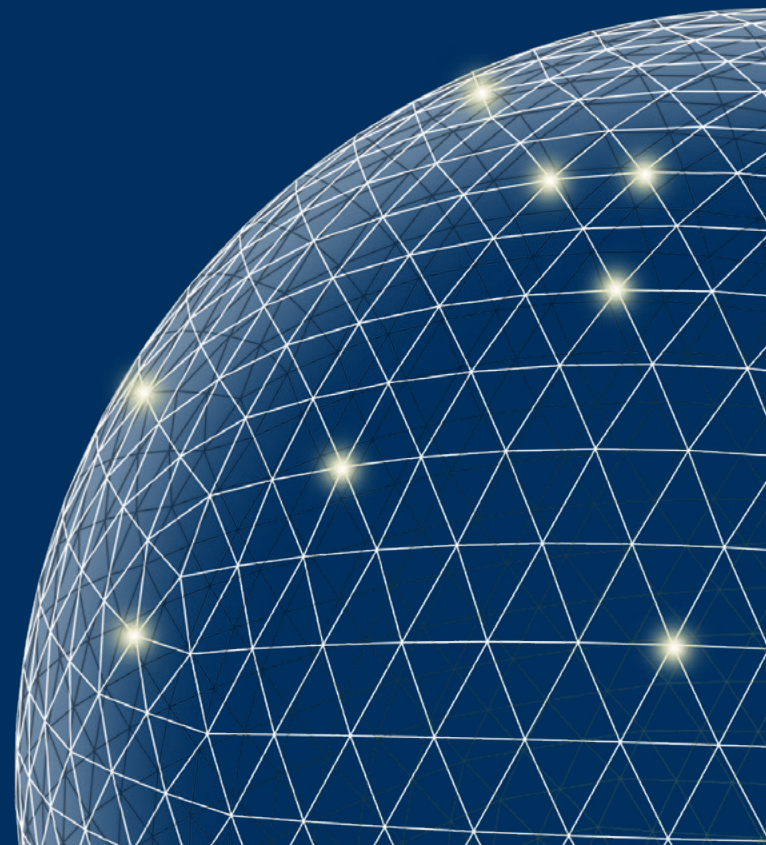


# Engineering Solutions

**Services based  
on tradition –  
References**







Client: Krefeld municipal utilities  
 Voltage range: 110 kV / 10 kV  
 Rated current: 1,600 A / 2,500 A  
 Short circuit current: 40 kA / 31.5 kA  
 Work areas: Engineering – Project management –  
 Assembly – Commissioning  
 Challenge: Parallel operation of old and new  
 secondary technology

