Hybrid Drive System

Liebherr Pactronic®

www.liebherr.com

LIEBHERR

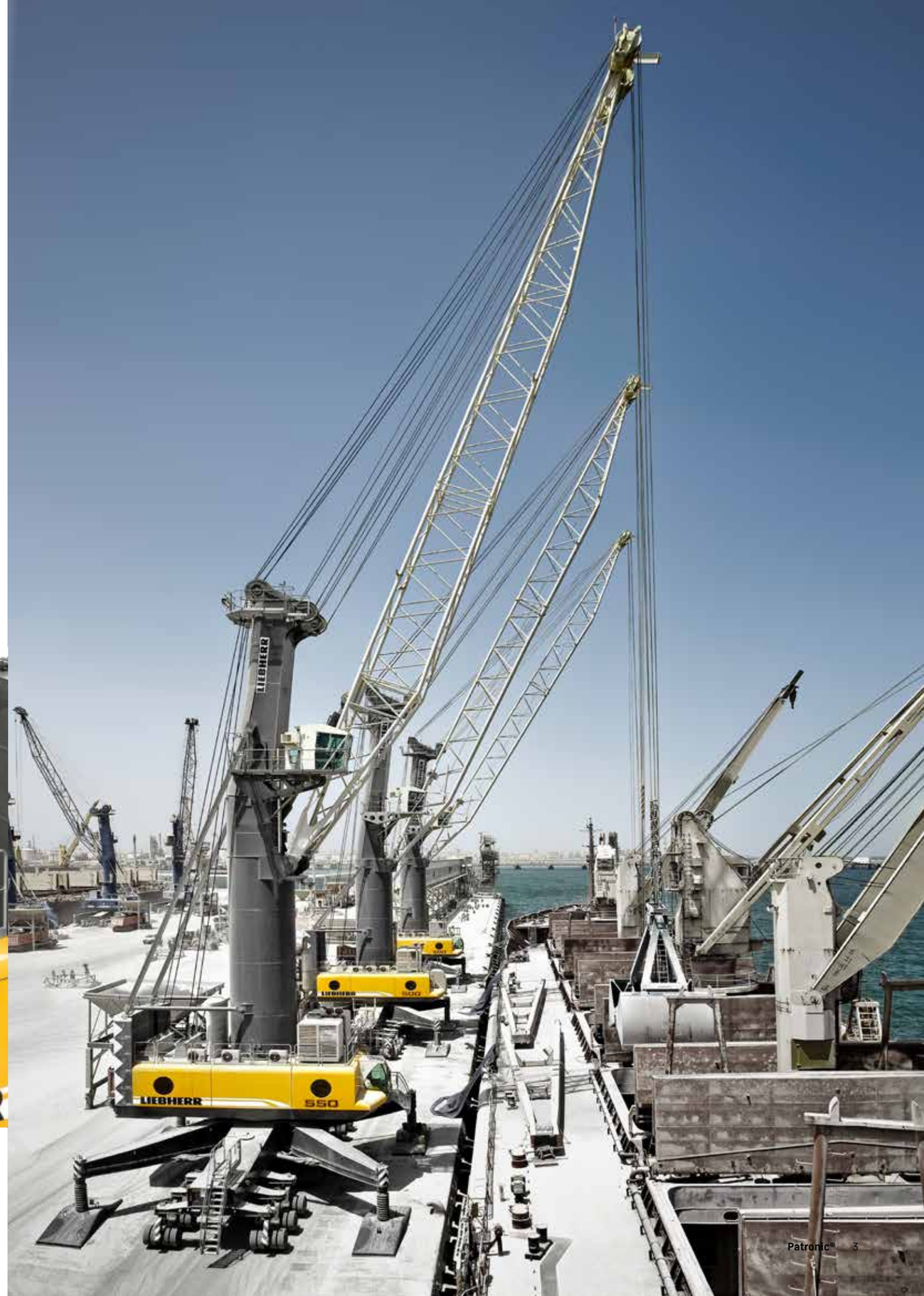
Mobile harbour crane

Power by accumulator and electronics

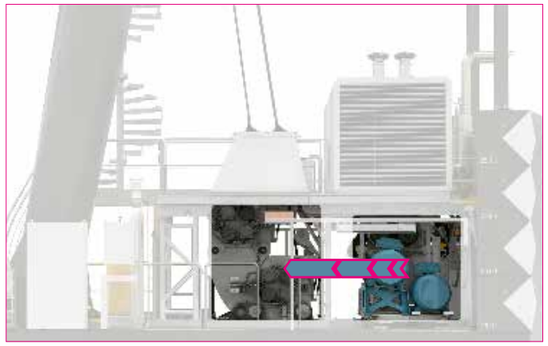
The Liebherr Pactronic® is a revolutionary hydraulic hybrid drive system. It is characterized by an energy storage device. A hydro-pneumatic accumulator supplements the hydraulic system in delivering power to the system. It serves as a pressure storage reservoir for gas and a hydraulic fluid. Energy is stored in this compressed gas to be released upon demand.

