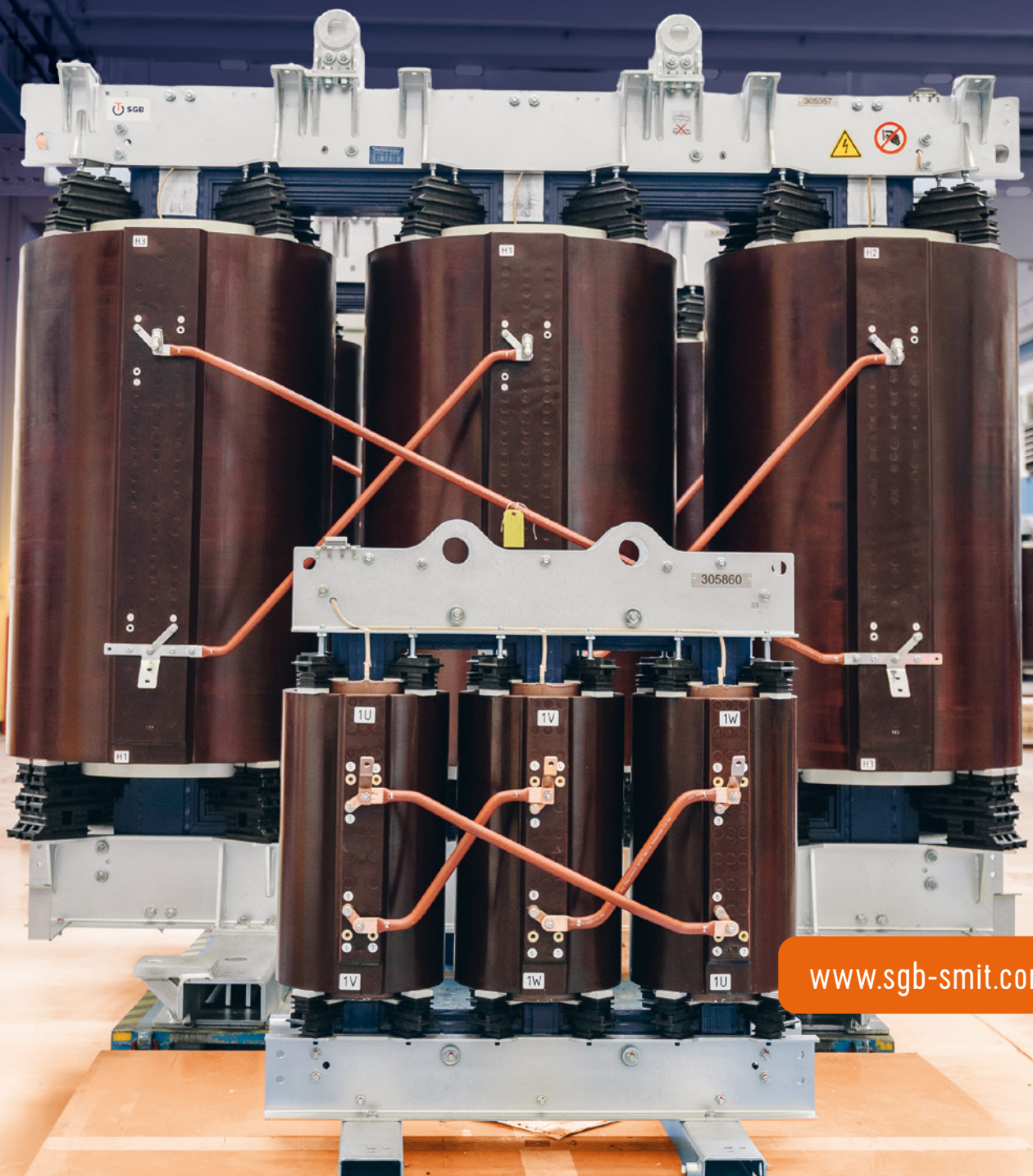


CAST RESIN TRANSFORMERS



www.sgb-smit.com

SGB-SMIT AT A GLANCE

HISTORY



1913

SITES



15

EMPLOYEES



3,800

TRANSFORMING TOGETHER THE FUTURE OF ENERGY

The SGB-SMIT Group manufactures reliable and efficient transformers in line with demand and adapted to our customers and their requirements for applications worldwide.

Sales and service centers on all continents ensure optimum processes.

