Technical specification – SIS

1. BASIC DESCRIPTION

This document describes the technical specifications of the solid insulated bus bar system SIS produced since 1984 by RITZ Instrument Transformers GmbH in accordance with IEC standard 60137. The SIS bus bar system is a medium-voltage power distribution solution designed to transfer high currents between electrical installations. Typical applications are connections between devices such as:

- Generators
- Generator circuit breakers
- Switchgear cabinets
- Insulated phase buses (IPBs)
- Power transformers
- Reactors

SIS bus bar systems

The SIS bus bar system consists of a copper (Cu-ETP) or aluminium conductor (AlMgSi0.5). The capacitively controlled insulation consists of epoxy resin impregnated paper with an additional embedded earthing layer.

SIS connection sleeves

In SIS bus bar systems with more than one bus bar per phase, the individual sections must be securely connected using SIS connection sleeves that use the same insulation technology as the SIS bus bars. SIS connection sleeves have a fixed and a floating bearing so that neither the connection point nor the insulating surface of the bus bar is damaged by the thermally induced contraction and expansion of the bus bar. In addition, the SIS connection sleeves are equipped with pressure relief valves, which drain off trapped moisture and thus prevent possible negative effects on the bus bar connection.

Indoor and outdoor installation

The components of the SIS bus bar system are fully insulated, touch-safe and suitable for indoor and outdoor applications. The surface of the components for indoor use is made of heat shrink tubing, which reliably protects the cast resin insulation of the bus bars and connection sleeves.

The components for outdoor use are available in the SISOL and SISES variants. As with the components for indoor use, the bus bars and connection sleeves of the SISOL variant are provided with additional polyolefin heat shrink tubing, which is highly resistant to chemicals and UV radiation.

The SISES components for outdoor use are manufactured with a stainless-steel alloy surface that guarantees high resistance to extreme and abrasive environments. The stainless-steel alloys used are listed in the following table:

	DIN standard	EN standard	AISI standard	UNS standard
V4A	X2CrNiMo17-12-2	1.4404	316L	S31603
V4A	X6CrNiMoTi17-12-2	1.4571	316Ti	S31635
AL29-4C	X2CrNiMoN29-7-2	1.4477	-	S44735

2. TECHINACAL DATA

The following information defines the standard parameters of the SIS bus bar system. We are aware that project-specific requirements may deviate from the following parameters. Our technical department will check your specific requirements so that we can provide you with a suitable offer. Please do not hesitate to contact us to discuss your individual requirements.

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Max. electrical parameters:

Highest rated voltage	U_m	≤ 40.5 kV
Withstand AC voltage	U_w	≤ 85 kV
Rated lightning impulse withstand voltage	BIL/U_B	≤ 200 kV
Rated current	I_r	≤ 6500 A
Thermal short-time rated current	I_{th}	≤ 100 kA/3 s
Dynamic rated current	I_d	≤ 250 kA
Rated frequency	f_r	50/60 Hz

Insulation level acc. to IEC 60137:2017:

U_m [kV]	U_w [kV]	BIL [kV]	max. I_r [A]
3.6	10	40	6500 A
7.2	20	60	6500 A
12	28	75	6500 A
17.5	38	95	6500 A
24	50	125	6500 A
36	70	170	4000 A
40.5[1]	85	185	4000 A

[1] 40.5 kV is not listed in IEC 60137:2017

Technical standard parameters[2]:

Installation altitude	IEC 60137		≤ 1000 m
Ambient temperature	IEC 60137	INDOOR USE OUTDOOR USE	-5 °C to +40 °C -25 °C to +40 °C
Corrosion resistance	DIN EN 60068-2-52		Process 8
Insulating class	IEC 60034-1		Class E
Wind load	DIN 1055-4:2005-03		Zone 2: 25 m/s
Atmospheric humidity		INDOOR USE OUTDOOR USE	≤ 95 % (without condensation) ≤ 100 %
Seismic conditions			Not considered
IP protection type SIS connection sleeve	DIN EN 60529	INDOOR USE OUTDOOR USE	up to IP 64 up to IP 66 / IP 68
IP protection type connection boxes	DIN EN 60529		IP 23
Degree of impact resistance	IEC 62262		IK 10
Freedom from halogen	IEC 60754-1		YES
Creepage distance (SCD)	IEC 60815	INDOOR USE OUTDOOR USE	9 mm/kV (U_m) 31 mm/kV (U_m)
Earthing shield			8 mm² Cu
Earthing cable			50 mm² Cu
Operating life			≥ 35 years

[2] Deviating parameters may be possible, but these must be assessed and approved by our technical department.

