



Over 2,000 SIPOS Aktorik actuators are being installed at RWE's Eemshaven power station.

Specialist Products and Service Underpin Power Sector Success

SIPOS Aktorik highlights the importance of specialist actuation products and service solutions for the power sector. Supporting the need for tailored technology and comprehensive support, energy industry illustrations are provided from Eemshaven, Franken 1 and the Rosenheim waste-fuelled combined heat and power plant (CHP) in Bavaria, Germany.

By Mathias Rebhan, SIPOS Aktorik

Technical background

With integral electronic frequency converters replacing the traditional solution of motor plus reduction gear, the variable speed actuation (vsa) advancement was introduced in the late 90s - a key breakthrough was the ability to provide soft start capability. Pressure peaks associated with water hammer have been known to rupture pipes and valves. Plants including power sector installations, occasionally have to

resist major differential pressure of this nature. The damaging impact can be mitigated by controlling the operation speed of the flow restrictor with a vsa that provides soft start technology. With components contained within the actuator, the integral vsa is a solution that is robust enough to operate in the challenging power industry environment - which is frequently subjected to vibration and extremes of temperature. An integrated frequency converter

ensures that motor speed is automatically reduced in the end positions. Therefore, there are no magnification torques if the valve is blocked between the end positions. The voltage for each of the many available speed/cut-off torque combinations is pre-selected so that the cut-off torque setting corresponds to the stalling torque of the motor. In other words, if a vsa is used, the usual massive current peaks experienced when the motor starts are eliminated and even an unscheduled stop does not cause torque damage.

The alternative to vsa's with internal componentry is to fit an external frequency converter. However, this is not an aesthetically pleasing option and workers on-site are required to programme and maintain highly complex converter software.

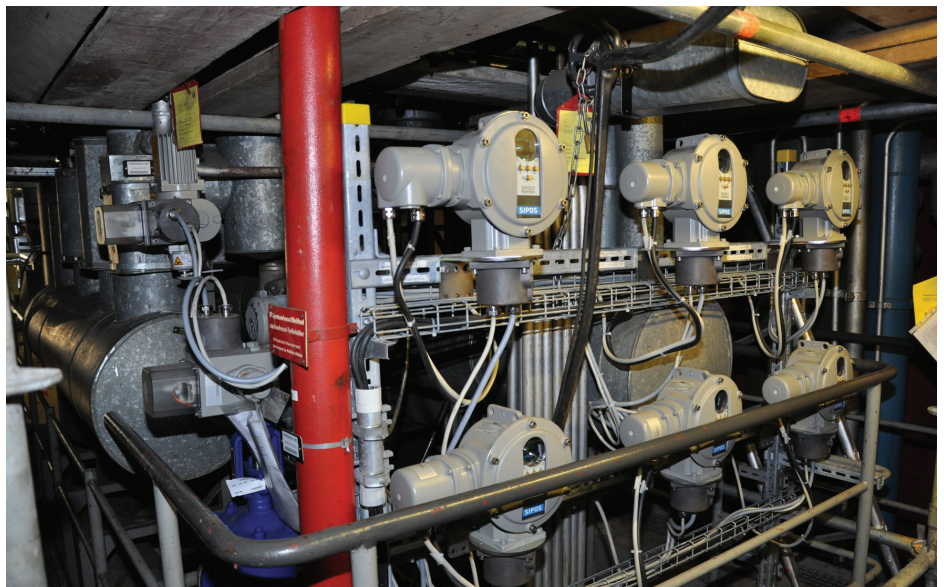
With widespread take up around the globe, vsa's are now widely adopted in the power industry where they are used

with high pressure bypass valves, steam reducing valves and feed water control valves.

At Eemshaven in the Netherlands over 2,000 electric actuators have been supplied where they play a key role automating valves at the coal fired power plant. Representing an investment for RWE of approximately 220 million Euros, the prestigious project will, when fully operational, require a workforce of over 350 people.

