Quality and Know-How

Connecting Your Ideas

MEDICAL & INDUSTRIES
A Synonym for Quality and Innovation

On the following pages we present the complex and wide range of innovative, high-quality products developed in our Medical & Industries business area.

Our Rosenberger Online Catalog contains the current standard product range with specific details, including data sheets, assembly instructions and panel piercings.

www.rosenberger.com/ok

<table>
<thead>
<tr>
<th>Contents</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Preface</td>
<td>4</td>
</tr>
<tr>
<td>Company</td>
<td>6</td>
</tr>
<tr>
<td>Quality &amp; Environment</td>
<td>8</td>
</tr>
<tr>
<td>Technology Trends</td>
<td>10</td>
</tr>
<tr>
<td>Our Competencies</td>
<td>12</td>
</tr>
<tr>
<td>Medical &amp; Industries</td>
<td>14</td>
</tr>
<tr>
<td>Enabling Technologies</td>
<td>16</td>
</tr>
<tr>
<td>Magnetic Products</td>
<td>22</td>
</tr>
<tr>
<td>Non-Magnetic Products</td>
<td>26</td>
</tr>
<tr>
<td>Innovative Custom Solutions</td>
<td>30</td>
</tr>
<tr>
<td>Fiber Optic Solutions</td>
<td>42</td>
</tr>
<tr>
<td>Machine to Machine</td>
<td>46</td>
</tr>
<tr>
<td>Telematics</td>
<td>50</td>
</tr>
<tr>
<td>Success Story</td>
<td>52</td>
</tr>
<tr>
<td>Contact</td>
<td>54</td>
</tr>
</tbody>
</table>
Welcome to Rosenberger

The roots of Rosenberger start as early as 1958. Since then, Rosenberger has grown from a small tooling shop to a global manufacturer of connectivity solutions.

The Rosenberger Medical & Industries business area was created in 2008 to design and produce customized and standard products for these specific markets. From the beginning we have developed a close and open relationship with our customers which was and is a key for early project involvement and understanding of the specific customer applications. Being an integral part of the overall value chain enables us to create products and systems helping to improve the solutions and services of our customers.

Over the past decades, Rosenberger has gained deep knowledge in data transmission technology, connector and system design and highly automated production methods: from high-temperature connectors for industrial and consumer applications, high-voltage and magnetic easy mating connectors for medical systems, to complete machine to machine (M2M) communication systems applicable across industries. With a very high-degree of in-house production, we ensure quality control and cost effectiveness of our products.

But besides offering innovative technology and products, as a family owned business, Rosenberger stands for a long term and personal relationship with our customers. In the end people work with and for people.

A trustful relationship is what makes projects successful.

Sincerely yours,

Dr. Tosja Zywietz
Rosenberger
Chief Executive Officer

Folke Michelmann
Business Area Medical & Industries
Executive Vice President

Preface
Home of Innovation

A global network of Rosenberger R&D, manufacturing facilities and sales offices provides innovation, optimized cost structure and outstanding local customer service.

Company Profile

Rosenberger is one of the world’s leading manufacturers of impedance-controlled and optical connectivity solutions. We provide these solutions in high-frequency, high-voltage, and fiber-optic technology for mobile communication networks, data centers, test & measurement applications, automotive electronics, as well as high-voltage contact systems, medical electronics and aerospace engineering. A global network of R&D, manufacturing and assembly locations provides innovation, optimized cost structure and excellent customer services. Around 11,000 employees are involved in the development, production, and distribution of our products.

Rosenberger Group

Europe

- Germany: Fridolfing, Augsburg, Laufen, Radeberg, Neuenbürg
- Austria: Timelkam
- Hungary: Jászarákoszázals, Jászberény, Nyirbátó, Taksony
- Denmark: Birkened
- Sweden: Kista, Solna
- Spain: Madrid

North America

- USA: RNA Plano, RNA Akron, RNA Pennsauken, RSS Lake Charles

South America

- Brazil: Cacapava - São Paulo
- Chile: Santiago

Asia

- China: Beijing, Kunshan, Dongguan
- India: Manesar, Goa

The Rosenberger headquarters located in Fridolfing in the southeast part of Bavaria, Germany
Quality and the Environment

Ensuring the optimum quality of products and services and taking responsibility for our environment are fundamental elements of Rosenberger’s corporate philosophy.

