

CASE STUDY

Retrofit at the next level: JKS Engineering, Bruker and OMRON modernize high-precision vacuum furnace control

JKS Engineering AG and Bruker Switzerland AG, Switzerland

Maximum Stability:
±0.5 °C control accuracy

Highest Precision:
< 1 °C deviation at 700 °C

Excellent Dynamic Response:
Profile tracking error < 1.5 °C

Click here for more information on Bruker

Key Benefits

1. ±0.5 °C control accuracy for maximum process stability
2. Less than 1 °C temperature deviation at 700 °C
3. Profile tracking error below 1.5 °C during dynamic temperature profiles
4. No overshoot during transitions to a constant temperature setpoint
5. Future-proof retrofit solution based on OMRON's Sysmac platform
6. Reduced complexity
7. Modernization of existing equipment within defined budget and time constraints

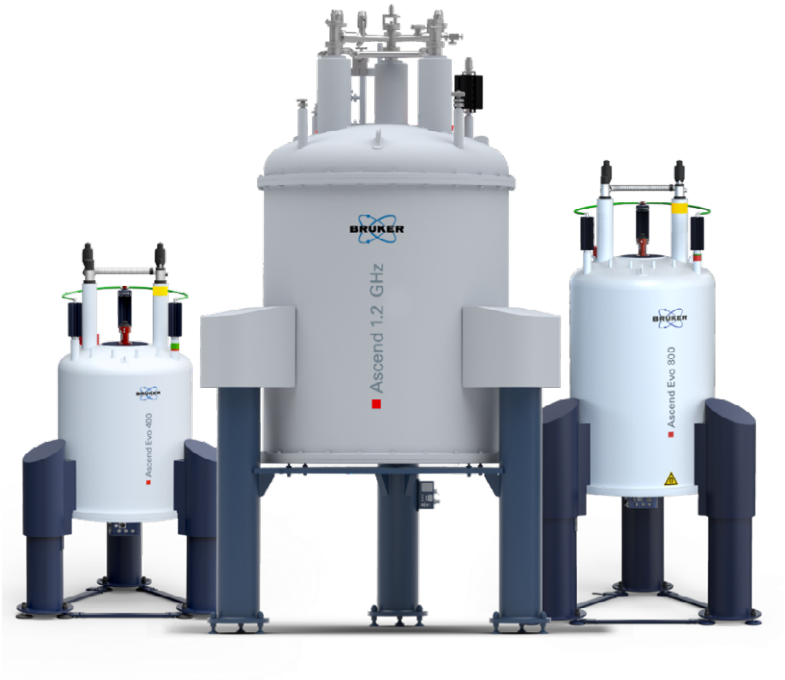
At a glance

Bruker Switzerland AG needed to modernize an existing vacuum furnace system to improve process reliability and temperature stability. Working with JKS Engineering, the team developed a high-precision retrofit solution built on the OMRON Sysmac platform. The result: exceptional control accuracy, stable processes, and a significantly reduced risk of costly rejects, even across highly dynamic temperature profiles.

Precise temperature control for the highest quality requirements

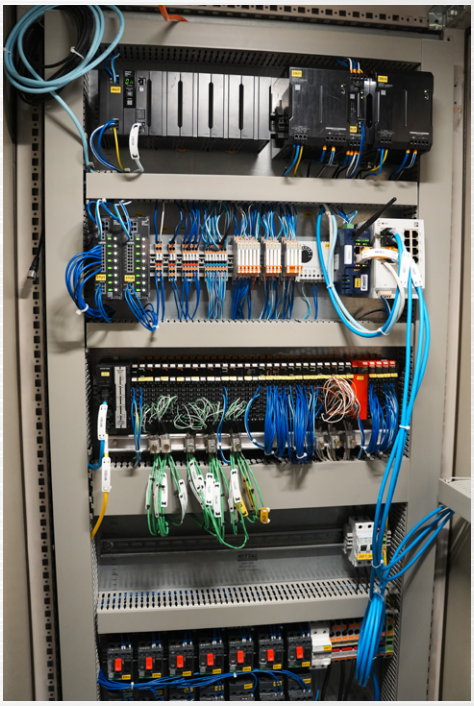
Bruker, JKS Engineering and OMRON modernize vacuum furnace system for greater stability, reproducibility and process reliability.

