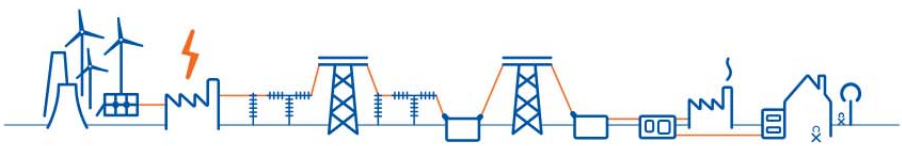
SGB MY
Your dedicated partner
of the SGB-SMIT Group

CAST RESIN TRANSFORMERS



CAST RESIN

SGB MY SDN.BHD WAS LOCALLY INCORPORATED IN 1994 AND COMMENCED MANUFACTURING OF CAST RESIN TRANSFORMERS IN NILAI IN 2009.

WHY CAST RESIN TRANSFORMERS MADE BY SGB-SMIT?

The range of SGB-SMIT cast resin transformers includes power ratings up to 25 MVA and rated insulation voltages up to 36 kV as well as converter, distribution and special transformers. With its over 30 years of experience in the construction of cast resin transformers, SGB-SMIT's scope of special expertise is one of the largest world-wide, a fact which is reflected by the extremely high quality level such as our MTBF (mean time between failures) of over 2,400 years.

SGB MY at Malaysia is able to deliver upto 6.3MVA and rated insulation voltages upto 36kV

Thanks to their special design, SGB-SMIT cast resin transformers offer a range of features which, on the one hand, distinguish them from other cast resin transformers in terms of technology and, on the other hand, make them a highly reliable and extremely safe solution.

The operative benefits for you, our customer, are the following:

- **Thanks to the multi-layer winding principle, high surge voltages and switching voltages are handled safely.**
- **Cooling ducts provide thermal reserves and allow for overload.**
- The use of glass-fibre reinforced plastics (GFK) in the encapsulated windings provides resistance to temperature shocks.
- Long service lives are ensured.
- High voltage and low voltage windings conductor either copper or aluminium.
- Insulation class F or H

HV WINDING

HIGH VOLTAGE WINDING

The high voltage winding (HV winding) is the heart of the cast resin transformer. It embodies the enormous technical know-how of SGB-SMIT.

Cast resin transformers are characterized by the conductors of the HV winding being embedded completely in an enclosed cast resin body with a smooth surface. Even if not specified so explicitly by the standard, this can be achieved in production of high voltage applications only using vacuum-encapsulated moulds. To this effect, the SGB-SMIT production technology and the materials used feature important USPs (USP = unique selling proposition) which distinguish them on the one hand from other cast resin transformers in terms of technology and, on the other hand, make them a highly reliable and extremely safe solution.

RESERVES-EQUIPPED

Thermal reserves due to special primary insulation allow for overload.

ENDURANCE-ENHANCED

Cooling ducts ensure long service life.

SURGE-PROOF

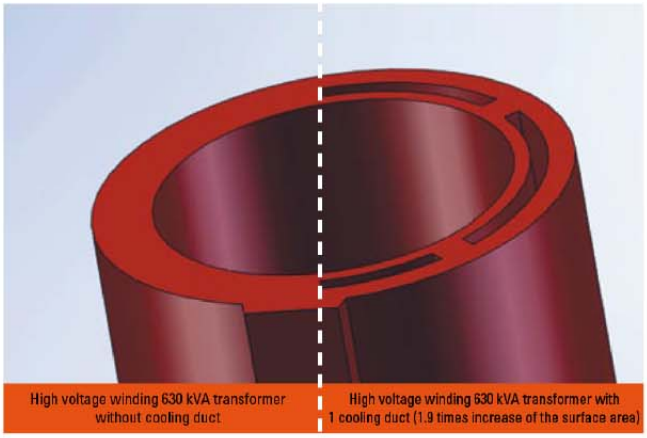
Double-layer winding enables the handling of high surge voltages.

QUANTUM-LEAP

Glass-fibre reinforced plastics ensure safe transport and operation, even in the case of temperature shocks. For our customers, these special features imply a high degree of safety both regarding operation and security regarding their investment decision.

