

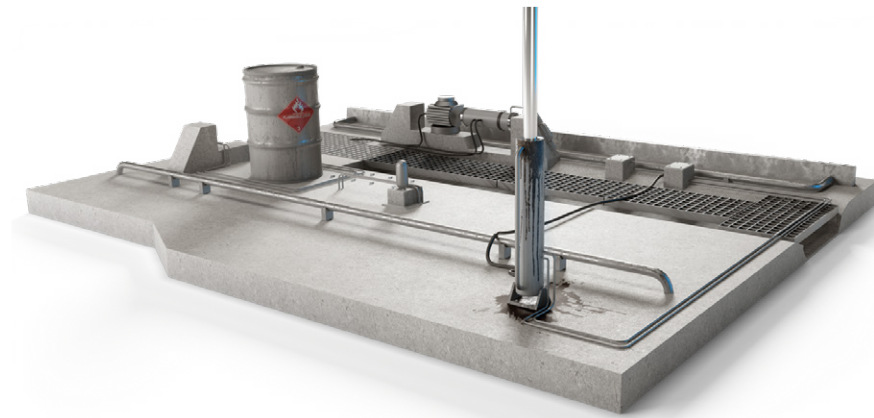


TECHLINE<sup>®</sup>  
IMPROVING FLEXIBILITY

Focus on  
construction

[LINAK.COM/TECHLINE](http://LINAK.COM/TECHLINE)

**LINAK<sup>®</sup>**   
WE IMPROVE YOUR LIFE



### Hydraulic system

- Complex system of oil tanks, pumps, filters and hoses
- Per default no integrated positioning
- Requires routine maintenance
- High energy consumption
- Risk of fluid leaks

VS.



### Electric actuator system

- Simple system of actuator, control and power connection
- Integrated positioning
- Maintenance-free
- Low energy consumption
- No fluids

# Linear actuators - tough enough for construction work

The main concerns when considering an electric actuator solution for heavy-duty construction machinery and equipment are durability and reliability.

These machines must work relentlessly in all kinds of weather and withstand dust, dirt and rough handling. Any failure could put both people and values at risk. Not to mention the often costly delays caused by failing equipment.

We give you two good reasons why you can rest assured that your TECHLINE® actuator solution will do the job no matter what.

The first good reason is our extensive testing programme. The second and equally important reason is the fact that all members of the TECHLINE team of engineers and consultants have vast product and application expertise.

Quite simply, we understand and respond to your needs. Our primary objective is to help improve your application to give you a competitive edge.

## Go electric and spot the difference

Electric linear actuators are the perfect solution when you need simple and clean movement with accurate and smooth motion control. You may choose actuator systems for adjustments, tilting, pushing, pulling and lifting with thrusts up to 15,000 N.

Actuators can be integrated into sophisticated control systems using data bus communication. You get precise position feedback and accurate variable control over acceleration and velocity.

Compared to both hydraulic and pneumatic systems an actuator solution is a lot easier to install. It takes up less space and there are no hoses and pumps that require routine maintenance.

*“More than 15 years of experience with construction and close cooperation with major construction manufacturers has matured our products in robustness and supplied quality.”*

