

E-One²



BECAUSE OUR TOMORROW NEEDS LEADERS

E-One²

– save energy and be safe

First we introduced the E-One, the all-electric Rubber Tyred Gantry Crane (RTG) which quickly became the industry's favourite. Then we improved it with several quality and safety features, and the greener E-One² was born. But we constantly push ourselves forward, because you deserve the best that technology and innovative thinking can provide. As the challenges are constantly changing and new requirements are being imposed, **we now give you the E-One² family.**

E-One² RTG: providing unrivaled performance at minimum energy consumption, optionally featuring VSG technology.

E-One² Hybrid RTG: increasing performance through addition of energy storage to allow regenerative energy to be used during hoisting.

E-One² SmartPower RTG: minimizing energy consumption by providing the optimum balance with productivity through an intelligent power management system.

E-One² Zero Emission RTG: going green by eliminating diesel emissions, engine noise and hydraulic oils.

PERFORMANCE AT A NEW LEVEL

All E-One² RTGs help you to meet the latest environmental demands without sacrificing operational productivity and lifetime cost efficiency. The E-One²'s amazing maintenance interval of 1,000 hours, for both crane and optionally for engine, remains by far the longest in the industry.

SAFETY IS A PRIORITY

With its new advanced Fail-Safe PLC, which complies with EN 954-1, your staff can perform at maximum impact at all times whilst enjoying a safe working environment.

A GREENER, MORE INTELLIGENT TOMORROW

Each model E-One² RTG comes with a package of proven all-electric components to boost your overall performance whilst reducing your impact on the local and global environment. With its smooth, ecological method of shipment as well as decreased number of maintenance points the E-One² has an uncompromising green advantage.

Because our tomorrow deserves it.

E-One² RTG

LOWER FUEL CONSUMPTION

The E-One² provides fuel savings of up to 60% compared to conventional RTGs by combining our Variable Speed Generator, system and the optional hybrid package. Combined with the array of energy-saving features found on the E-One+, this puts an unbeatable cost-saving combination at your service.

VARIABLE SPEED GENERATOR (VSG)

With its new optional Variable Speed Generator (VSG), the E-One² provides considerably better fuel economy, as the engine runs at a lower RPM level when idling. The system automatically optimises the engine's RPM according to power needed, resulting in lower fuel consumption. Auxiliary

loads, such as air conditioning and working lights, are powered continuously. When compared to conventional RTGs consuming around 21 litres per hour, CO2 emissions are reduced by 100.000 kg/year (assuming 4.000 operating hours/year). Other emissions are also reduced accordingly.

Fuel savings of up to 45%.

E-One² Hybrid RTG

HYBRID PACKAGE

The E-One² is modularly designed and ready for Hybrid Package adaptation. It can be equipped with an energy optimized Variable Speed Generator set combined with an energy storage system. Regenerative energy is stored in the energy storage system and is used again in hoisting. Energy consumption, emissions, noise and operating costs are reduced even further.

Fuel savings up to 60%.



E-One² SmartPower RTG

The Kalmar SmartPower RTG minimizes fuel consumption even further. Requiring merely 9 liter of fuel per hour in a typical configuration the SmartPower RTG saves up to 10 liters per hour in comparison to conventional RTGs. Additionally, based on an assumed 4000 operating hours per year, it will save up 100.000kg of CO2 emission per year (per crane)!

BALANCED PERFORMANCE

The SmartPower RTG provides a better balance between productivity and cost efficiency. The new crane is equipped with an intelligent power management system, which ensures the most economical engine RPM is used at all times during operation and controls speeds and accelerations to reduce the peak power requirement. The Kalmar SmartPower RTG has been designed for typical applications handling between 9 and 18

containers per hour, where it provides the perfect balance between productivity and cost efficiency.

The RTG has a significantly smaller diesel engine compared to conventional RTG's. These technological innovations lead to a fuel consumption of only 9 liters per operational hour in typical RTG applications, which is the lowest fuel consumption without energy storage in the industry. Typical RTG engines range from 450 to 550 kW. Conventional RTGs consume approximately 18 to 21 liters per hour while the more modern E-One² RTGs with a large engine consume between 11 to 15 liters. The SmartPower RTG features a much smaller engine (250 to 280 kW), resulting in the much lower fuel consumption.