SGB technology is less sensitive to temperature shocks due to the use of glass fibre reinforced epoxy system, achieving double the tensile strength of conventional cast resin system and allowing for the manufacture of copper and alumimium.

HV WINDING



High voltage winding 630 kVA transformer without cooling duct

High voltage winding 630 kVA transformer with 1 cooling duct (1.9 times increase of the surface area)

LV WINDING

LOW VOLTAGE WINDING

The low voltage winding of SGB-SMIT cast resin transformers is almost always designed as coil-winding. The benefits of this winding design are self-explanatory:

- **Reduction of extra losses**
- **Balanced temperature distribution within the winding**
- **High short-circuit capability**

Exceptions exist, for technical reasons, only in case of minor ratings below 250 kVA and for higher system voltages (> 3.6 kV).

LOW VOLTAGE WINDING CONDUCTORS

For over 40 years, SGB-SMIT has manufactured coil windings for distribution transformers and cast resin transformers. This long-standing experience is the reason for specificities ensuring quality:

- There are two established processes to connect the end lead bars to the coils:
  inert gas welding or cold pressure welding under high pressure (400 kN). For over 20 years, SGB-SMIT has only used the cold pressure welding process. Advantages: • no metallurgical change to the conductor metal by a thermal process • no foreign matter as might occur during welding

- By using multi-layer prepregs with subsequent bonding, a highly resistant cylinder is created which, other than the usual solutions, is capable of absorbing the radial shortcircuit forces in a self-supporting fashion.
  The simple support to the core is used only for centering.

- The winding edges are stiffened additionally, thus affording reliable protection against the penetration of humidity and enhancing mechanical resistance. This technology has proven its worth over many decades, including in terms of extreme applications, and is equivalent to an encapsulated winding.

THE CORE

For specifying cores for cast resin transformers, no-load losses, noise and no-load current are essential quality features which are, in many cases, of decisive importance. Thus, the core design is an important engineering task. This includes the precise geometrical design, determination of the material properties of the magnetic sheet to be used and many details, including design measures such as those to control vibrations, slanting positions and other mechanical requirements.

Core lamination with high-temperature resistant varnish is suitable for all – even extreme – installation conditions. This provides not only corrosion protection, but also enhances the core's stability, as the SGB-SMIT varnish penetrates between the individual laminations, bonding them to one another.

The core is fastened by a holding frame which consists of upper and lower steel clamps and flat tie bars resting directly against the core. The tie bars consist of non-magnetic flat steel and connect the lower and upper steel clamps via forces. The holding frame is designed so that the laminations are largely kept free of traction and pressure strain, as this is the only way to ensure that they retain their excellent loss - and noise-related properties. The lower yoke rests, supported by moulded parts of glass-fibre reinforced plastic, on the lower chassis beams to which bi-directionally adjustable rollers can be fastened. Depending on the requirements at the site of installation, various fastenings can be selected such as additional foot bridges, skids, vibration-reducing elements etc.