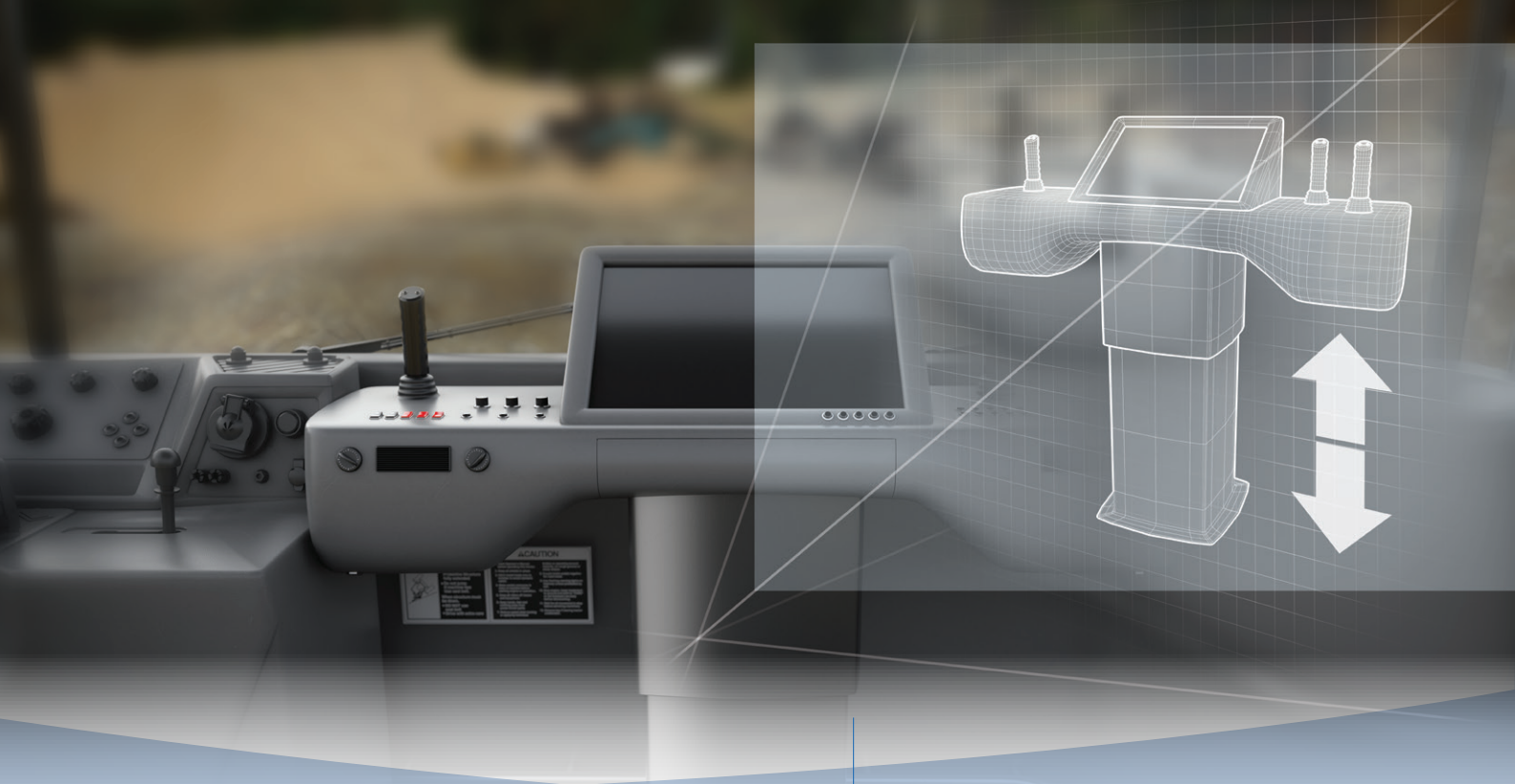
*- Søren R. Bruun, Application Engineer, Off-highway*

A linear actuator has a long lifetime with little or no maintenance at all. This ensures a very low total operating cost compared to other systems. Electric actuator systems are quiet, clean, nontoxic and energy efficient. They fulfil the ever increasing demands and legislation concerning environmentally sound equipment.

LINAK offers service  
worldwide

Please contact your local LINAK office with  
your enquiry





## Improving ergonomics is easy

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### Control panel

Height adjustment of the control panel is a good way for the driver to change their working position between sit and stand for a less straining, and more comfortable working environment

# Focus on ergonomics within construction - and why neglecting it can cost you

There is no other industry where employees suffer more from ergonomics-related injuries and pains than within construction.

According to the British 'Health and Safety Executive' (HSE), more than 8.9 million working days are lost every year in the United Kingdom, due to 'musculoskeletal disorders' (MSD). As many as 80,000 (1 in 40) British construction workers report a work-related illness every year. 65% of them are related to MSD.

In many cases, poor ergonomics is the root cause. The culprits seem to be vibration, bending, twisting or poor work postures while operating a machine or a vehicle or when entering/exiting a large vehicle.