Our approach to ensuring quality covers more than just the optimization of parts and products – it also includes the continuous improvement of all company processes: from product development, planning, procurement, production, sales, and logistics right through to environmental policy.

To summarize, we want to offer maximum benefits for our customers all over the world.

We aim to act in an environmentally conscious manner, use materials economically, protect natural resources, recycle, and ensure energy efficiency.

As we have continuously improved our processes and consistently applied our quality management systems, we have been awarded many certificates.

Certifications
- IATF 16949
- DIN EN 9100
- ISO 9001
- ISO 14001
- DaKks accreditation according to DIN EN ISO 17025

Rosenberger has won a number of prestigious quality awards and prizes from several renowned customers and organizations for achieving its quality and environmental objectives.

Our Promise to You and the Environment

The quality of our products, solutions and services is an essential part of our company strategy.
Creating the Future

At Rosenberger, we firmly believe in developing technology for the future. We are currently working on products and solutions that will shape our lives in the future.

Markets Change. Products Change.
Rosenberger has a long tradition of designing innovative technologies, keeping up with current trends and continuously moving towards developing for the future.

Ecological Needs
Ecological requirements, such as limited energy and raw-material resources, are a driving force, which is encouraging us to focus on creating more efficient products. Customers want up-to-date services and technologies to be available in real time and to offer even higher performance. This requires smarter solutions with higher bandwidths, less weight, longer battery life and better usability.

The Digital Industrial World
We are now part of the digital industrial world delivering smart products for Logistics, Automation, Asset Tracking and Smart Home applications.
But M2M is more: it permeates our everyday private and professional lives with the “Internet of Things” and makes it easier and safer.
Driven by Perfection

Rosenberger’s mission is to be an innovation and technology leader within its business segments.

Our Competencies

The most modern manufacturing technologies, the highest possible levels of efficiency in production and continuous development are our core competencies, guaranteeing not just fast delivery and strict adherence to delivery dates, but also the highest level in product quality.

Research & Development
Scientifically-based high-frequency know-how enables us to continuously improve existing products and to design innovative products and solutions whether standard or customer-specific. Numerous patents are a proof of Rosenberger’s leadership as a creative and innovative partner.

Assembly
Rosenberger operates manufacturing and assembly locations around the world – fully automated assembly centers and customer-oriented cable assembly locations offer global support and local sourcing.

Production
Rosenberger is proud to offer as much in-house production as possible whether on RF, power or fiber optic components or at a system level. This includes leading edge production equipment, automated assembly lines and quality and cost effective solutions, all working within a streamlined process.

Plating Technology
Whether corrosion protection, optimized conductivity or other technical and physical features, our components are quickly and flexibly electroplated in our in-house electroplating plant.

Injection Molding
The most modern machinery and methods as well as the use of special materials and components form the basis for precision and durability of our tools and products. Rosenberger is able to process all available high-performance plastics.
Medical & Industries

The Rosenberger Medical & Industries business area creates innovative products for medical, industrial and consumer markets. In close cooperation with our customers our offering is the complete product development from the first idea to volume production.

The Medical & Industries team is located in Germany and USA. As part of the Rosenberger Group we use the synergies of research and development, purchasing, production and sales know-how and resources around the world.

Rosenberger’s core competencies are:
- Mechanical design
- RF design
- Electrical and optical data transmission technologies
- Enclosing solutions in metal and plastics for components and complete systems
- Connectivity solutions
- Electronic systems on circuit boards

Our business is project-oriented, we are highly customer-focused in what we do and therefore the definition of development schedule, selection of production technologies and materials, use of know-how in development and production with internal resources or with external partners is standard for us.

The Rosenberger Group is used to handle small and large production volumes utilizing our global manufacturing infrastructure.
Enabling Technologies – Understanding Customer Needs

Rosenberger provides customized solutions – cost-optimized and timely – from the initial idea right through to volume production.
Idea/Concept

Every solution starts with an idea. The development of new ideas and their development towards implementable solutions that add value is part of our customer promise. Based on your technical and commercial specifications, we create an overall concept for the realization of your product. In addition to the fulfillment of electrical and mechanical requirements, we also select the suitable technologies to transform your idea to reality.