Earthing system

The bus bar system is used exclusively for the transport of electrical current and insulation from contact voltage in insulated or high resistance earthed networks[3], in accordance with the specification defined within the order documentation.

[3] High resistance earthed network" here means a medium voltage network whose star point is earthed via an impedance that limits the earth fault current to a value of ≤ 60 A.

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3. SCOPE OF SERVICES

Simulation with FEM (finite element method)

All SIS bus bar systems are simulated using FEM (finite element method) to determine the conductor diameters and the minimum distance between phases before we submit a quotation. Customers of RITZ Instrument Transformers GmbH can be sure that the SIS bus bar solution meets their requirements.

Design

The technical drawings and the three-dimensional (3D) design of the SIS bus bar system, including the corresponding building components, are created using SolidWorks.

Production

Our SIS bus bar systems are produced exclusively in Germany.

Routine tests in accordance with IEC 60137

Every bus bar and every connection sleeve is subjected to rigorous testing before it leaves our factory. This ensures that all components fulfil or exceed the minimum requirements specified in IEC 60137. The following electrical routine tests are carried out as standard:

a. Measurement of the dielectric loss factor (tan δ)
b. Measurement of the capacitance
c. Power-frequency withstand voltage test
d. Measurement of the partial discharge quantity

By adhering to these strict test procedures, RITZ ensures the quality and reliability of its bus bars and connection sleeves.

Packaging and shipping

SIS bus bar systems are packed and delivered ready for installation in disposable freight crates.

Shipping-optimized packaging and container stowage

RITZ uses customised freight crates, which are manufactured by our experts in accordance with HPE packaging standards. In addition, container stowage is also handled in our factory. This avoids external shipping preparations and reduces processing costs and transit times.

Disposable crates made from ISPM15-certified wood

The packaging boxes are made from ISPM15-certified wood. This ensures that the international plant protection conventions (IPPC standard) are complied with.

Securely sealed freight crates

Regardless of the selected shipping method (air freight, land freight, sea freight), the contents of the freight boxes are enclosed in a sealed film to protect them from environmental influences during transport. Desiccant is included for a storage period of 6 months to prevent condensation within the film.

Shipping documents

RITZ Instrument Transformers GmbH handles all shipping documents so that third parties do not need to be involved in this process. This helps to ensure that shipping can be handled easily and efficiently. Country-specific import documents can be provided on request.

Documentation

Language

All technical documentation, including drawings, specifications and certificates, are provided in German, English or a combination of both languages. On request, we can also provide the documentation in other languages.

Provision of documents

All technical documentation, including drawings, specifications, certificates and application manuals, are provided in both paper and electronic form.

Provision of Documents after project completion including final drawings

Upon completion of the project, we will provide you with all updated documentation and final drawings to ensure comprehensive "AS BUILT" documentation of the project.

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4. OPTIONAL SERVICES

Measurements

On request, RITZ Instrument Transformers GmbH offers 3D measurements on site.

FAT - Factory Acceptance Test

On request, RITZ Instrument Transformers GmbH offers a factory acceptance test.

Supervision during installation

On request, RITZ Instrument Transformers GmbH will provide an experienced supervisor for the installation process of the SIS bus bar system.

Installation of the bus bar system

On request, RITZ Instrument Transformers GmbH offers installation of the SIS bus bar system by experienced fitters.

VLF test

On request, RITZ Instrument Transformers GmbH offers VLF tests after installation of the SIS bus bar system. This service is only available in Germany, Austria and Switzerland.

Type tests

On request, RITZ Instrument Transformers GmbH offers additional, previously unperformed type tests.

5. LEGAL INFORMATION & DISCLAIMER

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