Our goal is to help our customers accelerate the transition from conventional energy sources to renewable alternatives and the expansion of electrification.

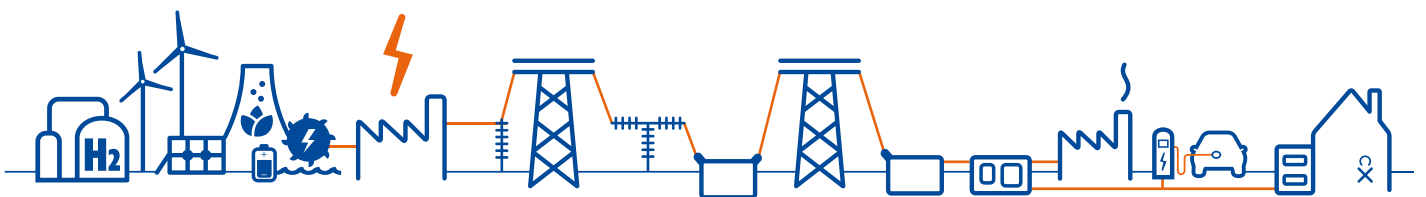
With our products, we ensure a safe and reliable supply of energy.

PRODUCTS



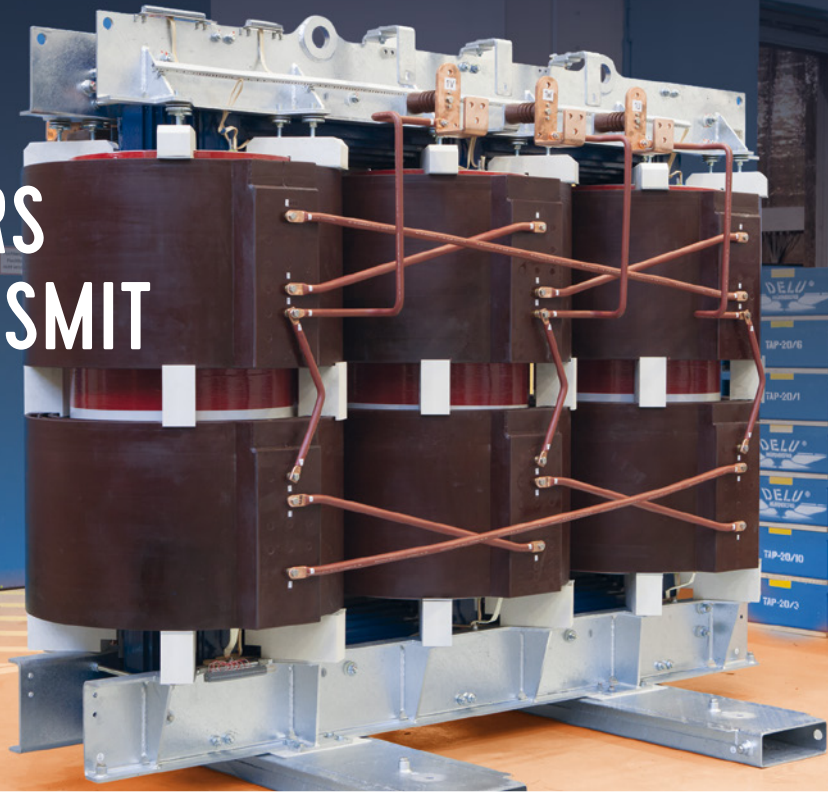
- large power transformers
- medium power transformers
- large liquid-immersed distribution transformers
- liquid-immersed distribution transformers
- dry type transformers
 - cast resin transformers
 - VPI transformers
- shunt reactors
- series reactors
- phase shifters
- Lahmeyer-Compactstationen (compact substations)

Transformers from 30 kVA up to incl. 1,200 MVA in the voltage range up to 765 kV.



