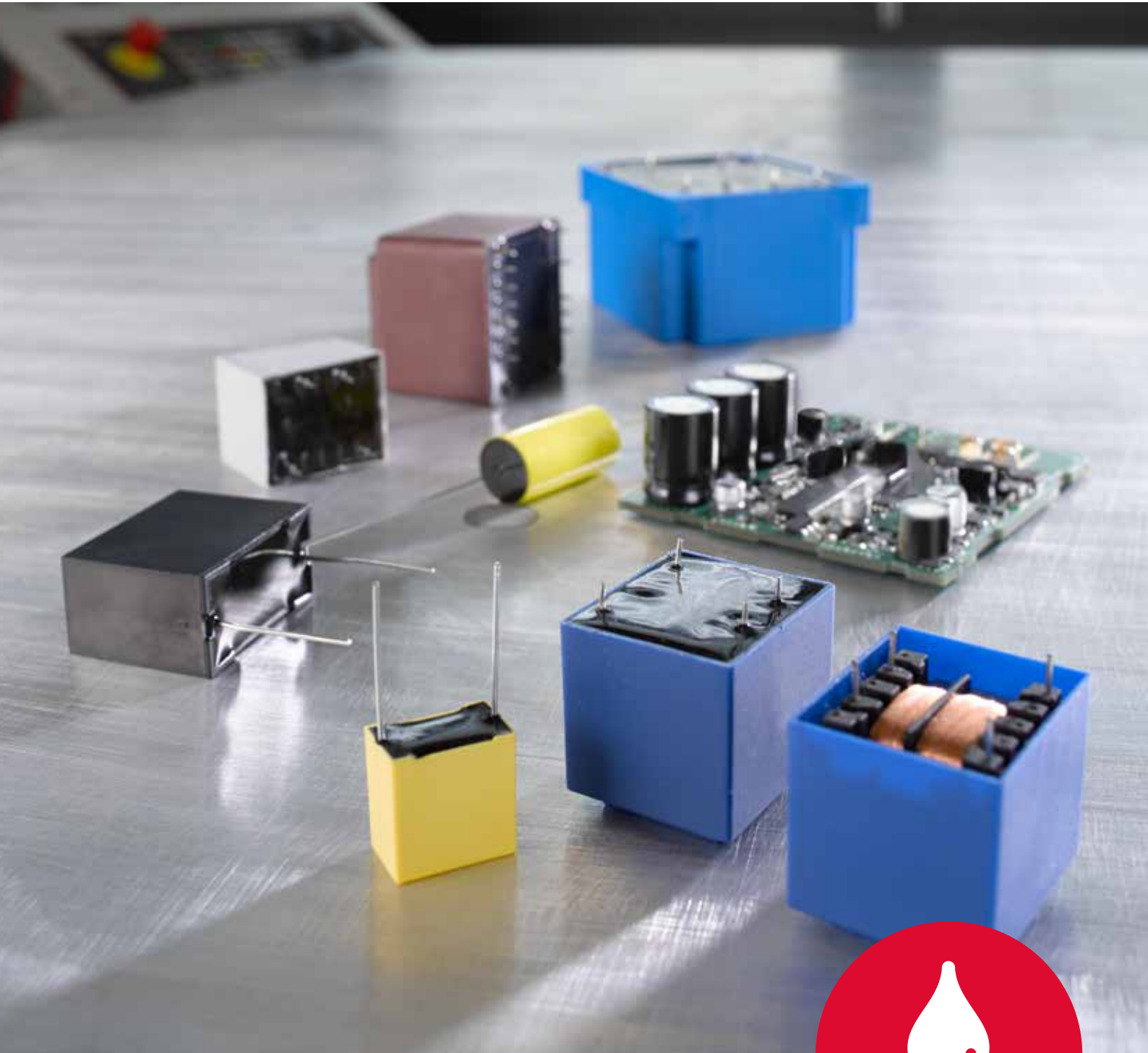


Electro casting resins | **Innovative casting systems for electrical and electronic components**





» Electro casting resins are key to the further development of numerous industries. The automotive, energy, automation, and household goods industries are all heavily dependent on developments in storing and transferring electricity. Electro casting resins from RAMPF Polymer Solutions ensure greater safety, control, cost-efficiency, and convenience. RAMPF can optimize electrical and electronic systems with materials, machinery, and processing from a single source – and has been doing so for over 35 years. «

Innovative solutions for sealing, bonding, casting, and protecting

RAMPF Group

The international RAMPF Group stands for **engineering and chemical solutions** and caters to the economic and ecological needs of industry.

