accumulator is compressed to release extra volume, allowing the pressure peak to be absorbed.

The damping opens, and the oil flows into chamber 2.

DAMPING:

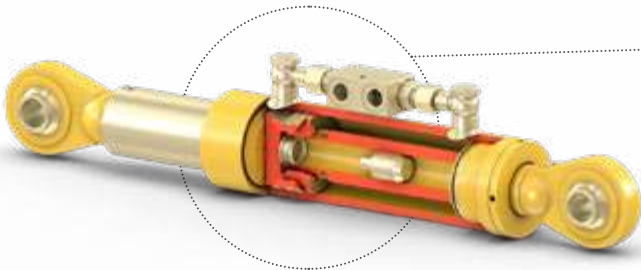
Once the pressure peak has been absorbed, the oil pressure in chamber 1 decreases. The gas, which absorbed the energy, pushes the oil transferred into chamber 2 back into chamber 1.

The damping system is closed in the process, forcing the oil to pass through a calibrated hole to ensure that the return movement can be controlled.



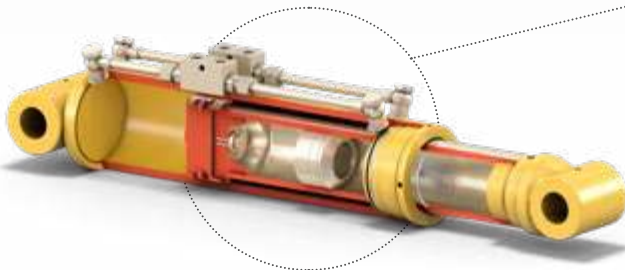
• RETRACTABLE TRANSPORT WHEELS FOR AGRICULTURAL MACHINERY

FRONT LOADER



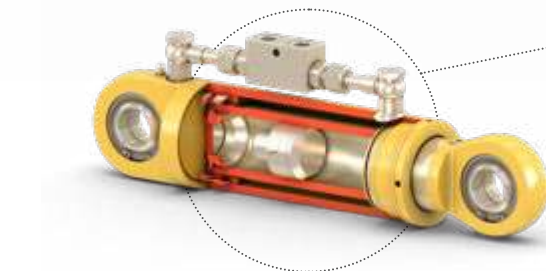
• SNOW PLOUGHS

WHEELS FOR HEIGHT COMPENSATION WITH POSITION MEMORY

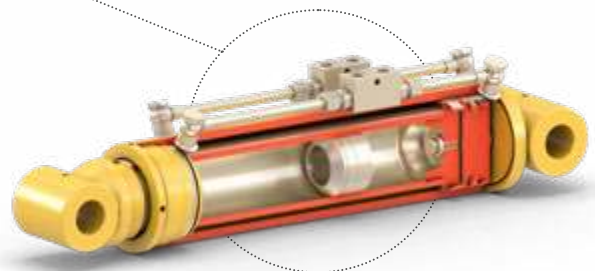


• UPPER LINK IN THREE-POINT SYSTEMS

SLOPE COMPENSATION IN HARVESTERS (COMBINES)



• TRACK SYSTEMS



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Benefits of cylinders **with** integrated damping:

PRODUCTIVITY:

Walterscheid damped hydraulic cylinders boost machine productivity. Improved road-holding properties allow the ground speed to be adapted in case of difficult conditions.

COMFORT:

A vehicle offers more comfortable handling if it is equipped with damped cylinders. With reduced shocks and counter-shocks, operators need to perform fewer corrections. Operators are protected against shocks resulting from pressure peaks.

MAINTENANCE:

Fewer pressure peaks mean less wear. Improved operating conditions prevent premature wear and even failure of other components. Maintenance times can be reduced.

ROAD TRANSPORT:

The damped cylinder reduces pressure peaks and therefore improves stability on the road. Travel times can be reduced.

OPERATING CONDITIONS:

The use of selected materials ensures reliable accumulator operation even under extremely challenging conditions. Seals with a low friction factor and high thermal resistance allow the internal accumulator of the damped hydraulic cylinder to operate across a range from -20°C to +80°C.

Benefits compared to systems with **external** accumulator:

SAFETY:

The block valve can be installed either on the cylinder or directly in the cylinder base. It protects the internal nitrogen accumulator in either case. The block valve and absence of hose connections ensure safe road transport with active damping.

PERFORMANCE:

- ▶ Very rapid damping response, with as little as 20 to 30 ms being realistic
- ▶ Highly efficient damping system without external components

COMPACT SIZE:

- ▶ Highly compact system, optimal utilization of available space
- ▶ No requirement for an external accumulator and associated connections
- ▶ Can be replaced by standard cylinders

INSTALLATION:

No need for lengthy installation. The hydraulic cylinders are filled with nitrogen up to the pressure required for your specific application by the manufacturer.

INCREASED PRODUCTIVITY:

- ▶ Easier integration than other, comparable systems
- ▶ The cylinder is already delivered with the correct pressure and can therefore be used immediately for most applications.
- ▶ Custom pressures can be agreed with the customer and pre-set.