High-level healthcare thanks to electric power availability

Secure power distribution and monitoring solution for operating theatres
99.99998%

Electric power availability* for patient safety

*Equivalent to a mean time before failure of 290 years, according to the study carried out with one IT system per electrical switchboard.
Improving the performance of operating theatres...

To ensure the safety of patients, the availability and quality of electric power are essential. The electrical installations of operating theatres should enable the continuity of healthcare in all circumstances.

Enhancing patient safety
Ensuring the satisfactory operation of operating rooms is essential for a hospital.

Ensuring continuity of service
Because nothing must disturb the medical team during operations.

Improving the efficiency of hospital personnel
A controllable environment and perfectly functioning equipment mean more comfort.
Secure power distribution and monitoring solution for operating theatres

A reliable, efficient solution from a single manufacturer ...

A solution you can trust ...

> All the components of this solution are designed, manufactured, and tested by Schneider Electric™ to operate together and be implemented by trained and approved partners.
> Schneider Electric provides maintenance plans and operating procedures linked to this solution.
> Schneider Electric ensures the continuity of the components throughout the installation’s life.

... thanks to secure power distribution ...

> The Schneider Electric solution incorporates an isolation transformer and a continuous insulation monitor in conformity with the required standards to ensure the supply of power to medical equipment in the event of a first insulation fault.
> The continuity of the electric power supply is ensured thanks to the performance of the uninterruptible power supply system and the additional automatic transfer switch (ATS).
> The Schneider Electric solution is designed, wired, and tested to attenuate electromagnetic disturbances in accordance with the IEC 60364-4-44 standard.

... to event monitoring and traceability

The Schneider Electric solution incorporates a monitoring system to:
> Inform maintenance and medical personnel in real time in the event of an electrical fault in the operating room.
> Monitor the operating room environment and record all environmental events and data.
> Provide data to the hospital building management system.

Schneider Electric is the global energy management specialist.

Architectures designed to ensure the availability of overall electricity distribution for the hospital

Efficient services throughout the operation and life cycle of your installation

Products selected and installed to state-of-the-art standards, and coordinated with one another

Services

Architectures

Products
... tested in compliance with the standards and regulations in force

What do the standards say?

> In Group 2* rooms for medical use, a medical IT system† shall be used for the circuits powering medical electrical equipment and systems for survival and surgical applications, and the other equipment located in the environment of the patient.
> An audible and visual alarm must be provided for in the room in question to alert medical personnel.
> For class \( \leq 0.5 \text{††} \), a backup power system shall maintain the supply for a minimum of 3 hours within a changeover period not exceeding 0.5 s.
> For the optimum operation of medical equipment, prevention of electromagnetic disturbances is necessary.

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* Group 2 (according to IEC 60364-7-710): rooms for medical applications in which the parts applied are designed to be used in applications such as intracardiac procedures, operative fields, and vital treatments where discontinuity (failure) of the power supply could entail danger for life.
† The medical insulation power system (IPS) does not require automatic cutoff of the power supply whenever an isolation fault occurs.
††Class 0.5 (according to IEC 60364-7-710): anaesthetic room, operating theatre, operating recovery room, intensive care room, etc.
Secure power distribution and monitoring solution for operating theatres

A power distribution and monitoring to meet the needs of all users

Our solution offers an optimal level of safety and comfort for both medical personnel and maintenance personnel. Everyone can concentrate on their jobs and optimize their work.

The surgeon
> remains concentrated on what is essential, his/her patient.
> benefits from the stability and security of the electric power supply.

The nurse
> tests the insulation monitoring system at start-up of the operating room.
> is warned of an electrical fault or insulation fault.
> is warned of real UPS remaining time if system switches to backup supply.
> is warned of load consumption to anticipate overload situation.
> uses the Magelis™ touch screen panel to monitor environmental conditions.
> is notified of any work performed by maintenance personnel.
> generates an insulation test.

Our power distribution and monitoring solution consists of:
• an electrical distribution switchboard
• a monitoring system
• an uninterruptible power supply
The maintenance personnel
> is notified by SMS text message of the presence of an electrical fault in an operating room.
> consults via PC the electrical state of each operating room.
> performs switchboard fault diagnosis.

The supervision personnel
> views the states of all operating rooms via PC.
> generates event reports.
> sets alarm thresholds for the temperature and relative humidity values of operating rooms.

- Real-time information for decision-making and action
- Traceability of events
- Monitoring of each operating room
- Continuity of service for patient safety
Secure power distribution and monitoring solution for operating theatres

An electrical distribution switchboard with the best equipment from Schr

Organized by zones for efficient servicing operations and to prevent electromagnetic disturbances.