Our range of competencies includes:

- > Production and recycling of **materials** for modeling, lightweight construction, bonding, and protection
- > **Technical production systems** for precise, dynamic positioning and automation, as well as technologies for complex composite parts production
- > **A comprehensive range of solutions and services**, particularly for innovative and customer-specific requirements

This know-how helps our customers achieve profitable and sustainable growth.

Trusting relationships are of utmost importance to RAMPF. They are a vital part of the family-owned company's success story which now spans over 35 years.

RAMPF thinks globally and acts locally. The company has production facilities strategically located in Germany, the United States, Canada, China, and Japan.

RAMPF Polymer Solutions

The company from Grafenberg, Germany, is a leading developer and manufacturer of reactive resin systems based on polyurethane, epoxy, and silicone.

The RAMPF Polymer Solutions product portfolio includes liquid and thixotropic sealing systems, electro and engineering casting resins, edge and filter casting resins, adhesive systems, and hot-melt adhesives.

Research and development have top priority at RAMPF Polymer Solutions. A large innovation center is available for laboratory and application technology. Every day, this center is involved in work on developing new products, adapting existing products to specific customer requirements, and testing a huge range of material combinations. In doing so, it places particular emphasis on the use of renewable raw materials.

It goes without saying that RAMPF Polymer Solutions provides customer support during product introduction and the production process.

The company is certified to ISO 9001, ISO/TS 16949, ISO 50001, and ISO 14001.