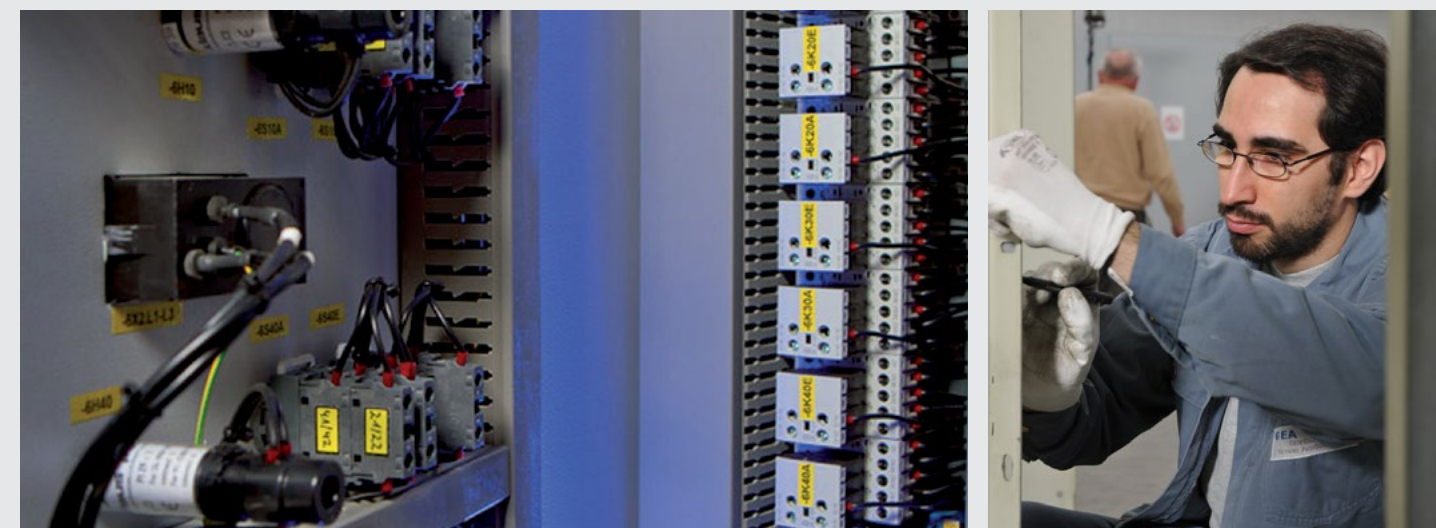


## Complex solutions offered by a strong service partner

In many ways, energy is omnipresent in today's world. The design, refurbishment and retrofitting of energy systems often require technically challenging, customised solutions. The GSB team has proven its outstanding abilities time and time again: Engineering skills combined with technical expertise and manufacturing capacities are key requirements for intelligent solutions.

As an engineering company with own in-house production facilities and many years of experience, GSB is a strong partner for its clients and proud of many long-standing customer relationships. GSB is known for top quality at every stage – from its engineering service right up to the production and review phases. This consistently high level of performance is ensured by an integrated QM/SHE management system according to DIN EN ISO 9001 and SCC (internationally recognized certification system for SHE standards).

**This brochure introduces a variety of high-level reference projects relating to the core competencies of the company.**



## Retrofit: Extend life cycles by upgrading of the secondary technology **Stadtwerke Krefeld (Krefeld municipal utilities), retrofit of a 110-/10-kV substation**

Stadtwerke Krefeld placed an order at GSB to carry out the retrofit of the secondary technology of the Obergath power substation. The renovation work had to be performed during ongoing operation.

In a power substation, the voltage of the electrical energy is transformed from the level of the transmission grid to the level of the distribution grid. Since the secondary technology has shorter life cycles than the primary technology, single components need to be replaced. This retrofit – i.e., the upgrading of energy transmission or distribution systems using state of the art components – is usually economically sensible. Retrofitting meets high safety standards, ensures high availabilities and requires a reduced cost effort compared to a full reinstallation.

GSB's work on the power substation was carried out in close cooperation with the operator and the supplier of the protection and control technology, on whose behalf the on-site commissioning tests were also carried out. Thanks to GSB's convincing performance, Stadtwerke Krefeld also commissioned them to replace the secondary technology at another power substation.





Client: Elpro Berlin (end customer: Rheinbahn Düsseldorf)  
 Voltage range: 12 kV  
 Rated current: 630 A  
 Short circuit current: 31.5 kA  
 Work areas: Engineering – Project management –  
 Delivery – Assembly – Commissioning  
 Challenge: Replacement of the asbestos-containing  
 partition plates



