

SYKO Expert in Power Electronics

SYKO®

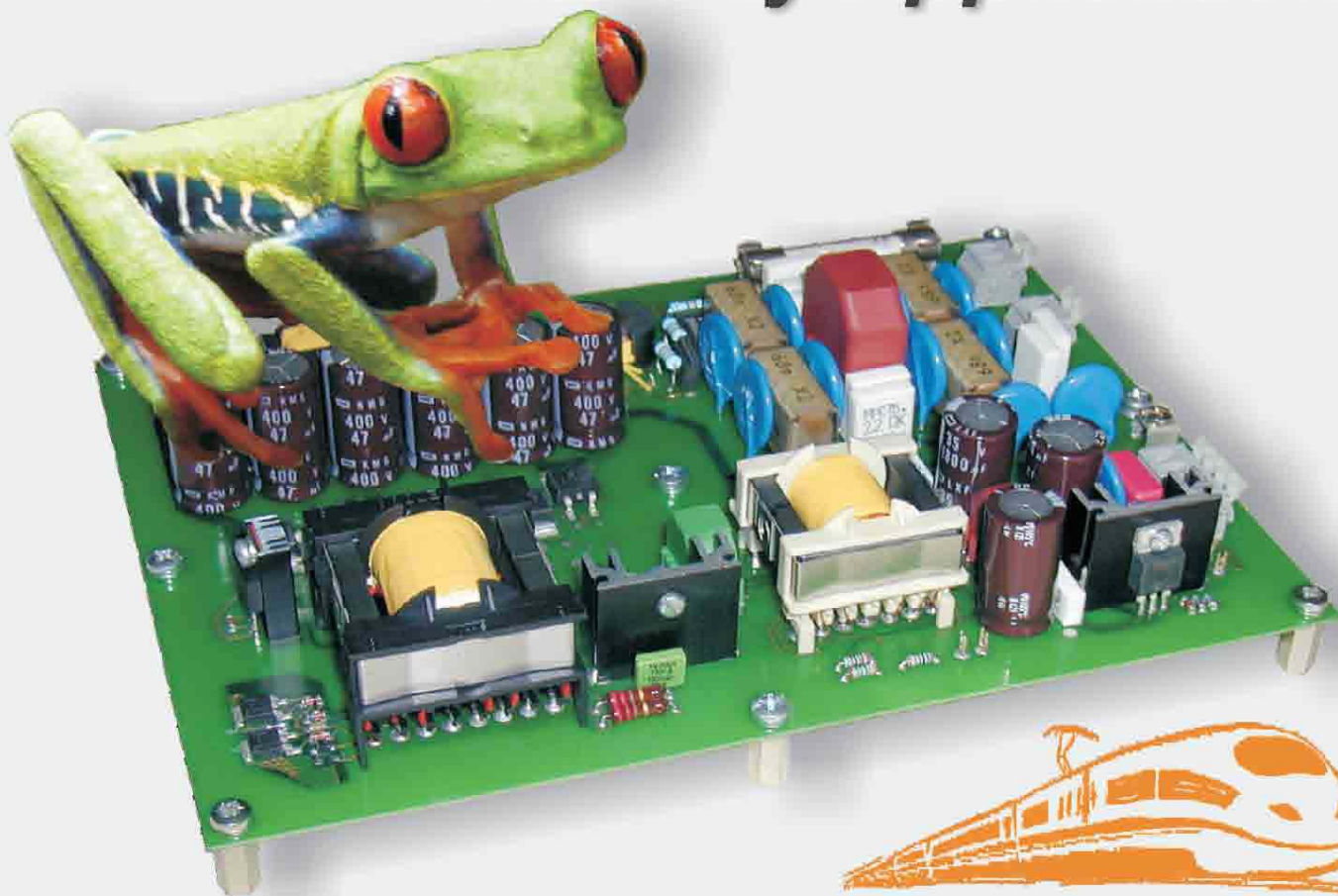
POWER



Our current

Power Supply Program

Railway Applications



Focusing your Power Visions

® registered trademark of Company SYKO Gesellschaft für Forschung und Entwicklung GmbH & Co. KG

The product lines A, B, D, C, D, and E up to an output power of 1500W are offered for mobile and stationary use as well as for very high reliability applications. These converters are available as PCB-modules, 19"-cassette style and chassis mountable solutions. Product specific functions as active reverse polarity protection, active hold-up time, active transient filters, active inrush current limiting, control functions and signaling are integrated. These DC/DC product lines are ideal for battery supplied railway applications.