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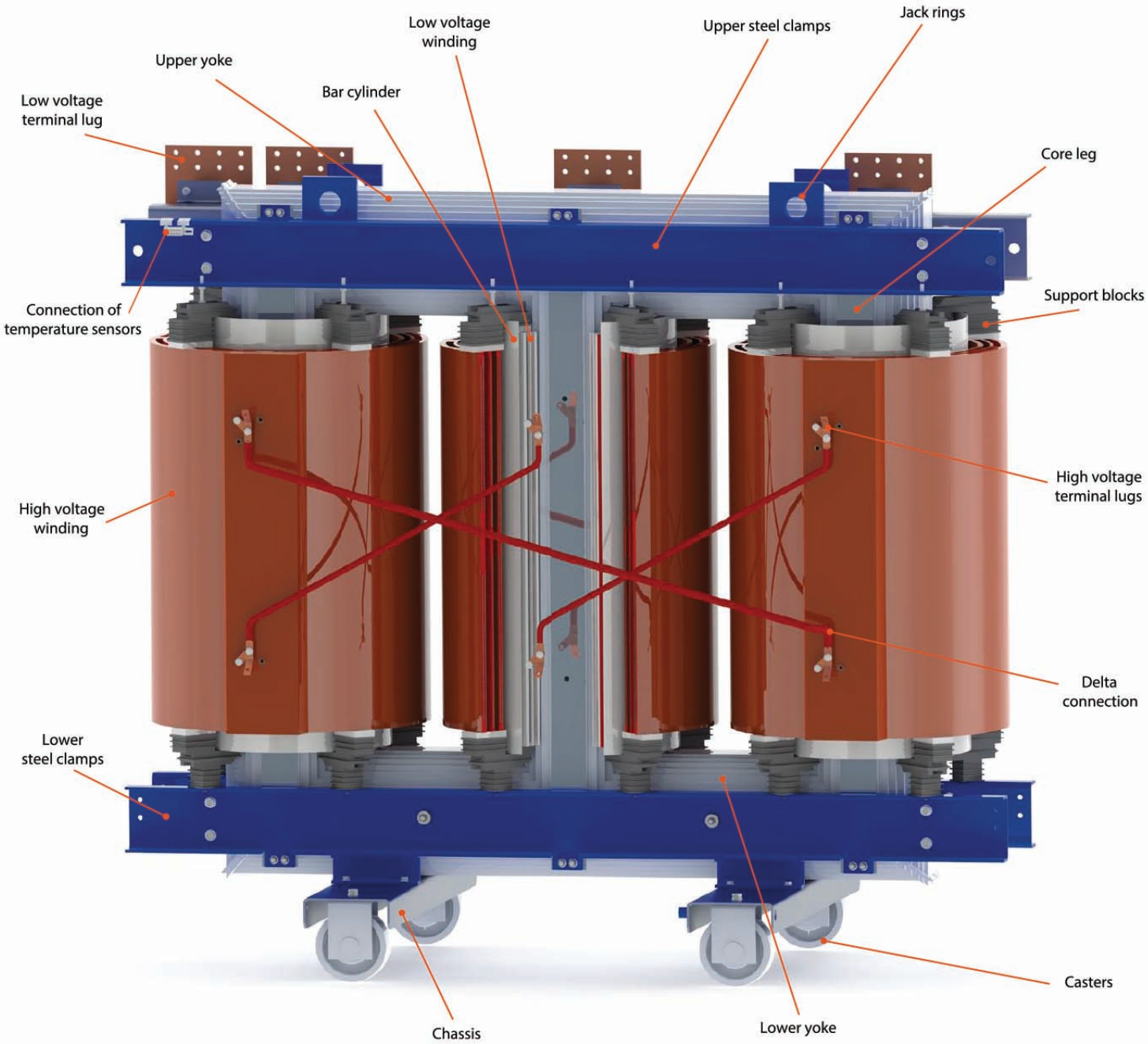
CAST RESIN TRANSFORMER

- KEY COMPONENTS



QUALITY

With production starting in the late 1970's, SGB-SMIT were one of the first manufacturers of cast resin transformers, thus we are able to offer our customers the benefit of our extensive experience and know how. This extraordinary know-how is reflected by a especially high quality score, e.g. an **MTBF of over 2,400 years.**

It goes without saying that SGB-SMIT cast resin transformers meet all the established quality conditions: Fire classification F1 • Environmental class E2 • Climate classification C2

And as a matter of course, the product sector Cast-Resin Transformers at SGB-SMIT has been certified according to ISO 9001, ISO 14001 and OHSAS 18001.

The extremely high quality of SGB-SMIT cast resin transformers has a name: Uni|Q. Uni|Q is synonymous with the special quality and test features which make our cast resin transformers so unique:

- **SEVERAL DECADES OF EXPERIENCE**
- Comprehensive operating experience world-wide including international production sites
- First-class international references in all sectors
- Ample know-how and long-term experience in the field of onshore wind power plants including special cooling systems: Jet System
- Transformer system tailored to open sea conditions for offshore wind power plants with many years of operating experience: Safe-System
- Optimum solutions for all industrial applications with extreme climate conditions – no matter whether extremely hot or cold: All Climate Safe System

QUALITY

- **UNIQUE DESIGN**
  - The multi-layer winding is electrically the best and most reliable option. Thus, almost all oil distribution transformer manufacturers apply this principle. Millions of these have been securing the energy supply in many countries for several decades world-wide. SGB-SMIT is the only manufacturer of cast resin transformers who uses this principle!

