

**FRIWO**

**Medical Power Solutions**  
The Heart Of Your Application



# Welcome To FRIWO

## Power Solutions Worldwide

*"We are a global system provider with manufacturing facilities worldwide, specializing in **power supply and drive solutions for various industries**, including medical technology, mobile tool technology, industrial applications and e-mobility."*

## 50 Years of Quality Manufacturing

*"With over 50 years of experience, we prioritize innovation, safety, quality and efficiency in cost-effective production. Our certifications in **DIN ISO 9001, DIN ISO 14001 and DIN ISO 13485** attest to our commitment to maintaining high standards."*

**FRIWO**

# About FRIWO

The background is a dark blue gradient with a network of glowing blue lines and dots. The lines form a complex, interconnected web of polygons, while the dots are scattered throughout, some appearing as bright points of light. The overall effect is that of a digital or astronomical network.

# FRIWO - Global Footprint

Established in **1971**

**6** locations

Headquarters: Ostbevern (GER)

Dresden, Vietnam, India, China, USA

**184.9 €**

Revenue 2022 (m.)

**>2500**

Employees 2022

**> 1 bn.** Power Supply Units sold

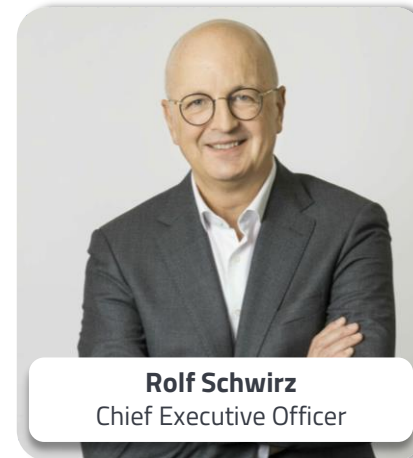


# Harmonizing Strengths: The FRIWO Management Team

Building a strong management team is a major challenge for modern businesses.

Our success strategy involves diverse individuals with complementary backgrounds, experiences, and competencies.

The result? A goal-oriented leadership team with clear responsibilities.



**Rolf Schwirz**  
Chief Executive Officer



**Oliver Freund**  
Chief Financial Officer



**Dominik Wöffen**  
Chief Operations Officer



**Peter Fiedler**  
Chief Technology Officer





## Excellence Crafted In Vietnam: European Precision, Global Quality

Our state-of-the-art production facility in Vietnam operates under **German management**, adhering to European standards to ensure top-notch quality.

With expertise in complex charger and power supply production, we focus on higher volumes while maintaining rigorous **quality control measures**. Our commitment to excellence is supported by certifications including **ISO 9001** and **ISO 14001**.

Additionally, we invest in our workforce through a dedicated training center, ensuring skilled and knowledgeable employees.





## Quality Above All: Elevating Standards With FRIWO

We carry out a large number of tests in our **own laboratory** to ensure that our products meet the demanding requirements. With our **in-house approval department**, we ensure that all products receive the necessary approvals.

Our testing procedures include EMC Cabin, dripping water testing, climate testing, drop testing, tensile strength testing, vibration testing and conducting design failure mode and effects analysis (DFMEA).





## TOOLS

Shortest possible charging times for constant availability.



## INDUSTRIAL

Outstanding performance in the most challenging environments.



## MEDICAL

Complete security of supply for critical applications.



## E-MOBILITY

Innovative power supply units and drive systems for limitless mobility.

# FRIWO Market Segments:

We provide versatile sector-specific solutions, including **OEM** and **standard** options from plug-in power supplies to software-based electronics. High competence and experience across the entire **product development process**, from project initiation to mass production, is essential for success in today's competitive market.

This expertise ensures that **all phases of product development**, including conceptualization, design, prototyping, testing, and final production, are executed with precision and efficiency. It enables the seamless integration of various engineering and design principles, while also incorporating critical feedback loops for **continuous improvement**.

Moreover, a thorough understanding of the **product lifecycle management (PLM)** allows for the anticipation of challenges and the implementation of solutions that minimize costs, optimize timelines, and enhance product quality. This comprehensive approach not only accelerates the **time-to-market** but also ensures that the final product meets or exceeds customer expectations, thereby solidifying a company's reputation for excellence and innovation in its field.

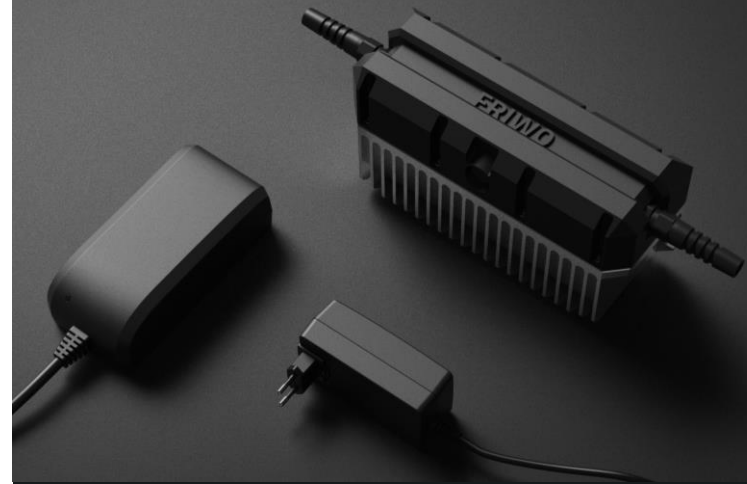
**FRIWO**

# Explore Our Versatile Portfolio

Welcome to our latest collection of power management solutions, designed to meet the diverse needs of modern electronics and applications.

