1. GENERAL
	1. SUMMARY
		1. This Section includes hospital isolated power distribution panels, including the following: ***{Specifier: Delete listed items as required per project}***
			1. Isolation Distribution Panel
			2. Duplex Isolation Distribution Panel
			3. Dual Voltage Isolation Distribution Panel
			4. Laser/X-Ray Isolation Distribution Panel
		2. Related Sections include:
			1. Section 26xxxx “Power and Ground Modules”
	2. SCOPE
		1. The contractor shall furnish, install, and ensure proper testing and certification of a complete isolated power and equipotential grounding system, including associated accessories, as indicated on the electrical plans, wiring diagrams, panel schedules, and as specified herein.
	3. SUBMITTALS
		1. Product Data: Provide dimensions, ratings, operating characteristics, and included accessories.
		2. Installation/Operation Instructions: Provide instructions for handling, installation, and operation of product.
		3. Test Data: Manufacturer to supply Test Report after completion of all commissioning tests.
	4. REference
		1. NFPA 70 – National Electric Code, Article 517
		2. NFPA 99 – Health Care Facilities
		3. UL 1022 – Line Isolation Monitors
		4. UL 1047 – Isolated Power System Distribution Equipment
		5. UL 50 – Enclosures for Electrical Equipment
	5. Approved manufacturers
		1. This specification is based on equipment manufactured by PG LifeLink.
		2. Products of other manufacturers will be considered provided they are equal in all respects and request for approval is submitted in writing to the engineer at least 2 weeks prior to the bid date.
2. products

***{Specifier: Delete listed items as required per project}***

* 1. Isolation Distribution Panels
		1. Provide Isolation Distribution Panels for all operating rooms and other critical procedure areas as indicated on contract drawings. Isolation Distribution Panels are intended to serve 120V equipment in a single patient area.
		2. Isolation Distribution Panels shall be a three‑piece assembly consisting of: back box, component chassis, and front trim. For ease of installation, component chassis shall be pre-assembled, pre-wired, and shall contain isolation transformer, Line Isolation Monitor (LIM), primary main and total quantity of secondary branch circuit breakers as indicated on panel schedule(s).
		3. Panels shall be single-phase with voltage and load ratings as indicated on panel schedule(s).
		4. Panels shall be flush mount. Back boxes shall be available for shipment during rough-in construction stage. Pre-wired component chassis and front trim shipped according to construction schedule.
		5. Where contract drawings call for panels to be installed outside of the room being served, a Remote Annunciator connected to the Line Isolation Monitor shall be installed inside the room.
		6. PG LifeLink model IDP panels shall be basis for design.
	2. Duplex Isolation Distribution Panel
		1. Provide Duplex Isolation Distribution Panels for all operating rooms and other critical procedure areas as indicated on contract drawings. Duplex Isolation Distribution Panels are intended to serve 120V equipment in a single patient area where more than a single panel is required.
		2. Duplex Isolation Distribution Panels shall contain two independent isolation systems, physically separated by a barrier. Panels shall be pre-assembled and pre-wired, and shall contain two each: isolation transformers, Line Isolation Monitors (LIM), primary mains and two sets of secondary branch circuit breakers as indicated on panel schedule(s).
		3. Panels shall be single-phase with voltage and load ratings as indicated on panel schedule(s).
		4. Panels shall be flush mount. Back boxes shall be available for shipment during rough-in construction stage. Pre-wired component chassis and front trim shipped according to construction schedule.
		5. Where contract drawings call for panels to be installed outside of the room being served, Remote Annunciators connected to the Line Isolation Monitors shall be installed inside the room.
		6. PG LifeLink model DIDP panels shall be basis for design.
	3. Dual Voltage Isolation Distribution Panel
		1. Provide Dual Voltage Isolation Distribution Panels for all operating rooms and other critical procedure areas as indicated on contract drawings. Dual Voltage panels are intended to simultaneously serve both 120V equipment and 208-240V portable laser or x-ray equipment.
		2. Dual Voltage Isolation Distribution Panels shall contain a single isolation transformer with a single input and dual output windings. Panels shall be pre-assembled and pre-wired, and shall contain two each Line Isolation Monitors (LIM), and two sets of secondary branch circuit breakers as indicated on panel schedule(s).