TRANSFORMING TOGETHER THE FUTURE OF ENERGY

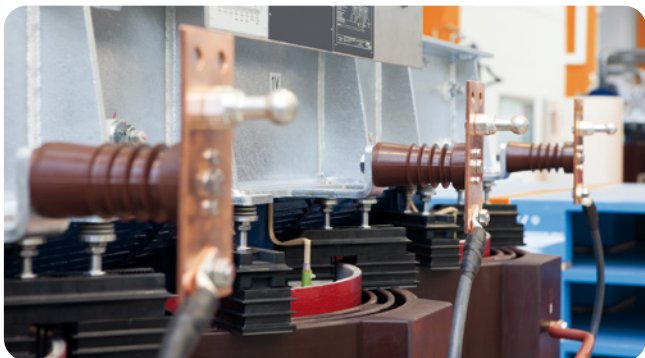
CAST RESIN TRANSFORMERS MADE BY SGB-SMIT



MAXIMUM RELIABILITY

Operators from all over the world appreciate the extremely high reliability of SGB-SMIT cast resin transformers, as they provide maximum safety:

- Over 40 years of experience
- High degree of safety for operators and equipment
- Low environmental impact
- Low operating and maintenance costs
- Service over „a transformer’s entire service life“
- No fee end of transformer life factory return for recycling. Recycling rate is of over 90 %



FIELDS OF APPLICATION

SGB-SMIT cast resin transformers provide solutions for:

- Operation in grids subject to harmonic distortion
- Switching surges and lightning overvoltages
- Extreme environmental conditions:
 - very hot climates, e.g. desert regions
 - high environmental exposure (salt, air humidity, gases)
 - climatic areas with extremely low ambient temperatures (down to -50 °C), e.g. the Arctic
- High short-time overload requirement, e.g. up to 450 % of the rated power
- Mean long-term loads up to 140 % of the rated power with fans
- Power systems requiring a high degree of availability
- Loads due to switching surges (vacuum circuit-breakers)
- High demands regarding mechanical oscillations (crane, excavator, seismic areas, ships)
- Installation altitudes > 1,000 m



WE SET NEW STANDARDS FOR OUR CUSTOMERS' BENEFIT:

SGB-SMIT cast resin transformers offer a range of features which distinguish them from other cast resin transformers in terms of technology and make them a highly reliable and extremely safe solution.

OUR QUALITY – THE DIFFERENCE



SGB-SMIT has been producing cast resin transformers for over 40 years; thus, SGB-SMIT is one of the companies with the widest pool of experience in this area worldwide.



EXPERIENCE SPANNING SEVERAL DECADES

SGB-SMIT has ample operational knowhow on a worldwide basis, including international production sites and first-class international references in all industrial sectors. Specifically in the field of construction of wind power plants, SGB-SMIT offers many years of experience and knowhow and provides proven systems:

- “Jet System” incl. special cooling system for onshore wind power plants
- “Safe System” which is specifically tailored to open sea conditions for offshore wind power plants

Moreover, SGB-SMIT has ample experience in handling extreme climate conditions. Here, customers profit from reliable system solutions such as the “All Climate Safe System”.



Quality is ensured in advance by intensive risk assessments of all processes. From the very design stage, we make sure to achieve the highest overall quality.

COMPUTERIZED PRODUCTION MONITORING

Based on a precise analysis according to automobile standards, all relevant production parameters of each transformer are recorded continuously and compared online to the set-point values. The next production step only follows if everything is found to be correct.

This system makes it possible to achieve a uniform level of quality over large production quantities at all locations of the SGB-SMIT Group on an international basis.



UNIQUE DESIGN

Electrically speaking, the multi-layer winding system is the most reliable option. Thus, almost all manufacturers of oil distribution transformers follow this principle. Millions of them have secured the energy supply in many countries worldwide for several decades.



SGB-SMIT has optimized and/or further developed the special multi-layer winding and is one of the few manufacturers to use this principle for cast resin transformers.

WHAT IS SPECIAL



The combination of many decades of experience, computerized production monitoring, unique design and extraordinary internal test equipment result in safe and reliable operation.

INTERNAL TEST EQUIPMENT

SGB-SMIT cast resin transformers are designed and manufactured as standard in accordance with IEC 60076-11. In line with the value-added chain at SGB-SMIT, the tests specified in the standard for routine and type testing are performed in our own, modern test area:

- Routine tests (Fig. 1)
- Type tests (Fig. 2):
- Special tests
 - Noise measurement (Fig. 3).
 - Verification of the climate class C2/C3 (Fig. 4)
 - Verification of the environmental class E2/E3 (Fig. 5)
- External special tests:
 - Test of fire behaviour (destructive testing)
 - Dynamic short-circuit test acc. to IEC and IEEE

Moreover, we perform detailed measurements for important technical areas together with external institutes:

- Electromagnetic compatibility (EMC)
- Test of the building protection classes
- Vibration test
- etc.