Machine Systems



Production Systems



Composite Solutions



Eco Solutions



Polymer Solutions

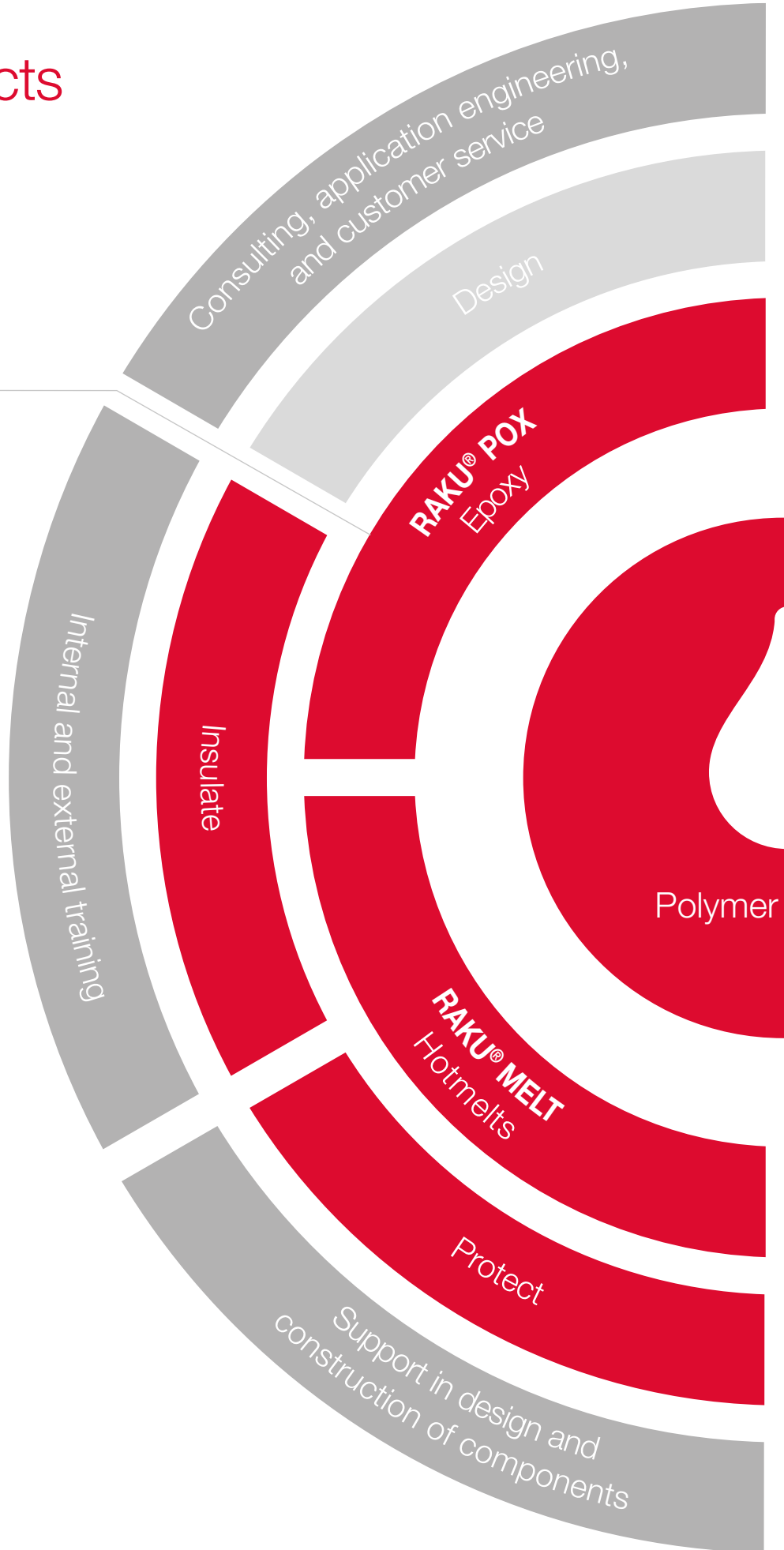


Tooling Solutions

Range of products and services

01 | Materials

Innovative, high-performance, sustainable – RAMPF Polymer Solutions develops and manufactures reactive resin systems based on polyurethane, epoxy, and silicone, and places a particular emphasis on the use of renewable raw materials.





02 | Applications/Technologies

Future-oriented, high-tech, professional – the RAMPF Innovation Center uses the latest systems and test procedures to develop new products, adapt existing products to specific customer requirements, and test a huge range of material combinations.

03 | Services

Customer-oriented, skilled, committed – it goes without saying that RAMPF Polymer Solutions provides customer support throughout the development and production process. It also offers material and applications training and innovation workshops.

Technology



Technology | Top properties and premium quality

The optimum solutions for your application based on polyurethane, epoxy, and silicone

We have been designing and manufacturing made-to-measure electro casting systems for over 35 years. You can rest assured that we have the perfect material for your application and industry – made of polyurethane, epoxy, and silicone.

	Polyurethane (RAKU® PUR)	Epoxy (RAKU® POX)	Silicone (RAKU® SIL)
Chemical reaction	<ul style="list-style-type: none"> > 2-component > Polyaddition reaction > Low exothermic reaction > Curing at room temperature > Curing conditions can be flexibly adjusted by adding a catalyst > Low shrinkage pressure on cast components 	<ul style="list-style-type: none"> > 1- or 2-component > Homopolymerization (1-component) and polyaddition reaction (2-component) > Curing at room temperature > Curing can be accelerated using heat > Heat curing required for 1-component and hot-curing epoxy > Good impregnation properties > Low sensitivity to moisture 	<ul style="list-style-type: none"> > 1- or 2-component > Polyaddition and polycondensation reaction > Low exothermic reaction > Curing at room temperature > Curing can be accelerated using heat > Curing without by-products possible (polyaddition reaction) > Low shrinkage pressure on cast components > Low sensitivity to moisture > Hydrophobic
Application range	<ul style="list-style-type: none"> > Application temperature range: -60 to +155°C Short-term: +160°C > Wide range of mechanical properties, from tough to highly elastic 	<ul style="list-style-type: none"> > Application temperature range: -40 to +180°C Short-term: +200°C 	<ul style="list-style-type: none"> > Wide application temperature range: -60 to +200°C Short-term: +250°C > Best physical properties almost constant across the entire temperature range of the application
Properties	<ul style="list-style-type: none"> > Excellent resistance to fluctuations in temperature for sensitive components > High crack resistance of flexible products > Good chemical resistance > Low water absorption > Good electrical properties > Tg: From -75 to +120°C > RTI: To +155°C > OBJS2-listed 	<ul style="list-style-type: none"> > High heat distortion temperature > Low coefficient of thermal expansion > High dielectric strength > High media resistance to fuels > Low water absorption and water vapor permeability > Tg: -20 to +180°C > OBJS2-listed 	<ul style="list-style-type: none"> > Excellent resistance to fluctuations in temperature > High crack resistance > Excellent chemical resistance for extreme environments > Low water absorption > High water vapor permeability > High UV and weather resistance > Tg: always < 0°C
Bonding	<ul style="list-style-type: none"> > Good adhesion to housings and components > Good adhesion to plastic: PA, PBT, ABS 	<ul style="list-style-type: none"> > Good adhesion to metals 	<ul style="list-style-type: none"> > Good adhesion to mineral substrates > Adhesion to other substrates often only with pretreatment
Flame retardancy	<ul style="list-style-type: none"> > UL 94 V0 possible 	<ul style="list-style-type: none"> > UL 94 V0 possible 	<ul style="list-style-type: none"> > UL 94 V0 possible