		3. Panels shall be single-phase with voltage and load ratings as indicated on panel schedule(s).
		4. Panels shall be flush mount. Back boxes shall be available for shipment during rough-in construction stage. Pre-wired component chassis and front trim shipped according to construction schedule.
		5. Where contract drawings call for panels to be installed outside of the room being served, a Remote Annunciator connected to the Line Isolation Monitor shall be installed inside the room.
		6. PG LifeLink model XTLD panels shall be basis for design.
	4. Laser/X-Ray Isolation Distribution Panel
		1. Provide Isolation Distribution Panels to serve portable laser and x-ray device loads in all operating rooms and other critical procedure areas as indicated on contract drawings. Laser/X-Ray Isolation Panels are intended to serve 208-240V portable equipment in several nearby patient areas.
		2. Laser/X-Ray Isolation Distribution Panels shall be pre-assembled and pre-wired, and shall contain: isolation transformer, Line Isolation Monitor (LIM), programmable control system, primary main and total quantity of secondary branch circuit breakers and associated contactors as indicated on panel schedule(s).
		3. System shall include contactor control system with programmable lock-out feature to protect against accidental shutdown or overload.
		4. Panels shall be single-phase with voltage and load ratings as indicated on panel schedule(s).
		5. Panels shall be flush mount. Back boxes shall be available for shipment during rough-in construction stage. Pre-wired component chassis and front trim shipped according to construction schedule.
		6. Each circuit being served by Laser/X-Ray Isolation Panel shall include a Laser/X-Ray Outlet Module which includes: stainless steel panel with hinged door over NEMA {***Specifier: specify configuration here}*** receptacle, door activated control switch, and Remote Annunciator connected to Line Isolation Monitor at Isolation Panel.
		7. System shall include provisions to operate “Laser-in-Use” illuminated sign(s) at room entrance(s) via control relays when local isolation circuit is energized.
		8. PG LifeLink model XTL panels with LO-R outlet modules and CLR control relays shall be basis for design.
	5. components
		1. Enclosure
			1. Back-box shall be fabricated of galvanized steel in accordance with UL 50 and shall be flush mounted, unless indicated otherwise, at the elevation shown on the plans.
		2. Front Trim
			1. The front trim shall be made of type 304 stainless steel polished to a # 4 satin finish. Front shall be secured by 1/4-20 stainless steel screws and shall include a full length hinge allowing easy access during testing and maintenance without having to fully remove trim. A lockable door shall provide access to circuit breakers. The Line Isolation Monitor (LIM) shall be accessible on the front of the panel at all times. The breaker access door shall not obscure LIM even when open.
		3. Chassis
			1. All Components within the isolation panel shall be mounted to a removable chassis plate and pre‑wired using low leakage type XHHW wire in accordance with UL requirements.
			2. Barriers shall be included for separation of the incoming grounded primary feeder. Separation shall be maintained between grounded and ungrounded conductors.
			3. A terminal block shall be provided for connection of remote signal conductors.
		4. Hospital Grade Isolation Transformers
			1. The Hospital Isolation Transformer shall be single phase, 60 Hz, \_\_ kVA, ***{specify 3, 5, 7.5, or 10}*** with \_\_\_ VAC primary, ***{specify 120, 208, 220, 240, 277, or 480}*** and \_\_\_ VAC secondary {***specify 120, 208, 220 or 240}***.
			2. The transformer shall be of stacked core design with an electrostatic shield between the primary and secondary windings to prevent direct shorting, and to reduce coupling of harmonic distortions between the windings. The shield shall be grounded to the enclosure. Core and coil shall be varnish impregnated and include a final wrap of insulating material to prevent exposure of bare conductors.
			3. Total leakage current to ground from windings shall not exceed the values shown in Table 30.2 of UL Standard 1047.
			4. Transformer shall be installed inside panel utilizing a vibration isolating system. Maximum design sound level of installed unit shall not exceed 35 dBA.
			5. Insulation shall be Class R rated 220° C UL recognized system. The design temperature rise of the transformer shall be limited to 80° C above ambient at full load.
