



NEW

Hydraulic Digital Solution

EPX Hydraulic Energy Recovery

System for recovering hydraulic energy through meter out compensation technology



The new Hydraulic Digital Solution line

SAVE		5% +
RECOVER		UP TO 20% =
	SAVINGS + UP TO TOTAL ENERGY	25%

The modern mobile machinery market demands a constant increase in productivity and performance, together with lower operating costs, greater efficiency and reduced emissions in favor of sustainability and social responsibility.

Various research and studies in the field point out that up to 40% of the energy supplied to the hydraulic system of the operating machine is dissipated by the limited efficiency of the components and the pressure drops due to the metering and control of the movements.

The problem is even more evident on electrified applications, where energy efficiency is synonymous with prolonged range and reduced battery capacity.

Walvoil illustrates how to increase efficiency of the hydraulic system and its components with the new **Hydraulic Digital Solution** product line, which guarantees a consumption reduction up to 25%.

How can we increase efficiency and reduce consumption in hydraulic systems?

- by reducing consumption and energy dissipation with ALS (Adaptive Load Sensing) systems, already presented to the market.



- by recovering energy, which would otherwise be wasted, through EPX (Meter out compensation) technology.



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EPX-Hydraulic Energy Recovery

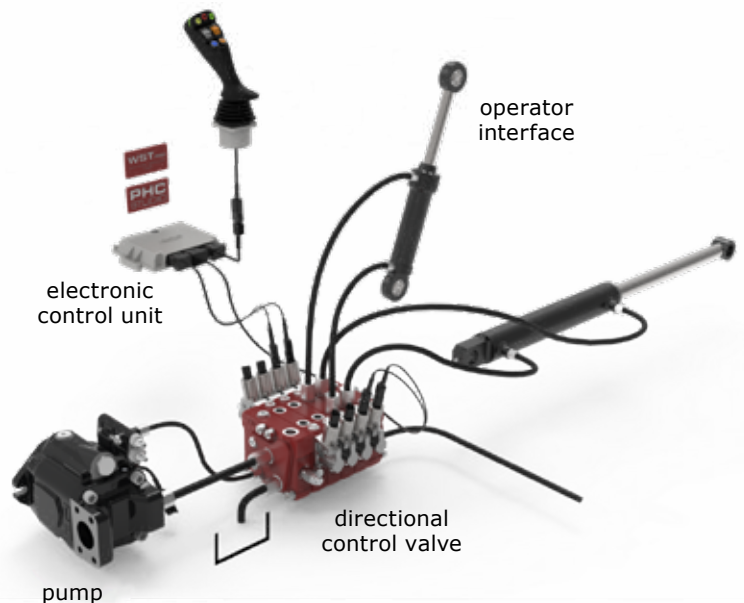
System for recovering hydraulic energy through meter out compensation technology