## Demographic trends drive numbers up

Researchers at Construction Research and Training (CPWR), USA, concludes that aging is one of the global trends playing a negative influence on the

MSD statistics too. People generally postpone retirement and stay longer at work. If that include sitting inside a construction vehicle for years, you have the recipe for ailments like pains, strains, and fatigue in the neck or in the back.

## Meet the challenges with simple adjustments

Solutions, however, do exist to meet these negative effects. Various electric adjustment options can minimise physical stress of prolonged sitting, and will help personalise settings, for instance reposition control panels or lower pedals. This also allows any driver to change posture from time to time.

Drivers of construction vehicles deserve a good working environment too.

### 5 obvious benefits of ergonomics:

- Reduces costs
- Improves productivity
- Improves quality
- Improves employee engagement
- Creates a better safety culture

### 5 ergonomics trends:

- Being proactive
- Integrating the process
- Engaging others
- Moving upstream
- Addressing the office



### Ladder adjustment

Extending and retracting ladders ensure a strain-free climb aboard larger construction machinery, and extending a ladder closer to the ground helps the operator get safely off the machinery

# Improve ergonomics with adjustable ladders

- safety from entry to exit

When designing large construction machinery, integrating an adjustable ladder is worth taking into consideration. The most prominent win is that it significantly improves the level of safety for the operator, when entering or exiting the cab.

Powered retractable access systems provide a strain-free climb on board larger machinery, as ladders can be lowered close to ground level. This is a significant improvement as the first step up these ladders is usually quite a leap. The same principle also helps the operator get safely off the machine, avoiding painful and costly fall accidents when failing the last tall step down.

## Comply with standards using electric actuators

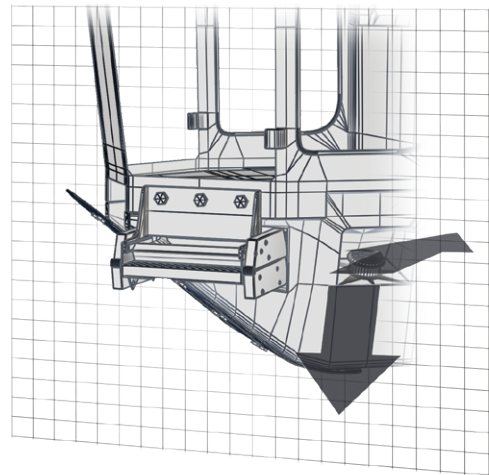
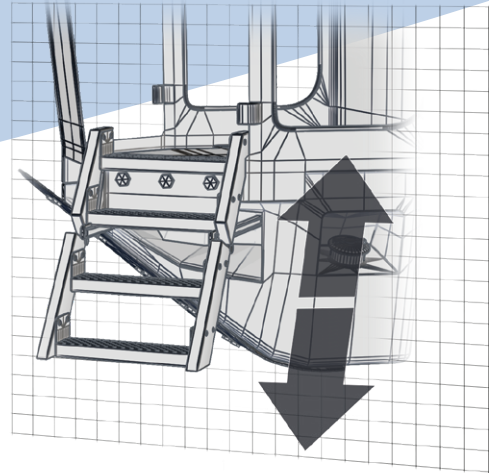
To ensure maximum safety, the standard IOS 2867:2011 states that an adjustable ladder must be activated and fully extended before the operator is allowed to access it. Using electric actuators from LINAK® makes it easier to comply with this standard.

Traditional adjustment systems are often powered by the machine's main engine. However, with electric actuators moving the ladder, the operator depends only on the battery to get safely in or out. Also, actuators with IC™ can integrate smoothly with any CAN bus control system, for instance, making it impossible to open the doors before the stairs are extended. Safety first!

## Improve performance and prevent theft

Another benefit gained by adjustable ladders is the sheer fact, that retracting the ladder while operating the machinery, gets the ladder out of the way and prevents damage to the equipment when working in rough terrain. In fact, a damaged ladder is a safety risk – both to the operator and to the machine itself.