Prisma Plus™ switchboard

> Physical separation between zones
> Pivoting front panels
> Separation of data currents and power currents
> Power distribution by distribution blocks with spring terminals

Connection zone for outgoing and incoming cables

> The terminals are grouped together in 3 zones identified by labels

- Servicing operations on connections limited to a single zone
- Clear markings for maintenance operations

Data acquisition and communication zone

> Real-time monitoring of the state of circuit breakers, insulation monitors and transformers in the IT systems
> Acquisition of temperature, pressure, and relative humidity values for the operating room and comparison with thresholds
> Information on medical gas states
> Data and alarm transmission to the touch screen panel in the operating room and to the supervision and maintenance PCs
> LON, Modbus™, and TCP/IP protocols support connection to the hospital network

Protection from electromagnetic disturbances, in accordance with IEC 60364-4-44 and IEC 61000-6-2 and -3 thanks to:

- Physical separation of sensitive and interfering components, and of low and high current cables
- Metal screen separation between functional units
- Linking of exposed conductive parts to reduce the common impedance between the devices
- Low emissions and high immunity of the devices
board designed
Schneider Electric

3 TNS system feeder zone
> Isolation switch-disconnector for maintenance operations
> Miniature circuit breakers with magnetic trip units for non-critical feeders with failsafe contact for electrical fault detection
> Backed-up 24 VDC power supply (battery life: 1 hour) for the touch screen panel in the operating room and the data acquisition system
> When the voltage at the main distribution board drops, a safety power supply source assumes the supply automatically

+ • Reliable fault detection on feeders
• Data monitoring system and touch screen panel in operating theatre backed up for 1 hour

5 Isolation transformer zone, 6.3/8 and 10 kVA
> Isolation transformer for IT system in compliance with IEC 61558-2-15:
  - Strengthened galvanic isolation between primary and secondary: 100 MΩ
  - Leakage current between secondary and frame: < 0.5 mA
  - Limited inrush current: < 12 In
  - Low no-load current and reduced voltage drop under load (< 3%)
> Temperature monitoring by bimetallic strip and overload monitoring by thermal relay

+ • No electric shock for patients
• Stability of medical instrumentation power supply
• No switchboard ventilation, no noise

4 IT system feeder zone and insulation monitoring
> Vigilohm™ IM10-H or IM20-H insulation monitor in compliance with the IEC 61557-8 standard and the requirements of the IEC 60364-7-710 standard
> Miniature circuit breakers with magnetic trip units for critical feeders with failsafe contact for electrical fault detection

+ • No power cutoff on first fault
• Permanent digital display of insulation impedance
• Fault indication by failsafe contact

6 Uninterruptible power supply*
> Protects the switchboard against mains power cuts, voltage dips, and overvoltages
> Filters slight current fluctuations and isolates the switchboard from major mains disturbances
> Ensures a continuous supply of power until the mains supply returns to normal
> Transmits information when battery-supply goes on, and the remaining time of the battery. This information is shown on the Magelis screen and on the supervisor PC

+ • Quality of electric power supply
• Continuity of service

*For local application only.
Secure power distribution and monitoring solution for operating theatres

A monitoring system...

With its monitoring system, our solution provides access to all information concerning the electrical and environmental state of rooms.

Personnel in operating room

Magelis touch screen panel
- Visual and audible indications of electrical faults
- Audible alarm stoppage
- Display of environmental parameters and state of medical gases
- Information on load consumption and insulation level in real time
- Information on fault handling by the maintenance personnel
- Testing of the insulation monitoring system

Supervision personnel

PC with the supervision system software pre-installed
- Display of parameters for each operating room
- Recording of all electrical events and environmental parameters, with reporting capabilities
- Temperature and pressure threshold setting

Maintenance personnel

PC with a Web browser
- Display of parameters for each operating room
- Notification to medical team that the fault is being handled

Alarm by SMS text message

- Get the information you need to make the right decisions
- Event traceability
- Get the information you need to take corrective action
- Reassure the medical team
... for information in real time

15” Magelis touch screen panel

Welcome page
- Time
- Display of temperature, relative humidity, pressure, state of medical gases (O₂, N₂O, and vacuum), insulation level, and load consumption
- Hours/minutes/seconds display
- Access to other functions and locking of the touch screen panel

Time management
- Timer, chronometer

Testing of insulation monitor
- Verification of the insulation monitoring system

Environmental management
- Temperature and relative humidity alarm threshold setting
- Day/night screen lighting