Our portfolio encompasses a comprehensive range of **power supplies, chargers, battery pack and e-drive solutions** each engineered with cutting-edge technology to provide reliable, efficient and sustainable power solutions.

Explore the highlights of our portfolio below in the further course.

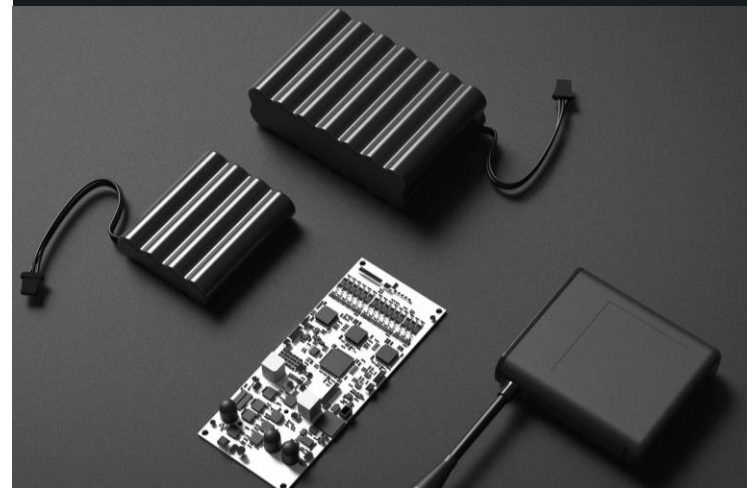
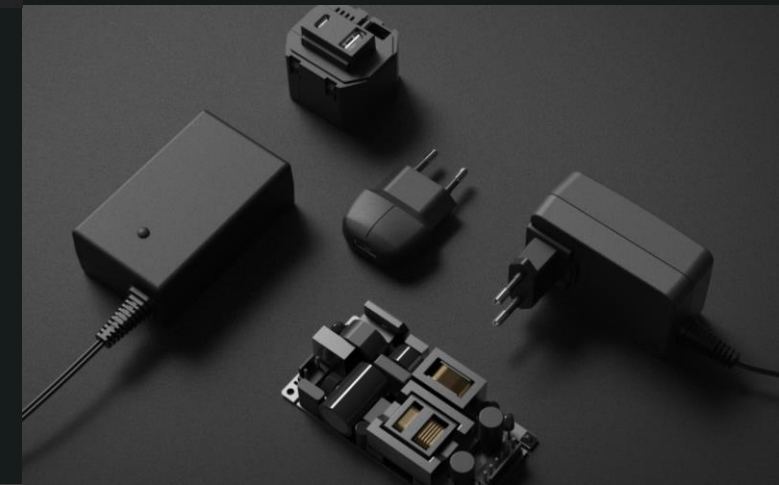


## CHARGERS & BATTERY PACKS

Adapter Li-Ion Chargers, Adapter Lead Acid Chargers, E-Bike chargers, Light Electric Vehicle Chargers, Charging Stations and various Li-Ion Battery Packs.

## POWER SUPPLIES

Adapter and Desktop Power Supplies, Open Frame Power Supplies and In Wall Power Supplies.



## E-DRIVES

Comprehensive range of products, including Motor Controls, Service Software, Drive Units, Vehicle Control Units, Displays, Chargers and Battery Packs.



**FRIWO: Your Partner For Medical Innovations  
And Excellent Customer Service**

# Original Equipment Manufacturer

## One Single Source

With our **extensive** experience as an OEM service provider across diverse industries, we guide you from defining project scope to prototyping, rigorous testing, and tailoring your custom power supply for **optimal design-in**.

Our **deep industry knowledge** ensures compliance with standards, while our leading expertise guarantees efficient, dependable solutions throughout your entire project.

## YOUR ADVANTAGES

- ✓ Electronics, mechanics and software from a single source
- ✓ Working with German contacts and FRIWO's in-house development team
- ✓ Dedicated project management to meet project schedules



## YOUR ADVANTAGES

- ✓ Easy ordering via our product catalog or webshop
- ✓ No development costs
- ✓ Fast delivery times
- ✓ Proven products of highest quality

## Setting New Standards

### Standard Products

FRIWO offers a wide range of standardized products such as **chargers, batteries, power supplies and e-drive system solutions** that can be conveniently ordered from our catalog.

Our customers can select the right solution from our **product portfolio** without the need for customized products.

# Electronic Manufacturing Services (EMS)

## Complete Service

As an experienced **EMS service provider**, we offer end-to-end contract manufacturing of electronic assemblies and devices.

You supply the technical documentation, e.g. component lists and drawings, and we take care of the rest - you get everything you need from a single source.

## YOUR ADVANTAGES

- ✓ Focus on your own core competencies
- ✓ Obtaining additional capacities
- ✓ Reduction of your entrepreneurial risk



## Empowering Care FRIWO - Medical Product Advantages

- ✓ **Compatibility and Interoperability:** A diverse portfolio allows for seamless integration with a wide range of medical equipment, supporting various voltages, currents, and connector types, thereby reducing complexity and ensuring consistent performance
- ✓ **Durability and Longevity:** Medical environments demand power supplies and chargers that can withstand rigorous use, including resistance to sterilization processes, physical impacts, and long-term operation without degradation in performance
- ✓ **Regulatory Compliance:** Meeting global regulatory requirements is essential for legal market access and to avoid costly recalls or legal issues.

