Focus on
Solar Tracking

LINAK®
WE IMPROVE YOUR LIFE

LINAK.COM/TECHLINE

Improving energy efficiency

Global warming and the drive to minimise greenhouse gas emissions has put the focus on how to make the most of natural energy sources.
Solar tracking is an obvious way to improve the efficiency of solar power plants. As the sun moves across the sky, an electric actuator system makes sure that the solar panels follow automatically and maintain the optimum angle to make the most of the sunbeams.

In recent years, the TECHLINE® team of engineers and consultants have given solar tracking their special attention. The well-proven reliability and long maintenance-free lifetime of LINAK actuators even under extremely rough conditions make TECHLINE electric actuator solutions particularly well suited for this kind of application.

Flexibility is a keyword. You get excellent stepless positioning and feedback to your control system - both digital and analogue. When the main power is not available, LINAK actuators can run on battery backup and manual override is also available.

Creating value for our customers – by cooperating with LINAK® you get:

- Dedicated worldwide sales and service teams in more than 30 countries.
- Quality actuator solutions developed to meet the harsh environments to which solar parks are exposed.
- Complete and simple solutions from one supplier. As an option our actuators come with embedded Modbus technology for ease of communication and less component complexity.

LINAK® industrial actuators offer a versatile array of movement solutions for solar tracking, with the overall goal of improving the yield from PV installations.

LINAK offers service worldwide

Please contact your local LINAK office with your enquiry

Actuators with embedded Modbus communication

Modbus is part of our IC™ programme and is a well-known communication technology that has been on the market for years. Modbus simplifies the communication, meaning you can connect several solar trackers in serial and thereby eliminate the need for lots of signal cables and still control the whole park from a central point.

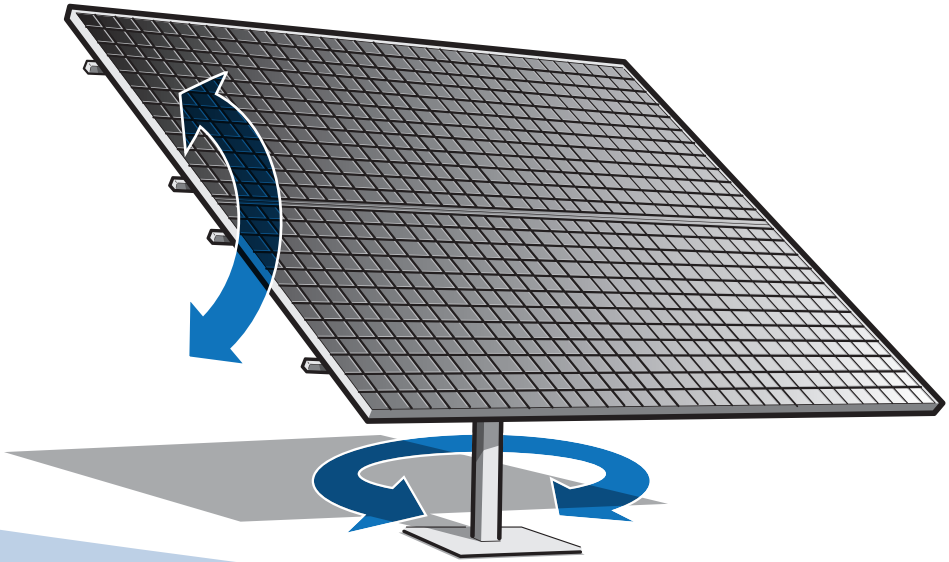
Besides from improving your return on investment, Modbus has many other advantages:

Lower investment

- Less complex system
- Less cables due to BUS topology
- Less need for I/O boxes
- Less programming time due to standard communication language
- Less installation time as the number of components are reduced and the control of the solution is embedded
- Everything programmable and controllable from a central controller
- One scalable solution for different sizes of installations

Longer lifetime

- Electronic overload protection protects the actuator. The current can be adjusted in both directions.
- Lowering of speed and soft-start and stop reduce the wear on mechanical parts
- Temperature surveillance and alarm



Imagine...

...if LINAK could reduce your maintenance costs by 50%?