Ultimately, automatic retraction of the ladder at the end of the working day, leaves a machine less prone to break-in, vandalism, or theft, as it becomes virtually impossible to enter.



# What LINAK® actuators do for the wheel loader

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TECHLINE® actuator systems are ideal for use in harsh environments and they already provide movement and adjustments in a number of different construction applications.

In heavy machinery, electric actuators provide advanced motion control and rugged force for hoodlifts, steps and footboards, superior position feedback for throttle adjustment, ergonomic positioning of steering wheels, seats and pedals as well as electric operation of ventilation hatches, mirrors etc.

## Steering wheel

Positioning of the steering wheel for easy access and comfort during operation

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## Quick attachment

For easy change of front end mounted tools

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### Cabin tilt

For easy access under the cabin  
if maintenance is needed

### Throttle adjustment

Depending on the type of operation the  
number of revolutions and thereby the  
diesel consumption is adjusted to ensure  
economic operation

### Hoodlift

Easy access for maintenance  
and routine service

### Ladder

Moving access  
ladder up and down

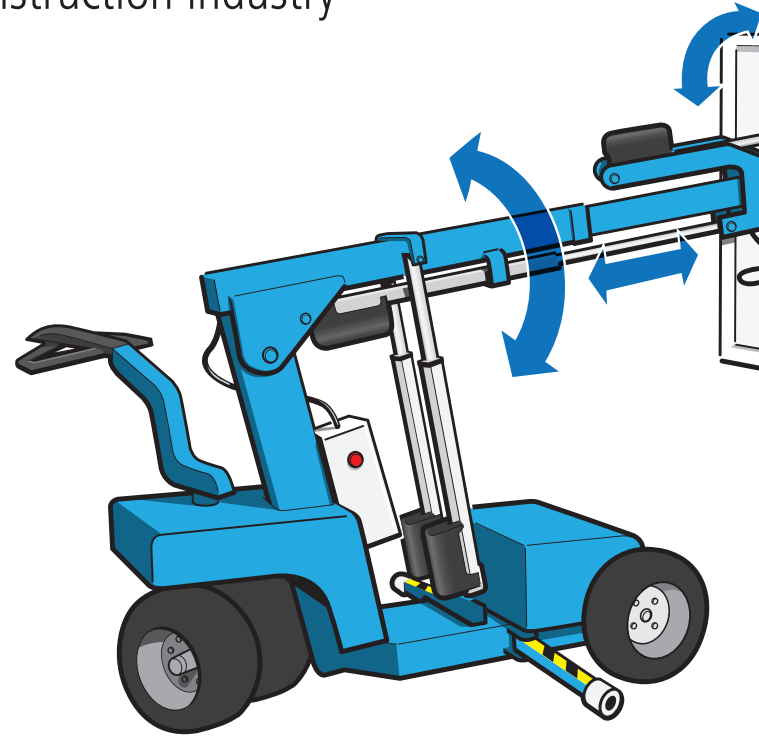
### Protection plates

Easy access for maintenance and routine service  
on ground level

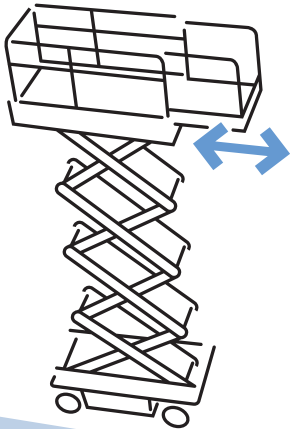
# What LINAK actuators do for the construction industry

Safety and ergonomics are key elements when designing construction and off highway applications. For example, a lifting device provides an efficient relief from heavy manual lifting, when workers handle glass and window panes. Through simultaneous operation electric actuators allow for safe lifts of heavy loads.

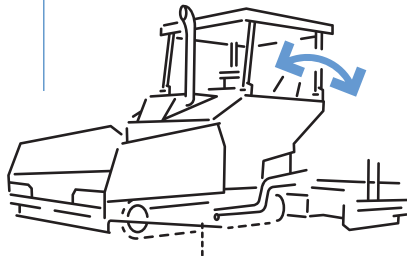
When it comes to traffic control signs, LINAK® actuators have a proven track record. They provide remote operation of traffic signs, which ultimately increases the safety for the operators handling traffic-related issues, since their presence on site is not required.