Modern production demands ever-higher levels of precision, stability and reproducibility, particularly in high-temperature thermal applications. At the same time, many manufacturers face the challenge of upgrading existing systems cost-effectively rather than investing in entirely new ones. That was exactly the situation at Bruker Switzerland AG: an existing vacuum furnace needed to be brought up to standard for its next operating period. The priorities were clear: Maximum process reliability, tighter temperature control, and minimal risk of rejects. Together with JKS Engineering and OMRON, the team took on an ambitious retrofit project that shows what modern automation technology can do for an existing system. The outcome is a precise, stable and future-proof solution built on the OMRON Sysmac platform, delivering outstanding control accuracy even under demanding temperature profiles.



The challenge: Maximum process reliability in complex thermal processes

Bruker Switzerland AG develops and manufactures high-precision scientific measurement and analysis instruments, and operates specially built vacuum furnaces for the thermal processing of its magnet sections. The existing system “Reaction Furnace 3” had been updated several times over the years, but the historically grown software structure and lacking alignment between controller and process were causing instability. In high-temperature thermal applications, even minor temperature deviations can directly affect product quality. The conclusion at Bruker was straightforward: the system needed a thorough modernization, with precision and process reliability as the primary goals. “Temperature control in thermally inert systems is one of the most demanding challenges in modern control technology,” JKS Engineering commented.

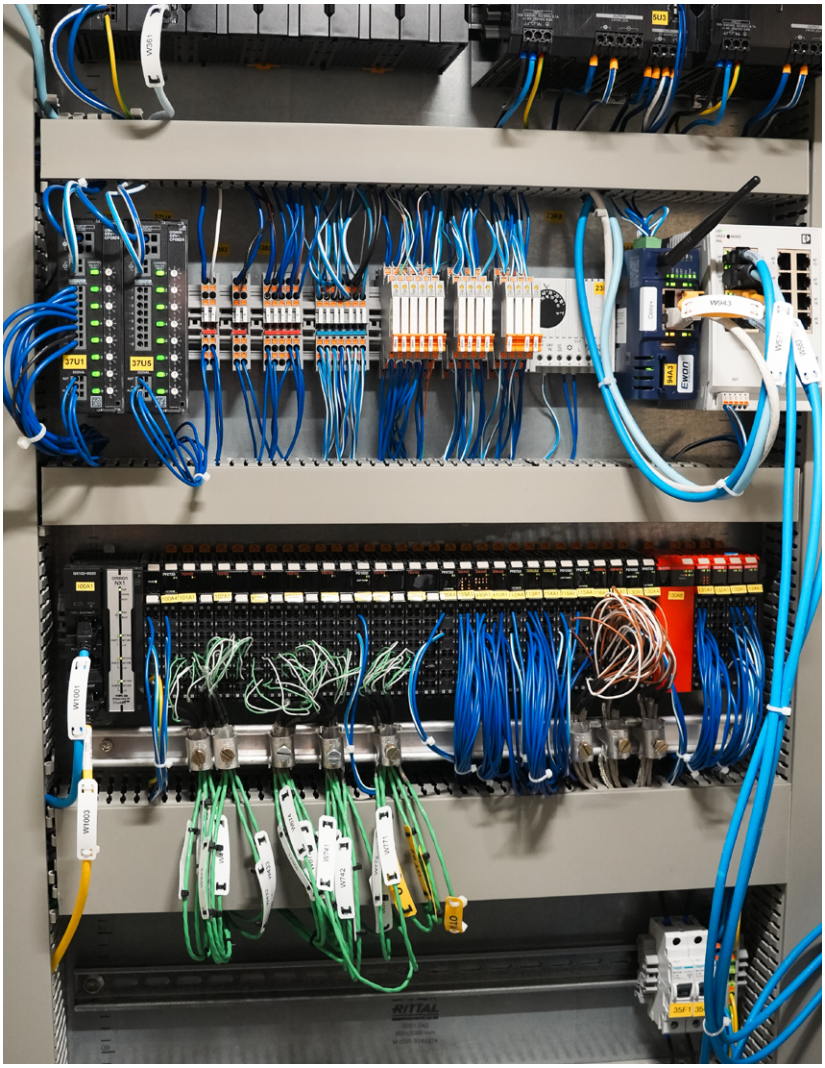


The high sampling rate, integrated control algorithms and seamless integration into the Sysmac architecture deliver an exceptionally stable and reproducible process.