Real UPS battery backup capacity
- Remaining time

Insulation fault
- Electrical and insulation fault indication
- Indication of fault handling by the maintenance personnel
- Audible alarm stoppage

Vigilohm HRP: an alternative to Magelis

Simple and efficient
- Audible and visual alarm for an insulation or electrical fault (transformer overload or circuit breaker tripping)
- Testing of the insulation monitoring system
- Audible alarm stoppage

+ Flush mounted
+ Antibacterial
+ Resistant to cleaning products
Secure power distribution and monitoring solution for operating theatres

One coherent electrical system architecture dedicated to continuity of service

> An uninterruptible power supply ensures excellent power quality.
> A changeover switch in the event of loss of the UPS and for maintenance.
> Total coordination between equipment contributes to long life and continuity of service of the installation.

Three levels of information for the monitoring system

<table>
<thead>
<tr>
<th>The Schneider Electric offer</th>
<th>Classic</th>
<th>Advanced</th>
<th>Full</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control and signalling panel</td>
<td>Type of display</td>
<td>Vigilohm HRP</td>
<td>Magelis touch screen</td>
</tr>
<tr>
<td>State of temperature, pressure, relative humidity, medical gases</td>
<td>-</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Maintenance access</td>
<td>Access to operating theatre data</td>
<td>-</td>
<td>Yes</td>
</tr>
<tr>
<td>Access to operating theatre data</td>
<td>-</td>
<td>-</td>
<td>Yes</td>
</tr>
<tr>
<td>SMS alarm</td>
<td>-</td>
<td>-</td>
<td>Yes</td>
</tr>
<tr>
<td>Supervision personnel access</td>
<td>Access to operating theatre data</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Event traceability</td>
<td>-</td>
<td>-</td>
<td>Yes</td>
</tr>
<tr>
<td>Event report</td>
<td>-</td>
<td>-</td>
<td>Yes</td>
</tr>
<tr>
<td>UPS</td>
<td>If normal power supply not backed up</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Remaining time of the battery</td>
<td>-</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>
Two switchboard sizes depending on the space available

Prisma Plus P enclosure
> Integrated transformer
> Floor mounting

<table>
<thead>
<tr>
<th></th>
<th>Height</th>
<th>Width</th>
<th>Depth</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2206 mm</td>
<td>856 mm</td>
<td>450 mm</td>
</tr>
</tbody>
</table>

Prisma Plus G floor standing enclosure
> External transformer with IP21/IK07 cover
> Floor mounting

<table>
<thead>
<tr>
<th></th>
<th>Height</th>
<th>Width</th>
<th>Depth</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1830 mm</td>
<td>900 mm</td>
<td>243 mm</td>
</tr>
</tbody>
</table>

Transformers with IP21/IK07 cover

<table>
<thead>
<tr>
<th>Power</th>
<th>Height</th>
<th>Width</th>
<th>Depth</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.3/8 kVA</td>
<td>710 mm</td>
<td>470 mm</td>
<td>540 mm</td>
</tr>
<tr>
<td>10 kVA</td>
<td>740 mm</td>
<td>470 mm</td>
<td>540 mm</td>
</tr>
</tbody>
</table>

APC Smart-UPS™ RT uninterruptible power supply*

<table>
<thead>
<tr>
<th>Power</th>
<th>Height</th>
<th>Width</th>
<th>Depth</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>8/10 kVA</td>
<td>432 mm</td>
<td>263 mm</td>
<td>736 mm</td>
<td>111 kg</td>
</tr>
</tbody>
</table>

*Standard duration at half load 15 minutes. For 15 minutes duration at full load another UPS version is available.
## Technical characteristics

### Electrical characteristics

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operational voltage</td>
<td>230 V / 50-60 Hz</td>
</tr>
<tr>
<td>Isc</td>
<td>25 kA</td>
</tr>
<tr>
<td>In</td>
<td>63 A maximum</td>
</tr>
</tbody>
</table>

### Environmental conditions (operating room or electrical premise)

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location</td>
<td>Indoor</td>
</tr>
<tr>
<td>Altitude</td>
<td>≤ 2000 m</td>
</tr>
<tr>
<td>Maximum ambient air temperature</td>
<td>30°C</td>
</tr>
<tr>
<td>Relative humidity</td>
<td>90%</td>
</tr>
<tr>
<td>Switchboard power losses</td>
<td>465 W</td>
</tr>
</tbody>
</table>