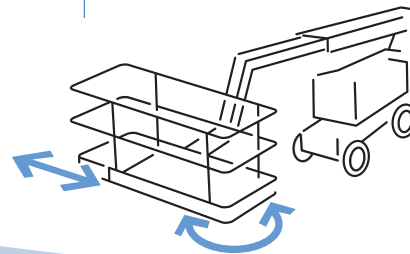
Lifts



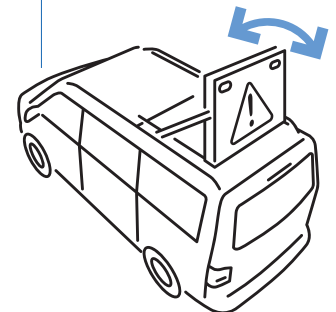
Asphalt paver

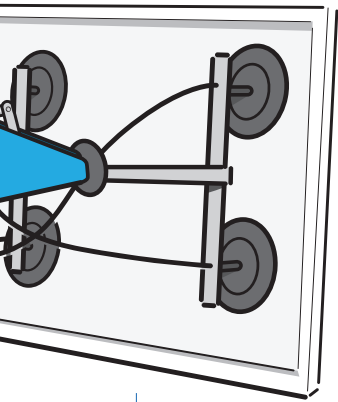


Aerial workstation



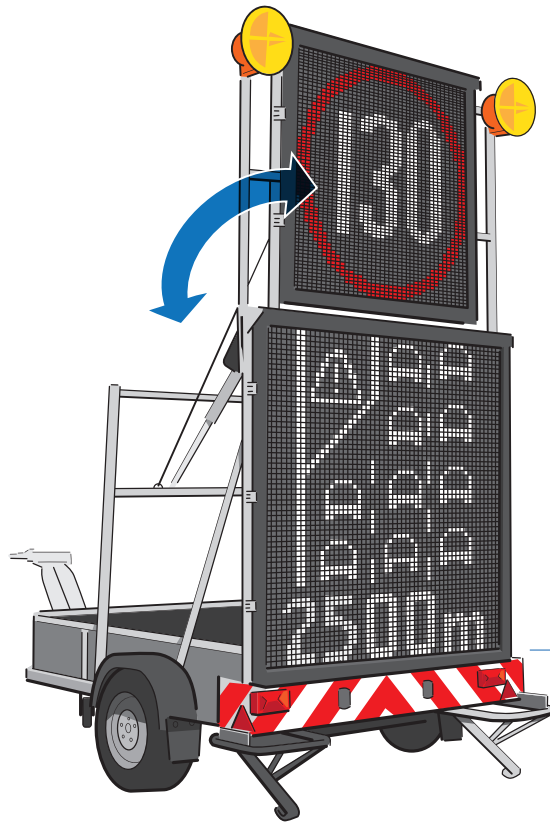
Folding lights





### Lifting device

Easily lifting and handling glass and window panes for optimised ergonomics



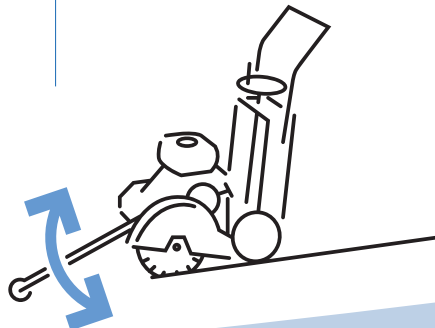
### Traffic sign

Remotely controlling traffic signs for safe operation

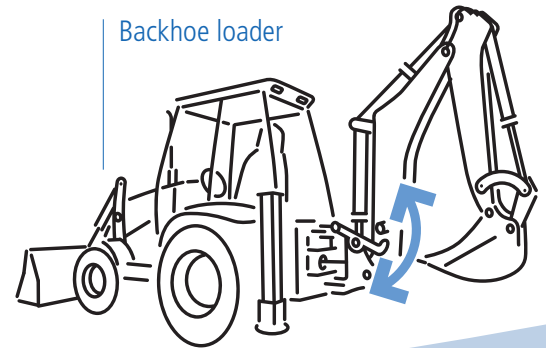
### Water mist blower



### Concrete saw



### Backhoe loader



# Explore the rich technology behind actuators

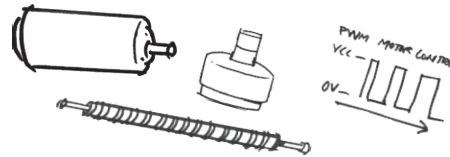
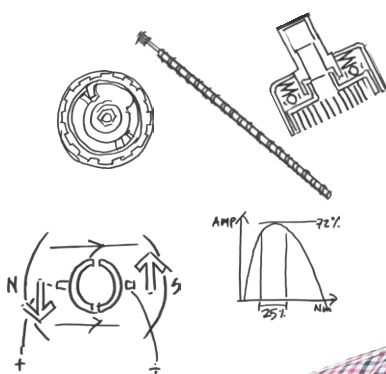


At the Actuator Academy™, you will find a library of videos and information about actuator components, actuator testing, and intelligent actuator control.

Find out what you should expect of a good industrial actuator, what affects its performance and efficiency, and how to best utilise your linear motion actuator.

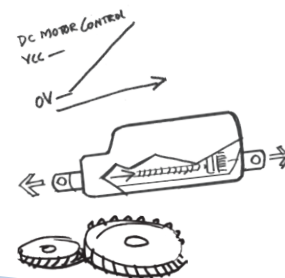
We hope to inspire you and ultimately make you wiser on the moving electric revolution we are all part of.

**Happy exploring!**

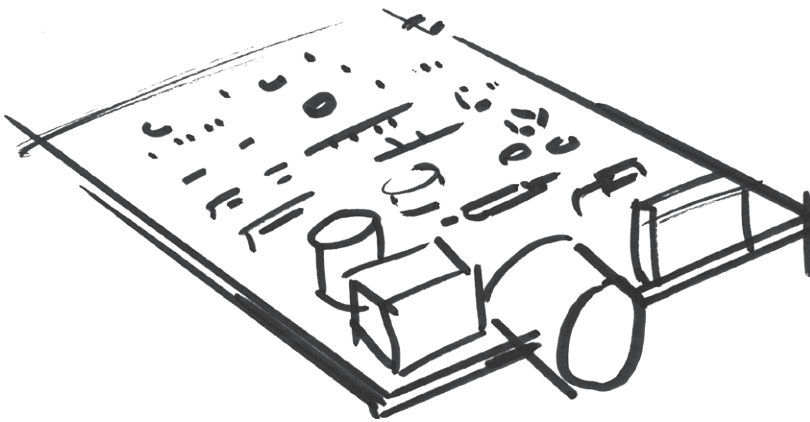


Check out the  
Actuator Academy

[LINAK.COM/  
ACTUATOR-ACADEMY](http://LINAK.COM/ACTUATOR-ACADEMY)



# Smart movement for construction applications



A LINAK® IC actuator with built-in controller reduces the number of external components and the need for a third-party supplier for power electronics.

It also offers a comprehensive range of interfaces and gives you access to productivity enhancing data - all delivered by a single supplier you can trust.

By helping you move smarter at every stage of your application process, from development, installation and integration to tailored movement and improved productivity, our IC actuators add value across the board.

## IC INTEGRATED CONTROLLER™

Choosing an IC actuator for your application is a smart move in many ways:

- Reduced complexity for faster development and production
- Flexible integration with a variety of industrial interfaces
- Data monitoring that minimise downtime and boost productivity
- Benefit from one single supplier



For more information on IC, please visit [LINAK.COM](http://LINAK.COM) or scan the QR code.

# Actuators for construction machinery

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LINAK® industrial actuators offer a versatile array of movement solutions for construction applications.

With **thrusts up to 15,000 N, max speeds up to 160 mm/s, and strokes between 20 and 999 mm**, the actuators are highly adaptable for a wide variety of applications.