Part Selection/Design

We select all electrical and mechanical components according to relevancy and function and we ensure the derivability of the components over the planned project duration. Modern design and simulation tools reduce the number of design cycles and accelerates the development time.

Mechanical Construction

Through the integration of electrical and mechanical development, the design can be verified prior to prototyping. All design, material, environmental and compliance requirements are determined at this stage.
Prototyping/Verification Practicability

In our specialized laboratory, we carry out all major electrical and mechanical tests, including EMC and signal integrity. Product certifications are carried out in cooperation with internationally accredited laboratories.

Test/Certification

In our specialized laboratory, we carry out all major electrical and mechanical tests, including EMC and signal integrity. Product certifications are carried out in cooperation with internationally accredited laboratories.

Serial Production/Logistics

The manufacturing process is developed according to your specifications, including manual assembly in semi or fully automatic production. In addition to the series production we also take responsibility of the complete supply chain.

From Prototyping to Volume Production
Modern Connections are Easy to Mate

Rosenberger magnetic connectors are vibration-proof, cleanable and guarantee a correct connection even in the most inaccessible locations. A further benefit is the "break-away function", which prevents damage to the connector by unintended disconnection.
Magnetic Self-Mating Connectors

Magnetic connectors offer conventional features such as a high number of mating cycles, vibration-proof and combined current, data, LAN & RF connections, but also the advantages of a self-mating magnetic function, prevention of misconnections, easy cleaning and guaranteeing a correct connection in the most inaccessible locations. An important benefit is the break-away function, which prevents damage to the application by unintended disconnection.

Features
- Current up to 40 A
- Flexible voltage range
- Mating cycles >10,000
- Reliable contact pressure and zero-force mating
- Shock and vibration-proof
- Waterproof
- UV resistant
- Available in various design versions

Characteristics
- Easy and fast connecting
- High number of mating cycles
- Break-away function

Applications
- Combined power, data, LAN and RF
- Medical equipment
- Heating system
- Industrial automation
- Outdoor area systems
- Consumer products

RoPD®
Rosenberger Power Data Connectors (RoPD®) were developed for the Light Electric Vehicles Industry (LEV). The contact system consists of 4 data contacts and 2 power transmission pins. Available designs include: cable assemblies black and white as well as panel connectors.
www.rosenberger.com/ok/ropd

RoDi®
Rosenberger Diagnostic Interface Connectors (RoDi®) are recommended for building services, industrial control and bus systems. The contact system consists of 5 contacts. Available designs include: PCB and panel connectors and cable assemblies.
www.rosenberger.com/ok/rod\n
MultiMag
MultiMag connectors are designed for small and compact applications in tight spaces. Available designs include: MultiMag 6 for e.g., USB and MultiMag 15 for general power and data transmission.
www.rosenberger.com/ok/muma

MagneticUSB®
MagneticUSB® solutions are designed for USB 2.0-consumer devices for the various USB connector variants: A, micro-B and adaptor.
www.rosenberger.com/ok/musb

PowerSystem
This connector is a magnetic connector system for 12 V and 24 V with mechanical twist lock. Available designs include: PowerPort straight, PowerClip right angle.
www.rosenberger.com/ok/pows

MagneticRJ45
The magnetic RJ45 connector is designed as an adaptor solution and can also be used for Power over Ethernet (PoE+) applications.
www.rosenberger.com/ok/mrj45
Optimized for High-End Applications

Rosenberger non-magnetic connectors meet the standards of the aerospace industry.
Non-Magnetic Products

Rosenberger non-magnetic products are widely used in MRI (Magnetic Resonance Imaging) equipment, the aerospace industry and industrial applications.

The non-magnetic product range includes standard coaxial connector families, cable clamps and cable assemblies. Customized solutions are available upon request.