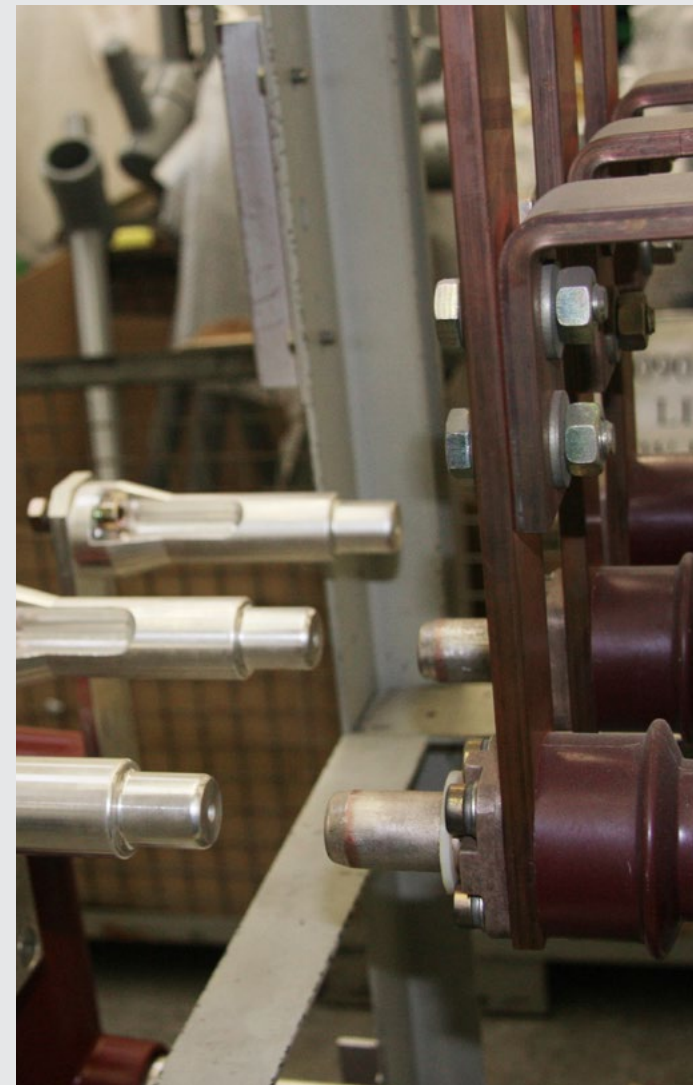
## Retrofit

### Rheinbahn Düsseldorf, upgrading of air-insulated medium-voltage switchgear panels

Elpro is a special service provider in the field of traction power systems. Rheinbahn, founded in 1896 as Rheinische Bahngesellschaft AG, is the public transport company of the North Rhine-Westphalian state capital of Düsseldorf.

While industrial energy providers may have access to reserve areas, the railway sector houses its substations in confined spaces. Modifications and expansions are only possible to a limited extent. A 1:1 replacement is not an option, as rail operations do not allow for extended downtimes.

GSB had the task of properly disposing of the asbestos-containing partition plates of the medium-voltage switchgear panels – in accordance with the technical guidelines for hazardous substances and replacing them with new, asbestos-free partition plates. Through the simultaneous retrofitting of the primary and secondary technology, GSB ensured that the switchgear panels will remain reliable for many more years to come.



## Effective protection against short circuit currents

### ABB Ratingen, parallel connection of 2 units 36-kV- $I_s$ -limiters

Short circuits in electrical systems are rare, but cannot be ruled out completely. In order to minimize short circuit currents,  $I_s$  limiters can be used. They interrupt a fault current before the first peak value is reached, thus protecting electrical systems from mechanical and/or thermal destruction. Up to now,  $I_s$  limiters for the 36 kV level were only available for rated currents up to 2,500 A.

On behalf of ABB Ratingen, GSB has now delivered a combination of two  $I_s$  limiters for a rated current of 4,000 A for a Brazilian operator.

GSB can rapidly implement new designs on the basis of existing type-tested systems and special solutions. The close coordination between design and manufacturing also ensures that changes are implemented and documented quickly. The use of three-dimensional models in the design phase allows GSB to determine feasibility before the start of production, and to guarantee a smooth manufacturing process.

Client: ABB Ratingen  
 Voltage range: 36 kV  
 Rated current: 4,000 A  
 Short circuit current: 40 kA  
 Work areas: Engineering – Production  
 Challenge: Special design with a short  
 delivery time