Lower maintenance and operational costs

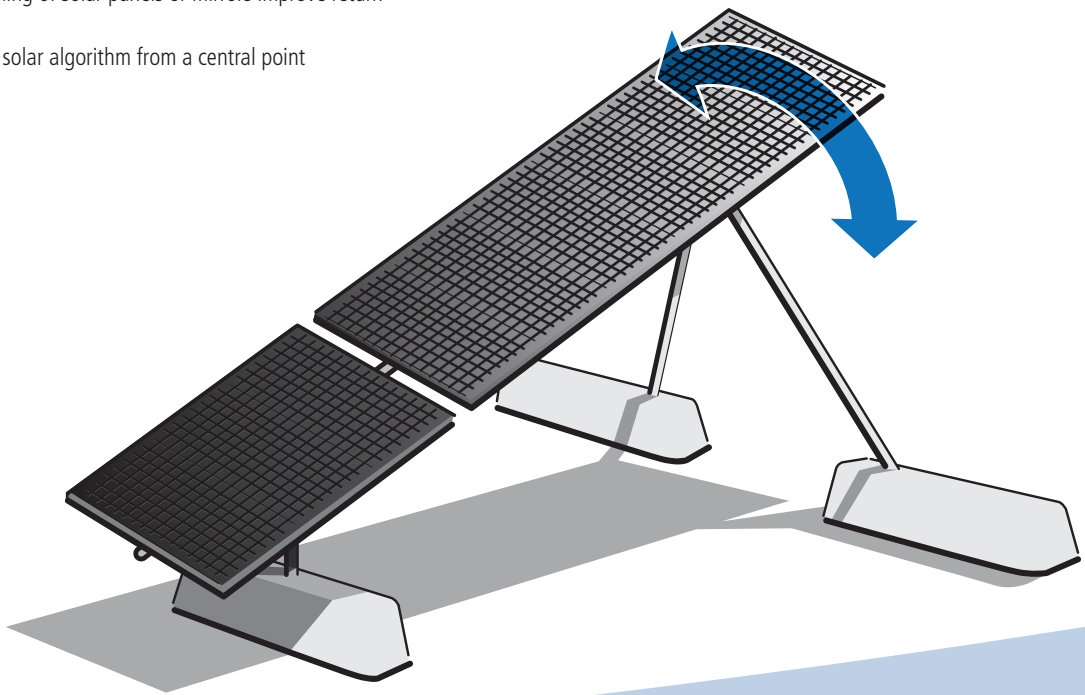
- Less components
- Maintenance-free mechanics
- Easy integration with SCADA systems through BUS interface
- Integrated diagnostics enable preventive maintenance.
  E.g. log of current, cycles and temperature
- Remote monitoring of installation by use of an Ethernet-BUS gateway

Improved yield of PV installations

- Accurate positioning of solar panels or mirrors improve return of investment
- Enhancement of solar algorithm from a central point

What is Modbus

Modbus Protocol is a messaging structure developed by Modicon in 1979. It is used to establish master-follower communication between intelligent devices. It is a de facto standard, truly open and the most widely used network protocol in the industrial manufacturing environment. It has been implemented in different devices to provide reliable data transport between devices.



Explore the rich technology behind actuators

Actuator Academy™

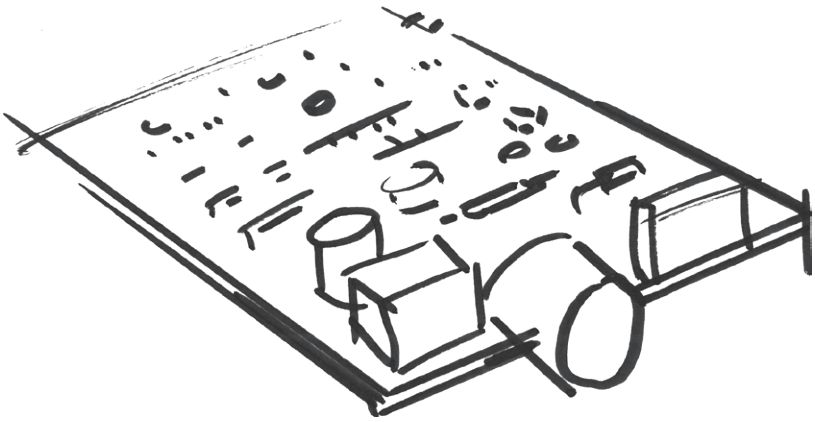
At the Actuator Academy™, you will find a library of videos and information about actuator components, actuator testing, and intelligent actuator control.

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!

Smart movement for solar tracking



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 or scan the QR code.

Actuators for solar tracking

LINAK® industrial actuators offer a versatile array of movement solutions for solar tracking.