The Liebherr Pactronic® is an impressive powerbooster. Hoisting speeds are increased substantially – without the need to go for a bigger or additional diesel engine with more output and emissions. Thus the crane's efficiency reaches new levels with higher turnover figures.

Key Advantages:
- Proven energy storage technology
- Has the same service life as the crane
- Maintenance free – Visual inspection every 10 years sufficient
- Fast charging
- 100 % recyclable
- Individual adjustable
- Pactronic® has a very high energy density and the output power is temporarily at the same level as that of a diesel engine.

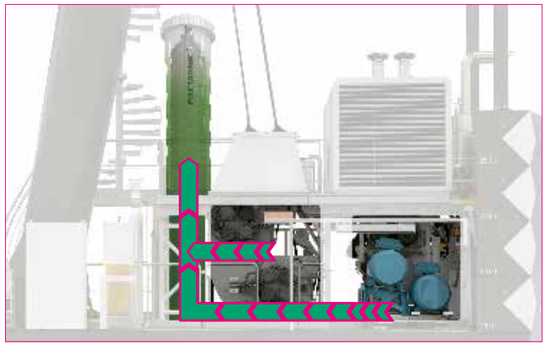


Mode of operation



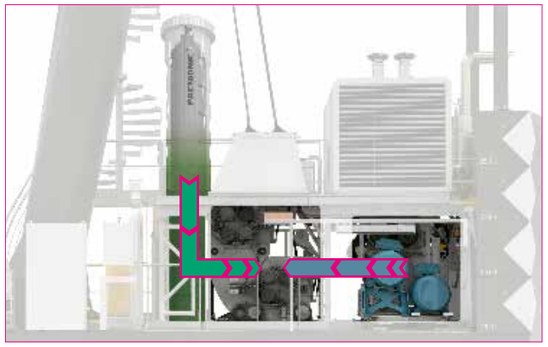
Hydrostatic power transmission

Conventional Drive System
The conventional, hydrostatic hoist system of a Liebherr mobile harbour crane is driven by a primary motor (diesel or electric motor), the splitter gearbox, a hydraulic pump, and a hydraulic motor.



Charging of the accumulator

Pactronic® – Lowering Mode
With Pactronic® a secondary energy source is added to the drive system. Charging of the accumulator is done by regenerating the reverse power while lowering the load. In addition, the surplus power of the primary energy source is also used for charging.



Discharging of the accumulator

Pactronic® – Hoisting Mode
The stored energy of the accumulator is transferred back to the system when the crane requires peak power during hoisting. Consequently, the total hoisting power is the sum of the conventional hydrostatic power and the secondary energy, provided by the accumulator.

Pactronic® 2.0

Boost mode
There are times when extra performance is needed, such as when selectively heavier cargo has to be handled during operations. Boost mode uses stored hydraulic energy from the Pactronic® system for extra lifting speed.

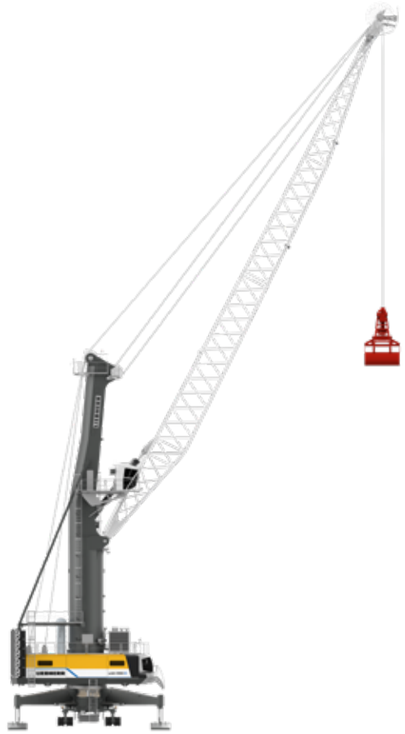
- In this mode, the Pactronic® acts as a significant power amplifier
- Lifting speeds are significantly increased – without the aid of a larger or even additional main unit for more power

This massively increases the efficiency of the crane.

Green mode
For times when harbour operations are less hectic, Green mode offers a suitable mode of operation. With it, the stored hydraulic energy from the Pactronic® system allows the crane to maintain the same winch speeds while reducing CO_2 and fuel costs – for benefits all around.

- This mode is designed to save fuel or power consumption and to reduce CO_2 emissions
- During the lifting process, the Pactronic® supports the main unit to such an extent that less power is required by the main drive, despite the lifting speeds remaining the same

As a result, absolute fuel or power consumption and emissions are reduced.



Individual adjustable
For precise control, the energy utilized by Pactronic® can now be configured to the desired lifting height. This means that the system performs only at the reach that's needed in a given situation – no more worrying about wasted energy, with lower emissions and saved fuel costs to boot.

The second generation Pactronic® is thus even more closely aligned to the actual needs of the user

- By setting the individual lifting height, the power output of the Pactronic® is adjusted accordingly.
- The additional energy of the Pactronic® is distributed over the entire lifting process.
- Pactronic® reacts to changes of the outside temperature and the accompanying change in pressure in the reservoir.

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