Emergency Medical Technology

Most modern medical examination and surgical procedures would not be possible without electricity. Whether body scanning, heart monitoring using an electrocardiogram or dental treatment, the use of electrical equipment has replaced and improved traditional methods, whilst at the same time making certain medical procedures possible.

The use of electricity means that there is a potential for danger, electrical applications in medical technologies especially may have particular hazards for patients and operating personnel alike. These hazard sources will be avoided with standards like DIN EN 60601-1 or UL 2601 which are responsible for safety power supplies in the medical area.

The factory in Pfarrkirchen develops and produces REO transformers for medical applications conforming to global standards setting a benchmark for risk-free operation and efficiency.
Facts about medical technology

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Facts about medical technology
The standard DIN EN 60601-1 and the EU guideline 93/42/EWG define the safety of electrical systems. To guarantee a safe power supply, experience and knowledge is necessary. REO has many years experience of transformer production for industrial applications, REO provide solutions which go above and beyond the required standards.

REO transformers are especially characterized by:

- Minimal leakage field - Meaning that high EMC compatibility can be guaranteed
- High quality core - Means high efficiency and good regulation properties
- Fully encapsulated - For protection from mechanical influences and better heat dissipation
- Additional electrical components - Such as short-circuit, overload protection and inrush current limiting sections are developed and manufactured in-house, which ensures optimal performance.

REO also produces bespoke solutions integrating many of our core competencies. This allows customer-specific solutions such as special housing or mounting plates for example.

Components used in medical application must be safe, so each product is rigorously tested. REO also develops and manufactures test systems for railway traction and industrial applications. So safety and product testing to high standards are the norm for REO.

To ensure standards are maintained, REO has its own testing facility at Pfarrkirchen. Experience in many electrical fields and broad market knowledge guarantee optimal solutions with the latest technology and developments. REO is a partner that you can rely on. Constant research and development and continuous improvement systems ensure that REO always employs state of the art in its field.

Benefits of REO components

- REOMED with toroidal fixed cores
- Reduction of energy especially at continuous operation
- Environmentally friendly by saving energy
- Integrated inrush limitation
- Protection against short-circuit and overload
- Wide range of options
- Long product life
REOMED isolation transformers for efficient reduction in costs and energy

Due to the increasing environmental impact and the resulting awareness of these issues energy efficiency is a key driver in REO’s product development.

REOMED transformers help to achieve this goal. The following chart shows the loss values between a normal transformer and a REOMED transformer at various power levels. The large difference shows the increased efficiency of REOMED transformers against conventional designs.

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**Selections for the REOMED:**

- Mains input 115 or 230 V or far range 100-130 V / 200-250 V
- Output 115 or 230 V or far range 100-130 V / 200-250 V

**Options:**

- Inrush current limiter:
  - Option 10 = NTC
  - Option 20 = NTC + time relay
  - Option 50 = electronically damped start-up.
  - Option 01 = Overvoltage protection
  - Option 02 = Mains filter
  - Option 03 = Overvoltage protection + Mains filter

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**Standard models**

Default or preferably our REOMED models are equipped as follows:
- REOMED 300 = Option 20
- REOMED 600 = Option 20
- REOMED >1000 = Option 50

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**Efficient energy reduction**

Comparison of the losses between a normal transformer and a REO toroidal transformer: The large energy savings become quickly visible.

*Loss at operating temperature*
**Technical data**

<table>
<thead>
<tr>
<th></th>
<th>REOMED 3rd</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input voltage</td>
<td>100 - 130 V / 200 - 250 V</td>
</tr>
<tr>
<td>Output voltage</td>
<td>100 - 130 V / 200 - 250 V</td>
</tr>
<tr>
<td>Rated power</td>
<td>300 - 2200 VA</td>
</tr>
<tr>
<td>Casing protection</td>
<td>IP 20</td>
</tr>
<tr>
<td>Weight</td>
<td>4.5 - 12.5 kg</td>
</tr>
<tr>
<td>Earth leakage current at 254 V / 50 Hz</td>
<td>&lt; 500 [µA]</td>
</tr>
<tr>
<td>Number of output connections</td>
<td>4 - 9 x IEC 320 [V]</td>
</tr>
</tbody>
</table>

*All devices have an integral start-up current limiter (NTC or electrical), a equi-potential earthing pin conforming to DIN 42801, a primary mains line and over current protection. The devices can mounted on a wall, bench or even on the floor.*

**REOMED 3rd Edition isolation transformers**

Medical systems must have low levels of leakage currents, combinations of systems and components often increase this level beyond safe limits. The TÜV-certified REOMED isolating transformers are proven and reliable equipment for use with all electrical systems in a medical environment. They reduce the leakage current and thus help to ensure the safety of patients.

