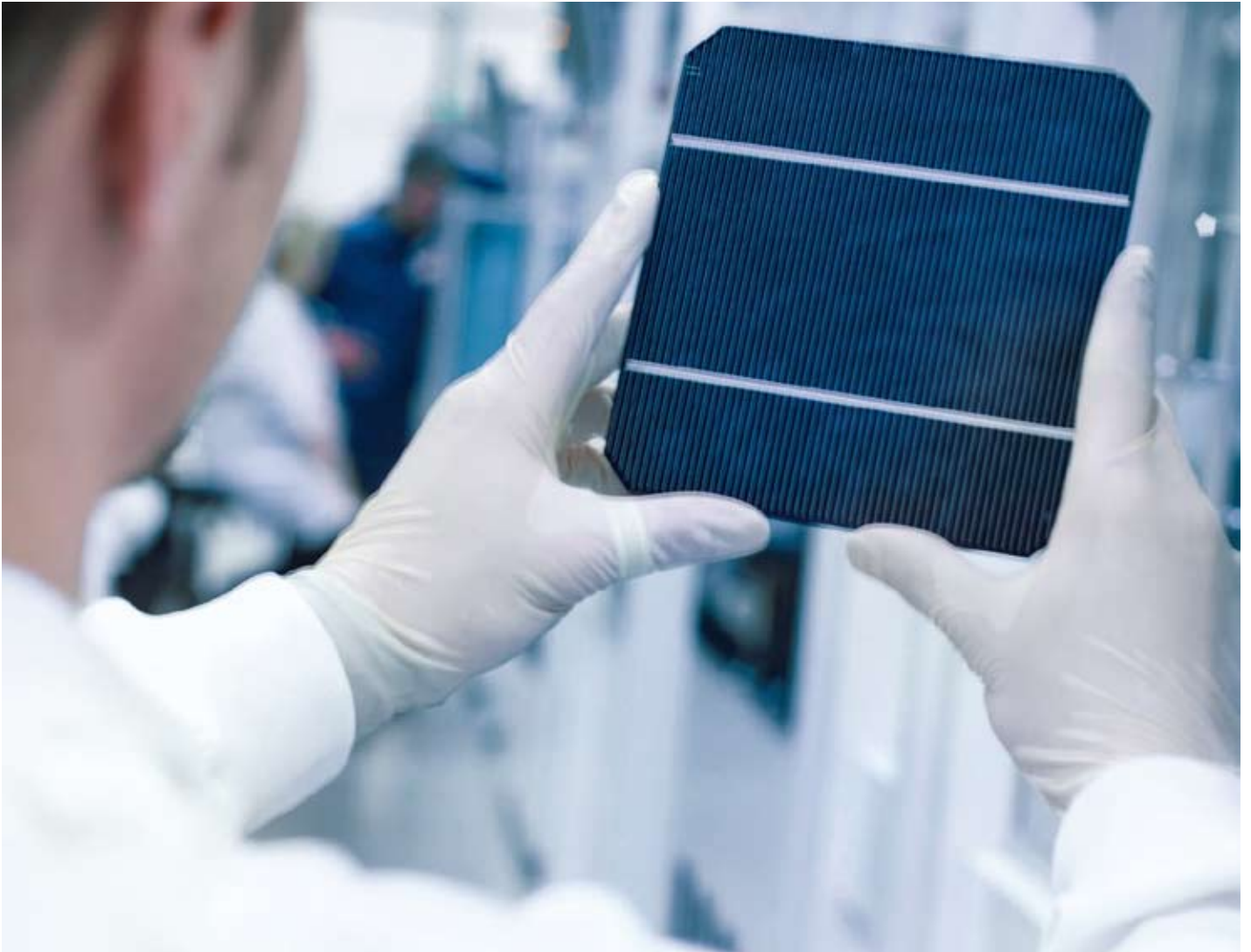


Opening up new dimensions with Rexroth – fully fledged automation solutions for the photovoltaic industry





Higher productivity, lower manufacturing costs

Reduce production costs permanently with fully fledged one stop shop system solutions: As a manufacturer of all drive and control technologies, Rexroth combines global application experience with a modular automation system customized for the photovoltaic industry. Your benefit as a machine operator: increased availability and productivity.