System approach

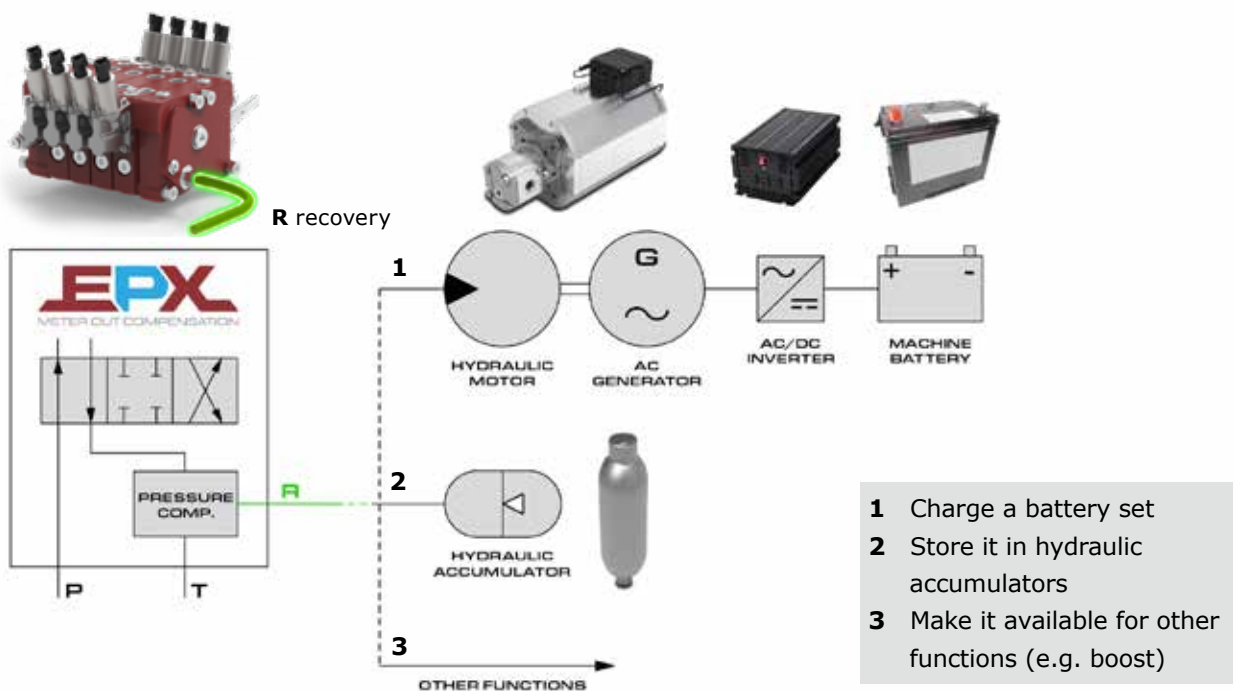
EPX technology is made of a Flow Sharing directional control valve, an electronic joystick, a Load Sensing pump and an electronic control unit with customizable modular software developed by Walvoil (PHC STUDIO). EPX technology is based on new compensator's function with a recovery line R powered by flow in pressure (Power).

This principle is at the basis of the recovery, which occurs in contemporary movements, in dependant sections at lower loads, and also in single movements with overrunning loads, thanks to a low pressure pilot source X feeding LS line. The downstream compensator keeps independent from the pressure the flow to the actuators and allows recovering energy during simultaneous movements in the sections at lower load and in presence of gravitational loads.



Energy recovery strategy: multiple options of recovery with R line

Once the recovered flow is available in the line R, its management depends on the choices of the equipment manufacturer. It is possible to regenerate the recovered flow into the system directly, to store it in a hydraulic accumulator, or to transform it in electrical energy and store it in a battery.