Industrial actuators with **heavy-duty aluminium housings** are very suitable for use in corrosive environments. Having been thoroughly salt spray and chemical resistance tested and approved for ratings up to **IP66 and IP69K static**, these actuators will work reliably for years, even when exposed to salt, water, wind, and sun.

**Operating temperatures between -40°C to +85°C** make them fit for work in numerous settings.

Actuator LA37



Actuator LA36



Actuator LA33



Actuator LA25



Actuator LA14



## SAE J1939 CAN bus

As an all-in-one package solution, LINAK also offers actuators with integrated SAE J1939 CAN bus control. With this well-known bus standard you can use linear actuator movement in your CAN bus system without having to customise additional controls.

In addition to full position control, the CAN bus actuator is able to provide feedback information about the piston position, service data and full diagnostics. It also provides system identification data and actual current at runtime.

**CAN | J1939**

# Testing programme

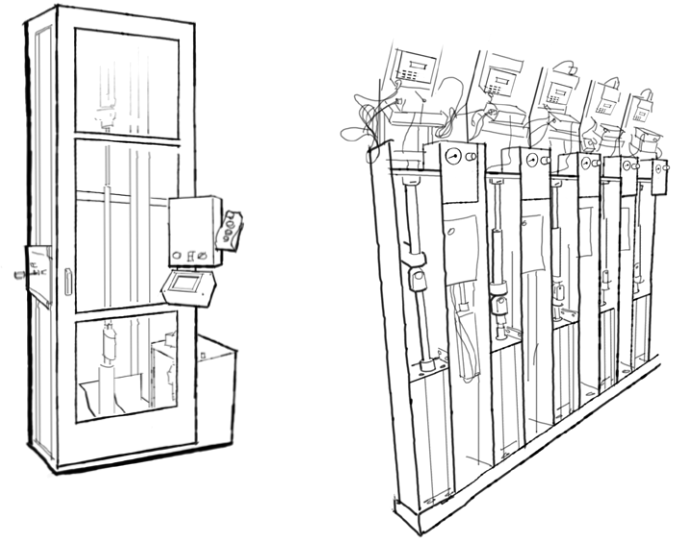
In each industrial application, the actuator is just one component of many, but at LINAK® we fully appreciate that it is of utmost importance to you and your customers. Not a single actuator leaves the factory until it has undergone a 100% function test.

Depending on the actuator type, various tests have been carried through. Please consult your local LINAK office or take a look at the actuator data sheet in question to get a thorough test overview.

This is your guarantee that a solution based on LINAK TECHLINE electric actuator systems is a solution that will work reliably for years and years.

“Our actuators must never malfunction. Therefore, it is important that all our products are tested inside and out, and to the extreme in a wide range of tests.”