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 LA35

* Product is shown with optional trunnion mounting

The LINAK solar park

At LINAK, we want to showcase our flexible actuator solutions in action. Therefore, we have developed a solar tracking solution based on our LA35 and LA36 actuators for our solar park at LINAK headquarters in Guderup.

The park has been succesfully up and running since 2011 and in 2014 we added an additional 5,000 squaremeters of photovoltaic (PV) panels on the roof of our new factory.

By tracking the movement of the sun, we are able to get 30 - 40 % extra output from the panels. There are three different trackers, all single axis and all using Modbus communication.

Thanks to the integrated Modbus, we were able to daisy chain the actuators - making the cabling and overall installation easier. Furthermore, the Modbus communication allows us to remotely monitor the status of each solar panel and ensure that they are automated based on seasons and weather conditions.

At this point, the entire PV facility covers approx. 12 % of our total power consumption.

Video - LINAK solar park

LINAK.COM/BUSINESS-AREAS/ENERGY/SOLAR-TRACKING

Testing programme

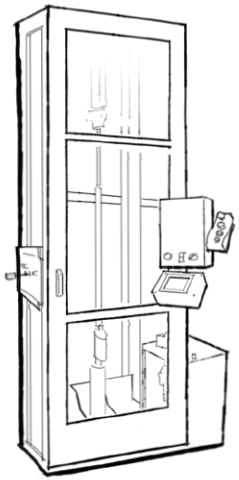
In each industrial application, the actuator is just one component of many, but at LINAK® we fully appreciate that it is of utmost importance to you and your customers. Not a single actuator leaves the factory until it has undergone a 100% function test.

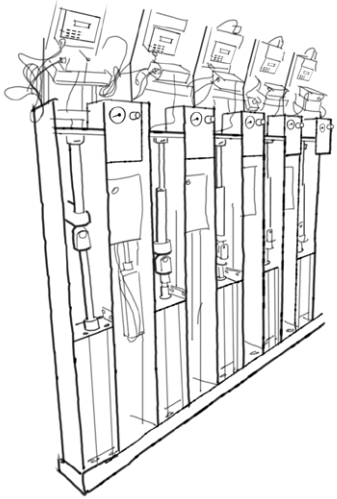
Depending on the actuator type, various tests have been carried through. Please consult your local LINAK office or take a look at the actuator data sheet in question to get a thorough test overview.

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

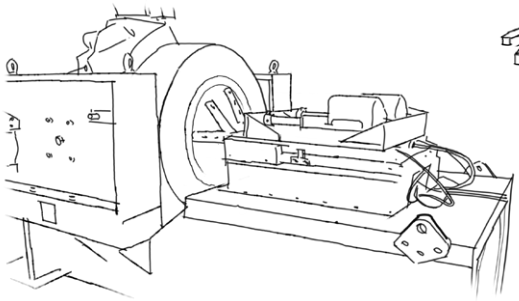


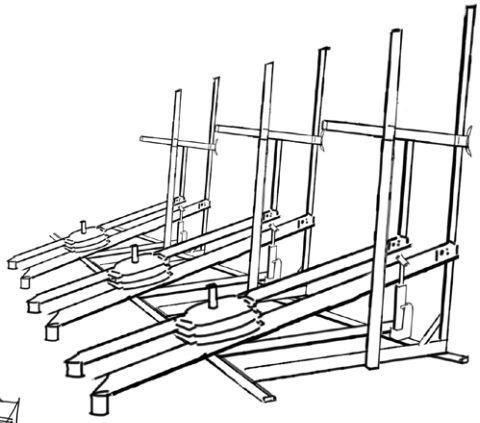


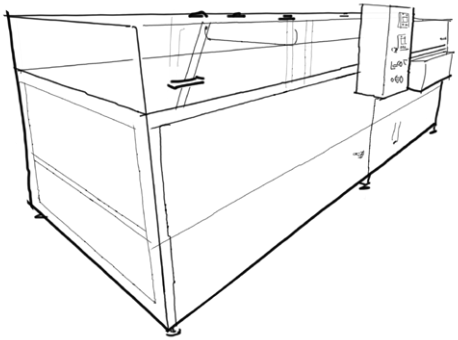
Climatic tests:

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.

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

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

For further information, please visit our website:
LINAK.COM/BUSINESS-AREAS/ENERGY/SOLAR-TRACKING/

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.

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