The easy way to get faster results

Perfectly coordinated electric drives, controls, pneumatic, linear and assembly technology are provided for the entire manufacturing process of solar cells and modules. The modular automation system with its finely scaled hardware and software simplifies operation all along the value chain. This reduces your training and maintenance periods.

The certified safety technology in the drives shortens downtimes after manual interventions while innovative condition monitoring systems for electric drives and pneumatic cylinders provide early warning of wear and tear, thus reducing machine downtimes.

Represented in more than 80 countries, Rexroth provides you with global support in standardizing and increasing the efficiency of your production systems. Experienced specialists assist you from the concept phase to project execution and commissioning. Our closely meshed service network is always on hand to provide you with a range of services throughout the entire life cycle of your product. The result is increased productivity and reduced manufacturing costs.

Implementing sophisticated projects swiftly and efficiently: Rexroth assists machine manufacturers and system integrators to speed up the entire engineering process. All Rexroth modular automation system interfaces are perfectly coordinated, all components can be finely scaled.

Be it components, turnkey modules or fully fledged system solutions, you can always rely on Rexroth to provide the right solution. Swift engineering is the key focus. The IndraWorks engineering environment offers all software tools for commissioning and diagnostics on a modular basis. Motion Logic integrations based on IEC 61131-3 and PLCopen function libraries. In many cases, predefined functions replace programming with simple parameter setting.

camoLINE, the modular concept for handling systems dramatically reduces assembly work with Easy-2-Combine positive fit connection technology and replaces expensive robots.

The contactless linear motion system carries the highly sensitive solar cells through the process chambers via an externally mounted linear motor. This considerably simplifies design work. The TS 2pv transfer system conveys thin-film modules and wafer-based solar modules placed on it directly without any vibration. Fully standardized interfaces and programs, innovative products and extensive support by Rexroth: the easy way to get faster results.



Customized assembly line, all over realised with the handling system camoLINE and transfer systems from Rexroth.

Efficiency you can measure

Overall equipment efficiency forms the objective yardstick for productivity in real terms: real system availability and output of flawless products during this period determine this value which is considerably enhanced by Rexroth automation solutions.



As varied as the individual process stages are, from molten silicon to the finished solar module, Rexroth covers them comprehensively. From wafer and solar cell production to module assembly, Rexroth components, modules and system solutions increase system availability and output and improve quality.

The certified Safety on Board technology integrated in the drive reduces machine downtimes as during manual interventions operators only have to activate the safety functions of the relevant axes. Following intervention, the station immediately resumes production. Action-oriented diagnostic tips provided by the productivity agent in the servo drives and DDL-X tool signal wear and tear.

Lifetime lubrication in the linear axes further reduces maintenance requirements. IndraDrive servo drives with Multi Ethernet interfaces and guide rails and carriages which can be freely combined also simplify spare parts logistics.

The drive, controller and PC-based motion logic systems coordinate all movements with outstanding precision. In doing so, the IEC-compliant PLC flexibly performs process tasks. In the event of format changes, Rexroth simplifies conversion by implementing intelligent technology functions with measurable efficiency.

Easy, safe and economical

The Rexroth modular automation system flexibly implements the requirements of every single process stage, saving scarce resources and energy and always affording optimum personal safety for operators and maintenance workers alike.



Control City

The Rexroth control world is synonymous with the openness and diversity that only metropolises can offer. These finely scalable, consistently open system solutions provide the space for your ideas to unfold. At the same time, many predefined functions help you to focus on essentials, on your process know-how. A coherent engineering environment and standard PLC for all hardware versions speeds up implementation.

Safety on Board

Maximum safety is of course one of the fundamental requirements. Only Rexroth can supply the expertise for practical safety at all levels of automation and in all technologies with standardized products. From components to system solutions and including software, services and practically based training, Rexroth assists you in implementing economical machine and system solutions.



Rexroth 4EE

In our Rexroth 4EE we have developed a universal system. It perceptibly increases the energy efficiency of machines and systems in a fourfold cross-technology approach. This helps you lower CO₂ emission for your production as well as energy costs. Rexroth: for easy, safe and economical automation.



Perfect automation solutions: from liquid silicon to the finished module



◀ Ingot production

Vibration-free – powerful direct drives for high torque and outstandingly smooth action.