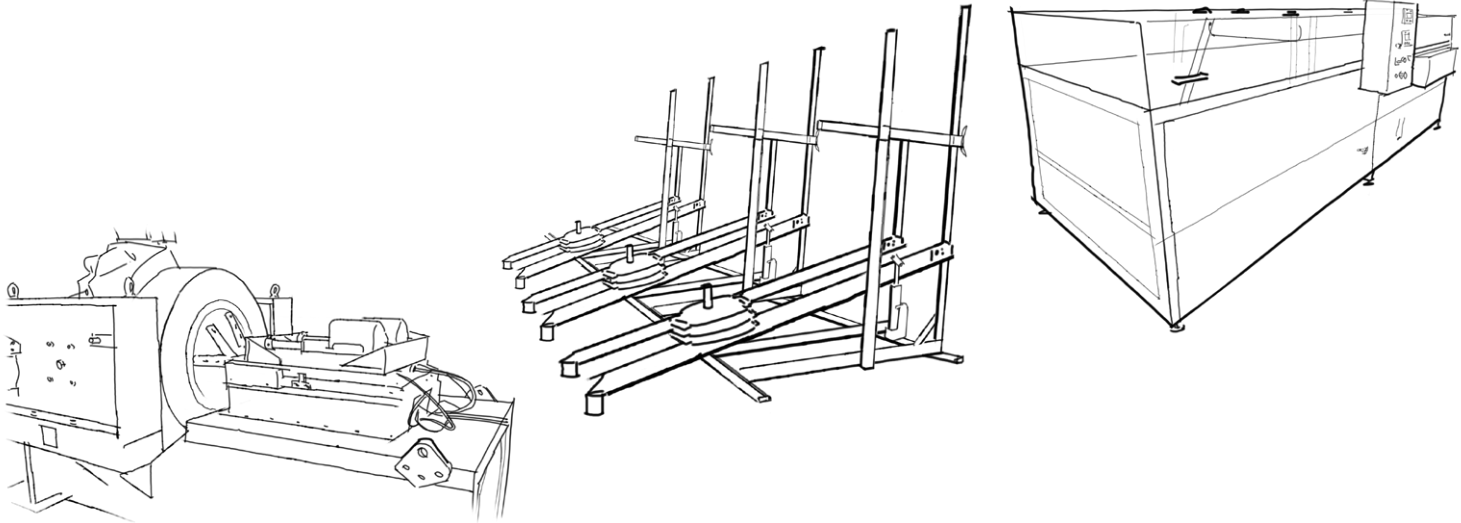
- Claus H. Sørensen, Director R&D



## Climatic tests:

In the climatic test the actuators are tested to operate in extreme temperatures as well as to endure rapid changes in temperature. In a dunk test, the actuators have to withstand repeating temperature fluctuations between +85°C to -40°C and still maintain full functionality and ingress protection.

<b>EN60529-IP6X</b>	- Dust
<b>EN60529-IPX6</b>	- Water
<b>ISO16750- IP69K</b>	- High pressure cleaning
<b>IEC60068-2-3</b>	- Moisture storage
<b>IEC60068-2-30</b>	- Operation in moisture
<b>ISO16750-4:2010</b>	- Dunk test
<b>EN60068-2-52</b>	- Salt spray
<b>BS7691 Section 6.11.2.4</b>	- Chemicals



### Electrical tests:

All electrical parts are tested i.e. power supply, power and signals cables, control signals etc. Electrical immunity is tested according to industrial standards i.e. for radio noise, electrical discharge and burst.\*

<b>EN/IEC 61000-6-4</b>	- Generic standard emission industry
<b>EN/IEC 60204</b>	- Electrical equipment of machinery
<b>EN 50121-3-2</b>	- Railway applications - Rolling stock apparatus
<b>94/25/EC</b>	- Recreational crafts directive
<b>EN/ISO 13766</b>	- Earth moving machinery
<b>EN/IEC 61000-6-2</b>	- Generic standard immunity industry
<b>2004/104/EC</b>	- Automotive Directive
<b>EN/ISO 14982</b>	- Agricultural and forestry machines
<b>EN/ISO 13309</b>	- Construction machinery

\* These tests do not apply to third party products!

### Mechanical tests:

**Vibration:** The actuator must withstand continuous vibration in three directions.

**Shock:** The shock test puts the actuator through 3 shocks of up to 50 G in each of six directions.

**Bump:** The actuator receives bumps of up to 30 G in each of six directions several hundred times.

**EN60068-2-64 (Fh)** - Random vibration

**EN60068-2-27 (Ea)** - Shock

**EN60068-2-29 (Eb)** - Bump

Find out more about how we test actuators to the extreme:

[linak.com/segments/techline/tech-trends/testing/](http://linak.com/segments/techline/tech-trends/testing/)





Resting on the pillars of the LINAK values

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QUALITY

Built by market leading experts, using state-of-the-art technologies and perfected production methods, you can expect the same quality worldwide.



INNOVATION

Innovation is in our core. We take the lead and have the courage to make it real.



RESPONSIBILITY

We are responsible in what we do – towards customers, employees and environment. Creating trust is a natural part of who we are.



LOCAL  
& GLOBAL

From global presence to local understanding. We believe in world-wide support and being close to our customers.



For further information, please visit our website:  
[LINAK.COM/BUSINESS-AREAS/CONSTRUCTION/](https://www.linak.com/business-areas/construction/)

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