REOMED isolating transformers are characterized by their very low magnetic stray-fields and reliability, whilst also providing high efficiency and easy connectivity.

In addition to the standard range, these transformers may be constructed to customer requirements and enhanced by adding an electronic, start-up current limiter, surge protection and a mains filter.

**Benefits**

- Wide range of options
- Small weight
- Short-circuit and overload protection
- Integral start-up current limiter
- Solid aluminum casing
- Equi-potential earthing pin DIN 42801
- Output sockets EN 60320
- EMC tested to EN 60601-1-2
### REOMED II isolation transformers – Prepared for 3rd Edition

#### Technical data*

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input voltage</td>
<td>230 [V]</td>
</tr>
<tr>
<td>Output voltage</td>
<td>230 [V]</td>
</tr>
<tr>
<td>Rated power</td>
<td>660 - 2000 [VA]</td>
</tr>
<tr>
<td>Casing protection type</td>
<td>IP 20</td>
</tr>
<tr>
<td>Primary circuit breaker</td>
<td>4 - 12 [A]</td>
</tr>
<tr>
<td>Secondary circuit breaker</td>
<td>3 - 10 [A]</td>
</tr>
<tr>
<td>Earth leakage current at 254 V / 50 Hz</td>
<td>&lt; 100 [µA]</td>
</tr>
<tr>
<td>Test voltage (between primary and secondary winding)</td>
<td>4 [kV]</td>
</tr>
<tr>
<td>Max. ambient temperature</td>
<td>40 [°C]</td>
</tr>
<tr>
<td>Isolation</td>
<td>&gt; 2 [MΩ]</td>
</tr>
<tr>
<td>PE resistance</td>
<td>&lt; 0,1 [Ω]</td>
</tr>
</tbody>
</table>

*All devices have an integral start-up current limiter (NTC or electrical), a equi-potential earthing pin conforming to DIN 42801, a primary mains line and over current protection. The devices can mounted on a wall, bench or even on the floor.

#### REOMED II isolation transformer

The REOMED II isolation transformer provides reliable leakage current reduction in medical applications.

Safe isolation on the input side is effected by using high quality materials and first class production methods. The isolation transformers are designed for low internal losses and so achieve very low no-load losses (<= 1% relating to the input power).

Overload and short-circuit protection on the input and output side is effected by an integral circuit breaker. The transformer is isolated using an illuminated mains switch and circuit protection is effected by two fuses on the input side and a single-pole one on the output side. As thermal protection is utilized problems regarding fuses (i.e incorrect values being fitted, power interruption are avoided)

Furthermore in the isolating transformer a temperature cut-out is integrated, which provides an additional protection in the event of exceptional ambient conditions or prolonged obstruction of the cooling vents.

#### Benefits

- Compact dimensions
- Solid aluminium casing
- Green illuminated mains switch
- Low total weight
- Integrated circuit protection

**Prepared for 3rd Edition**
**Medical transformers**

**Benefits**

- Very high efficiency
- Very low no-load current
- Minimal magnetic stray field
- Low mechanical noise
- Integrated PTC + thermo controller
- Protection against short-circuit and overload (external)
- Low heat build up
- Electronically damped start-up.
- No inrush current peak, minimum loads on the supply grid or Connected equipment eg. UPS

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**Promed1 + Promed3 isolation transformers**

The PROMED isolation transformers are constructed for central power supply in medical systems and provide high single-phase powers ranging from 3150VA up to 8000 VA. The transformers are also available in three-phase versions.