Features
• Frequency range DC to 18 GHz
• Current rating typical 2 A
• Data rates up to 10 Gbps
• Tolerance compensation > 0.6 mm
• High number of mating cycles up to > 100,000

Characteristics
• Mandatory in special applications, e.g., MRI

SMP Non-Magnetic
Available designs include: Cable and PCB connectors, cable assemblies, adaptors.
www.rosenberger.com/ok/smpnm

QMA Non-Magnetic
Available designs include: Cable and PCB connectors, cable assemblies, adaptors.
www.rosenberger.com/ok/qmanm

Multi Channel Mini-Coax
These are used in low space requirements for high packing densities. Available designs include: PCB connectors, 4 and 8 channel housings, cable connectors, cable assemblies.
www.rosenberger.com/ok/mcmx
Precision has No Maximum Temperature

Rosenberger’s innovative solutions for special environments are made for applications in which standard connectors may not work.
High-Temperature Connectors

Rosenberger high-temperature connectors are generally used in engine compartments, boilers and ovens. These durable/resilient and customized connector systems are suitable for temperatures up to 450 °C. Rosenberger has the know-how of performing thermal and electrical simulations as well as processing high-temperature-proof materials such as ceramics and stainless steel. Different components such as cable assemblies, housing connectors and matched antenna systems are developed in close cooperation with our customers and partners.

Features
- Temperature range up to +450 °C
- Corrosion and chemical resistant materials
- Frequency range up to 2.4 GHz
- Non-contact connections
- Variable and fitted housing sizes
- Available in various design versions, e.g., hermetically sealed connectors

Characteristics
- Reliable connector solution in thermally harsh environments

Applications
- Engine compartments
- Boilers
- Ovens
- Customer specific solutions

High-Mating Cycle Products

Industrial and consumer applications often require a robust user interface for the connection between a special power supply and the device. In these use cases Rosenberger high-mating cycle products are the first choice and are available in standard and customized versions.

Features
- Up to 100,000 mating cycles
- RF and DC versions
- Emergency disconnection function
- Non-magnetic versions available

Characteristics
- Reduced connector wear leads to longer service intervals and less connector failure
- Longer product lifetime

Applications
- Test equipment
- Sensor interfaces

High-Temperature Connectors
Customer specific assemblies.
www.rosenberger.com/ok/higt

High-Mating Cycle Products
Customized products.
www.rosenberger.com/ok/higm
High-Speed Data Connectors

Our interconnect system has been developed for automotive electronics as well as for digital infotainment electronics, digital symmetrical networks, radio base stations and industrial applications.

Features
- Data rates up to 1.5 Gbps
- Fully shielded twisted quad cables
- Single, double 8 mm and double 12.7 mm types
- Primary and secondary lock
- High cable retention force
- Mechanical and colored coding
- No contact pin damage possible
- Waterproof variants

Characteristics
- Transmission of high data rates
- Prevent misconnection: different codings on plastic housings
- Scoop-proof

Application transmission standards
- LVDS
- Ethernet
- USB 2.0, 3.0
- IEEE 1394 (Firewire)
- CAN (Controller Area Network)

Rosenberger HSD®
Rosenberger HSD® is a high-performance digital system for low-voltage differential signals which prevents interference from crosstalk and external sources.
www.rosenberger.com/ok/hsd

Rosenberger H-MTD®
Rosenberger H-MTD® is a fully 360° shielded differential connector system. The system combines high-performance data transmission up to 15 GHz or 20 Gbps and a small package size in a robust grade housing. A big advantage is the modularity of the system which provides a wide range of applications.
www.rosenberger.com/ok/hmtd

Rosenberger HFM®
Rosenberger HFM® is the next generation of coax connectors for high data transmissions up to 20 Gbps, while saving installation space and weight.
www.rosenberger.com/ok/hfm
Sensor Cables and Connectors

In conjunction with the appropriate sensors, our cable technology measures force, pressure, acceleration and torque. The piezoelectric measuring technology demands highly insulated coaxial cables and connectors in order to ensure a high insulation resistance greater than $10^{14}$ ohms throughout the measurement chain.

