

By incorporating an intelligent battery management system the state of charge to the batteries is continually monitored and regulated to both provide the AGV motive power when required and to minimise levels of battery discharge when the AGV is stationary thus maximising battery life. The method of transferring the electric power from the grid to the transport vehicles provides an almost invisible integration of our charging system into the port's infrastructure.

BENEFITS

- Economically friendly
- Fuel saving
- Battery weight reduction
- Optimal battery management control
- Optimal battery life
- No battery storage
- Higher level of availability
- No downtime due to battery exchange
- Integration of stationary components into the ground
→ no risk of collision
- Flexible positioning of charging stations
- Secured charging through secure contact technology
- Multiple supply charging points via the
- 40' ISO Container VAHLE substation
- Many years of experience in public transportation
- and high power supply technology

VAHLE

Paul Vahle GmbH & Co. KG
Westicker Str. 52
59174 Kamen
Germany

Tel.: +49 2307 704-0
Fax: +49 2307 704-444
port-technology@vahle.de

www.vahle.com

VAHLE

POWER SUPPLY FOR HORIZONTAL TRANSPORTATION

DISCOVERING NEW PATHS

VAHLE – YOUR EXPERIENCED AND RELIABLE PARTNER IN PORT BUSINESS – has developed the next generation of electromotion for further increased efficiency and reduced operational costs. Automated guided vehicles (AGV) and terminal tractors are essential elements which have to be available for 24/7 operation.

Conventional electrical systems for horizontal container transportation are nearly always dependent on regular exchange of batteries or even complete battery replacement and the need of charging stations. With every charging process there is a loss in productivity which results in a higher number of required vehicles. By introducing VAHLE's complete solutions for keeping the container movement in a constant flow powered by electricity you can choose between conductive or inductive power transfer. The VAHLE charging system consists of the VAHLE substation, the charging station and the components on the vehicle. Our turnkey system with high efficiency charging and reliable system performance maximises the AGV's availability for a lean quay to stacking area transport system. The flexible positioning of charging points provides the means to turn the planned stops into charging opportunities.



INDUCTIVE CHARGING SOLUTION

When an invisible method of power transfer is necessary the inductive contactless power supply is the most suitable solution. Being modular and scalable it can be adapted to the specific needs of your transport system by freeing the electric AGV from time limitations with a fast, safe and automatic charging process.

The inductive charging system integrates seamlessly into the infrastructure ready for point charging. Not least the proven coexistence between the state-of-the-art RF transponder positioning and the inductive power transfer system combines to create a truly competitive alternative to diesel and hybrid systems by providing up to 300kW of electrical power with a direct current voltage from 640V up to 800V.

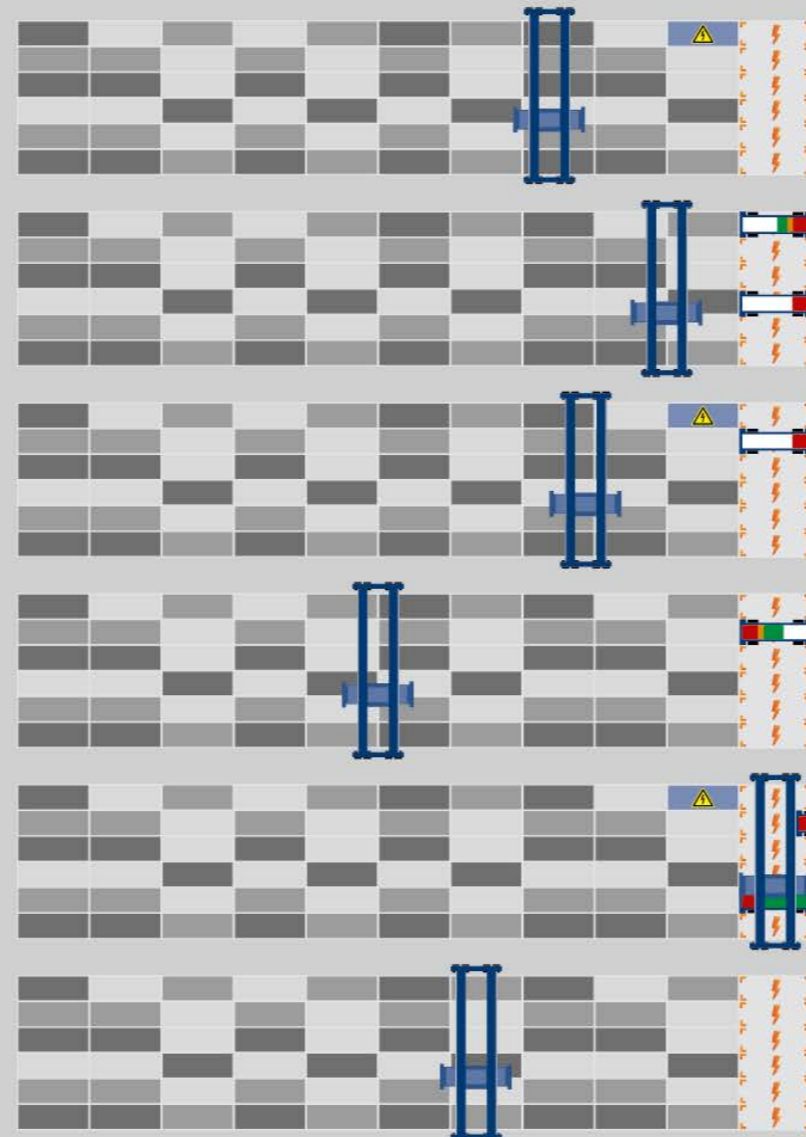
To further optimise the process of energy charging on fully electrical powered transport vehicles with regards to increasing the power-to-weight ratio and significantly reducing the carbon footprint, VAHLE provides the contactless power system – CPS – for heavy duty transport applications.

