

A low-angle, black and white photograph of a large industrial structure, likely a port crane (RTG), with a worker silhouetted on a walkway. The scene is overlaid with a red border and several bright red laser lines that create a sense of depth and technology. The sun is visible in the background, creating a lens flare effect.

RTG Electrification.

The numbers really add up.



KALMAR



Reap the rewards of electrification.

Electrifying your existing RTGs means more than just breathing new life into your current RTG fleet. Converting to electricity from a diesel power unit will give you substantial cost savings, plus environmental benefits that will help you meet the rigorous emissions and environmental standards that are becoming more a part of everyday business life. Having an electrified RTG fleet is also the essential first step when considering automated terminal solutions. You just need to choose which electrification solution is right for you: conductor lines or cable reels.

The benefits of electrification can really add up.

Electrifying your current RTG fleet will bring both financial and environmental benefits to your business:

- Up to a 100% reduction in on-site carbon emissions
- Up to a 100% reduction in fuel costs
- Substantial reduction in operating noise levels
- Longer service intervals means less downtime
- No need to re-fuel means more uptime
- Fewer moving parts to replace and service.

With a return of investment period of 2-6 years depending on your site and equipment, you can see that the numbers for electrifying your RTGs do add up.

Start the journey to automation.

Electrifying your RTGs is also the basic prerequisite for any future automation projects. The cabling that is used to power your RTGs will also be the cable that carries the high-speed data that drives automation between your equipment and your terminal operating system. Investing in electrification today also means investing in automating your terminal for the future.

A partner you can have confidence in.

Kalmar, with five regional business centres, has decades of experience in delivering complex crane upgrade projects and can support your business during the entire RTG electrification process, from preliminary planning to deployment and ongoing maintenance with Kalmar Care. Careful planning and pre-integration of systems ensure minimum downtime for each RTG block during the conversion project. With Kalmar and Stemann-Technik you can be confident that we will be by your side every step of the way.

Two ways you can electrify your RTGs.

With our partner Stemmann-Technik, a world leader in terminal electrification, you can choose from two different types of conversion: conductor lines or cable reels. The best solution for your terminal will be dependent on your terminal layout and type, your current RTGs' specification, the number of cranes to be converted and your identified needs in the future. Kalmar will do a full site assessment with you to ascertain which solution will best meet your needs today and in the future.



Cable reel system.

Why a cable reel system?

You could benefit from a smaller yard size overall as cable reel systems don't need a fixed conductor line, which results in fewer fixed structures. This system also gives you more flexibility when extending your stack length and the cables are capable of carrying high-speed data for remote monitoring and future automation.

So how will it work for you?

In cable reel systems (400 V–13 kV), a large cable reel and a power transformer are both installed on the crane. The cable reel provides a feeder cable, which can be connected to the power source at either end or the middle of the yard. Having a power transformer attached to the crane means that the power supply from the sub-station can be at a much lower voltage than conductor line systems. There are three different types of cable reel systems for you to choose from:

Fixed cable reel.

This system offers the lowest capital expenditure of all the RTG electrification methods, and is used when you don't need to move the RTG to other stacks. If needed, you can upgrade this system to a manual or automatic plug in/out system.

Cable reel with plug in/out solution.

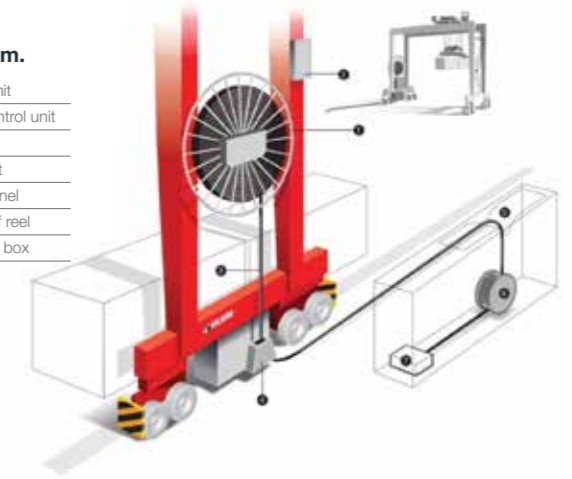
This system gives you the flexibility to move your RTGs to other container stacks when needed. Plugging the RTG in and out needs to be done manually by your ground staff.

Cable reel with automatic drive in/out solution.

As with the manual plug in/out cable reel system, this system allows the RTG to be moved to other stacks. However, plugging in and out is fully automated, which saves you time as you can change lanes much faster. Operational expenses are reduced and safety is improved, as ground staff are not needed in the RTG operating area.