# Our Versatile Standard Portfolio

Discover our portfolio of medically certified standard solutions, including innovative series such as:

**Plug-In Power Supplies:** The proven solution for the highest requirements and the future of medical technology

**Desktop Power Supplies:** Reliable and resilient security of supply

**Open Frame Power Supplies:** Powerful performance in a compact form

**Battery Packs:** The energy source for your applications







Application examples:

- Portable Patient Monitoring Devices
- Homecare Medical Devices
- Medical Wearables
- Infusion Pumps
- Electronic Fever Thermometers
- And many more...

Our medically approved USB power supply solutions are certified according to **IEC 60601-1** and offer the highest safety standards, including **low leakage current** ( $\leq 10\mu\text{A}$ ) and protection class 2xMOPP.

With high energy efficiency, efficiency level VI and protection against overload and overvoltage, they are reliable and efficient.

## Plug-In Power Supplies – FOX series

NEW



**FRIWO**



Application examples:

- Dental Handheld Devices
- Hearing Aids and Audiometers
- Physiotherapy Devices
- Skin Analysis Devices
- Digital Microscopes
- And many more...

The FOX NEO family offers exceptional flexibility and unique design for a wide range of applications.

With **interchangeable adapters** and customized laser printing, it enables **individual design**.

It meets stringent standards such as EN/IEC 62368-1, Medical 4th Edition and Regulation EC 278/2009.

## Plug-In Power Supplies – FOX NEO



**FRIWO**

# Battery Packs

## Application examples:

- Hearing Aids
- Wearable Health Monitors
- Portable Oxygen Concentrators
- Mobile Medical Carts
- Portable Ultrasound Machines
- Emergency Medical Equipment

Our versatile battery solutions range from 1S to 7S configurations and are UN38.3 approved. Some are also certified to IEC62133. The SMBus interface enables effective communication and monitoring with gas gauge function.

We also offer **shrink tube** options and customized extensions to suit your needs.



**FRIWO**



### Application examples:

- Blood Glucose Monitors
- Portable Diagnostic Devices
- Centrifuges
- Dental Imaging Equipment
- Portable Ultrasound Machines
- Battery Chargers for Medical Devices

Our desktop power supply units stand for one thing above all: **complete security** of supply for your application.

The particularly durable devices are characterized not only by various protective measures such as **overload protection, overvoltage protection** and **continuous short-circuit resistance**, but above all by their high efficiency and particularly low no-load losses.

## Desktop Power Supplies

# NEW





### Application examples:

- Digital X-ray Systems
- Automated Liquid Handling Systems
- Benchtop Analyzers
- Patient Monitors
- Physical Therapy Equipment
- Dental Chairs
- Home Dialysis Machines

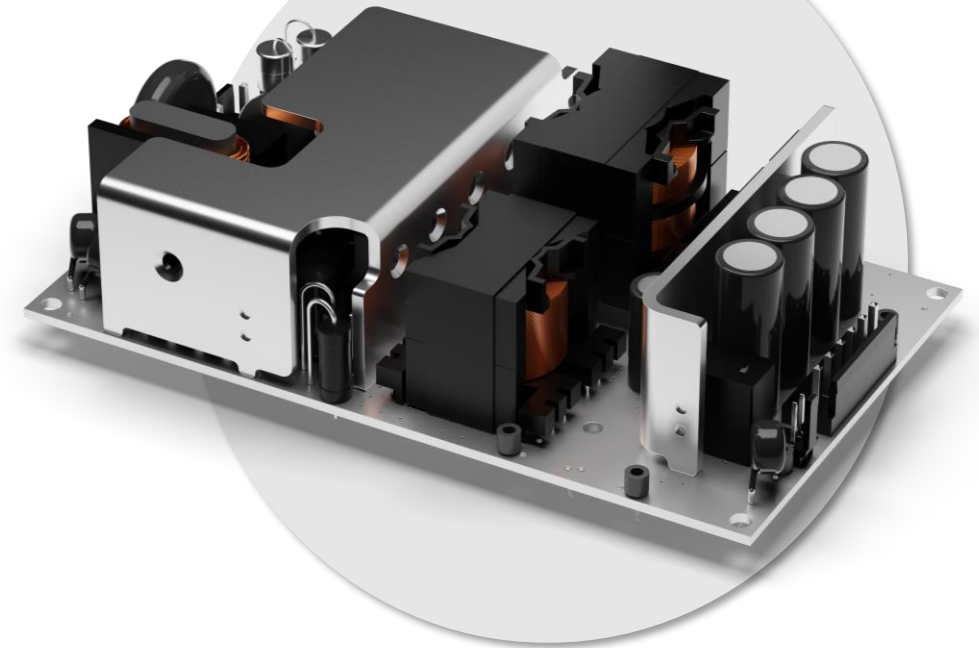
Our open frame power supply units are highly certified in accordance with IEC60601-1, IEC 62368-1 Hazard Base Standard and Medical 4th Edition and meet strict **safety and quality standards**, especially in medical applications.

They offer extremely **low leakage current** ( $\leq 100\mu\text{A}$ , some variants  $\leq 10\mu\text{A}$ ) and protection class 2xMOPP for maximum safety.

Our **fanless products** offer up to 1kW of power and a wide range of installation options for individual customization.

## Open Frame Power Supplies – HERC series

# NEW



**FRIWO**



# FRIWO Power Delivery 3.1 Family

SOON



Introducing the future of power supplies - FRIWO Power Delivery 3.1 adapter and desktop solutions. Engineered with cutting-edge GaN technology, our devices redefine efficiency and reliability, delivering unparalleled power to a wide spectrum of IT/Audio, Household and Medical devices in professional environments.

Consider using one power supply for different applications!