◀ Ingot sawing

Safe and easy – pneumatic dancer control prevents wire break.

▲ Wafer cleaning

Media-resistant – protective transport thanks to corrosion-proof components.



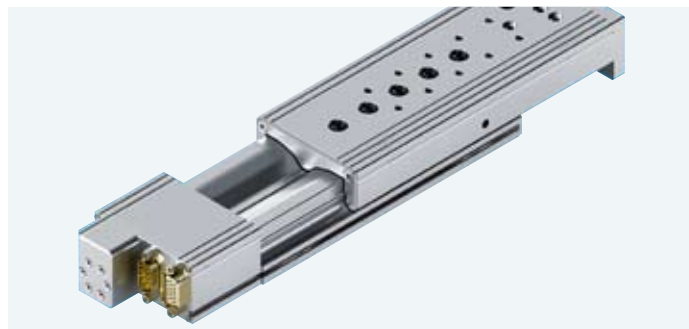
◀ Test and quality classification

Careful – contact-free handling with pneumatic grabbers based on the Bernoulli principle.



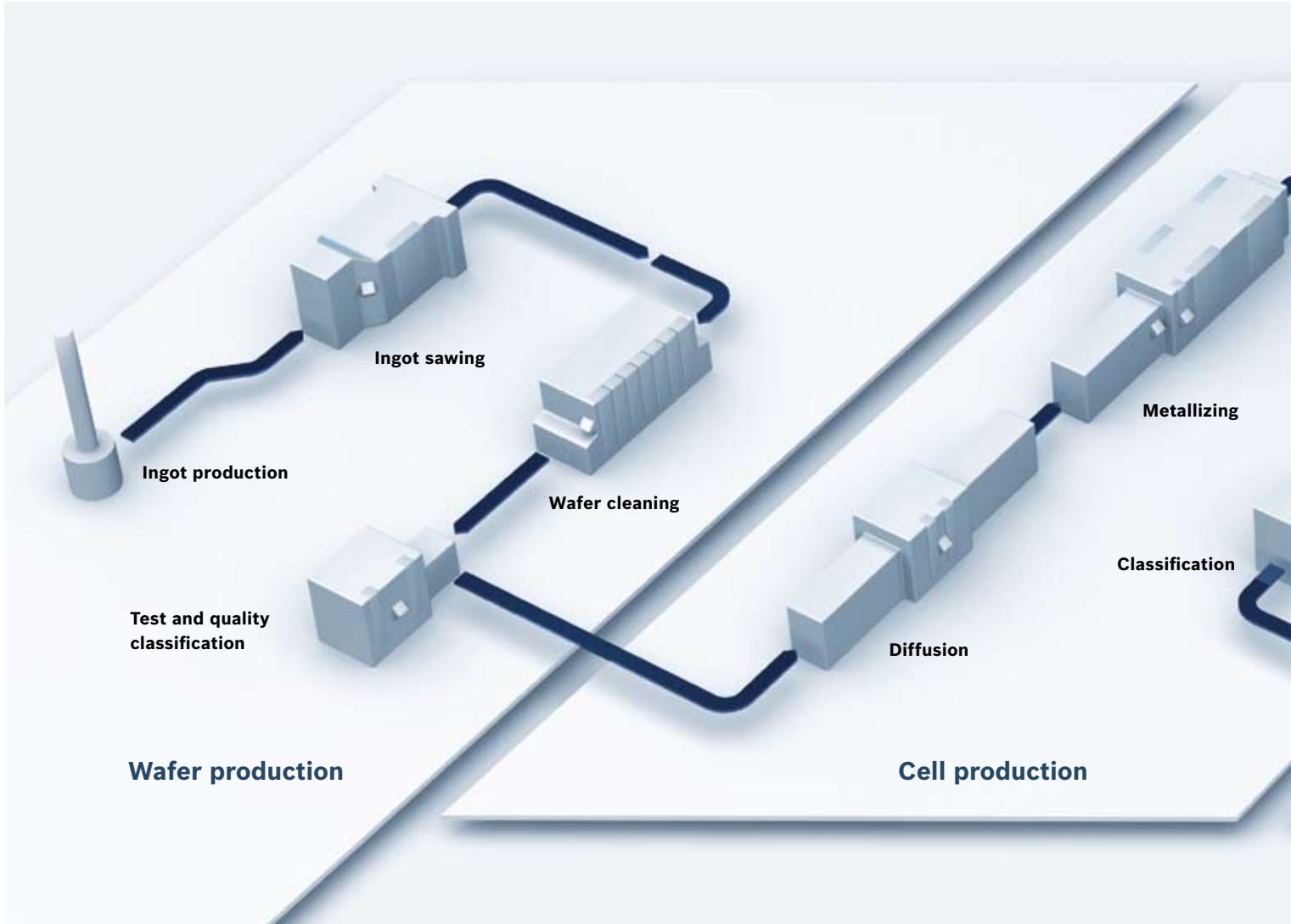
◀ Diffusion

Process-independent – contact-free transport by the linear motion system with a linear motor mounted outside the process chamber.



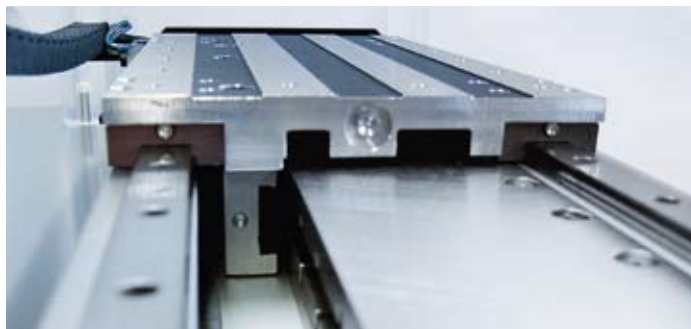
◀ Metallizing

Precise – maximum positioning accuracy with pneumatic guide cylinders.