Processing



Processing | Expertise and know-how

RAMPF knows how to achieve optimal material processing

Material quality and material processing are key to the correct functioning and durability of electrical and electronic systems.

1- and 2-component electro casting resin systems from RAMPF Polymer Solutions, combined with the application expertise of RAMPF Production Systems, one of the world's leading specialists in low-pressure mixing and dispensing systems and automated solutions, enable the rapid development of customized complete solutions for a wide range of electrical and electronic applications.

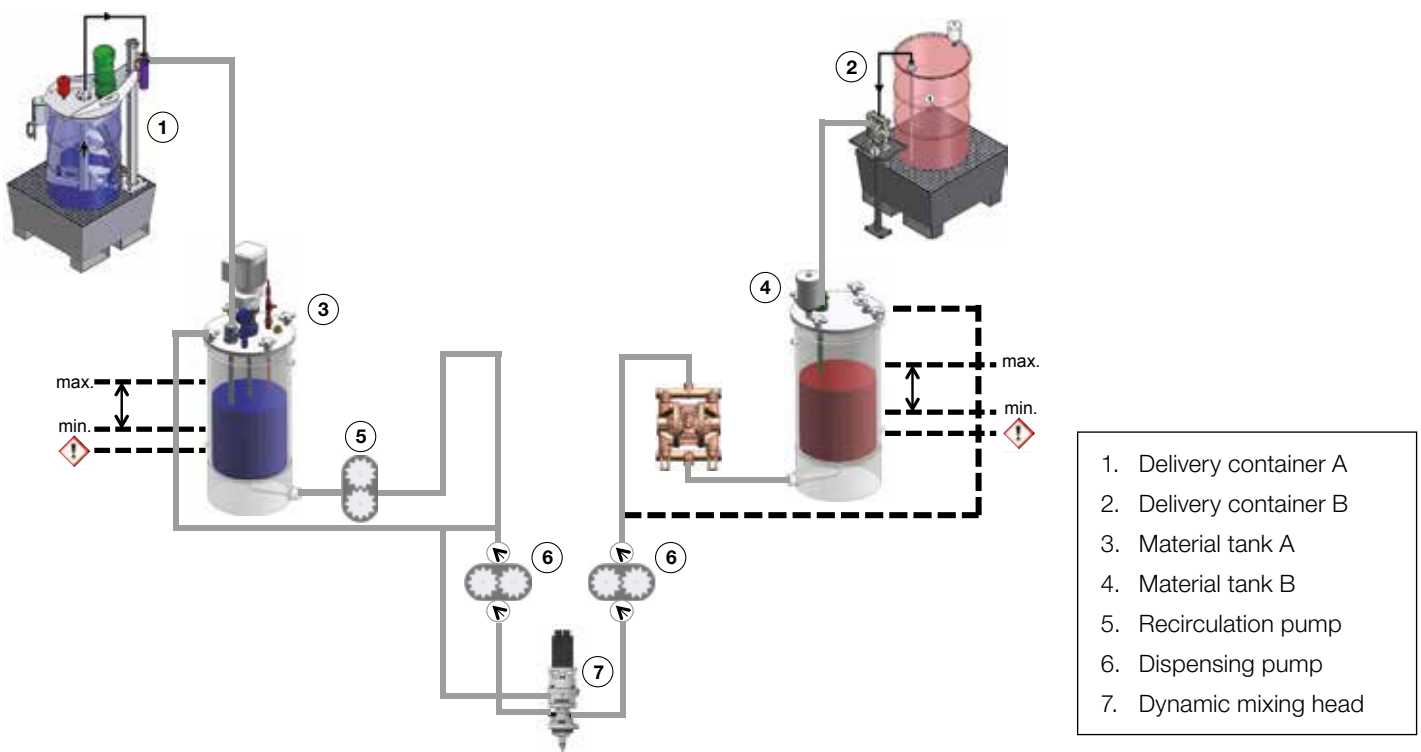
Whether manually, statically, dynamically, under atmospheric or vacuum conditions, or at high or low temperatures – RAMPF knows how to achieve optimal material processing.