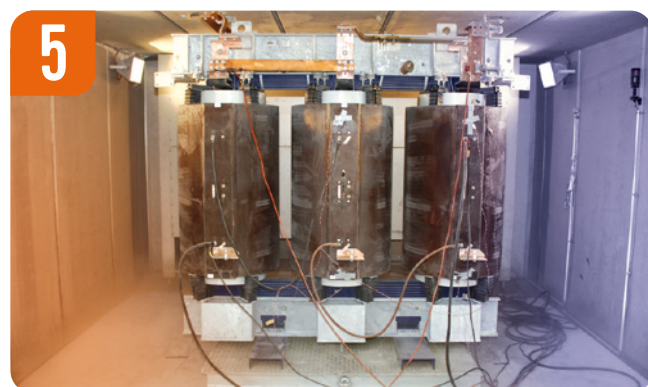
Cast resin transformers made by SGB-SMIT are delivered in over 50 countries – of course, design, manufacture and testing are based on the standards relevant in these countries such as ANSI, IEEE, IEC.



SGB-SMIT is the first transformer manufacturer worldwide with in-house C2/C3 and E2/E3 testing facilities.

Verification is done by notified bodies TÜV-Süd and KEMA or other accredited test institutes.

Furthermore, SGB-SMIT has numerous references regarding vibration measurements, enclosure classes, e.g. IP44 and other tests carried out by accredited testing institutes.



TOP FACTS

REDUCED RISK OF IGNITION



Cast resin transformers have the edge over oil distribution transformers in that they feature a low fire hazard.

Even in case of a fire in the surroundings, the fire load is extremely low.

This low ignition risk – verifying fire protection class F1 – is proven by tests according to the European IEC regulations.

The fact that no coolant is used for cast resin transformers make inclusion of complex collector tanks for coolant and the oil sampling by specialists which is necessary on a regular basis for liquid transformers a thing of the past. The air-cooled cast resin transformer is thus considered as largely “maintenance-free”.



For the above reasons, SGB-SMIT cast resin transformers do not require any special extra measures to ensure fire protection.

OPERATIONS POSSIBLE DOWN TO -50°C



In regions with considerably fluctuating temperatures and severe cold snaps such as Canada or Northern China, transformers are subject to high strain.

SGB-SMIT cast resin transformers have been used for quite some time in these climates, where they manage power supply in residential areas at temperatures down to -50°C ! SGB-SMIT cast resin transformers satisfy these requirements flawlessly!

To verify climate classification C2/C3, SGB-SMIT cast resin transformers are tested and qualified by thermal shock testing in accordance with the European IEC 60076-11 regulation. During this test, the transformers are, for example, cooled down to -40°C and then heated up again under specified conditions up to a temperature corresponding to the insulation class.



The C2/C3 tests are performed since 2012 in SGB-SMIT's own test chamber.

SGB-SMIT cast-resin transformers withstand extreme weather and site conditions, as demonstrated in numerous tests and in actual operation.



OPERATION UNDER SPECIFIC MECHANICAL CONDITIONS



The use of cast resin transformers

- in earthquake areas ...
- aboard ships ...
- in wind turbines ...
- in cranes ...

... requires special design features due to the mechanical strain imposed by accelerations in excess of 1g.



Various vibration tests have been performed successfully at customers' request and in cooperation with IABG Ottobrunn as well as with other institutes.

APPLICATION IN HUMID AND SALTY ENVIRONMENTS



- In offshore wind parks ...
- On oil platforms ...
- In coastal and/or tropical installations ...

... cast resin transformers are exposed to aggravated conditions due to the salty, corrosive atmosphere.

Suitability of the SGB-SMIT cast resin transformers for the appropriate environmental class E2/E3 is proved by a test according to the European regulation IEC 60076-11.

While this test was formerly limited to a one-time proof on a single transformer, today, a separate test for each new turbine type is required in the wind industry – a standard which SGB-SMIT is pleased to fulfil.



The E2/E3 tests are performed since 2012 in SGB-SMIT's own test chamber.

WIDE RANGE OF APPLICATIONS

SGB-SMIT cast resin transformers make minimum demands on the site of installation. Here are some examples of possible applications.

AUTOMOTIVE / ELECTROMOBILITY:

Substations, subdistributions and infrastructure projects.

RAILWAY:

DC supply for underground and suburban railways.