<table>
<thead>
<tr>
<th>Technical data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated Power</td>
</tr>
<tr>
<td>Input voltage</td>
</tr>
<tr>
<td>Output voltage</td>
</tr>
<tr>
<td>Short circuit voltage</td>
</tr>
<tr>
<td>No load current</td>
</tr>
<tr>
<td>Current</td>
</tr>
<tr>
<td>Weight</td>
</tr>
</tbody>
</table>

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**Promed1 - Single-phase power supply**

**Promed3 - Single-phase Power supply**
### Medical transformers

#### Benefits

- Conforms to medical standard EN 60601-1
- Standard connections ensure straightforward integration.
- Very low leakage current
- Very high efficiency
- High capacity
- No hum
- Low power losses
- Reduced magnetic stray field
- Easy installation

#### REO Unimed - Transformers for worldwide medical applications

The REO UNIMED can be configured to use many different input voltage combinations, ensuring safety standards can be maintained on a world-wide basis.

The UNIMED series are designed for installation in a compact housing or on mounting plates. The units have safe terminals for easy connection. The special winding design ensures a safe separation of primary and secondary circuits and compliance with the required air and creepage distances.

Another advantage of the REO-UNIMED: By using UL tested and high quality insulating materials functional safety and long product life is ensured. The series is manufactured according to the REO insulation system B1 (UL-No: E251513).

#### Technical data

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated power</td>
<td>100 - 300 [VA]</td>
</tr>
<tr>
<td>Weight</td>
<td>1,9 - 3,2 [kg]</td>
</tr>
<tr>
<td>Input voltage</td>
<td>0-115 / 0-100-115 [V]</td>
</tr>
<tr>
<td>Output voltage</td>
<td>230 [V]</td>
</tr>
<tr>
<td>Current</td>
<td>0,43 - 1,30 [A]</td>
</tr>
<tr>
<td>Max. ambient temperature</td>
<td>40 [°C]</td>
</tr>
<tr>
<td>Protection</td>
<td>IP 54 (Connections IP 00)</td>
</tr>
</tbody>
</table>
**Benefits**

- Easy to operate
- Audio/Visual alarm
- Functional test
- TÜV-certified according to EN 60 601-1-2
- EMC tested according to EN 60 601-1-2

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**ISOMONITOR - Isolation monitor for REOMED transformers**

Normal safety devices used for protection against isolation failures, such as residual-current circuit-breakers (RCD) used in domestic installations, cannot detect isolation breakdown on the secondary side of isolating transformers.

The ISOMONITOR monitors the dielectric resistance between both of the live output-socket terminals of the isolation transformer and earth potential, and generates a warning signal in the event of a fault condition. The insulation resistance is constantly monitored to ensure that it does not drop below a limit of 50 kOhm. If it does fall below this value, then both an acoustic alarm (sound pulsating at approximately 3kHz and 98 db) and a visual signal (LED display) are generated.

The ISOMONITOR can be connected to one of the socket outlets of the isolating transformer. The temperature of the transformer can also be monitored and the same audible alarm (tone) and visual signal (LED display) activated in the event of a problem.

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**Technical data**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated voltage</td>
<td>230 [V]</td>
</tr>
<tr>
<td>Operation range</td>
<td>207 - 253 [VAC]</td>
</tr>
<tr>
<td>Response value</td>
<td>≤ 50 [kOhm]</td>
</tr>
<tr>
<td>Response time</td>
<td>&lt; 2 [sec.]</td>
</tr>
<tr>
<td>Signal display</td>
<td>Green LED: Running</td>
</tr>
<tr>
<td></td>
<td>Yellow LED: Isolation fault</td>
</tr>
<tr>
<td></td>
<td>Yellow LED: Transformer temperature limit exceeded</td>
</tr>
<tr>
<td></td>
<td>Acoustic signal, pulsing for isolation fault</td>
</tr>
<tr>
<td></td>
<td>and continuous for temperature fault</td>
</tr>
<tr>
<td>Ambient operating temperature</td>
<td>0 – +40 [°C]</td>
</tr>
<tr>
<td>Relative humidity of environment</td>
<td>30 - 75 [%]</td>
</tr>
<tr>
<td>Protection class</td>
<td>II</td>
</tr>
<tr>
<td>Protection</td>
<td>IP 40</td>
</tr>
<tr>
<td>Dimensions [H x B x T]</td>
<td>125 x 67 x 40 [mm]</td>
</tr>
</tbody>
</table>

*Note: The ISOMONITOR has been designed solely for use with REOMED isolation transformers. Now available: network isolators to protect against surges on the network interface. Dielectric strength at least 4kV AC.*