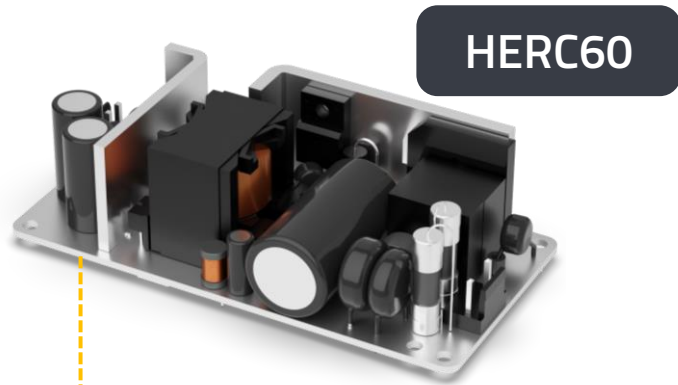
# New Open Frame Power Supplies

- High efficiency up to 93%
- Wide input voltage range: 90 to 264 VAC
- Low no load power consumption
- Safety standard IEC60601-1 & IEC62368-1

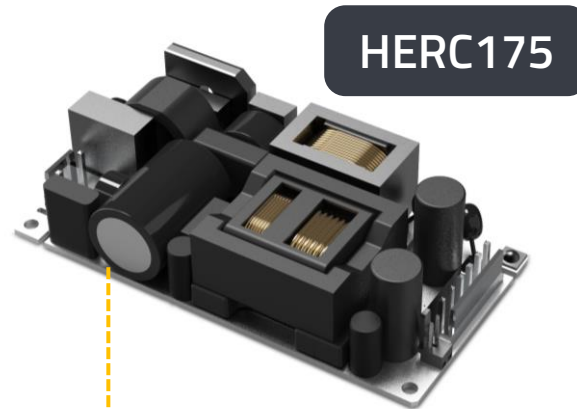
- Means of protection 2x MOPP
- IEC protection class I & II
- Wide operating temperature range -25 to 70°C
- Convection / Fan cooling possible

**Expected availability**

- HERC60 → Q2/24
- HERC175 → Q2/24
- HERC250 → Q2/24



Output voltage:  
12V / 24V / 48V



Output voltage:  
12V / 24V\* / 36V / 48V

\*already available



Output voltage:  
12V / 24V / 48V

# New Desktop Power Supply - DT60



Expected availability

- 12V & 48V variant  
→ in development
- 24V variant  
→ available

Means of protection: 2x MOPP

Wide range Input voltage:  
100 to 240 V (VAC 90-264V)

