Rexroth
Bosch Group

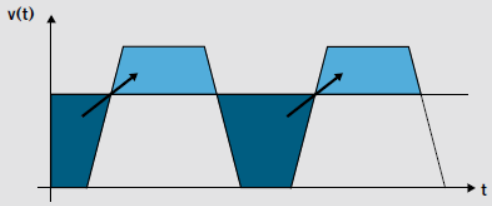
Hydraulic Hybrid from Rexroth: Hydrostatic Regenerative Braking System HRB

Recover Energy – Reduce Emissions

Hibrid: Two Pulling Together

"Hybrid" has its origin in the Greek language and means: "Mixture or combination of two things." Hybrid vehicles use two types of energy to attain optimum propulsion. Combustion engine demand is reduced by hybrid technology, giving the user two big advantages: lower fuel consumption and a significant reduction in emissions. The most common hybrid technologies are electric and hydraulic hybrids.

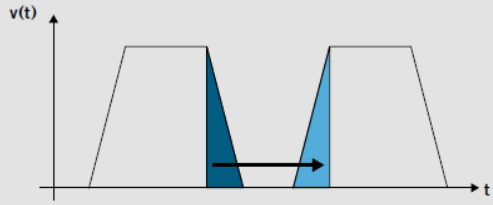
Characteristics of an electric hybrid:



Excess motor power is continuously accumulated in a battery over a longer time period (blue) and accessed as needed (light blue).

- High energy density and low power density: The battery can absorb a great deal of energy, but the charge time is relatively long, so it is not possible to fully recapture the braking energy.
- Energy is stored in batteries.
- Typically found in passenger cars.
- More detailed information about electric hybrid technology can also be found at the Bosch Web page www.bosch.de under "Hybrid Technology".

Characteristics of a hydraulic hybrid:



The kinetic energy from braking is fed to a hydraulic accumulator (blue) and immediately reused for starting (light blue).

- High power density and low energy density: There are limits to the amount of energy the system can accumulate. However, it takes less time to collect and store this energy, which can be called upon as needed.
- The full braking energy is then fed to a hydraulic accumulator and stored.

Hydraulic hybrids are ideal for vehicles with frequent, short start-stop cycles, such as public transit buses, refuse trucks, forklifts, pneumatic tire rollers, telehandlers, swap body movers and much more.

Advantages of the HRB

Environment
- Fewer harmful emissions, less pollution.
- Help in meeting future emissions and environmental requirements.
- Reduced brake wear, lower braking noise, and less brake dust.

Costs
- Significant reduction in operating costs.
- Durable Rexroth components reduce maintenance needs.
- More economical that other hybrid concepts.

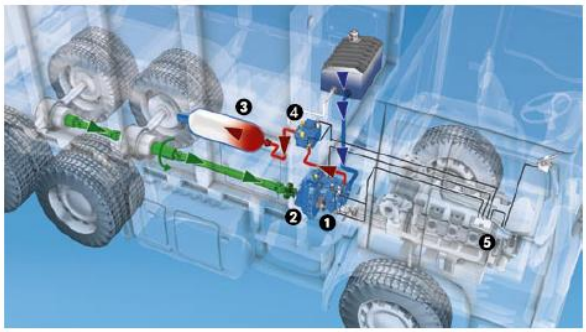
Function
- High functional reliability and low risk of failure.
- Simple maintenance and long service life.
- Ideal solution for new systems or retrofits.

Energy
- Reduced fuel consumption to preserve energy.
- Fuel-neutral system – can be combined with diesel, gasoline, or other types of motors.
- Increased vehicle range.

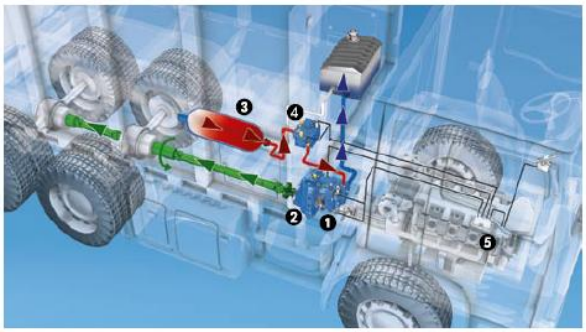
Fuel savings of up to 25% possible

The HRB is a hydraulic hybrid for vehicles with no hydrostatic transmission: For example, vehicles used in refuse collection and public transit buses. Use of an HRB system results in significant fuel savings of up to 15% and improved acceleration – depending on the focus of the application.

How HRB works



Storing braking energy
The hydraulic axial piston unit ❶ is coupled to the mechanical drive train through a gearbox ❷. When braking, the axial piston unit converts kinetic into hydraulic energy and pumps hydraulic fluid into the pressure accumulator ❸, increasing the pressure in the accumulator.



Reusing the stored energy to assist the vehicle drive
The pressurized hydraulic fluid in the accumulator drives the axial piston unit, which now acts like a motor. Hydraulic energy is converted into kinetic energy. The axial piston unit remains coupled to the mechanical drive train until the pressure accumulator is discharged. The valve control block ❹ controls the filling and discharge cycle and protects the accumulator from excessive pressure. The electronic controller ❺ operates the HRB. In “normal” drive mode the Hydrostatic Regenerative Braking System is decoupled.

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