Material and machines from a single source – harness RAMPF's full range of services for your application.



Your benefits

- > More than 35 years of experience in developing and producing innovative 1- and 2-component electro casting resin systems
- > In-depth technical consulting on selecting the most suitable material
- > Joint process development and optimization
- > Material, machine, and process from a single source – the complete expert service from RAMPF





Industries



Mobility

We cast components from a wide range of materials that meet the most demanding requirements. We offer a broad spectrum of solutions for road, rail, water, air, and much more.



Electrical/Electronics

We cast your electrical and electronic components and protect them from mechanical, chemical, and environmental influences both reliably and efficiently.



Renewable energy

Our electro casting resins are used in all applications connected to energy and propulsion, including solar, wind energy, and electromobility.

Your industry | Your applications

Market-driven solutions for current and future challenges

Sensitive electronic components in cars, high-precision measuring, monitoring, and regulating sensors, and numerous other electrical and electronic components can be reliably and efficiently protected against chemical substances and environmental influences such as heat, cold, and moisture using electro casting resins from RAMPF Polymer Solutions.

Our polyurethane-, epoxy-, and silicone-based products – RAKU® PUR, RAKU® POX, and RAKU® SIL – offer a wide portfolio of mechanical, thermal, and chemical properties and meet the

highest quality requirements. Naturally they are used by leading manufacturers, including the automotive and electronics industries.

Our many years of experience in product development and processing technologies enable us to provide you with comprehensive advice on materials and process engineering.

We have the best solution for your application, especially in the following sectors:



Mobility



Renewable energy



Medical technology



Electrical/Electronics



Household appliances



Energy management



Applications



Automotive | Speed and reliability

With customized electro casting resin systems

Automotive technology is developing at a rapid pace. The majority of innovations are occurring in the electrical and electronic fields, where high thermal, chemical, and mechanical resistance and reliable protection against environmental influences ensure safe and comfortable driving.

Electro casting resins play a key role here. RAKU® PUR, RAKU® POX, and RAKU® SIL brand products meet the above requirements, and a whole lot more, too. They can be adapted quickly to new industry specifications and, due to their high quality, ensure that components deliver consistent performance throughout their entire service lives and beyond as spare parts.

Thanks to our management system certified to ISO/TS 16949, we ensure our customers top quality and a high level of innovation. That's why leading manufacturers and suppliers in the automotive industry put their trust in us.

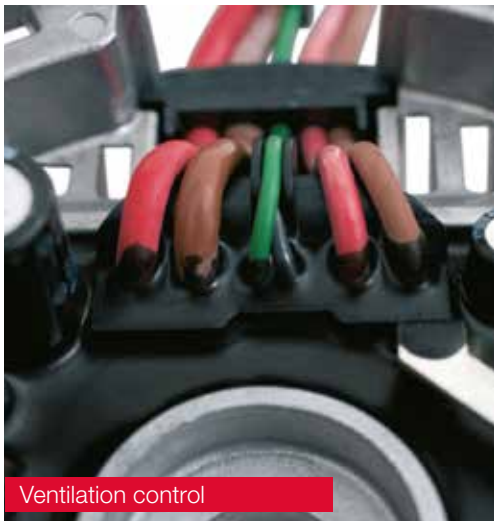
Applications:

- > Fuel pump control
- > Brake light sensors
- > Ventilation controls
- > Electronic control units (ECU)
- > AC/DC and DC/DC converters
- > Battery cut-off relays
- > Door-locking modules
- > Indicators
- > Tire pressure sensors
- > Axle bearing sensors
- > Trunk latches



Your benefits

- > Comprehensive product range and broad spectrum of properties ensure the perfect choice of material for your requirements
- > RoHS and REACH compliance
- > ISO 9001 and ISO/TS 16949 certification
- > Used by leading manufacturers in the automotive industry
- > Compliance with the test standards of leading OEMs