The ground installed components combined with the receiving pick-ups located beneath the vehicle provide a system which is designed for highly efficient power transfer and a minimal maintenance requirement.



CONTAINER PORT OVERVIEW

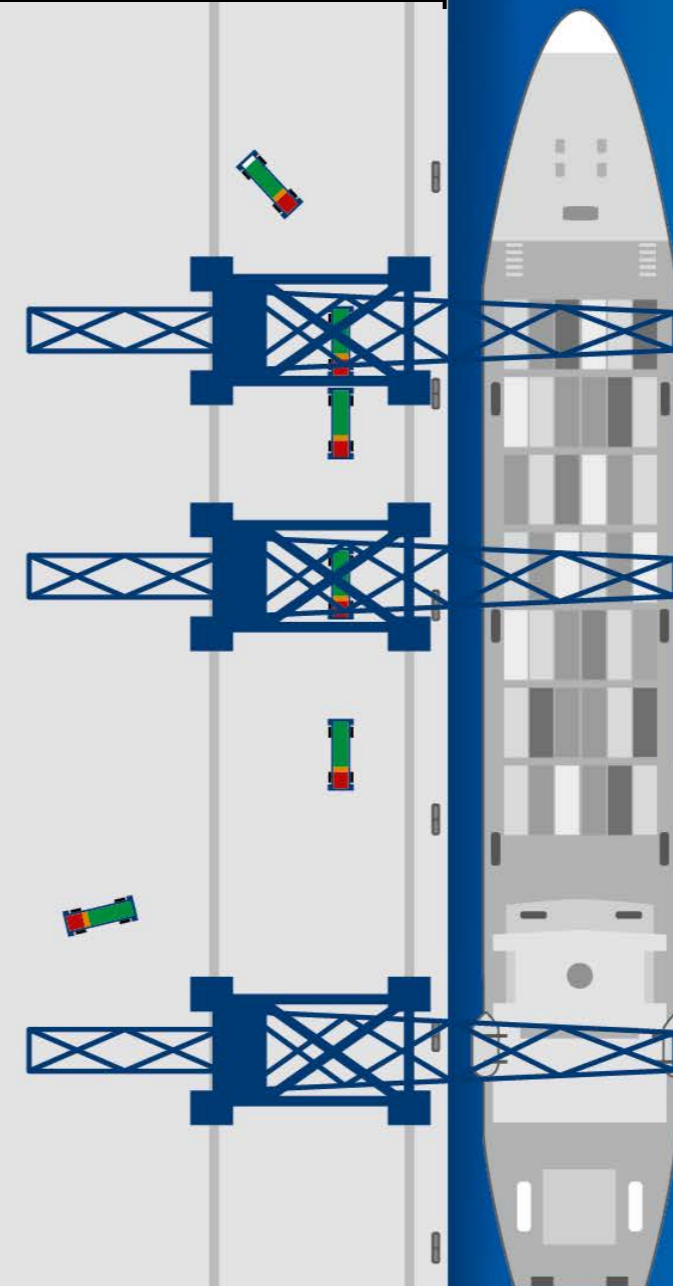
STACKING AREA – RMG/ RTG YARD



QUAY TO STACKING AREA TRANSPORT



QUAY



CONDUCTIVE CHARGING SOLUTION

For high power transfers within a short time the VAHLE conductive charging system by conductor rails is your preferred choice. The simplicity of the system with low maintenance components is a reliable tool for charging the vehicles batteries directly.

The charging point is kept as simple as efficient, consisting of conductor rails, which provide a direct-voltage from 690V to 800V with up to 30000A direct-current. The RF pilotsensor system and the intelligent substation together, developed by VAHLE, ensure that the voltage is only applied to the charging point when the vehicle is in exact position. Therefore the conductor rail can be safely driven.

Every time an AGV is about to be charged at a charging point, the position is verified by the RF pilotsensor system before the contacting element is extended to engage the conductor rails.

The established contact between the vehicle and charging point is monitored by the VAHLE substation and when positioned correctly the power is switched to the AGV. The substation is capable of providing power to several charging points simultaneously to meet operational requirements.

This fully integrated system of small and light conductive charging is the next step to a convenient e-mobility for horizontal container transportation significantly reducing downtime to the process flow due to battery changes.