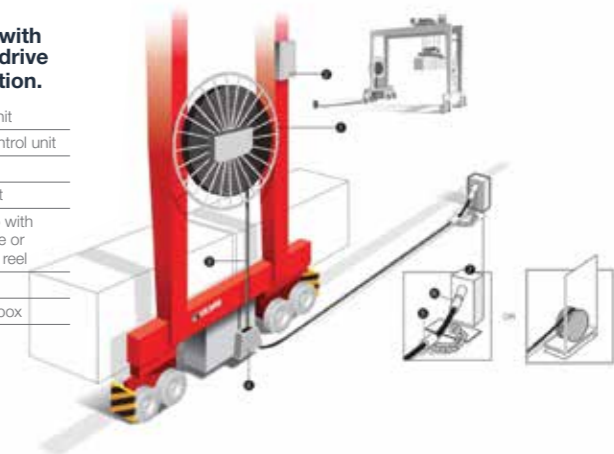
Cable reel fixed system.

- 1 Cable reel unit
- 2 Electrical control unit
- 3 Cable
- 4 Diverting unit
- 5 Diverting funnel
- 6 Tension relief reel
- 7 High voltage box



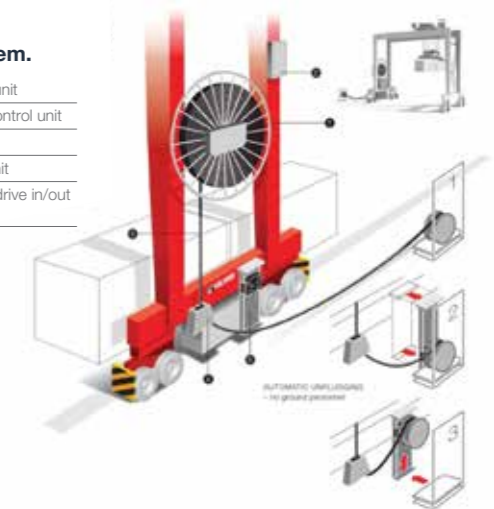
Cable reel with automatic drive in/out solution.

- 1 Cable reel unit
- 2 Electrical control unit
- 3 Cable
- 4 Diverting unit
- 5 Cable clamp with chain shackle or tension relief reel
- 6 Cable plug
- 7 Connection box



Cable reel fixed system.

- 1 Cable reel unit
- 2 Electrical control unit
- 3 Cable
- 4 Diverting unit
- 5 Automatic drive in/out unit





Conductor line system.

Why a conductor line system?

Conductor line conversions are ideal when you need to move your cranes regularly between container stacks. Conductor lines allow for the easy addition or removal of RTGs on the same block, they also make it easy to change the lanes being used and allow for easy access at the stack ends.

So how will it work for you?

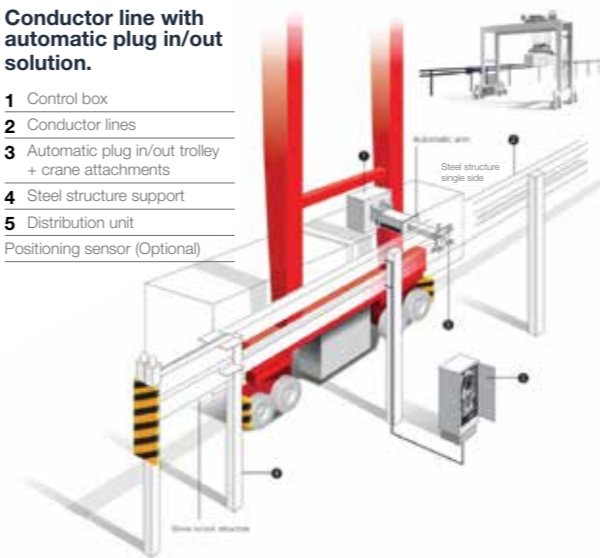
Conductor line conversions require the installation of a steel conductor assembly along each of the terminal's stacking areas, which are powered by connecting them with low voltage cables (400-1,000V) to your site's substation. This steel conductor assembly has mobile connector trolleys attached to it, which your RTG can simply be connected to. This is referred to as a plug in and out solution.

Alternatively, you can go for an automatic in and out system where an automatic arm-connector assembly is attached to your RTG. This eliminates the need for human intervention, as the assembly will connect and disconnect itself to the conductor lines when moving in or out of the stack: increasing safety and enabling much faster stack changes.

Electrifying your current fleet of RTGs will improve your productivity and is the first step in automating your terminal.

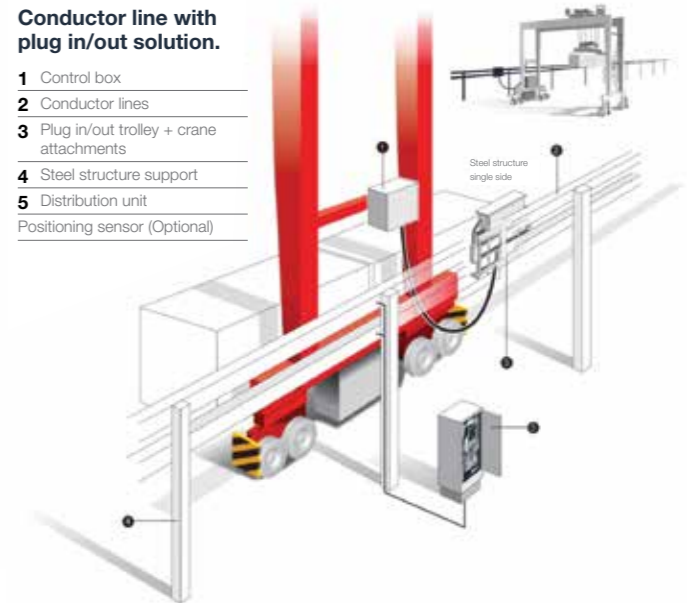
Conductor line with automatic plug in/out solution.