Ventilation control



Automotive sensor



DC/DC converter

© Hans Widmaier

Automotive Applications



Tire pressure sensors



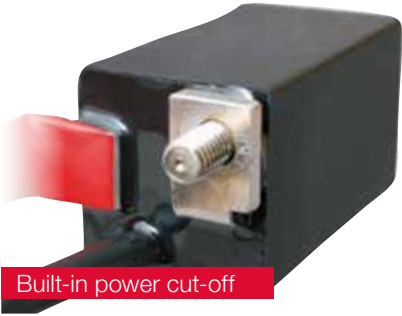
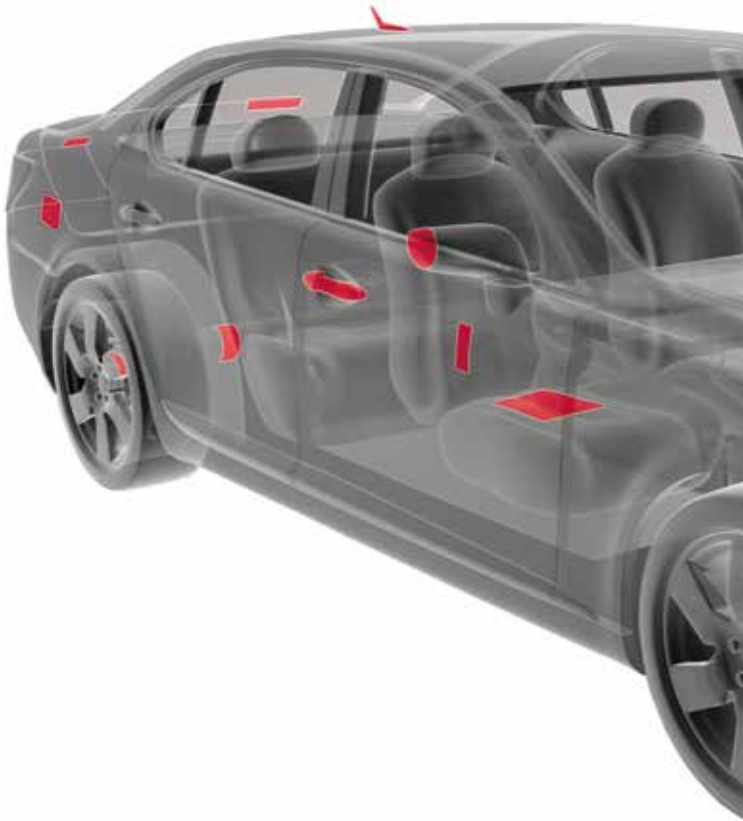
Brake light sensors

© TRW Automotive Electronics & Components GmbH



© Klackert AG

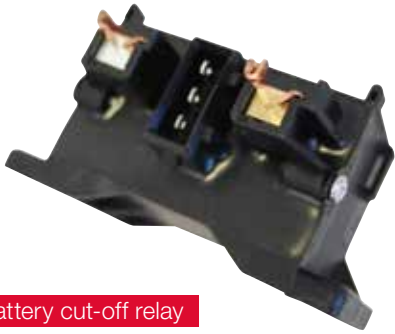
Door closing/locking unit



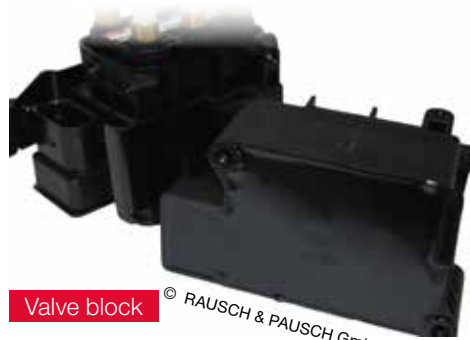
Built-in power cut-off



Automotive sensor



Battery cut-off relay



Valve block © RAUSCH & PAUSCH GmbH



Fuel pump control



Axle bearing sensor © SKF GmbH



Charging connector for electric vehicles

© MENNEKES Elektrotechnik GmbH & Co. KG

Applications



Electrical/Electronics | High-performance systems with a long lasting effect

Diverse range of products for reliable protection of sensitive components

Electrical and electronic components play a key role in the development of numerous industries. Robust and fault-free electronics are essential for the long-term functionality of assemblies. High resistance to fluctuations in temperature is of major importance for material and components in this regard. These need to withstand extreme and rapid levels of cooling and heating without sustaining damage.