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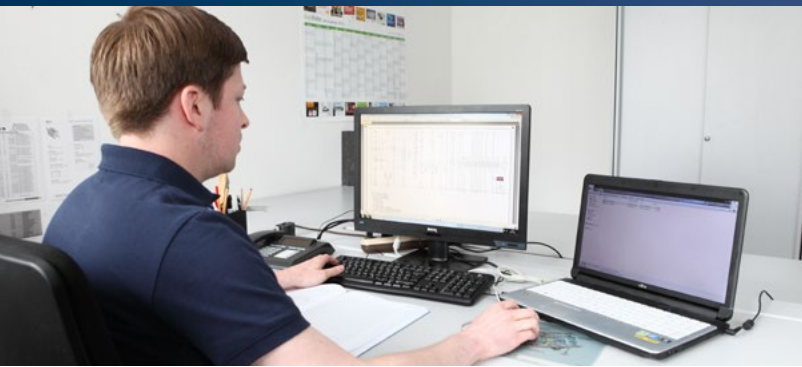
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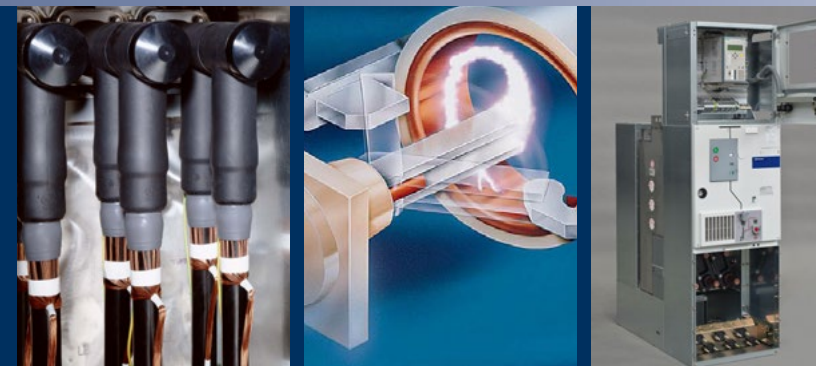
[www.LichtPlusTechnik.de](http://www.LichtPlusTechnik.de)







Client: CURRENTA Krefeld-Uerdingen  
 Voltage range: 12 kV  
 Rated current: 4,000 A  
 Short circuit current: 50 kA  
 Work areas: Engineering  
 Challenge: Clear representation of complex interrelations



Client: Dormagen district hospital  
 Voltage range: 12 kV  
 Rated current: 630 A  
 Short circuit current: 20 kA  
 Work areas: Project management – Disassembly – Delivery – Assembly – Commissioning  
 Challenge: Changing all inlet and outlet cables within a single day

Feasibility study determines most economical solution

## CURRENTA Krefeld-Uerdingen, feasibility study for the replacement or retrofitting of a power plant



When an electrical system is nearing the end of its service life, it is important to consider whether an extension of its useful life or a replacement with a new system makes more economical sense.

GSB has created a feasibility study for CURRENTA investigating the options of replacement or retrofitting of a power plant in Krefeld-Uerdingen. The study is based on an inventory of the existing actual data, the estimation of the future power demand, and the assessment of the costs to be expected. The analysis of this data led to the conclusion that the replacement of the existing power plant is the most economical solution.

As a follow-up project, GSB was commissioned to take over the preparation of tender documents and planning dates while considering the times for procurement, installation and commissioning.

Timely and reliable

## Dormagen district hospital, replacement of a medium voltage control unit

GSB's task was to replace the existing air-insulated medium voltage switchgear with modern SF<sub>6</sub> panels. Three transformers were also replaced in this modernization project. The 10-kV switchgear ensures the power supply not only of the entire hospital, but also of the

surrounding Dormagen districts. In order to restore the high availability of the grid as quickly as possible, all inlet and outlet cables had to be changed within a single day.