E-One² Zero Emission RTG

E-One² Zero Emission incorporates an electric power system that produces no diesel emissions or engine noise to impact the surrounding environment. The regenerated power of the RTG is returned to the power system, further reducing overall power consumption. Additionally, high-end power electronics are utilised for lower energy consumption without compromising performance. While providing superior performance, the design of the E-One² Zero Emission has eliminated the need for hydraulic oil, which greatly reduces the environmental load.

LESS COST, MORE PRODUCTIVITY

E-One² Zero Emission requires significantly less maintenance than a diesel-powered RTG. Whilst providing a more sustainable option, E-One² Zero Emission applies new technologies without compromising container terminal productivity, reliability or flexibility. The performance impact on your business is our priority.

E-One² Zero Emission is equipped with the latest technology, including Smartrail®, automatic gantry steering and a container position verification system. The result is a cost-effective, powerful, quiet, efficient, productive and environmentally friendly RTG.

GOING GREEN

In comparing the E-One² Zero Emission to a diesel-powered RTG, E-One²s produce 90% fewer emissions – even when factoring emissions from power plants generating the electrical power. All local NOx, PM, CO emissions are eliminated. Diesel engines are the number one source of Particulate Matter (PM) emissions, estimated to be responsible for about 70% of the total ambient air toxin risk.



E-One² VSG and is Pro Future Certified
E-One² Zero Emission is Pro Future Certified

* Depends on operation and local fuel/electricity prices
** Depends on ambient temperature.



Performance at a new level

The E-One² family is equipped with an all-electric trolley, wheel turning and spreader. It is an all-electric concept without the need for hydraulics. This means that parts are easy to access, and fewer components require maintenance than ever before. The E-One²'s modular design means it can be tailored to a suitable solution for each customer's needs, optimising energy consumption.

A maintenance interval of 1.000 hours for both crane and optionally for the engine is by far the longest in the industry.

NEW INTELLIGENT AUXILIARY LOAD CONTROL

The E-One²'s new automatic auxiliary load control system introduces a number of improvements. It manages air-conditioning, heating and lighting according to temperature and other operating conditions. It also features

an intelligent motor control for the RTG's main movements, considerably reducing energy consumption. The new load control manages the operating conditions, leaving you to concentrate on improving other aspects of performance. **Intelligent improvements in one package.**

RTG OPERATOR TRAINING SIMULATOR

Operators can be trained in a simulator prior to operating a real RTG. This increases safety by eliminating accidents at the training stage. It also means that your real RTGs are not out of productive work during training.



Simulator training also helps find suitable new operators and provides retraining opportunities for existing operators – for example in safe and energy efficient operation. This allows the continuous improvement of your operators’ skills and safeguards productivity. *Learning without downtime.*

IMPROVED LIGHTWEIGHT SPREADER

Getting the right ratio between lifting capacity and weight is one of the real challenges in spreader design. The E-One2 is fitted with an all-electric spreader manufactured by Bromma, which has been further improved. The spreader’s reeved-in design is now 2.000 kg lighter than competitors’ as it has no head-block. This gives a fuel saving of nearly 1 litre/hour.

The spreader’s micro-movements are joystick-controlled and provide +/- 5 degree skewing with an optional +/- 5 degree trim. Both are all-electric with automatic centring, which further contributes to reliability and operator efficiency.

Fuel saving in design.

COMPLETE SYSTEM PROVIDER

We provide in-house product support for all systems, including electrical systems. *Total support, total benefits.*





Safety is always our priority

Kalmar was the first RTG manufacturer to give operators and technicians complete access to the cabin and trolley via stairs. Never content with 'safe enough' we are constantly improving the standard safety features of our portfolio. **Safety is an essential part of your productivity.**

NEW FAIL-SAFE PLC

The new Fail-Safe PLC in the E-One² brings enhanced functional safety improvements. We identified the safety hazards associated with RTGs and analysed them thoroughly. The new safeguards were developed to fulfil category 3 safety requirements according to the EN 954-1 standard. The Fail-Safe has been redesigned and considerably enhances risk management. The Fail-Safe PLC is essential for semiautomation. The standardised Fail-Safe program is isolated and protected with a password.