Our high-performance electro casting resins under the RAKU® PUR, RAKU® POX, and RAKU® SIL brands protect sensitive electronic components thanks to their high thermal and mechanical strength, high resistance to moisture and chemicals, and high flame retardancy.

We have the solution for extreme conditions, too – because of their outstanding thermal resistance, our RTI electro casting resins permanently retain their properties and functions, and thus ensure the performance of the electrical/electronic systems they are used for.



Your benefits

- > High resistance to fluctuations in temperature
- > High mechanical and thermal strength ensure your product functions correctly over the long term
- > Wide range of applications due to innovative, customized product development
- > High thermal conductivity
- > Meets the strictest requirements of test standards and listings such as UL 94 V0, RTI, and OBJS2

Applications:

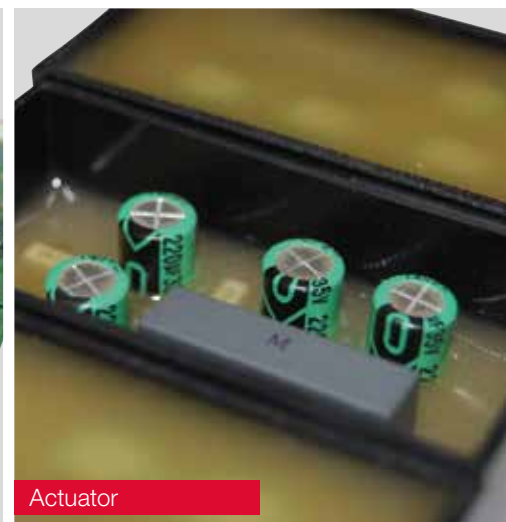
- > Sensors
- > Transformers
- > Capacitors
- > Plugs
- > Switches
- > Control units
- > Chargers
- > EMC-Filters
- > PCBs
- > Fieldbus interfaces
- > Motors