The solution: Precise temperature control with OMRON Sysmac

Bruker Switzerland AG, JKS Engineering and OMRON jointly developed a retrofit concept designed to not just modernize the system, but raise it to a new level of performance. Success came from combining three complementary areas of expertise: Bruker's deep knowledge of its own processes and systems, JKS Engineering's advanced control engineering capabilities, and OMRON's powerful Sysmac platform as the technical foundation.

At the heart of the solution is the OMRON NX-TS3102 temperature controller on the Sysmac platform, built specifically for high-precision, fast-response temperature control. Through optimized control strategies, careful parameterization and JKS Engineering's thorough understanding of thermal processes, the team was able to fully harness the platform's capabilities. The high sampling rate, integrated control algorithms and seamless integration into the Sysmac architecture deliver an exceptionally stable and reproducible process.



The benefits: High precision and a significantly reduced risk of rejects

The modernized system now achieves a control accuracy of ±0.5 °C and a temperature deviation of less than 1 °C at 700 °C. Even across dynamic temperature profiles, the tracking error stays below 1.5 °C, with no overshoot during transitions to a constant temperature setpoint.

Process reliability has improved significantly, and the risk of costly rejects has been substantially reduced. Bruker also benefits from more consistent production, better reproducibility and greater overall process efficiency. The result is a well-rounded solution that combines capable technology with strong engineering, and delivers the performance and reliability the process demands.

Stefan Frei, Automation Technician at Bruker Switzerland AG, summarizes the successful modernization of the furnace system: *"With JKS and OMRON, we found two competent partners who modernized our system professionally and efficiently. Thanks to the completely renewed software and hardware, the previous issues have been resolved and process reliability has been significantly improved. The excellent result confirms the quality of the collaboration and ensures the reliable, future-proof operation of our furnace system."*

Looking ahead: Retrofit as a sustainable modernization strategy

This project shows how existing systems can be modernized both economically and sustainably with the right automation technology. For Bruker, the new solution brings stability and reproducibility, as well as a solid long-term production foundation for demanding thermal processes. And with the open, scalable Sysmac platform, OMRON provides the foundation for future expansions and further optimization down the line.



About JKS Engineering AG

JKS Engineering AG, headquartered in Nänikon (ZH) and part of the JKS Group (JKS Engineering AG, Maprox AG, NEUMA AG and JKS America Inc.), is an innovative Swiss company specializing in engineering services and technical solutions. The company supports customers across a wide range of industries in the development, optimization and implementation of complex projects, from the concept phase through realization and industrialization to maintenance. With a strong focus on quality, precision and close customer collaboration, JKS Engineering stands for reliable and efficient engineering services of the highest standard. For more information, visit: https://www.jks.ch/home

About Bruker Switzerland AG

Bruker Switzerland AG, based in Fällanden, Switzerland, is part of the global Bruker Corporation — a leading provider of analytical instruments and scientific solutions. The company develops and manufactures high-precision instruments for research, materials science, life sciences and industry. Bruker is known for its commitment to innovation and quality, helping customers worldwide gain critical insights through advanced analytical techniques. Further information: http://www.bruker.com/de

About OMRON Corporation

OMRON Corporation is a leading automation company with its core competencies in Sensing & Control + Think technology. OMRON is engaged in a wide range of businesses including industrial automation, healthcare, social systems, device & module solutions. Established in 1933, OMRON has about 27,000 employees worldwide, working to provide products and services in more than 130 countries, contributing to the creation of a better society. For more information, please visit http://industrial.omron.eu