

**Indira Gandhi Memorial Hospital
Male', Republic of Maldives
Biomedical Engineering Department**

Technical Specification for Equipment

Technical Specification: 15 kVA Three-Phase Online UPS System

1. General Requirements

- Supply, delivery, installation, testing, commissioning, training, and handover of a Three-Phase Online Double Conversion UPS System.
- The system shall be new, unused, and of the latest available model.
- Suitable for continuous operation in a hospital and healthcare environment.
- Compliance with applicable IEC, ISO, and electrical safety standards.
- The proposal shall include all equipment, accessories, batteries, cabling, mounting materials, protection devices, and services necessary for a complete operational system.

2. UPS Performance Requirements

- Type: True Online Double Conversion UPS.
- Rated Capacity: Minimum 15 kVA.
- Active Power Capacity: Minimum 15 kW.
- Input Configuration: Three-Phase.
- Output Configuration: Three-Phase.
- Input Voltage: 380/400/415 VAC.
- Output Voltage: 380/400/415 VAC selectable.
- Frequency: 50 Hz.
- Output Frequency Regulation: $\pm 0.1\%$.
- Output Power Factor: 1.0 preferred.
- Online Mode Efficiency: Minimum 94%.
- Automatic Static Bypass: Standard.
- Maintenance Bypass: Included.
- Transfer Time: Zero milliseconds in online mode.
- Input Power Factor: ≥ 0.99 .
- Input Current Harmonic Distortion (THDi): $\leq 5\%$.
- Output Voltage Harmonic Distortion:
 - $\leq 3\%$ for linear loads.
 - $\leq 5\%$ for non-linear loads.

3. Electrical Input Requirements

- UPS shall operate from a dedicated five-wire electrical supply system.
- Electrical supply configuration shall consist of:
 - Three (3) phase conductors.
 - One (1) neutral conductor.
 - One (1) protective earth conductor.
- Input feeder shall terminate through a dedicated four-pole circuit breaker.
- Supply characteristics:
 - Phase-to-Phase Voltage: 400 VAC $\pm 10\%$.
 - Phase-to-Neutral Voltage: 225 VAC $\pm 10\%$.
 - Neutral-to-Earth Voltage: Less than 5 VAC.
 - Frequency: 50 Hz $\pm 5\%$.
- Minimum available feeder capacity:
 - Current Rating: 30 A.
 - Connected Load Capacity: 15 kVA or higher.
- UPS shall provide continuous, stable, regulated power without voltage fluctuations, interruptions, or frequency disturbances within specified operating limits.
- UPS shall incorporate automatic voltage regulation and power conditioning functions.

- Vendor shall verify electrical infrastructure suitability prior to installation.

4. Battery System

- Maintenance-free sealed batteries or equivalent advanced battery technology.
- Battery backup duration:
 - Minimum 30 minutes at full rated load.
- Battery cabinet/rack shall be included.
- Battery disconnect switch and protection devices shall be included.
- Intelligent battery management system shall be provided.
- Battery expansion capability preferred.
- Battery charging system shall automatically optimize battery life and performance.

5. Protection Features

- Overload protection.
- Short circuit protection.
- Input surge protection.
- Over-voltage protection.
- Under-voltage protection.
- Over-temperature protection.
- Battery deep discharge protection.
- Reverse polarity protection.
- Automatic shutdown protection.
- Emergency Power Off (EPO) capability preferred.

6. Monitoring and Communication

- High-resolution LCD display.
- Real-time monitoring of:
 - Input voltage.
 - Output voltage.
 - Frequency.
 - Load percentage.
 - Battery capacity.
 - Battery runtime.
 - Alarm conditions.
 - Operating mode.
- Audible and visual alarm indicators.
- Event and fault log recording.
- Communication interfaces:
 - USB.
 - RS-232.
 - Ethernet/SNMP.
- Dry contact interface preferred.
- Remote monitoring capability preferred.

7. Environmental Conditions

- Operating Temperature: 0°C to 40°C.
- Storage Temperature: -20°C to 60°C.
- Relative Humidity: Up to 95% non-condensing.
- Altitude: Up to 1,000 m without derating.
- Protection Class: Minimum IP20.
- Suitable for operation in tropical and coastal environments.
- Equipment shall be protected against humidity and environmental conditions commonly encountered in hospital installations.

8. Physical Requirements

- Compact footprint with minimum space consumption.
- Front-access maintenance preferred.
- Robust metal enclosure construction.
- Clear labeling of terminals and controls.
- Low-noise operation suitable for indoor healthcare facilities.
- Floor-standing configuration.

9. Installation, Civil Works, and Site Preparation

- Vendor shall be responsible for all installation activities.

- Vendor shall perform all necessary civil works associated with installation.
- Vendor shall provide:
 - Cable trays and supports where required.
 - Power and control cabling.
 - Earthing and grounding system connections.
 - Conduits and protective accessories.
 - Terminations and interconnections.
- Vendor shall ensure compliance with applicable electrical safety regulations and hospital requirements.
- All materials required for complete installation shall be included in the offer.

10. Testing and Commissioning

- Complete testing and commissioning shall be performed by qualified personnel.
- Functional tests shall be conducted prior to handover.
- Battery discharge and backup verification tests shall be performed.
- Input and output electrical parameter verification shall be conducted.
- Vendor shall submit:
 - Installation Report.
 - Testing Report.
 - Commissioning Report.
 - Acceptance Test Report.
- System shall be handed over only after successful completion of acceptance testing.

11. Documentation

- User Manual.
- Service Manual.
- Electrical Schematics.
- Installation Drawings.
- Preventive Maintenance Procedures.
- Troubleshooting Guide.
- Battery Maintenance Instructions.
- Factory Test Certificates.
- Commissioning Reports.
- Warranty Documents.

12. Training Requirements

- Vendor shall provide comprehensive on-site training for electrical and biomedical engineering staff.
- Training shall include:
 - System operation.
 - Safety procedures.
 - Preventive maintenance practices.
 - Good operational practices.
 - Battery maintenance and management.
 - Alarm interpretation.
 - Error and fault handling.
 - Troubleshooting procedures.
 - Shutdown and startup procedures.
- Training materials shall be supplied in both printed and electronic formats.

13. Warranty

- Comprehensive warranty covering all supplied equipment and accessories.
- Minimum warranty period: Two (2) years.
- Extended warranty options preferred.
- Warranty shall include parts, labor, travel, and technical support.

14. Service Support

- Vendor shall provide local technical support and maintenance capability.
- Vendor shall provide 24 hours per day, 7 days per week technical support throughout the operational life of the system until decommissioning.
- Preventive maintenance support shall be available after warranty expiry.
- Vendor shall clearly state response times for critical and non-critical faults.
- Availability of qualified service engineers shall be demonstrated.

15. Spare Parts and Long-Term Support

- Vendor shall provide a list of essential and recommended spare parts.

- Vendor shall maintain an adequate buffer stock of critical spare parts.
- Spare parts list shall include:
 - Part description.
 - Part number.
 - Recommended quantity.
 - Estimated unit price.
 - Estimated lead time.
- Availability of spare parts shall be guaranteed for a minimum of ten (10) years from the date of installation.
- Vendor shall provide a preventive maintenance consumables list with estimated pricing.

16. Compliance Requirements

- Manufacturer shall be certified to ISO 9001 or equivalent quality management standards.
- Equipment shall comply with applicable IEC standards for UPS systems, EMC, and electrical safety.
- Certificates of conformity and compliance shall be submitted with the bid.
- The bidder shall provide evidence of successful installation and support of similar UPS systems.

End of Specification