- **COMPUTERISED MONITORING OF THE PRODUCTION PROCESS**
  - Based on a precise analysis according to automotive 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.

SPECIAL FEATURE:

INTERNAL TEST EQUIPMENT – A CUTTING-EDGE TEST LABORATORY

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, all routine ,type and special tests specified in this standard and the most important special tests are performed in our own, modern test area.
Thus, the special characteristics stipulated in the customer's specification can also be verified.

• ROUTINE TESTS:

- Measurement of the winding resistance
- Measurement of the transformer ratio and verification of the polarity or vector group
- Measurement of the short-circuit impedance and the short-circuit losses
- Measurement of the no-load losses and of the no-load current
- Test with applied power frequency withstand voltage
- Test with induced power frequency withstand voltage
- Partial discharge measurement

• TYPE TESTS:

- Lightning impulse voltage test
- Temperature rise test

• SPECIAL TESTS:

- Noise measurement
- Verification of the climate classification (C2/C3)
- Verification of the environmental class (E2/E3)
- C2/C3 and E2/E3 testing can be performed at SGB Regensburg

• EXTERNAL SPECIAL TESTS:

- Test of fire behaviour (destructive test)
- Dynamic short-circuit test according to IEC and GOST

HOUSING

IN CASE OF INSTALLATION IN AN ACCESSIBLE LOCATION, PROTECTIVE EQUIPMENT AND/OR HOUSINGS ARE REQUIRED; THE DEGREE OF PROTECTION CAN BE SELECTED ACCORDING TO DIN 40 050 AND DIN 57 101 / VDD 101.

SGB MY OFFER TRANSFORMERS WITH HOUSING WITH THE FOLLOWING FEATURES:

- Protection class IP20 to IP54
- Design of cooling from AN (convection-cooled) and AF (fan-cooled)
- Low-cost standard housings with various equipment options
- Straightforward assembly on site delivery in preassembled condition
- For indoor installation, we offer IP20, IP21 and IP23, for outdoor installation, IP33
- Standard paint RAL 7032 or 7035. Other paint available on request
- For cable connection from below, entry plates and metal supports are provided
- Entry from above suitable for bus duct
- Housing as loose supply in flat packed condition

The housings feature air entry and outlet ports to dissipate the transformer's power loss for natural or forced air cooling. On the installation site, free supply and discharge of the required cooling air must be ensured

TEMPERATURE MONITORING

ANALYZER	TEC NT 935	TR250
AC	24-240V	24-240V
DC	24-240V	24-240V
PT100	4	3
PTC	No	3 chains
Fan control	yes	yes
Alarm	Change-over contact	Change-over contact
Trip	Change-over contact	Change-over contact
Error	Change-over contact	Change-over contact
LED	Alarm,Trip,Voltage,Fan	Trip, Sensors
Sensor monitoring	yes	yes
Contacts	5 A; 250 VAC	5 A; 400 VAC 330 VDC
Ambient temp.	- 20°C to +60°C	- 20°C to +65°C
Digital display	yes (3 digit)	yes (3 digit)
Programmable	yes	yes
RS232 / RS485	yes	no
Analog (4-20 mA)	yes	no

Temperature monitoring via PTC (resistors whose resistance changes quickly once the operating temperature is reached) is provided in general for each cast resin transformer. As the LV and HV windings are thermally balanced, the thermistors are located on the LV winding for reasons of insulation. They offer special protection of the vacuum-encapsulated high voltage windings against inadmissibly high temperatures which may occur in situations of overload, insufficient cooling and high ambient temperatures. Subject to customer's request, PT100 and core monitoring by PT100 or PTC are also possible. Non-contact temperature monitoring is also available. As a rule, two systems are installed:

- **TRIP**

This system signals exceeding of the temperature on which the normal service life consumption is based, i.e. rated continuous load at a coolant temperature of 20°C. It serves to warn operators and to instigate them to take remedial measures.

- **ALARM**

This second system is tuned to match the temperature limit of the declared temperature class. In this case, the transformer must be switched off. Operation at excess temperature reduces the service life. The cables of the three resistors are series-connected to a terminal strip.