C8 socket



Efficiency level: 87% at 230VAC

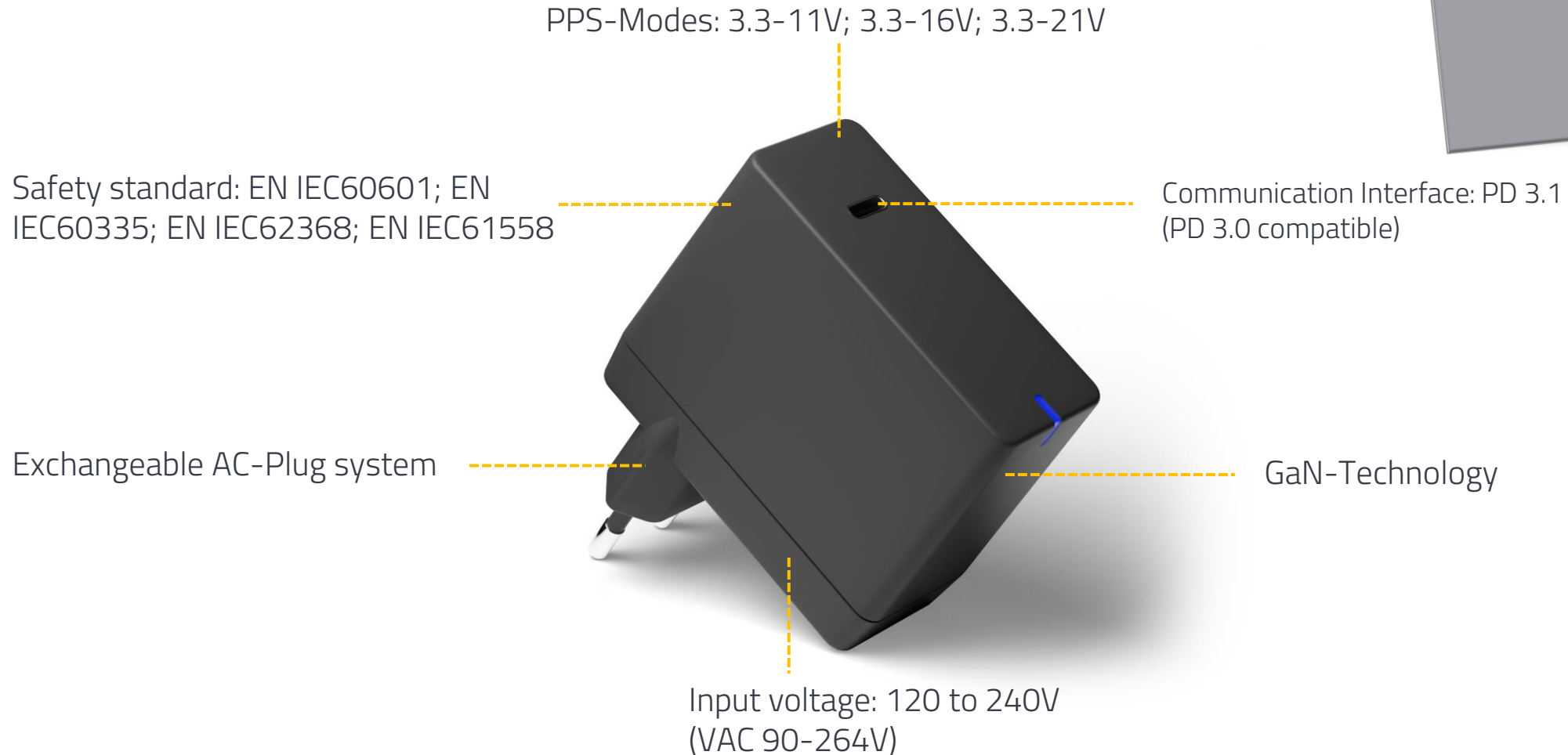
Housing protection: IP-X1

Safety standard: IEC/EN60601-1;  
IEC62368-1; IEC61558-2-16



# New PD Power Supply Family

Expected availability  
available in 2025



# New PD Power Supply Family

Expected availability  
Q2 2024

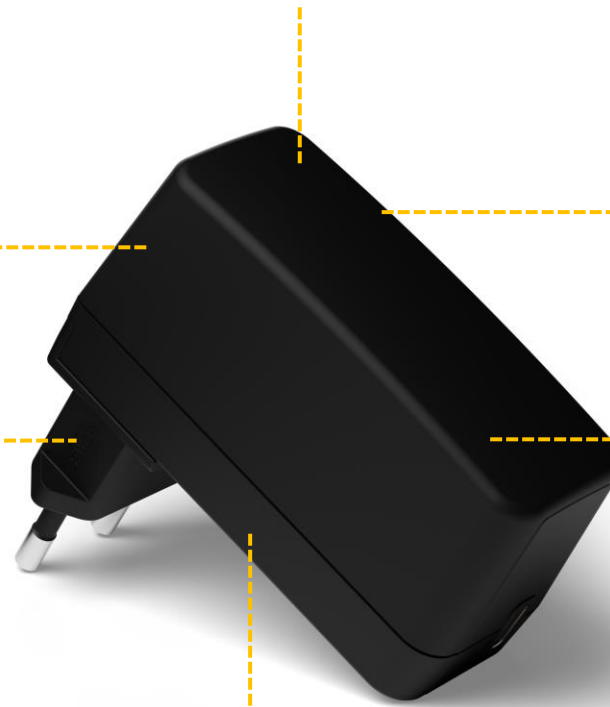
PPS-Modes:  
3.3-11V; 3.0A / 3.3-16V; 2.0A / 3.3-21V; 1.5A

Safety standards:  
IEC62368-1; IEC61558-2-16

Constant voltage modes:  
5V; 3.0A / 9V; 3.0A / 15V; 2.0A / 20V; 1.5A

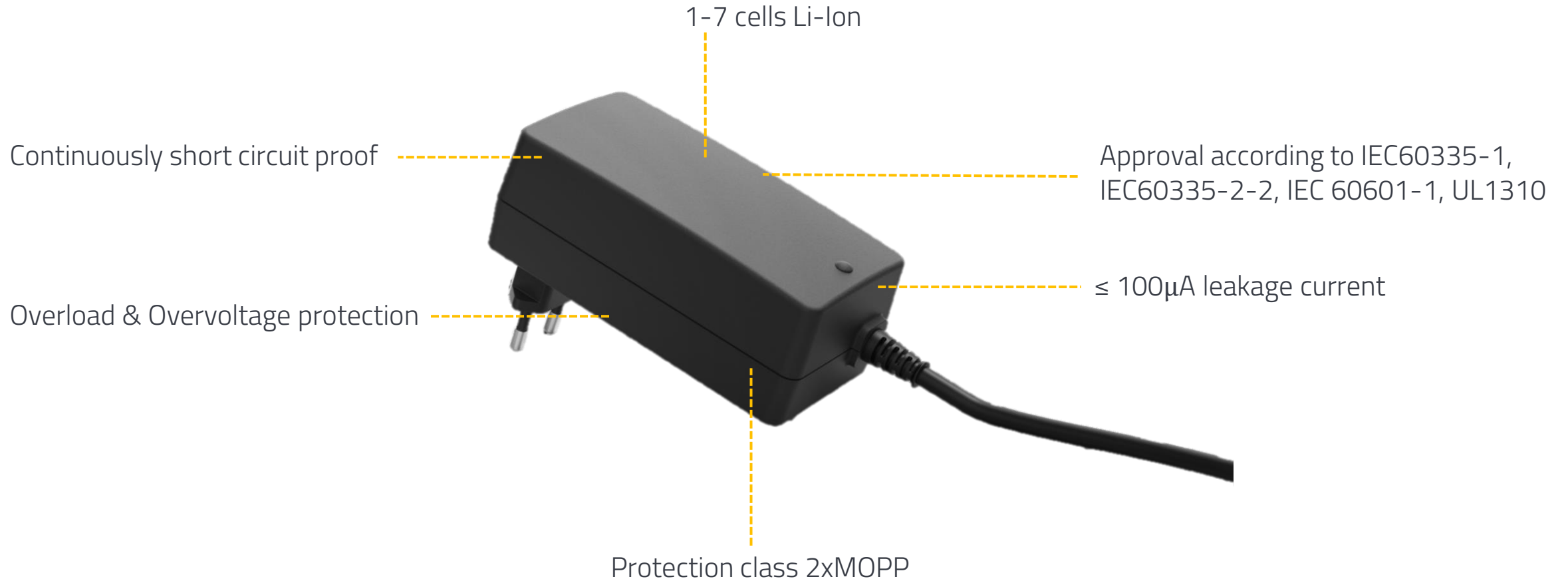
Exchangeable AC-Plug  
system (FOX)