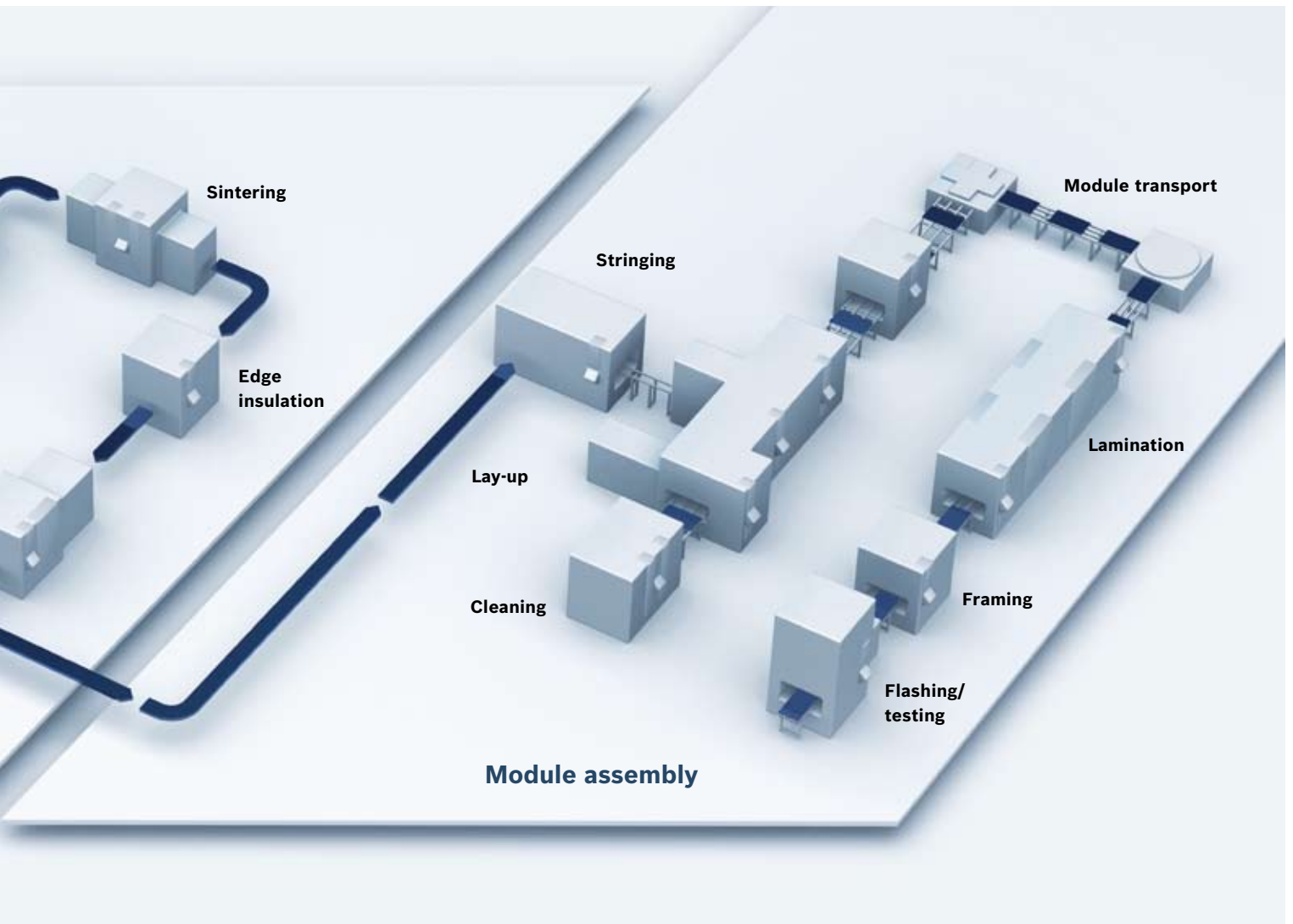
◀ **Sintering**

Temperature-resistant – ultra-quiet toothed chains resistant up to 450 °C.



◀ **Edge insulation**

Productive – swift CNC system solution with linear motors for demanding laser processing.



◀ Classification

Flexible – motion logic systems with robot control or turnkey cartesian systems.



◀ Stringing

Fully fledged – modular axle system to motion logic with predefined handling functions.

▲ Lay-up

Scalable – drive- and controller-based control systems with identical PLC and PLC-open function libraries.



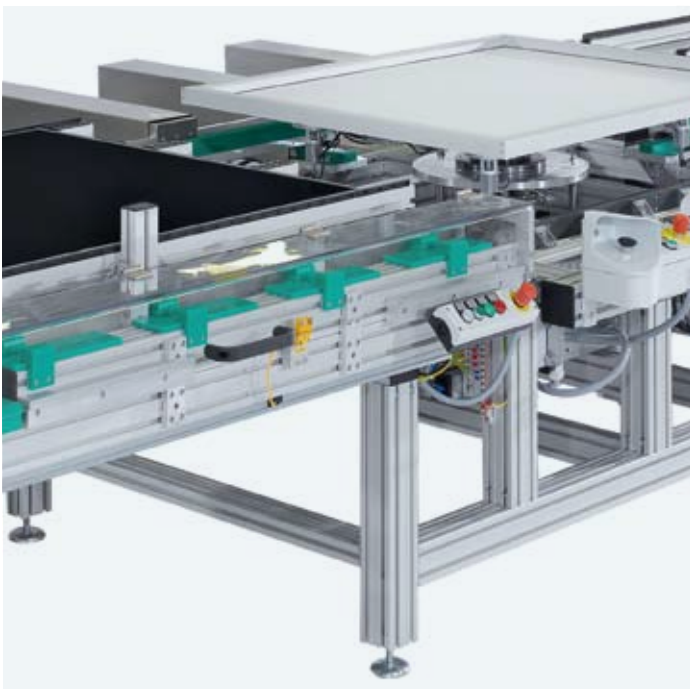
▲ Module transport

Vibration-free – toothed belts with closed surfaces and many conveyor modules for the transfer system.



◀ Lamination

Energy-efficient – efficiency-optimized synchronous motors and pneumatic cylinders.



◀ Framing

Process reliability – pneumatically driven cylinders with pressure control ensure smooth bead-on plate welding and careful joining.

▼ Flashing/testing

Documented – mechanical precision instruments in combination with high power industrial PC process measuring data in milliseconds.





Rexroth – automation by the industry's experts

Rexroth is one of the world's leading specialists in drive and control technology. The Drive & Control Company develops and produces customized drive, control and motion solutions. In doing so, the company consistently orientates itself towards markets and industrial sectors.

In solar technology sector management, Rexroth focuses its global application experience on the automation of production and assembly lines for the photovoltaic industry. The manufacturer of electric drives and controls, pneumatic, linear and assembly technologies thus offers a unique benefit: Rexroth experts support machine manufacturers and users with their cross-technology know-how.