Transformer



PCB

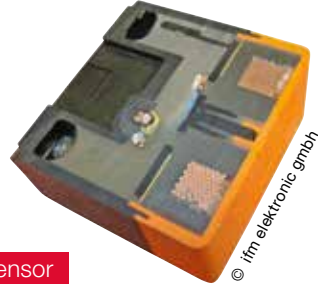


Actuator

**Electrical/
Electronics
Applications**



Relays

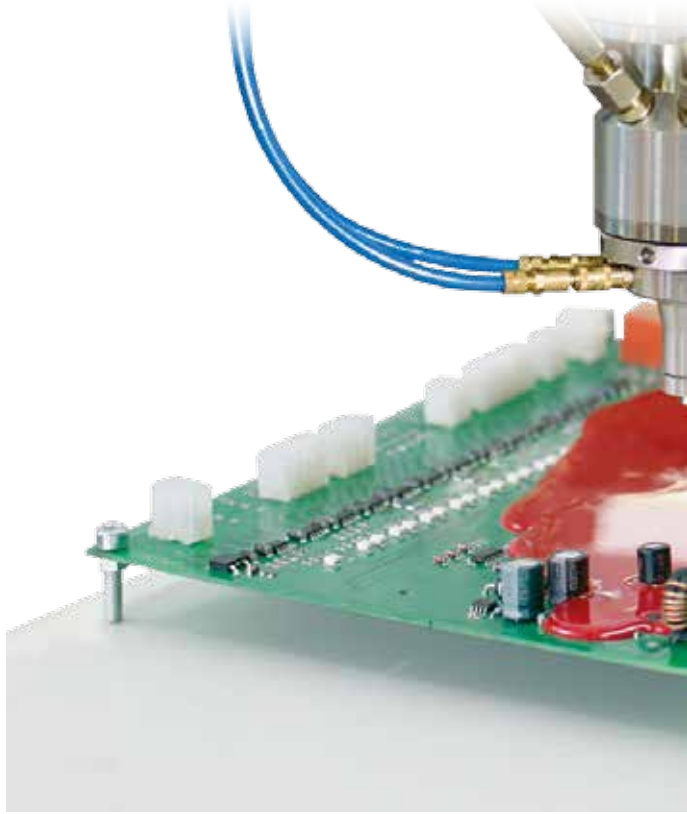


Sensor

© ifm electronic gmbh



Plug



Motor

© IDAM AG & Co. KG

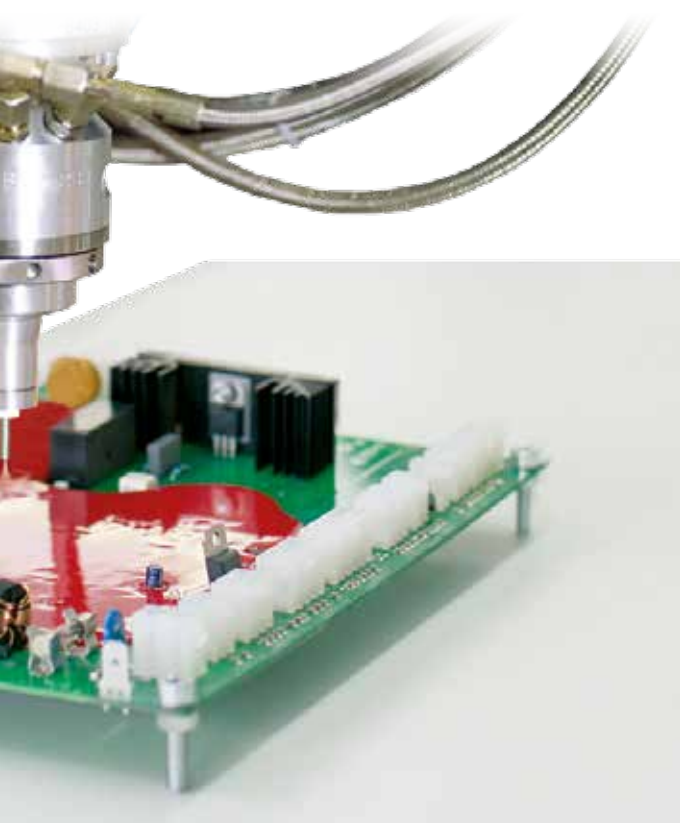


Capacitors



Sensors

© ifm electronic gmbh



Transformers



Capacitors



Electrical measuring device

Services

RAMPF Polymer Solutions
Specialist for innovative reactive resins



Comprehensive support | From concept to finished product

Materials, processing, consulting – your end-to-end partner

RAMPF offers its customers complete support – from product development to market launch:

Laboratory and application technology

- > Initial consultation on selecting the most suitable material and processing procedure
- > Customized development of your material or adaptation of a product from our comprehensive portfolio
- > Application engineering consultations for component design and manufacture of sample parts in near-series conditions
- > Manufacture of prototypes

Processing expertise

- > Support and consulting for applications as well as process development and optimization
- > All-encompassing machinery pool for conducting near-series customer trials
- > Low-pressure mixing and dispensing systems from RAMPF Production Systems. Perfect processing for all 1- and 2-component materials

After-sales service and training

- > Our customer service does not end with the start of series production: Technical field representatives, application technicians, and product developers are always at your service
- > The RAMPF Academy offers product and application training courses that emphasize sharing experiences



Your benefits

- > People come first – trusting and successful cooperation with customers is a top priority
- > Customer-focused and progress-oriented – we work with our customers to develop the solutions of the future
- > Comprehensive customer advice and cross-process expertise
- > Material, plant, and process technology from a single source – RAMPF offers a full range of services
- > Many years of experience in processing technologies such as foaming, casting, bonding, coating, and spraying



Services



Think global | Act local

With production on three continents and sales partners worldwide, we are always there for our customers – wherever they are

Global production

RAMPF Polymer Solutions thinks globally and acts locally. In addition to our state-of-the-art production facility in Grafenberg, our products are also produced at key strategic sites in the United States and China.

Global quality

When it says RAMPF, it *is* RAMPF. The highest standards of quality apply to our production operations in both the United States and China. And with great success – our foreign subsidiaries RAMPF Group, Inc. and RAMPF (Taicang) Co., Ltd are experiencing rapid growth, and ever more customers are building on and with RAMPF quality.

Global service

The high quality of RAMPF products is enhanced by first-class advice and a comprehensive array of services. This strategy is also supported by our global network of sales partners and experts at our sales offices in the United States, China, and Japan. They ensure our customers receive rapid and expert advice – no matter where they are and which industry they represent.



Your benefits

- > Global presence of our products and our experts
- > High level of flexibility in production
- > Short delivery times
- > Comprehensive consultation



RAMPF Group | Locations