- 1 Control box
 - 2 Conductor lines
 - 3 Automatic plug in/out trolley + crane attachments
 - 4 Steel structure support
 - 5 Distribution unit
- Positioning sensor (Optional)



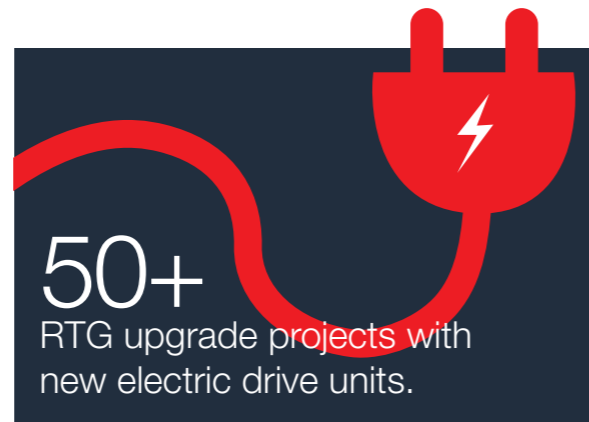
Conductor line with plug in/out solution.

- 1 Control box
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Experience where it counts.

When you are looking for an experienced and trusted partner, you couldn't do better than the combined strength of Kalmar and Stemmann-Technik, who have delivered nearly 150 electrification projects globally. With at least 50 of these projects combining new electric drive units as part of the project.



Making more of your current equipment.

In many cases Kalmar can retrofit your existing RTG fleet and ready it for electrification. You may choose to have this done as a part of a turn-key solution or as a separate project.

When retrofitting your current RTGs you can also choose to retain or remove your old diesel engine. Keeping it will allow you to move your RTG between stacks or to the maintenance yard independently. If you have removed your old engine you will need an auxiliary generator or batteries to move the RTG once it is uncoupled from the power source. The choice is yours.

A partnership that you can benefit from.

With over 150 electrification projects delivered globally, the Kalmar & Stemmann-Technik partnership has the experience and knowledge to deliver your electrification project seamlessly. Stemmann-Technik and Kalmar will take care

of everything that you require from equipment and hardware power supplies to the installation of the cable reels and the interphase software that will connect your software with the Stemmann-Technik software.

Pre-integrate for faster deployment.

We know that minimising the disruption to your yard is critical to your business, which is why we can now pre-integrate and test Kalmar cable reel solutions with a simulated version of your RTGs at our industry leading test center in Tampere, Finland. Pre-integrating and testing means much of the technical work can be done off-site and deployment on-site can be faster and result in your RTGs being fully operational on day one.



Electrification project overview.

This is an overview of a typical electrification project, the phasing and an estimate of the time for each phase. These timings are approximate and actual timings will depend on the scope of the project, the number of RTGs and the specific requirements of each terminal.





Making sure your business never stops.

Our job doesn't stop at the end of the project as we can also offer you a range of service and support contracts from Kalmar Care.

Regardless of the size of your business – whether you have in-house maintenance operations or require complete outsourcing of them – Kalmar Care has a range of service contracts for you to choose from.

Kalmar Care covers all the essential services for maintaining your RTGs or other equipment to help keep your operations going without

disruption. We offer four different types of service and support contracts, which are designed to help you improve your operational efficiency, productivity and financial predictability. Each contract type includes a set of standardised service modules that can be matched to meet your business's needs. You just need to choose which one is right for you and your day-to-day operations.

Genuine spare parts, when the right part matters.

When something needs to be replaced, you want the spare part that meets your exact needs – immediately. Kalmar offers a rapid delivery service for a huge range of premium-quality Kalmar spare parts to anywhere in the world, because unplanned downtime means lost productivity and lost revenue.

Our genuine spare parts are manufactured to the highest engineering standards and with over 50,000 different items in stock, we can deliver

most of them within 24 hours, helping to get your equipment fully operational again as quickly as possible. You can order directly on-line or through one of our e-Catalogues.

Our portfolio goes beyond just spare parts and includes a wide range of parts and logistics services that may be of benefit to your business.

No matter what your service and support needs, make sure that you speak to Kalmar first.

50,000+
Different parts in stock.



24 hrs

Most of our parts can be delivered to you within 24 hours.





KALMAR

Making your every move count

www.kalmarglobal.com