DC/DC Produkt lines - classification:

A:	no galvanic isolation	Buck-topology	PCB-modules, 19"-cassettes, chassis-mounting
B:	no galvanic isolation	Regenerator (buck-boost)-topology	PCB-modules, 19"-cassettes, chassis mounting
C:	with galvanic isolation	wide input range	PCB-modules chassis mounting
D:	with galvanic isolation	limited input range	PCB-modules
E:	with galvanic isolation	wide input range, system converters	19"-cassettes, chassis-mounting

- **Patented Switching topologies**
- **Topology-Cascading**
- **High operational reliability**
- **Dependable system suitability**
- **Wide temperature ranges (-40...+85)°C**
- **Very wide input ranges (up to >1:12)**
- **Transient proof / adjusted**
- **Very insusceptible to disturbances**
- **Single and multiple outputs**

Special solutions:

- **For driver's-cab-displays**
- **With UPS-function**
- **For voltage stabilisation**
- **Security redundancy**
- **Field regulators**
- **Resonant topologies**
- **Processor controlled**



Focusing your Power Visions

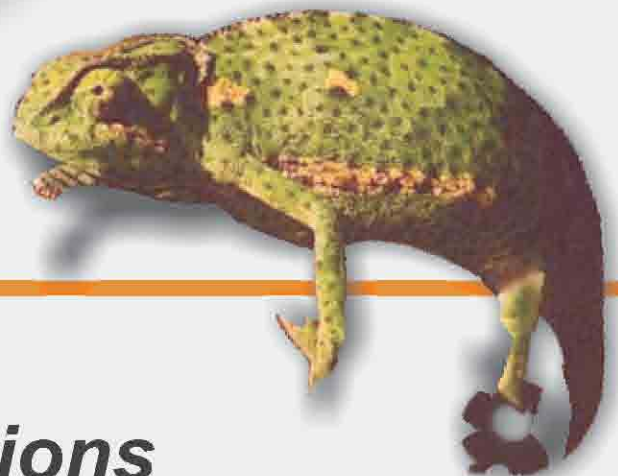
For applications on land, in water and in the air

Power supplies of the product line F are working on the 16-400Hz AC-Networks and the most converter families can additionally handle a parallel DC-input range. This Universal-input with the offered Ultra wide-input voltage range can be used in world wide projects. Today SYKO offers the following universal input ranges: 18-360V DC / 28-264V AC or 75-560V DC / 82-520V AC plus long term transients / short term transients up to 1kW. Shock-, vibration robustness, temperature ranges of -35...+ 85°C and optionally radiation tolerant types are available. PFC-inputs for 16 2/3 Hz up to 400Hz on two- respectively three-phase square-, trapezoidal- or sinus wave networks are increasingly offered.

Main points:

- **Universal input range DC and AC**
- **Very wide input voltage range**
- **Single and multiple outputs**
- **User-defined air- / creepage distances**
- **Very good EMC-compatibility**
- **Dependable system suitability**

- **Multi step-topologies**
- **Active transient protection**
- **Active inrush current limiting**
- **Active hold-up time**
- **Extreme insusceptible to disturbances**
- **High operational reliability**



Flexible topologies and customised solutions

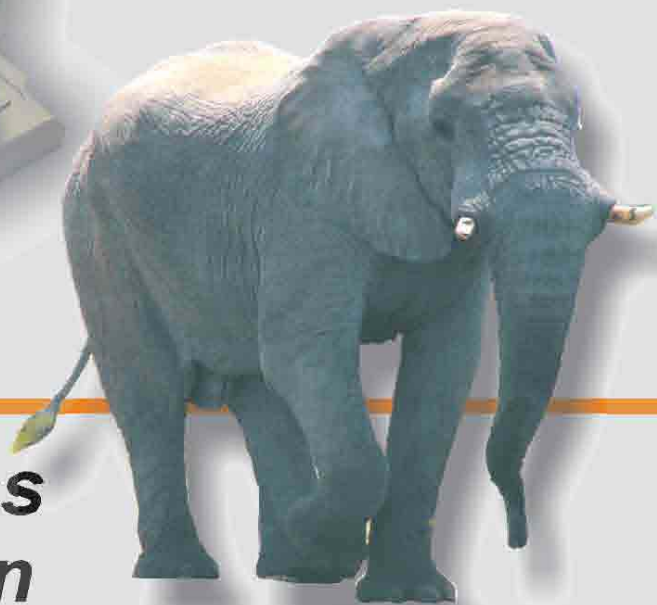
Out of the DC on-board network the inverters produce a synthetic single phase or three phase sine wave output voltage in a power range of (0,5 - 12)kVA. These 1ph/3ph-inverters as well as frequency inverters are designed to be used on low voltage, high voltage batteries, traction lines and intermediate circuits. They are suitable in mobile applications on 24V to 110V-rolling stock networks, on 220/450V high voltage batteries respectively 450V up to 800V intermediate circuits, on 750V-traction line and UIC-voltages. Because of the various possible combination and different system specific requirements, this applications has to be specified by the customer. The main characteristics are summarised as follows:

Main points:

- 1Ph-supply of equipment, computers, control systems, measurement units and tools
- Supply of 3Ph-motors with dynamic run-up of compressors, fans in climatic applications, vehicle ventilation, emergency ventilation, compressed air generation, pumps, etcetera

- 24V / 36V / 72 / 110V - battery networks
- 220V / 450V_{DC} - fuel cells
- 600V / 750V_{DC} - traction lines
- 450V/670V/800V_{DC} - intermediate circuits
- 3Ph-400/480V_{AC} - on-board network

- Single-outputs
- Duplex-outputs
- Triplex-outputs
(one, two or three independent 3ph-outputs)



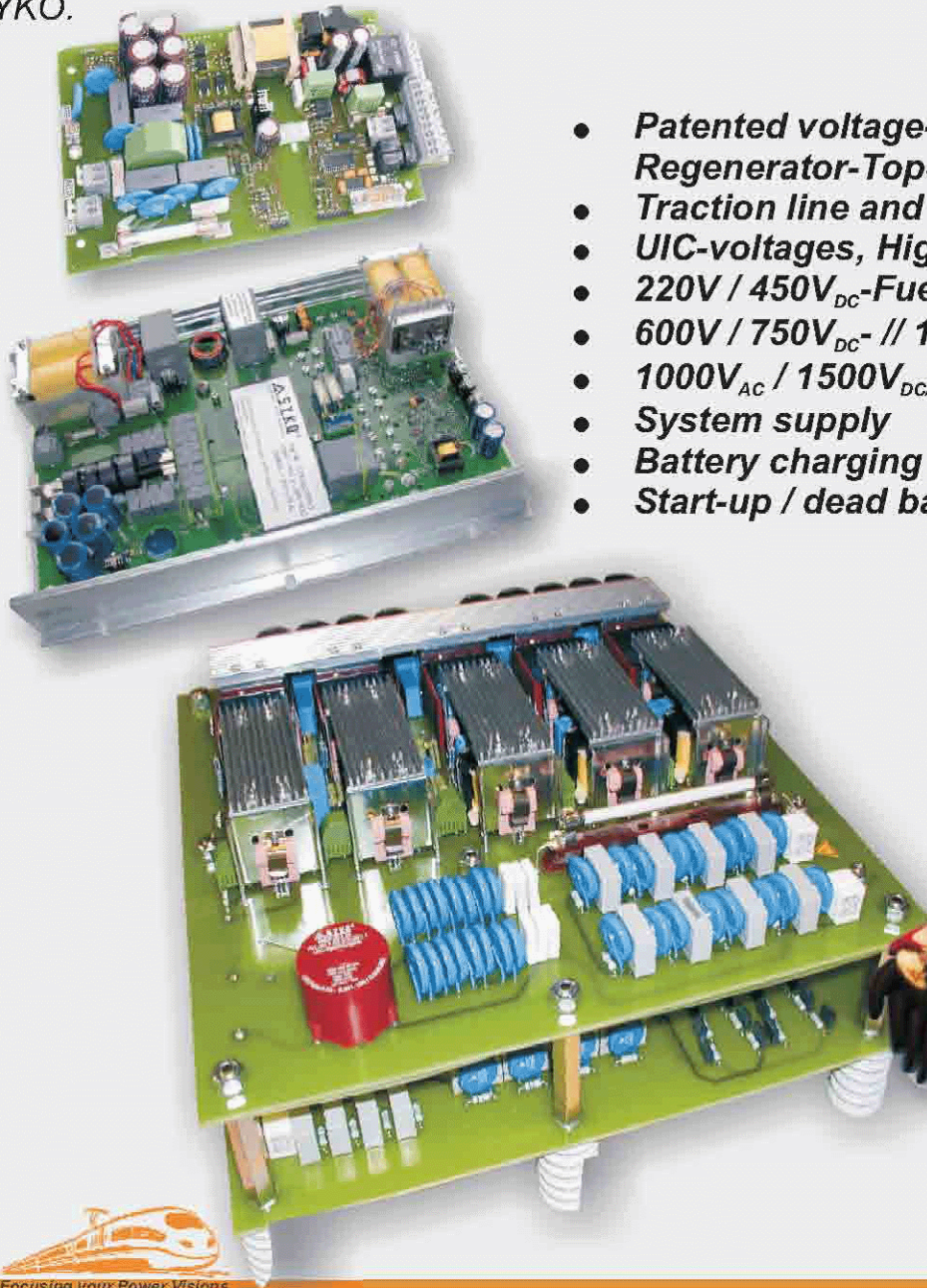
Mechanical robustness

Disturbance protection

SYKO defines high voltage converters when the power supply works on voltages as from 220V/450V-fuel cells, on 600V / 750V and 1200V / 2400V-traction line voltages, 660V-intermediate circuits of auxiliary inverters, up to UIC-voltages of 1000V AC / 16,3Hz, 1500V AC / 50Hz 1500V DC and 3000V DC. These high voltage converters are offered in a power range up to 3kW.