TECHNICAL DATA

– CAST RESIN TRANSFORMER

Note: The table shows technical parameter of standard design.SGB MY can offer transformers as per customers specification and different performance figures upon request.

11/0.433 KvDyn 11 50Hz (Um12/1.1kV)

RATING (KVA)	NLL (W)	LL (W) @ 75 °C	LL(W) @ 120°C	IMP. (%)	NOISE LEVEL (LpA @ 1.0M)	WEIGHT (KG)	TRAFO. OVERALL DIMENSION (M)		
							L	W	H
400	810	3930	4520	4	52dB	1640	1.32	0.82	1.33
500	840	4660	5350	4	52dB	1870	1.34	0.82	1.42
630	1400	6400	7360	4	58dB	1730	1.38	0.82	1.52
800	1570	7600	8740	6	58dB	2000	1.56	0.82	1.42
800	1420	4790	5500	5	52dB	2560	1.52	0.82	1.43
1000	2000	8800	10120	6	60dB	2220	1.66	0.98	1.37
1000	1580	5790	6650	5	52dB	2900	1.59	0.98	1.57
1250	2400	10200	11730	6	60dB	2820	1.64	0.98	1.61
1250	1880	7110	8170	5	52dB	3810	1.82	0.98	1.61
1600	2800	12500	14375	6	60dB	3180	1.86	0.98	1.66
1600	2290	8390	9650	6	55dB	4280	1.90	0.98	1.67
2000	3500	16000	18400	6	60dB	4320	1.98	1.27	1.91
2000	2860	11250	12940	6	56dB	4960	2.02	1.27	1.80
2500	4300	18500	21275	6	60dB	4920	2.04	1.27	1.97

24/0.416 KvDyn 11 50Hz (Um24/1.1kV)

RATING (KVA)	NLL (W)	LL (W) @ 75 °C	LL(W) @ 120°C	IMP. (%)	NOISE LEVEL (LpA @ 1.0M)	WEIGHT (KG)	TRAFO. OVERALL DIMENSION (M)		
							L	W	H
1250	3100	11800	13570	6	63dB	2780	1.85	0.98	1.9
1600	3500	14000	16100	6	60dB	3170	1.9	0.98	2.2
2000	4500	17000	19550	6	60dB	4130	2.08	1.27	2.2
2500	5000	20000	23000	6	63dB	4670	2.16	1.27	2.28

33/0.433 KvDyn 11 50Hz (Um36/1.1kV)

RATING (KVA)	NLL (W)	LL (W) @ 75 °C	LL(W) @ 120°C	IMP. (%)	NOISE LEVEL (LpA @ 1.0M)	WEIGHT (KG)	TRAFO. OVERALL DIMENSION (M)		
							L	W	H
500	1800	6000	6900	6	63dB	2040	1.69	0.82	1.94
1000	3000	10000	11500	6	63dB	2990	1.88	0.98	1.95
1600	4400	14400	16560	6	63dB	4350	2.2	0.98	2.1
2000	5100	17000	19550	6	63dB	4890	2.28	1.27	2.23
2500	5800	21000	24150	7	63dB	5470	2.38	1.27	2.23

CERTIFICATES

ZERTIFIKAT ■ CERTIFICATE ■ 認證證書 ■ СЕРТИФИКАТ ■ CERTIFICADO ■ CERTIFICAT

Management Service

CERTIFICATE

The Certification Body
of TÜV SÜD Management Service GmbH
certifies that

SGB MY
Your dedicated partner of the SGB-SMIT Group

SGB MY Sdn. Bhd.
PT 16688 & 16689,
Jalan Permata 2, Arab-Malaysian Industrial Park
71800 Nilai, Negeri Sembilan
Malaysia

has established and applies
a Quality Management System for

Sales, design, production, testing and service of oil immersed distribution, medium power transformer and cast resin transformers.

An audit was performed, Report No. **70013947**.
Proof has been furnished that the requirements
according to

ISO 9001:2015

are fulfilled.

The certificate is valid in conjunction
with the main certificate from **2017-06-02** until **2020-04-10**.
Certificate Registration No.: **12 100 11003/07 TMS**.