STORAGE BATTERIES AND CHARGING STATIONS:

“Split-Powerline” concepts.

MINING:

Underground and surface infrastructure, crane and excavator operations.

CHEMICAL / PHARMA SECTOR:

Rectifier and distribution applications for installation inside and outside.

DATA CENTERS:

Server facilities and cooling.

POWER PLANTS / UTILITIES:

“Power to” applications.

MARINE:

Ship propulsions, shore connections in harbours.

METAL AND PAPER INDUSTRY:

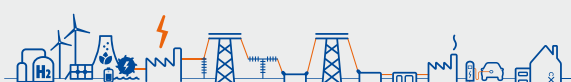
Roller mill motors and pumps.

OIL AND GAS:

Refineries, air separation units and oil and gas platforms.

REGENERATIVE INDUSTRY:

Onshore & offshore wind, photovoltaics, e.g. solar farms.



SUSTAINABILITY AND CERTIFICATES



SGB-SMIT not only satisfies the standards regarding production technology and occupational health and safety, but also has high self-imposed standards and takes the challenge also in environmental matters – which is highlighted by awards and certificates issued by various institutes.

SUSTAINABILITY

SGB-SMIT Group is an important supplier of products for the generation of green energy such as wind energy, photovoltaics and supports the development of the infrastructure for e-mobility with its products.

Moving from current fossil fuel-based energy industry to renewable energies demands substantial expansion in power generation, alongside significant upgrades to transmission, storage and distribution infrastructure. Our commitment to sustainability is reflected in the innovative solutions we offer for comprehensive energy transformation.

Our aim is to reduce our greenhouse gas (GHG) emissions and reach a minimum impact of our products and services across the value chain.

THE UL SAFETY LABEL: SYMBOL OF TRUST

Unconditional delivery of cast resin transformers in the USA requires mostly UL certification. UL is the abbreviation for “Underwriter Laboratories”, an independent organization from the USA which examines products with a view to safety, and certifies them. In response to growing demand from the data center sector across North America, and to ensure unrestricted supply to industrial applications in the USA, we obtained the certificate in record time.

To this effect, UL states:

“Previous in-house attempts to tackle testing were too complicated and other partners offered limited services. The two-phased approach of <Program Assessment> and <Testing & Certification> designed by UL and ELTEK dramatically simplified the process.

The new approach advances from:

- project design, development of the test procedure and protocol, test specimen construction,
- to implementation, full long-term testing
- and finally evaluation of results, and UL certification

Although there were numerous parts and aspects to be tested, the certification process was completed within one year. That’s a big improvement over the standard 3 - 5 years needed for the testing and certification of high-voltage electrical insulation systems!”



RELIABLE QUALITY

Awards and certificates underscore the high standards we set for our responsible conduct.



All certificates are renewed on a regular basis

KNOW-HOW WORLDWIDE.

To best serve our multinational customers, SGB-SMIT has established an international network of production sites and is committed to bolstering that global presence through continued investment.



**PRODUCTION SITES
OF SGB-SMIT CAST RESIN TRANSFORMERS**

- 1 SGB-USA, LOUISVILLE, OH, USA:**
Assembly works for the supply to our customers in Northern and Central America.
- 2 BCV TECHNOLOGIES, FONTENAY-LE-COMTE, FRANCE:**
Cast resin transformers LV/LV up to 400 KVA & HV/LV up to 3 MVA.
- 3 SGB, REGENSBURG, GERMANY:**
Complete cast resin transformer factory to supply our customers within Europe.
- 4 SGB CZECH TRAF0, OLOMOUC, CZECH REPUBLIC:**
Complete cast resin transformer factory for standard applications.
- 5 SGB TRANSFORMERS INDIA, CHENNAI, INDIA:**
Assembly works to supply our customers in India.
- 6 SGB MY, NILAI, MALAYSIA:**
Complete cast resin transformer factory to supply our customers in Asia, Africa and South-Western Asia and the Middle East.
- 7 SGB CHINA, CHANGZHOU, P.R. CHINA**
Assembly works for the supply of our customers for wind offshore plants.



INNOVATION

Applying the latest technologies and data-driven solutions



FLEXIBILITY

Customized solutions tailored to your specific needs



EXPERIENCE AND EXPERTISE

Decades of experience in maintenance and overhaul of transformers.



RELIABILITY

Provided consistency of service performance over time

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