### Electrical switchboard enclosure: Prisma Plus

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steel sheet, cataphoresis treatment</td>
<td></td>
</tr>
<tr>
<td>Degree of protection</td>
<td>IP30</td>
</tr>
<tr>
<td>Degree of protection against mechanical shocks</td>
<td>IK07</td>
</tr>
<tr>
<td>Ventilation</td>
<td>Natural ventilation</td>
</tr>
<tr>
<td>Cable inlets and outlets</td>
<td>In duct, through the bottom or top</td>
</tr>
<tr>
<td>Cable connection</td>
<td>To terminals</td>
</tr>
</tbody>
</table>

### IT system feeders

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Isolation transformer</td>
<td>6.3/8 or 10 kVA with temperature and overload monitoring</td>
</tr>
<tr>
<td>Insulation monitor device + display of insulation impedance</td>
<td>- Internal resistance in alternative current: 110 kΩ</td>
</tr>
<tr>
<td></td>
<td>- Measurement voltage: 25 VDC max.</td>
</tr>
<tr>
<td></td>
<td>- Measurement current: 0.2 mA max.</td>
</tr>
<tr>
<td></td>
<td>- Fault indication threshold setting: 50 kΩ to 500 kΩ</td>
</tr>
<tr>
<td>Modular circuit breakers</td>
<td>Up to 24 feeders on 3 rows (protection for 1 or 3 power outlets per feeder)</td>
</tr>
</tbody>
</table>

### TNS system feeders

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Modular circuit breakers</td>
<td>Up to 6 feeders</td>
</tr>
</tbody>
</table>

### Monitoring

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data acquisition and communication modules</td>
<td>TAC Xenta™ 731, 421, 411</td>
</tr>
<tr>
<td>Protocols</td>
<td>LonWorks®, LonMark®, Modbus, and TCP/IP</td>
</tr>
<tr>
<td>Temperature, pressure, and relative humidity sensors</td>
<td>Schneider Electric</td>
</tr>
<tr>
<td>Data backup time</td>
<td>1 hour</td>
</tr>
<tr>
<td>Magelis touch screen panel</td>
<td>15&quot; backlit active-matrix TFT LCD tested with Anios cleaning products</td>
</tr>
<tr>
<td>Vigilohm HRP</td>
<td>Plastic case: IP54, IK08 Testeed with Anios cleaning products</td>
</tr>
</tbody>
</table>

### Conformity with standards

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solution for operating theatres</td>
<td>IEC 60364-7-710</td>
</tr>
<tr>
<td>Switchboard</td>
<td>IEC 61439-1 and -2</td>
</tr>
<tr>
<td>Isolation transformer</td>
<td>IEC 61558-2-15</td>
</tr>
<tr>
<td>Continuous insulation monitor</td>
<td>IEC 61557-8</td>
</tr>
<tr>
<td>Electromagnetic compatibility</td>
<td>IEC 60364-4-44</td>
</tr>
<tr>
<td></td>
<td>IEC 61000-6-2 and -3</td>
</tr>
</tbody>
</table>

### Uninterruptible power supply

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Efficiency at full load</td>
<td>98%</td>
</tr>
<tr>
<td>Output voltage distortion</td>
<td>&lt; 3%</td>
</tr>
<tr>
<td>Standard duration of power supply at 50% load</td>
<td>15 min.</td>
</tr>
</tbody>
</table>
High value-added services

Throughout the world, our Schneider Electric service experts and our local partners are attentive to your needs and will deliver a comprehensive and unique service offering.

Expert services
For improved performance…
> Energy efficiency
> Installation reliability and safety
> Reduced capital expenditure
> Reduced power consumption
> Reduction in the number of failures
> Reduction in downtime and repair time
> Training of operation and maintenance teams
> Longer equipment service life
… over the entire life cycle of the installation
> Installation design
> Commissioning
> Operating aid
> Maintenance and revamping
> Energy efficiency audit
> Customized services

Customer support and online services
> Call centres, online diagnosis services, and technical assistance
> Services via Internet: electronic catalogues, downloadable software, information, and training

In search of excellence
Schneider Electric conducts an ambitious innovation, quality, and efficiency policy.
> Around 5% of turnover is invested in R&D
> 6500 researchers and developers

A close relationship with our customers
> We have a strong international footprint with more than 100,000 employees in over 100 countries worldwide. With our partners, distributors, panel builders, contractors, and engineering offices, we want to establish with you a relationship of trust and help you achieve an optimal level of performance.

A strong social commitment
> Sustainable development is a key part of the Schneider Electric strategy. Our solutions help those without electricity obtain access to it and favour a reduction in energy consumption by both industrial firms and private consumers.
> 91% of our plants are certified ISO 14001. The Schneider Electric product offering complies with all existing standards worldwide.
Make the most of your energy℠

To find out more, please visit: www.schneider-electric.com