Features
- Insulation resistance $> 10^{14}$ ohms
- Operating temperature up to 200 °C
- Interface models: M2, M3, M4, 10-32, for different sensor types and sizes
- Various cable types e.g., Viton® and Teflon® coated cables or armored cables

Characteristics
- Oil-, dust- and waterproof
- Corrosion-resistant materials
- Vibration stable

Applications
- Cables for pressure, force, acceleration and torque sensors
- Test equipment for mechanical stress (tension, pressure, torsion etc.)
- Combustion engine development

Sensor Cables
Rosenberger offers sensor cables for vehicle technology, plastics processing and metal machining, as well as assembly and testing technology.
www.rosenberger.com/ok/piezo
Good Connections are Precious

Rosenberger power supply and data connectors combine data and power transmission at the same time.
Power Supply and Data Connectors

Rosenberger power supply and data connector product ranges offer solutions for applications that require high-speed data transmission, ruggedness, high-voltage and current capability, water and pressure proofness and EMI-shielding. Application areas include automotive and medical, various battery supply and charging systems, outdoor equipment, AC/DC converters, industrial motors and factory automation.

Features
- Currents up to 200 A, voltage up to 10 kV
- Data rate up to 10 Gbps, frequency range up to 5.3 GHz
- Waterproof to IP 68
- Temperature range -40 °C to +140 °C
- HVIL (high-voltage interlock loop)
- EMI shielded
- Touch-safe contacts
- Snap-on/screw locking

Characteristics
- Versatile use for a wide range of supply and signal transmission applications in different industries

Applications
- Equipment for emergency and rescue services
- Battery supply and charging systems in home, mobile and professional systems
- Industrial automation

SLC – Spring Loaded Contacts

Rosenberger offers a wide range of SLC solutions (Spring Loaded Contact) for different designs:
- Impedance controlled SLC for transmission of RF signals in board-to-board applications
- Hybrid SLC solutions with a combination of DC, RF signal transmission, power supply and fiber optical lines
- SLC cable connectors, board and panel mounted products
- Backplane designs
- Products desiring a high degree of tolerance compensation between the mating partners

Features
- Frequency range DC to 6 GHz
- Current rating typical 1.5 A
- Data rates up to 10 Gbps
- Tolerance compensation > 0.6 mm
- Mating cycles > 1000

Characteristics
- Easy installation and uninstallation of sub-assemblies
- Application over a wide range of voltage, current and frequency ranges
- Compensation of position tolerance of mating partners within system

SLC (Spring Loaded Contacts)
Available in a wide product range of cable and panel connectors, PCB spring loaded contacts, spring loaded pins and blocks as well as customer specific connector solutions.

www.rosenberger.com/ok/slc
Fiber Optic Solutions for All Environments

Rosenberger Fiber Optic products enable solutions even in harsh environments and deliver optimal results.
The transfer of continuously rising, high data rates over fiber optic transmission lines is becoming increasingly common, even within industrial applications. This is due to fiber optic systems not being susceptible to electromagnetic interference. Rosenberger offers a complete range of fiber optic solutions complete with all necessary accessories.

**Features**
- Optical contacts for singlemode and multimode
- Hybrid connectors in combination with electrical contacts
- High return loss types available
- Customized fiber bore diameter
- IP 67 sealed variants
- Expanded beam technology for less susceptibility against contamination

**Characteristics**
- Long range as well as high data rates up to 100 Gbps
- Low loss data transmission
- Insensitivity against electromagnetic interference
- Low weight

**Applications**
- Sensor systems
- Data transmission in high-voltage systems
- Medical (MRT, Laser)
- Robots
- Shipbuilding
- Offshore oil and gas rigs
- Broadcast
- Mining
- Aircraft
- Laser systems
Fast Communication
Efficient Automation

Business processes run efficiently with a greater degree of transparency.
Machine to Machine Solutions

Reliable communication systems have become a part of our daily life. As a leading manufacturer of connectivity solutions with the necessary infrastructure, Rosenberger offers a comprehensive range of products, services and the know-how required to meet the continually increasing demands in terms of quality, efficiency and cost-effectiveness.

M2M Technologies
Even today, there are many application areas in which companies can use M2M technology. On the basis of this technology, business processes can be set up with a greater degree of automation and run more efficiently. In the coming years, M2M will establish itself as one of the key technologies in many commercial segments and industrial branches.