Communication Interface PD 3.0

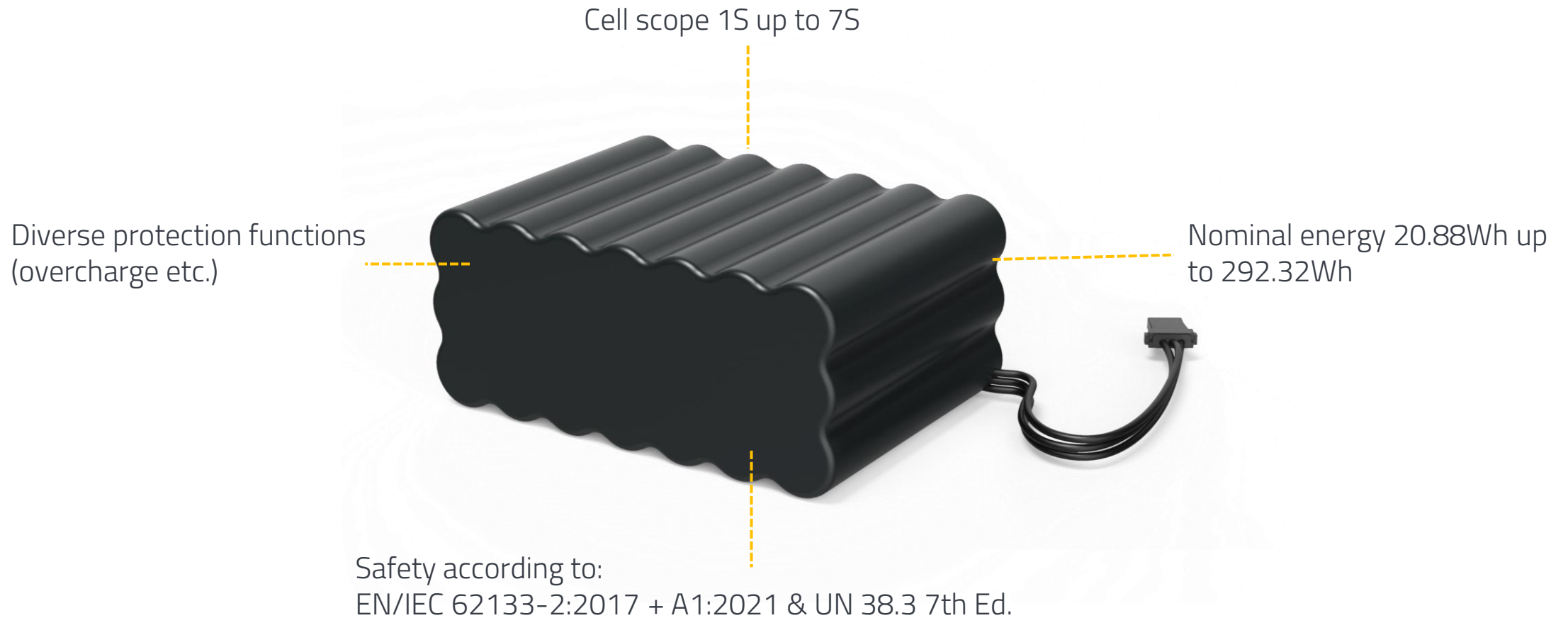


Efficiency level: up to 91%

# FOX Charger



# FRIWO Standard Battery Packs



# FRIWO - Excellence In Medical Solutions



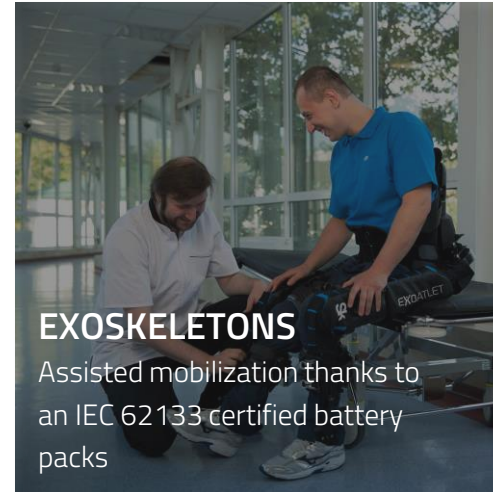
## INFUSION PUMPS

Waterproof and shock resistant – our patented potting technology protects sensitive electronics