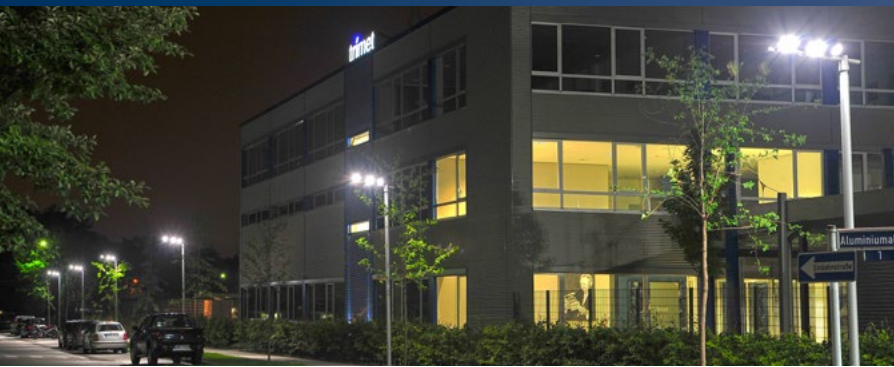
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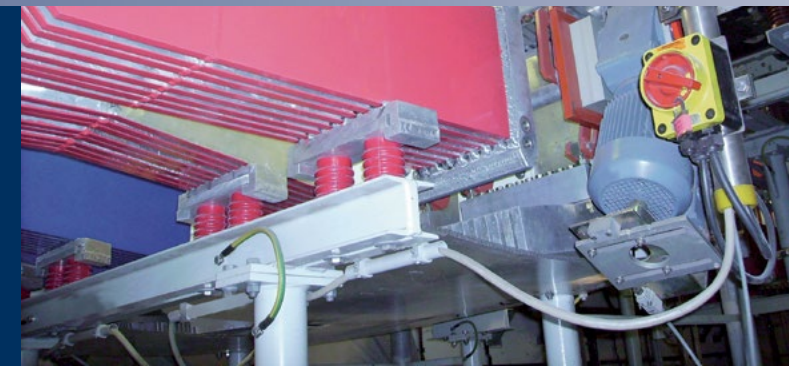
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Client: Trimet Aluminium SE Essen  
 Voltage range: 24 kV  
 Rated current: 630 A  
 Short circuit current: 20 kA  
 Work areas: Engineering – Project management – Delivery – Assembly – Commissioning  
 Challenge: Complete solution, including building construction and civil engineering



Client: Bayer MaterialScience Krefeld-Uerdingen  
 Voltage range: 1,500 VDC  
 Rated current: 54 kA  
 Short circuit current: 270 kA  
 Work areas: Engineering – Project management – Delivery – Assembly – Commissioning  
 Challenge: Assembly in a narrow construction field parallel to other trades

## Turnkey

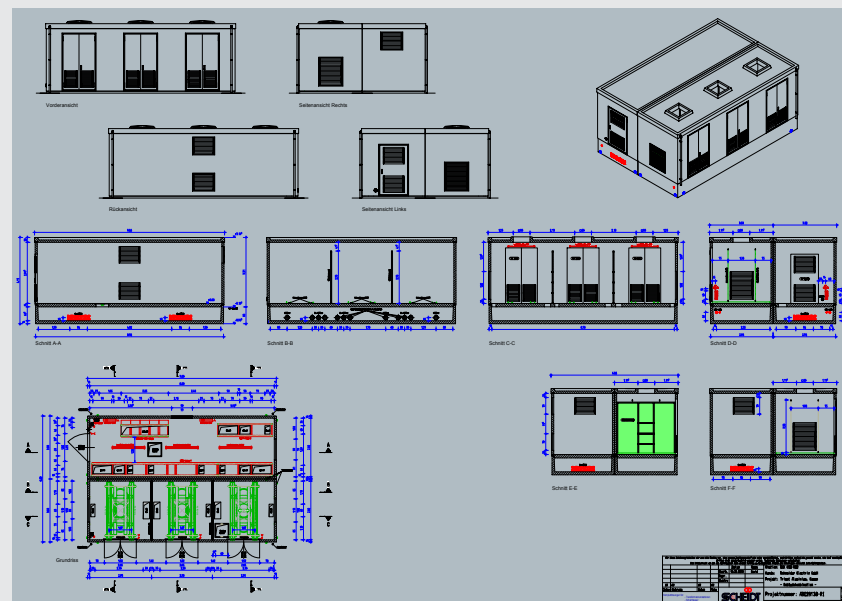
### Trimet Essen, installation of medium and low voltage systems, transformers and cable systems

Trimet develops, produces, recycles, pours and sells modern light metal products at several locations. Germany's largest aluminium manufacturer requires reliable power supply systems for its production. These systems constitute the backbone of economic success.

As a part of this expansion / modernization project of the electrical equipment, GSB coordinates all work processes as a general contractor. The scope of work ranges from the engineering stage to the delivery, installation

and commissioning of all electrical components, and the establishment of the building construction and civil engineering works.

Much of the new equipment is housed in concrete stations built specifically for this purpose. The replacement of the old system was carried out on the existing premises in order to keep the technical and economic costs as low as possible.