Product Compliance Management
Munich, 2017-06-06

TÜV SÜD Management Service GmbH • Zertifizierungsstelle • Ridlerstraße 65 • 80339 München • Germany
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Management Service

CERTIFICATE

The Certification Body
of TÜV SÜD Management Service GmbH
certifies that

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Your dedicated partner of the SGB-SMIT Group

SGB MY Sdn. Bhd.
PT 16688 & 16689,
Jalan Permata 2, Arab-Malaysian Industrial Park
71800 Nilai, Negeri Sembilan
Malaysia

has established and applies
an Occupational Health and Safety Management System for

Sales, design, production, testing and service of oil immersed distribution, medium power transformer and cast resin transformers.

An audit was performed, Report No. **70013947**.
Proof has been furnished that the requirements
according to

OHSAS 18001:2007

are fulfilled.

The certificate is valid in conjunction
with the main certificate from **2017-06-02** until **2019-05-03**.
Certificate Registration No.: **12 116 11003/07 TMS**.

Product Compliance Management
Munich, 2017-06-06

DAkkS Deutsche Akkreditierungsstelle D-ZM-14143-01-00

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Management Service

CERTIFICATE

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PT 16688 & 16689,
Jalan Permata 2, Arab-Malaysian Industrial Park
71800 Nilai, Negeri Sembilan
Malaysia

has established and applies
an Environmental Management System for

Sales, design, production, testing and service of oil immersed distribution, medium power transformer and cast resin transformers.

An audit was performed, Report No. **70013947**.
Proof has been furnished that the requirements
according to

ISO 14001:2015

are fulfilled.

The certificate is valid in conjunction
with the main certificate from **2017-06-02** until **2020-04-10**.
Certificate Registration No.: **12 104 11003/07 TMS**.

Product Compliance Management
Munich, 2017-06-06

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AFTER SALES AND SERVICE ACTIVITY

BY SGB MY

SGB MY offers after sales and service support for our Cast resin transformers. Dedicated service team of experienced staff (Electrical & Mechanical) is offering you an on-site investigation and complete support at site in case of minor issues or recommendation for repair at factory in case of major problems.

Cast resin transformers are maintenance free. However, below are the services offered being an OEM and transformer specialist.

ON SITE ACTIVITIES:

1. Visual inspection for any abnormality
2. Functional tests for control fan
3. Check pollution/contamination of transformer surface and cleaning if required
4. Functional test of temperature controller
5. Check of temperature sensors
6. Tightness check of terminal connection
7. Visual inspection of enclosure if applicable

Frequency for above checks are normally decided at every 6 months.

MAJOR REPAIR AT FACTORY:

1. Replacement of windings
2. Replacement of faulty parts
3. Routine testing

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CONTACT

SGB MY SDN. BHD.
Nilai • Malaysia
PT 16688 & 16689, Jalan Permata 2
Arab Malaysian Industrial Park
71800 Nilai, Negeri Sembilan, Malaysia
Phone +60 6 799 4014
e-mail sgbmy@sgb-smit.group

STARKSTROM-GERÄTEBAU GMBH
Ohmstraße 10 • 93055 Regensburg
Germany
Phone +49 941 7841-0
Fax +49 941 7841-439

SÄCHSIS CH-BAYERISCHE
STARKSTROM-GERÄTEBAU GMBH
Neumark • Germany
Phone +49 37600 83-0

ROYAL SMIT TRANSFORMERS B.V. / SMIT TRANSFORMER SERVICE
Nijmegen • The Netherlands
Phone +31 24 3568-911

SGB TRANSFORMERS INDIA PVT.LTD.
Tamil Nadu • 602 105
TEL: +91-44- 27156001 / 004

RETRASIB S.A.
Sibiu • Romania
Phone +40 269 253-269

SMIT TRANSFORMER SALES INC.
Summerville, SC • USA
Phone +1 843 871-3434

SGB-USA INC. / OTC SERVICES INC.
Louisville, OH • USA
Phone +1 330 871-2444

SGB CZECH TRAFO S.R.O.
Na vyhlídce 1254
739 61 Třinec

SGB-SMIT ITALIA S.R.L.
Via Donizetti, 25
20017 Rho' (MI) • Italy
Phone: +39 02 93 0 53 11