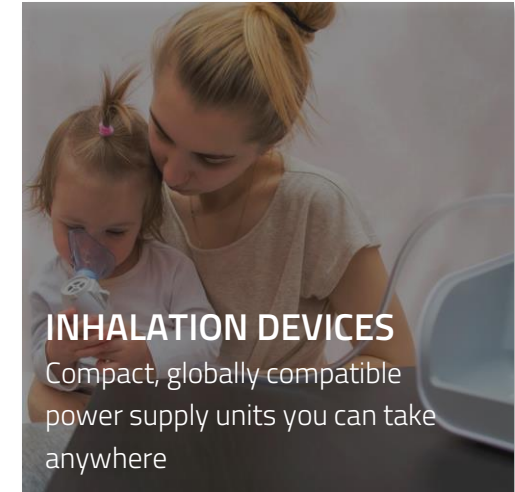
## ANESTHESIA TECHNOLOGY

Robust housing concepts with IPX protection for challenging environments



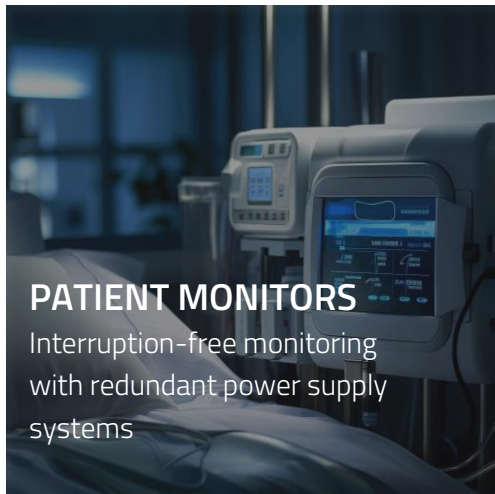
## EXOSKELETONS

Assisted mobilization thanks to an IEC 62133 certified battery packs



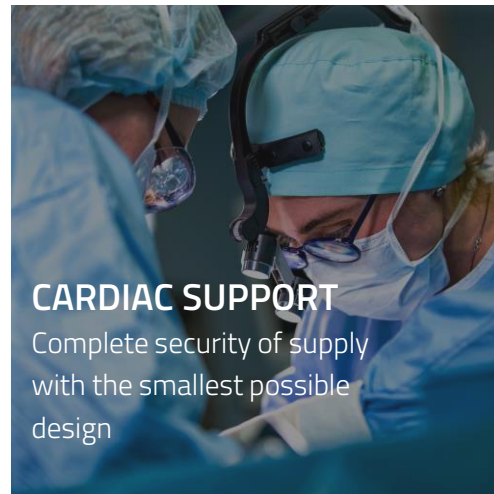
## INHALATION DEVICES

Compact, globally compatible power supply units you can take anywhere



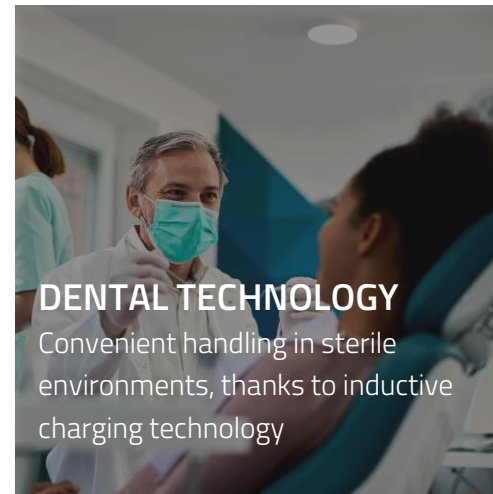
## PATIENT MONITORS

Interruption-free monitoring with redundant power supply systems



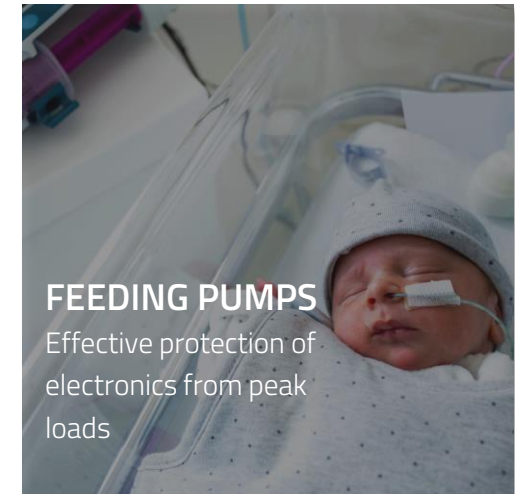
## CARDIAC SUPPORT

Complete security of supply with the smallest possible design



## DENTAL TECHNOLOGY

Convenient handling in sterile environments, thanks to inductive charging technology



## FEEDING PUMPS

Effective protection of electronics from peak loads





**Portfolio Highlights: FRIWO - The Future Of  
Medical Technology**

**Success Stories Of Our Customers**



# FRIWO Use Case - Medical

## Customized ventricular assist device - battery pack & charger

Customer challenge:

Customer wants to switch their application from power supply operation to battery operation.

FRIWO To-Dos:

- ✓ Provide batteries
- ✓ Deliver the battery in a sterilizable device
- ✓ Design charging station with four compartments

# FRIWO Use Case - Medical

## Customized ventricular assist device - battery pack & charger



### Battery pack

- 4S1P Battery Pack
- 14.54V / 3500mAh
- IP 67 housing
- Gas pressure measurement with LED display
- Communication with SMBUS
- Second safety board
- Housing complies with ISO 10993-5 (cytotoxicity requirements)
- Type approval: UN 38.3, EN62133, UL2054

### Charger

- 4 separate chargers (one housing)
- Integrated power supply
- LED status display
- Type approval: EN60601-1-2





# FRIWO Use Case - Medical

## Customized mobile X-ray unit - battery pack & charger

### Customer challenge:

Battery pack for the drive of his mobile vehicle on which a C-arm X-ray system is installed.

### FRIWO To-Dos:

- ✓ Implement multiple safety units within the battery system
- ✓ Provide robust metal housing
- ✓ Developing an intelligent battery system

# FRIWO Use Case - Medical

## Customized mobile X-ray unit - battery pack & charger



### Battery pack

- 15S5P Battery Pack
- Peak current up to 60A
- LiFePO<sub>4</sub> technology
- Communicates with the customer application via CAN-BUS
- Second safety board
- Metal housing

### Charger

- Integrated power supply
- LED status display
- Type approval: EN60601-1-2





# FRIWO Use Case - Medical

## Battery pack & charger for an endoscope

### Customer challenge:

The endoscope manufacturer wanted to create a self-sufficient endoscope and therefore needed a bundle of FRIWO battery packs including a charger.