## DC supply in the tightest construction field

### Bayer MaterialScience, Krefeld-Uerdingen, assembly of a DC busbar

The change of the chlorine electrolysis at Bayer Material-Science to a different method required the adaptation of the DC supply. The project was planned and implemented in close coordination with the customer's departments.

In order to minimize production downtimes, short set-up times were specified during several construction phases.



Calor Emag. Over 90 years of medium voltage technology from Ratingen.



Calor Emag Medium Voltage Products, founded in 1925, has been one of Ratingen's largest companies since 1936 and develops, manufactures and installs switchgear components and systems for electrical power distribution. With around 1,000 employees, the company is part of the global ABB Group and, with its focus on export business, operates in over 100 countries. Further information can be found at [www.abb.com/medium-voltage](http://www.abb.com/medium-voltage)

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Client: Rheinenergie Cologne  
 Voltage range: 10 kV / 400 V  
 Work areas: Maintenance – Disassembly – Assembly  
 Challenge: Live work, switching in the 400 V grid

Client: Düsseldorf municipal utilities  
 Voltage range: 10 kV / 400 V  
 Work areas: Maintenance/inspection  
 Challenge: Live work



## Expertise in air and SF6-isolated 10-kV systems

### Rheinenergie Cologne, framework agreement for grid installation

GSB received the framework contract from Rheinenergie to perform maintenance and alteration works on 10-kV distribution grid stations. The distribution grid stations include both air-insulated and SF<sub>6</sub> gas-insulated equipment.

The modification of the 10-kV distribution grid stations include the disassembly of medium voltage panels and outgoing units. Temporary solutions are required for maintaining the power supply during the upgrading. Afterwards, the new medium voltage switchgears and low voltage distribution including the 10-kV and 400-V transformer cables are assembled and the entire station is put into operation. The project also includes civil engineering works to install the cable.

Much of the low-voltage work will be performed as live work. The contract also includes 400-V system transfer.

## Ensure operational reliability

### Stadtwerke Düsseldorf (Düsseldorf municipal utilities), maintenance/inspection of transforming stations

Since 2010 GSB is authorised by Stadtwerke Düsseldorf to execute the maintenance/inspection of about 600 stations throughout the city on an annual basis. In order to avoid changeovers and to ensure an uninterrupted power supply to customers, cleaning and inspection work is performed as live work.

Maintenance and inspection are carried out on medium-voltage equipment, transformers, low voltage systems

as well as buildings and properties. The station types are compact, building and cellar stations. During the maintenance process the installation team takes the special requirements of the respective switchgear/ switch manufacturer into consideration.

Other customers in the field of maintenance/inspection include GWG Grevenbroich, SW Münster, SW Unna, NEW Netz, SW Iserlohn and real, SB-Warenhaus.







Client: Siemens Cologne  
 Voltage range: 24 kV  
 Rated current: 2,500 A  
 Short circuit current: 31.5 kA  
 Work areas: Assembly  
 Challenge: SF<sub>6</sub> work

## Assembly projects carried out with expertise

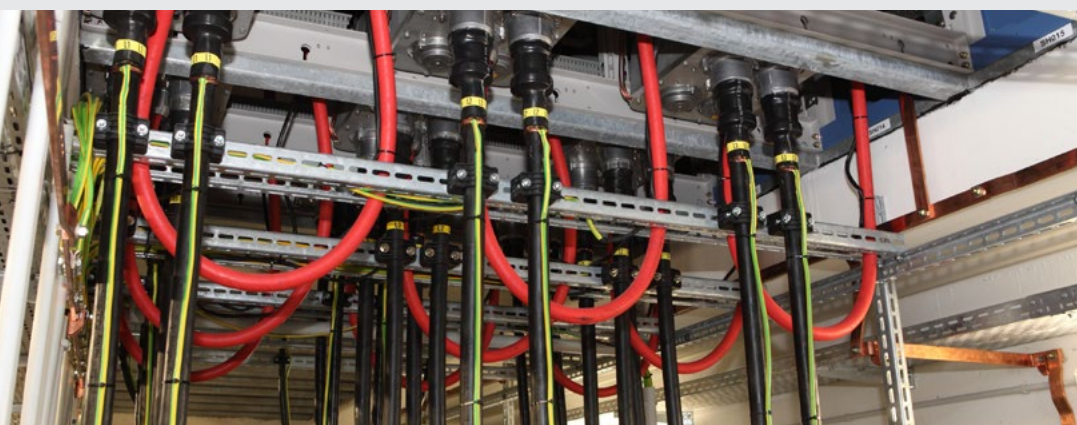
### Siemens Cologne, installation of a 8DB10 switchgear