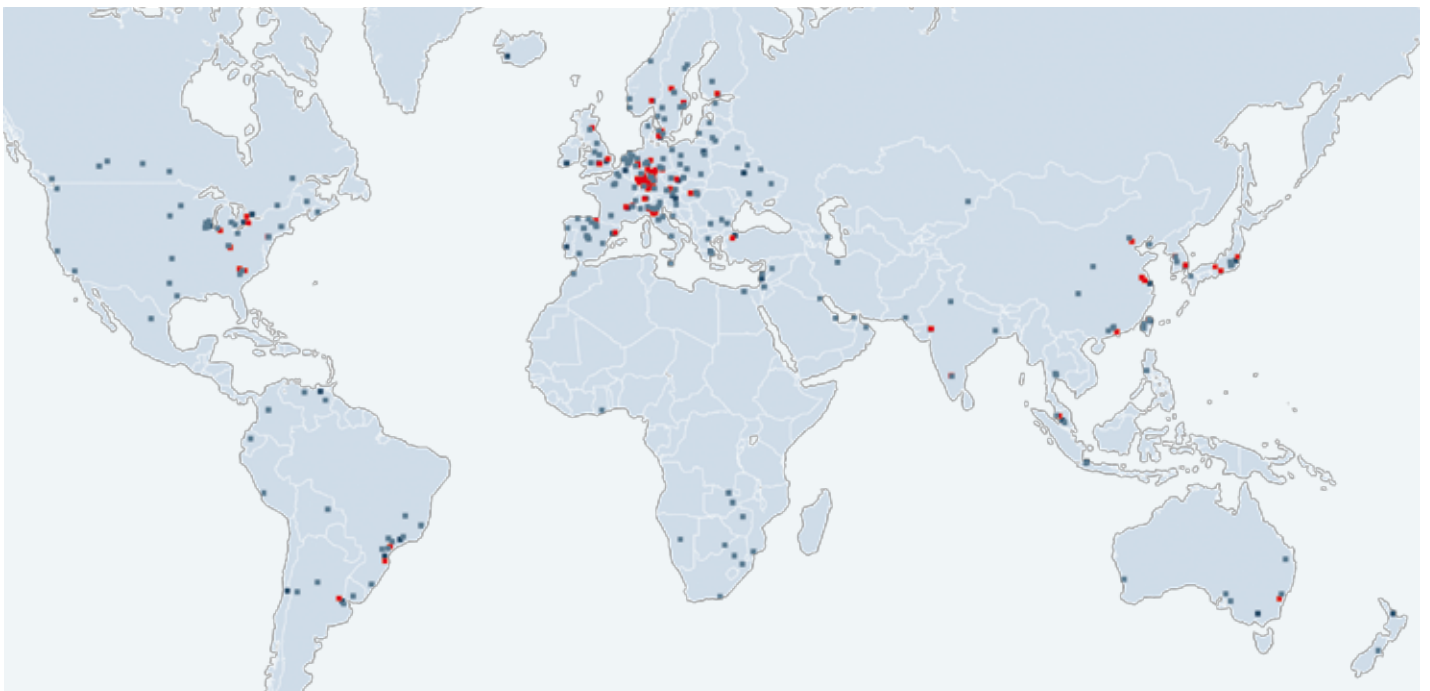
Drawing on close contacts with machine manufacturers and users, not to mention intensive collaboration in all key industrial organizations, Rexroth specialists continuously develop optimized solutions geared to the needs of the solar industry – from efficient components and build-in modules to fully fledged system solutions with a high software content.

Your partner throughout your machine's entire life cycle

Our Rexroth account management also coordinates complex, cross-country projects and ensures punctual start of production based on reliable project management from the planning stage to commissioning. Many of our customers are already taking advantage of this service to promote global standardization at their production facilities.

Rexroth is always on hand to assist you even after commissioning. Our worldwide service network in over 80 countries provides care for products and solutions throughout their entire machine life cycle. Aside from swift spare parts supplying, Rexroth provides an extensive consultancy and service spectrum.

This includes increasing energy efficiency to implementing condition monitoring strategies, implementing standardized machine safety to basic and further technical training of your staff. Throughout the machine's entire life cycle: Rexroth, your expert in the photovoltaic industry.



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