### FRIWO To-Dos:

- ✓ Provide housing that can be cleaned with germicides
- ✓ Battery pack with special State of Charge and State of Health technology
- ✓ The charge and life cycle status of the battery must be displayed

# FRIWO Use Case - Medical

## Battery pack & charger for an endoscope



### Battery

- 4S1P Battery Pack
- 14.54V / 3500mAh
- IP 67 housing
- Gas pressure measurement with LED display
- Communication with SMBUS
- Second safety circuit board
- Housing made of plastic to be resistant to germicidal wiping
- Type approval: UN 38.3, EN62133, UL2054

### Charger

- Integrated power supply
- LED status display
- Type approval: EN60601-1-2



# FRIWO Use Case - Medical

## High-end Power Supplies for laboratory equipment

### Customer challenge:

The customer was looking for a partner who could offer and promptly implement a technically demanding, customer-specific solution.

### FRIWO To-Dos:

- ✓ Develop a customized OF power supply with 700W power, multiple outputs and I<sup>2</sup>C bus
- ✓ Provide housing that can be cleaned with germicides

# FRIWO Use Case - Medical

## High-end Power Supplies for laboratory equipment



- Protection class I
- 700 W OEM
- I<sup>2</sup>C bus communication
- MTBF 800,000h
- Multi-output up to 700W
- Approval for laboratory use - UL 61010-1
- PFC with leakage current < 500  $\mu$ A
- Efficiency 94.5%

# Six Reasons To Choose FRIWO For Your Medical Application



## Customization capabilities

FRIWO has a strong focus on providing customized power supply, charging and electric drive train solutions. We work closely with its customers to understand their specific requirements and develop tailored solutions to meet their needs. This level of customization sets FRIWO apart from competitors and allows it to address unique challenges faced by different industries and applications.



## Technological expertise

FRIWO is recognized for its technological expertise in power supply, charging and electric drive train solutions. We invests in research and development to stay at the forefront of technological advancements. This enables FRIWO to develop innovative products and solutions that incorporate the latest technologies, ensuring high performance and reliability.



## Proven track record

FRIWO has a proven track record of delivering reliable and high-quality power supply solutions to a wide range of industries, including medical, industrial, e-mobility, and tools & garden. Its successful and longlasting partnerships with leading companies in these industries showcase FRIWO's expertise and reliability.



# Six Reasons To Choose FRIWO For Your Medical Application



## Regulatory compliance

FRIWO places a strong emphasis on regulatory compliance and certifications. We ensure that our products meet international safety standards and regulatory requirements, such as CE, UL, IEC certifications etc. This commitment to compliance demonstrates FRIWO's dedication to delivering safe and reliable products to its customers.



## Innovation-driven culture

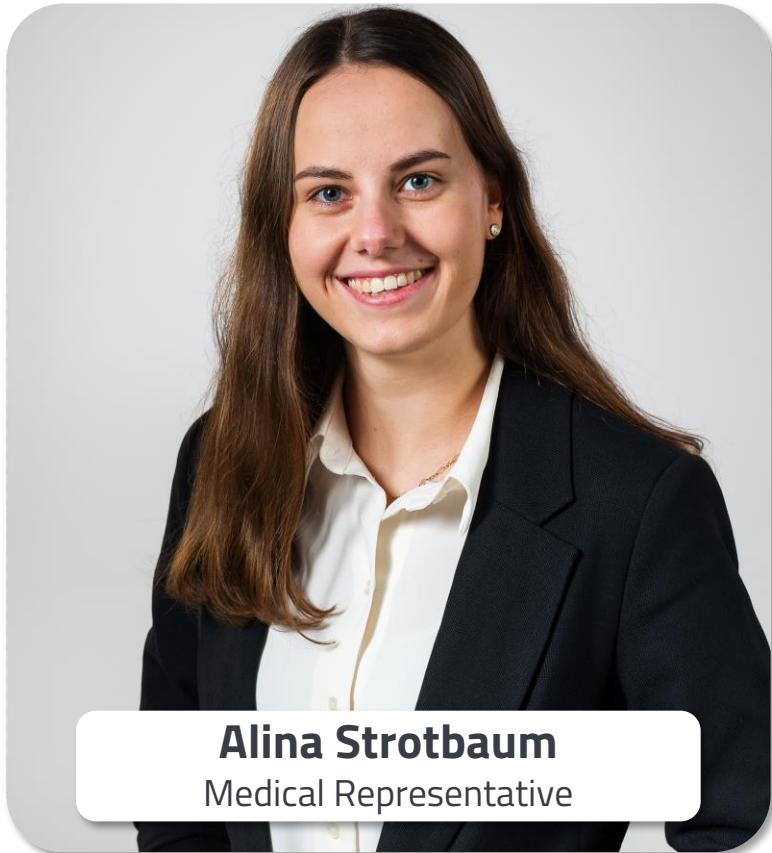
FRIWO fosters a culture of innovation throughout the organization. We encourage our employees to think creatively, explore new ideas, and push boundaries in the development of power supply, charging and electric drive train solutions. This culture of innovation enables FRIWO to stay at the forefront of technological advancements and deliver cutting-edge products to its customers.



## Market foresight

We continually adapt our strategies based on market conditions and evolving customer needs. We anticipate shifts in the market and proactively position ourselves to take advantage of new opportunities. Taking a long-term perspective, we invest in sustainable growth strategies, build enduring relationships with customers, and position ourselves to thrive for success in the market.

# Excited For A Successful Collaboration: FRIWO Sales Team Is Ready!



**Alina Strotbaum**  
Medical Representative



## Our Shop

A complete overview of our products can be found at:  
[www.friwo-shop.com](http://www.friwo-shop.com)



## Follow us on LinkedIn

Always stay up to date!  
<https://de.linkedin.com/company/friwo>



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