Ongoing Innovation

Ongoing innovation, and an eye for engineered solutions has resulted in continued actuator advancements including the launch of an extreme precision actuator range in 2011. Offering advanced flexibility and accuracy, the SIPOS 5 HiMod series addresses the most challenging valve control requirements for high end modulating duty, precision and longevity. The power industry is a major market for the product. Designed for both conventional and outside containment applications, typical installations include control / boiler start-up valves, turbine regulation and other operational examples where high levels of accuracy and flexibility are demanded. The HiMod provides sophisticated technology with long life components



SIPOS successfully managed a comprehensive actuator retrofit for E.ON's German power plant, Franken 1.

backed by a five year warranty for motor and gearing. A design initiative enables voltage fluctuation tolerance from -30% to +20% without system failure. Additional features offered as standard include external or wireless Bluetooth COM-SIPOS interface, encoder for position measurement, easy non intrusive commissioning without tools and highly sophisticated modulation software functions.

At the company, considerable focus is centred on providing specialist actuation solutions and, with a particular strength

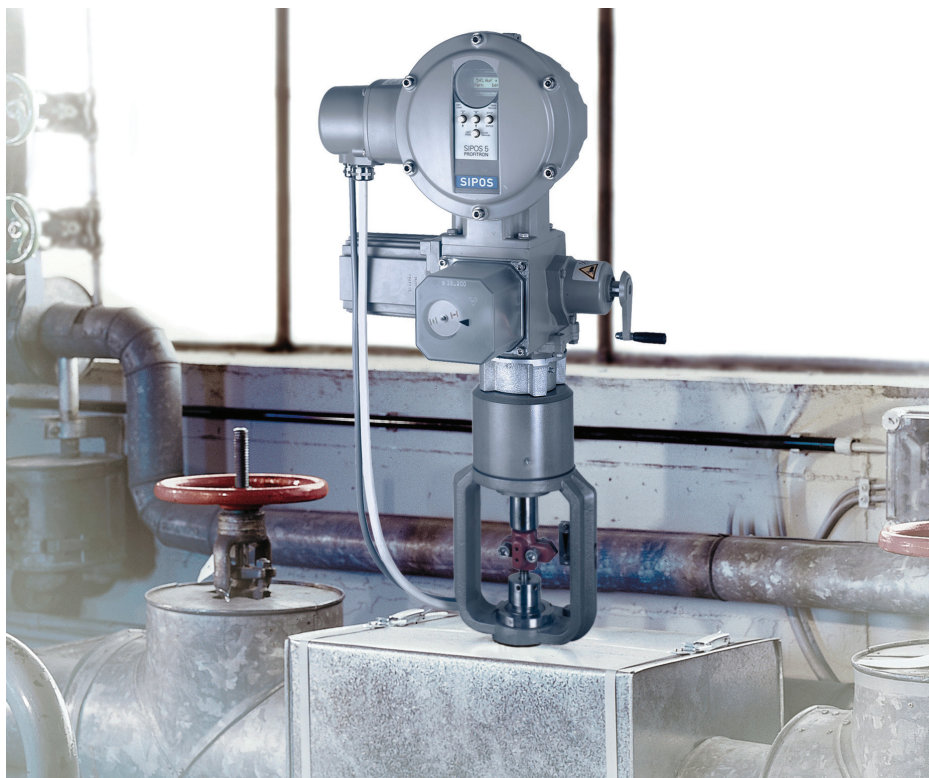
supporting the power industry, the company recognises the specific needs of nuclear power plants where continued operation and safety is paramount. A range of safety-relevant nuclear actuators sits within the company's portfolio – products include the standard M76361 and the modulating M76362.