Start-up power supply

The start-up converter can be connected statically to the high voltage-level and supplies the system for 3 x 3 minutes out of this UIC/traction line voltage, when the vehicle's battery is defect or discharged. Within this time the start-up converter starts auxiliary-inverter / battery-charger. The standard compliant UIC-start-up converters are offered exclusively by company Schaltbau GmbH / Munich in the versions ESP0, ESP1 and MSP. (www.schaltbau.de) Traction line voltages and system supplies are offered directly from SYKO.



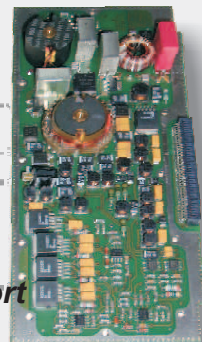
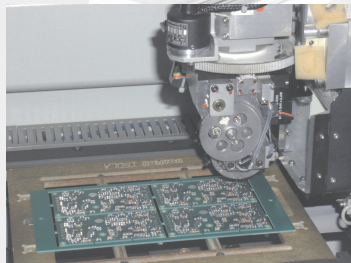
- **Patented voltage-cascaded Regenerator-Topology**
- **Traction line and intermediate voltages**
- **UIC-voltages, High voltage batteries**
- **220V / 450V_{DC}-Fuel cell**
- **600V / 750V_{DC} // 1200 / 2400V_{DC} - Traction line**
- **1000V_{AC} / 1500V_{DC/AC} / 3000V_{DC} - UIC-voltages**
- **System supply**
- **Battery charging**
- **Start-up / dead battery start**



Functionality, signalling and communication

About us

SYKO was founded in Mainhausen, Germany in 1973 by the electrical engineer Reinhard Kalfhaus. Since the very beginning, the company has focused on the development and manufacture of Switch-mode power supplies. SYKO today offers a comprehensive product range of superior-quality custom-tailored and standard components, including switching regulators, regenerators, DC/DC converters, power supply units and inverters. SYKO's products are characterized by extremely wide input voltage and temperature ranges, excellent interference suppression, multiple outputs, and mechanical robustness. They are compliant with the relevant standards, such as EN 60950, EN 55022.B, EN 50155/121, EN 61000-4-4/5, RIA 12, UIC 550, IEC- high voltage and the military standards VG and MIL.



Sales

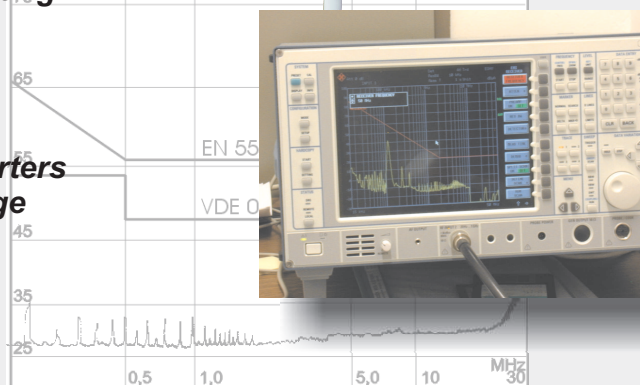
DC/DC, AC/DC, DC/AC, AC/AC
Standard and customized solutions
Project management, Technical support

Manufacturing

In accordance with DIN ISO 9001
Small and large batches, in-house automated SMD assembly
100% verification, documented verification,
Burn-in testing, cycle testing

Development

DC/DC converters, AC/DC converters, DC/AC inverters
up to 5kVA, 100A output currents, 5kV input voltage
In accordance with current standards/regulations
Customer-specific and standard program



Based on standardized circuit topologies, SYKO can deal with customer-specific modifications and custom development as easily as with standard technology. In most cases, a fully functional serial prototype can be delivered within 7-9 weeks. SYKO features one of today's most expansive and standard-compliant ranges of power supply products in:

railway technology, automotive industry, aircraft engineering, military instrumentation, industrial systems engineering, automation, transportation engineering, shipbuilding and telecommunication market segments.

SYKO delivers standard-compliant products for railways worldwide and will continue its stable growth. This is based on 75 employees in R&D, manufacturing and sales departments, the new 3.200 m² company site, and current sales of 7 million Euro.

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