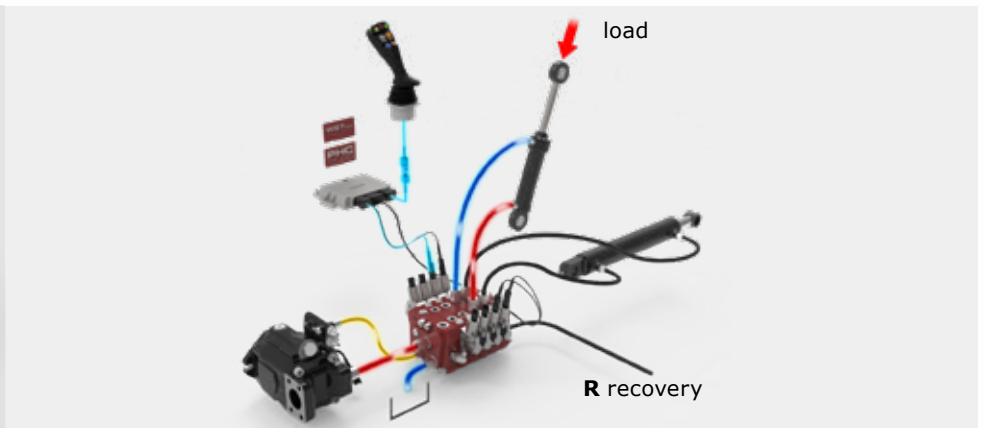


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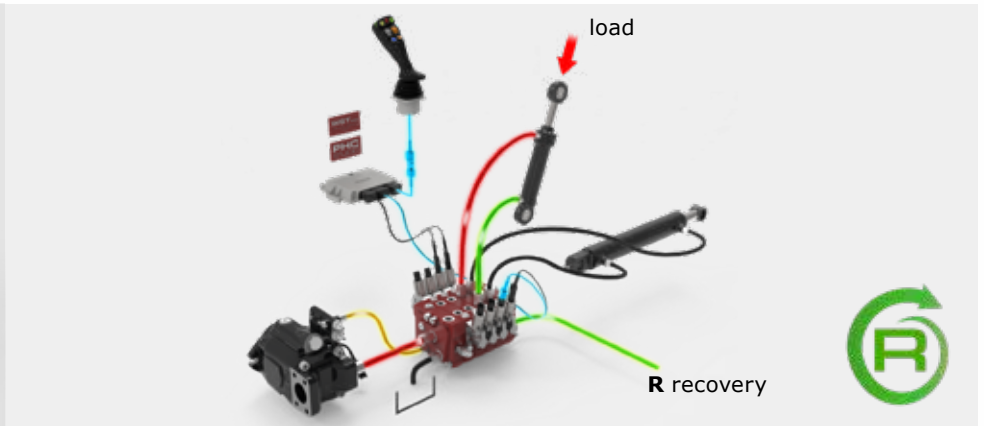
Hydraulic Digital Solution

How does it work?

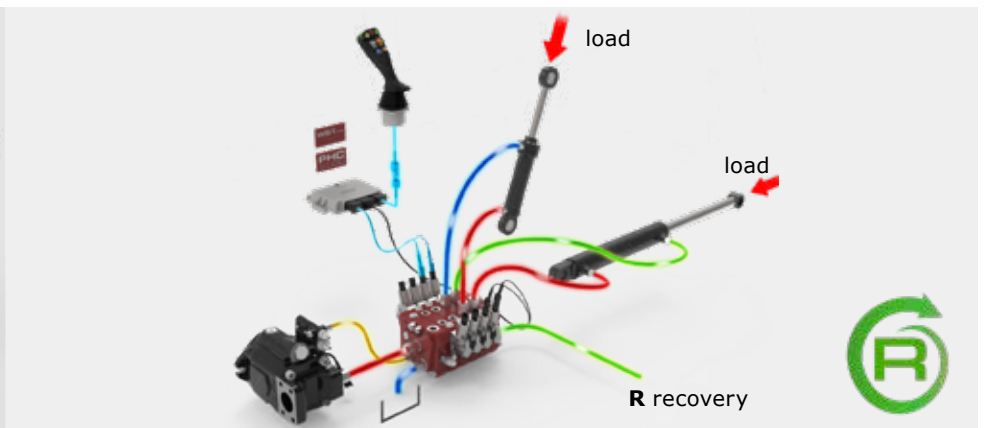
- Single resistive load (traditional load sensing Flow Sharing valve)



- Recovery of gravitational loads



- Recovery during simultaneous functions



EPX-Hydraulic Energy Recovery

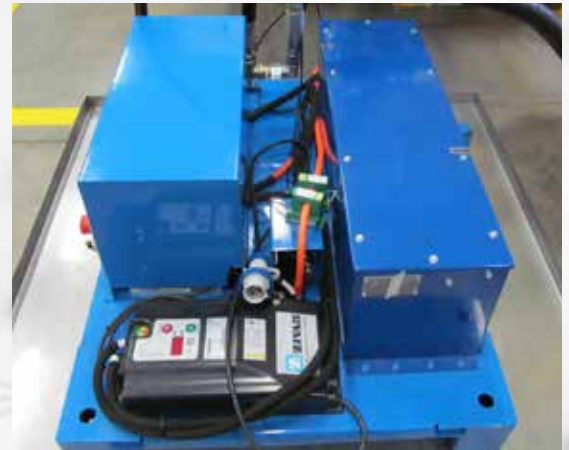
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Testing activity

EPX valve has been installed in a hybrid front end loader for tractors, powered by the primary ICE engine and by a secondary boost electric system composed by:

- ICE equipped with primary hydraulic pump
- Electrical Motor (19 kW) equipped with boost
- 600 A Inverter
- Battery charger control panel (CAN-Bus protocol)
- 48 VDC kWh lithium-Ion battery.



Test outcome

- 10% energy recharged to battery
- 8% saved with booster overcharge
- 16% energy saved with internal regeneration

Same working cycle performed using only **66%** of energy normally consumed.

Test performed on experimental equipment, under specific working conditions

EPX technology (Meter out compensation): benefits

- Traditional Flow Sharing architecture
- Energy recovery options based on OEM's choice
- Prolonged autonomy and reduced battery capacity on electrified machines.



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