Comprehensive Service for Complex Requirements

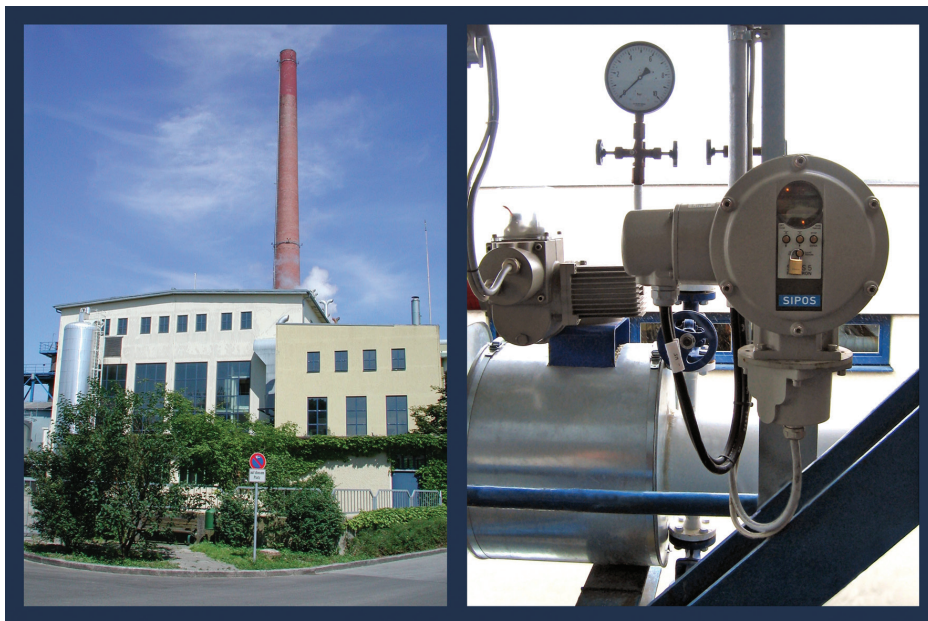
To fully support the power sector, it is recognised that the offer needs to extend beyond good technical capability and a suitable product range. A proactive and pre-emptive approach to service is essential to ensure that plant automation processes do not fail. As a result, major effort and investment is placed on service and, with tailored support for individual plants in mind, the company provides a comprehensive package of commissioning, inspection/overhaul, revision, retrofit and maintenance services.

One example of a comprehensive and rapid actuator retrofit was an installation for E.ON's power plant, Franken 1. In just four weeks, 80 pipeline valves were replaced, 120 original actuators were removed and 200 new Flash 5 electric actuators mounted and commissioned. The company recognises that minimising disruption and avoiding down-time is key to success in the power sector:

A further case-study illustration from the power sector is the waste-fuelled combined heat and power plant (CHP) at Rosenheim in Bavaria, Germany which highlights the need for



Over 200 SIPOS actuators were installed at Franken 1.



SIPOS actuators are adopted as part of a modernisation programme at Rosenheim CHP.

reliable, tailored solutions backed by comprehensive service and support. The gas, fuel oil and waste-fuelled plant converts approximately 60,000 tons of domestic and industrial waste by means of incineration into energy for power generation, process steam and district heat.

Electricity produced at Rosenheim is approximately 60,000 MW per year, which equates to around 30% of the city's power requirement. Approximately 100,000 MW per year of district heat is produced supplying just over 500 housing and business suppliers. Around 58,000 t of process steam per annum is generated. Some of the plant's sections had to be

replaced after 40 years of operation and different strategies for modernisation were developed. The heart of the waste-fuelled CHP, the gas motor plant with three newly installed gas motors, required safe cooling, i.e. the dissipation of the combustion heat generated during operation.

An emergency cooling system was installed for this purpose with a heat exchange performance of 12 MW, a cooling water volume flow of 500 m³/h and approximately 100 fans: the system ensures correct temperature and pressure conditions in the cooling water circuit. The emergency cooling system is dimensioned to ensure safe exhaust heat dissipation of the three gas motors at full

load. A DN 250 butterfly valve installed in the cooling water circuit controls volume flow depending on the water temperature.

A major challenge occurs during low load operation. For a cooling water volume flow range between 5 to 10 % of the total volume, the working point is in the lower section of the butterfly valve curve. For a general opening degree of 60 to 70 %, this is far from a linear section. As a result, it is difficult for actuation technology to achieve accurate control behaviour and to achieve the required stability within the control circuit. The repercussions of continuous 'overshooting' of the control circuit would extend across the plant resulting in fluctuations in the district heating network and a negative impact on the smooth operation of the gas motors. Addressing the requirements of Rosenheim, SIPOS provided a solution that gives reliable modulating operation both for the closed-loop control of the emergency cooling system and at the pressure reduction station.

About the author



Dr Matthias Rebhan is the General Manager at SIPOS Aktorik. He achieved a diploma (Dipl.-Ing.) in Electrical Engineering at Erlangen-Nuremberg University, Germany. He started his professional career in 1987 as an R&D engineer with SIEMENS. He initially worked in the field of digital real-time simulation and gained a doctorate (Dr.-Ing.) in Electrical Engineering at Braunschweig Technical University based on this work. Subsequently he worked in software / electronics development for frequency converters. At SIPOS, Dr. Rebhan has been influential in achieving variable-speed capabilities in electric actuators: since 2001, he has been at the helm of the company.



The Rosenheim CHP had special requirements which had to be met in order to actuate the plant.