Characteristics
• Enables the implementation of new business models, solutions and services
• Automated solutions for efficient and productive company processes that reduce costs
• Offers a wide spectrum of optimization potential and secures competitive advantages

For more information, refer to our website: www.rosenberger.com/telematics
Autarkic Tracking Unit

TINO® – positioning & tracking unit – is a battery-powered system for location determination by means of GPS and transmission of the position data to a portal via GSM/GPRS. Due to its energy self-sufficiency, this system is ideal for object localization in situations in which a power supply is either impossible or not desirable.

Features
- Energy self-sufficient and durable (up to 3,500 messages per battery pack)
- Robust and weather-resistant design (operating temperatures from -40 °C to +75 °C with IP67 protection class)
- Highest security (encrypted data transmission)
- Battery level indicator (information about battery status in the web portal and on the mobile phone)

Characteristics
- Integrated internal GSM/GPS antenna
- Embedded M2M SIM
- Secure Element for data encryption
- Integrated energy measurement for battery information
- 3D acceleration sensor gyroscope
- Firmware update over the air
- Integrated battery pack
- Stainless steel mounting plate

Applications
- Containers on roads and rails
- Freight wagons
- Transport containers and trailers
- Silos
- Cable reels
- Small or large construction machinery

Onboard Unit

For machine and vehicle manufacturers, we developed individual telematics solutions, which are offered as a part of the standard equipment. These highly innovative solutions for flexible tracking, fleet and machine park management as well as condition monitoring were developed in accordance with the stringent requirements of the automotive industry. The device’s enormous robustness (IP 69K) withstands the harshest environmental conditions, where extremely low temperatures, heat, dirt, dust, shock and vibration determine everyday life.

Features
- Two CAN busses to get a complete picture of vehicle and machine status
- Dead-reckoning navigation to retrieve position information in demanding areas (tunnels, parking buildings)
- Wide application field due to multiple interfaces
- Extensive use of internal sensor data allows deep insight to vehicle and machine status

Characteristics
- Embedded SIM card as well as LTE
- CAT.1 / 3G / 2G connectivity
- 2 CAN busses to motor and machine bus
- 9-axis internal sensor
- Several interfaces for a wide application field
- Secure element for communication data encryption
- Dead-reckoning navigation features

Applications
- Construction machinery manufacturer, agricultural machinery
- Municipal vehicle manufacturer
- Transporter manufacturer
- Heavy transport manufacturers

User Frontend

A highly scalable, modular and versatile software platform (Commander) that connects and manages all assets, vehicles, machines as well as objects. Commander provides access to detailed reports and analysis on a global scale. Operating times, machine activities, maintenance intervals and many more key-figures can be monitored in real-time. Moreover, the platform gives a variety of possibilities for event-related alarms.

Features
- Software-as-a-Service (SaaS) – no software installation, system maintenance and software updates needed
- Customized overview & reporting
- Device lifecycle management
- Fleet & asset management
- Maintenance and service management

Characteristics
- High scalability (> 1,000,000 devices)
- High security (ISO 27001 certified data center)
- 3rd party integration
- Open for data import from external sources
- Comprehensive administration module for safe authorization management at all levels of the organisation
Success Story

All About the Small Things

Innovative magnetic interface made by Rosenberger used in Vorwerk Thermomix TM5.
Team Work

Our expert staff will assist you at all times.
We will help you in solving your challenges.

Contact

Executive Vice President
Business Area Medical & Industries
Folke Michelmann
Phone +49 8684 18-0
folke.michelmann@rosenberger.com

Director Product Management
Matthias Rappl
Phone +49 8684 18-1751
matthias.rappl@rosenberger.com

Sales Director Medical
Günter Glatz
Phone +49 89 61 41 73 12
guenther.glatz@rosenberger.com

Sales Director Industrials
Jürgen Wengler
Phone +49 8684 18-1279
juergen.wengler@rosenberger.com

Sales Director Americas
Brett Philip
Phone +1 707 536 9557
bphilip@rosenbergerna.com

Customer Services
Phone +49 8684 18-0
info@rosenberger.com

Website

For more information refer to our website:
www.rosenberger.com/m&i