Enhanced diagnostics. Enhanced safety.

NEW EE-HOUSE

The E-One² has a completely new layout for its EE-House, with extended safety distances that exceed requirements. Its new state of the art inverters give excellent efficiency and fuel savings. The operator has better control of the main motors, enabling better control and responsiveness. Operators also benefit from its low noise level, as well as improved walkways with better lighting which make it a safer place to work. The maintenance for heavy components is now easier as maintenance is carried out inside the EE-House, meaning less downtime. **Better productivity with improved safety.**



NOISE REDUCTION

The E-One² has a lower noise level due to its re-engineered power unit enclosure. The variable speed engine also lowers noise levels as it idles at a lower speed. According to numerous studies, noise causes higher stress levels, reduces perceptual ability and impairs concentration.

Less noise, more performance.

IMPROVED WALKWAYS

The E-One² features safe access to the cabin, left main girder and trolley via a stairway. No more ladders to climb. The stairway also benefits from better lighting.

Better working conditions.

NEW AIR-FLOW SYSTEM

The E-One²'s new power unit enclosure has a new intelligent intake air-flow system. It decreases noise emissions as well as preventing water ingress. **Intelligence in action.**



Intelligence for a greener tomorrow

In the E-One² we have combined our ecological thinking and use of innovations with high productivity. The package of proven all-electric components boosts overall performance and helps you to reduce your impact on the local and global environment. **Uncompromisingly green.**

SMOOTH AND ECOLOGICAL SHIPMENT

With our new, environmentally efficient shipment methods, we are able to transport double the number of RTGs in the same shipment. This is made possible by shipping cranes fully erected in narrow mode with their span reduced for transportation. The process is reversed at the customer's site by widening the RTG back to its proper width, which takes just a few days. **Swift and ecological.**

LESS MAINTENANCE POINTS

Maintenance on the new E-One² just got easier and even more economical. As it is all-electric, there are no maintenance issues with hydraulics. It has a direct gantry drive which eliminates traditional higher maintenance chains and lubrication. The E-One² RTG has also been engineered with maintenance-free propeller shafts. These components do not require greasing – less oil and grease means less maintenance and a better environment. **Ecologically and economically sound maintenance.**

GLOBAL POSITIONING

All our RTGs can be equipped with Automatic Gantry Steering System (AGSS) that increases safety and productivity. The automatic steering solution guides the crane along virtual tracks while the Position Detection System (PDS) helps to keep track of all containers in the terminal. Already in use in 500 RTGs around the world, our automatic steering solutions have proven to be very reliable. **Innovation in action.**



We are at your service

TRAINING

Our operator and service training is included with every RTG and combines both theory and practice under skilled supervision. Your mechanics can participate in the assembly of the crane to gain valuable hands-on experience. We provide several additional training packages either on-site or at our training facilities, including the option to hire an experienced operator for an agreed period of time to train your operators and maintenance personnel.

SPARE PARTS

We are an experienced partner who understands your requirements. You can rely on us to provide fast and reliable delivery of high quality spare parts throughout the world. Our service network stocks more than 50.000 spare parts for immediate delivery – everything from large engines to the smallest electronic parts.

FLEET MANAGEMENT

We offer complete fleet management services to meet your particular handling requirements. Our services include everything from leasing and maintaining a complete fleet of equipment to providing operators for your equipment. You should be able to focus on your core business. Our experts are on standby to ensure reliable performance and minimal downtime.

LOCAL SERVICE

We practice innovative service development in order to continuously provide you with up-to-date services. Because of our local customer service strategy, we know our customers' local conditions and can provide efficient and effective service anywhere in the world.



Global presence and local service bring
our solutions closer to our customers.



Cargotec improves the efficiency of cargo flows by offering solutions for the loading and unloading of goods on land and at sea – wherever cargo is on the move. Cargotec's main daughter brands for cargo handling are Hiab, Kalmar and MacGregor. In addition, Cargotec's global network offers extensive services that ensure the continuous and reliable performance of equipment. www.cargotec.com



Cargotec Finland Oy, Kalmar Industries
Valmetinkatu 5, P.O. Box 387
FI-33101 Tampere Finland
tel. +358 3 265 8111
fax +358 3 265 8201
www.kalmarind.com