GSB installed 42 panels of a medium voltage switchgear, type 8DB10, consisting of two opposite switchgear lines, in a newly constructed switchgear building in CHEMPARK Dormagen and has made it ready for operation.

The switchgear installation and the filling of the system with SF<sub>6</sub> gas was performed by GSB's specialist, who are specifically certified and trained for this job.

The installation of the auxiliary systems (including control cabinets and DC power supply) was also in the scope of GSB.

Additionally the contract included the installation of the grounding system as well as extensive cable work (medium and low voltage cables), the installation of sleeves, joints, sealing ends and cable racks.



# SIEMENS



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## SION Vacuum Circuit Breakers

Precise form and function

### Simply reliable

SION vacuum circuit breakers are state of the art products based on Siemens know-how gained in four decades of vacuum control technology. The SION vacuum circuit breaker is tailored specifically to the requirements of switchgear engineers or consumers in power supply and industrial companies, as they increase productivity and availability – with negligible maintenance costs.

### Innovative design

SION vacuum circuit breakers can be integrated in all standard vacuum medium voltage control systems. Their compact design – and specifically their small depth and width – allows you to reduce complexity in switchgear cubicles. As a result, you benefit from full performance capacity in cramped quarters – and that across an incredible bandwidth of voltage levels. Perfected in form, function and versatility,

the SION vacuum circuit breaker is integrated quickly and easily in any switchboard environment. Its function is reliable and it is operated effortlessly via the well-organized panel.

### Sustainability

The use of smart technology has allowed us to create manufacturing processes with a reduced CO<sub>2</sub> footprint. SION vacuum circuit breakers are sophisticated quality – down to the last detail.

### Comprehensive support

We offer advice and assistance for your device selection and the integration in existing switchgear cubicles – you can choose between fixed mounting or removable versions for any pole center-to-center clearance and jaw width. Our comprehensive support offers fast and competent solutions.

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Challenge: Modification of the control unit of a replacement rectifier group to the production process with minimised production shut-down time

## Rectifier systems

### Long-term performance

After installation, rectifier systems should run fault-free and efficiently as long as possible. The following GSB services, which are offered for products independent from manufacturers, are focused towards this goal.

#### Assessment – Inspection

GSB uses different methods to ensure that errors are detected early, potential damage is avoided or at least minimized. Among these methods are visual inspections, temperature measurements, performance factor and harmonic wave measurements, the testing of alarm and shutdown signals as well as function tests of overvoltage/overcurrent protection relays.

#### Preventative maintenance

Preventative maintenance is the replacement of wearing material and parts that are no longer available as spare parts as well as the selection of suitable replacement products.

After 10 to 15 years in operation, programmable control systems are no longer technically up to date due to continuous developments of their functional scope and should be replaced. Even if spare parts are expected to be either obsolete or very expensive.



#### Performance upgrade

Adjustment to increasing requirements in order to prevent an overload and shortening of the life cycle. This includes the installation of additional semiconductors or fuses, reinforcement of transmission cross sections, and improvements to the cooling. Such measures may also optimize efficiency.

#### In the unlikely event of a fault

If a rectifier should fail in spite of all precautions, GSB's commissioning engineers are available via hotline 24 hours a day, 365 days per year. They first help to isolate the cause of the error, procure spare parts at short notice and organize additional specialist to give support on site.

#### Maintenance contracts

System support can also be arranged and carried out as a package within the scope of a maintenance contract.



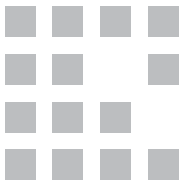


Photo: Michael Reuter

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