		5. Line Isolation Monitor (LIM)
			1. Line Isolation Monitor shall continuously monitor the impedance from each isolated conductor to ground and shall display the Total Hazard Current (THC) of the system. The LIM shall be capable of detecting all combinations of resistive and capacitive faults whether they are balanced, unbalanced or hybrid.
			2. LIM shall meet following performance specifications:
				1. Operating voltage 85 to 265 VAC
				2. Operating frequency 60 Hz
				3. Accuracy + 5% @ THC alarm point and rated voltage
				4. Monitor Hazard Current (MHC) 25 µA @ 120VAC (50 µA @ 240VAC)
				5. Total Hazard Current (THC) range 0-5mA (0-2mA selectable)
			3. The LIM shall be certified in accordance with UL Standard 1022.
			4. Normal status of the LIM shall be indicated by illumination of a green "Safe" LED. An alarm signal shall be obtained when the Total Hazard Current (THC) reaches a threshold value of not more than 5.0 milliamperes (mA). Alarm state is indicated by illumination of a red "Hazard" LED and by an audible alarm as well. A silence button shall be provided to mute the audible alarm without extinguishing the visual alarm indication. A yellow LED will remain on while LIM is in the silenced mode. The LIM shall automatically reset to normal status when the fault condition is corrected.
			5. The LIM shall also detect and signal an alarm if the ground connection to the LIM is broken. A momentary test switch shall be provided for periodic testing of the LIM circuitry. The LIM shall be flush mounted on the front of the panel so that the LIM signals are clearly visible at all times. The LIM signals must not be obscured when the circuit breaker door is open.
			6. LIM shall automatically initiate a self-test/calibration sequence according to a user defined schedule.
			7. LIM shall contain a 2-Line (20 characters each row) LCD user interface that simultaneously displays alarm status, selected range, and line-to-line voltage. Interface shall provide access to user selectable settings, and time/date stamped event logs.
			8. Optional isolation transformer load monitoring/overload and over-temp alarm accessories shall be available to protect against unintended shutdown of the system.
			9. LIM shall provide means for remote monitoring of system parameters via dry contact relay or via RS485 serial connection.
			10. LIM shall include provisions for connecting to PC based LIM management software via Ethernet. Software shall provide visual representation with unique addressing and labeling of each LIM installed in a facility, and allow full remote monitoring and control access. Software shall be capable of downloading and archiving all system logs and regularly synchronizing LIM time and date.
			11. Optional integration with facility BMS system shall be available. Coordinate project specific field-bus protocol with BMS vendor.
			12. Basis for design shall be the PG LifeLink model Mark V with LIM-Connect management software.
		6. Circuit Breakers
			1. A primary main circuit breaker shall be provided on the primary line side of the transformer. Breaker shall be 2-pole, thermal magnetic type, with minimum 10,000 AIC. Breaker shall be sized according to transformer voltage and kVA rating.
			2. Branch circuit breakers to be factory installed according to official project documents. Branch breakers shall be 2-pole, bolt-on type only. Refer to panel schedule for quantity and sizes. Breakers shall be thermal magnetic type, with minimum 10,000 AIC. Maximum 16 each per isolation transformer.
			3. All panelboard busbars shall be copper.
			4. Isolated Power Panels shall accommodate panelboards/breakers from all major manufacturers to match existing coordination studies and facility standard.
			5. Ground Bus
			6. A copper reference ground bus having capacity for 24 branch taps for #14 to 1/0 wires shall be provided.
		7. ACCESSORIES
			1. Power Receptacles
				1. All power receptacles shall be hospital grade, UL Listed type. NEMA configuration shall be according to layout drawings. Normal power shall be gray, Emergency power shall be red.
				2. Remote receptacle panels shall be supplied in quantities and locations in accordance with the layout drawings. Receptacle panels shall have stainless steel front plates with a #4 satin finish.
				3. ***{optional}*** Power receptacles shall be provided on the front of isolation panel. Quantity (8 max.) and configuration of receptacles shall be according to layout drawings.
			2. Ground Jacks
				1. All ground jacks shall be green, hospital type, 30A, twist-lock, UL Recognized Component. Compatible #10AWG grounding cord assemblies shall be supplied with all ground jacks. Cords shall be \_\_ feet ***{specify 5, 8, 10, 12, 15, or 20***} in length and shall consist of an extra flexible stranded copper conductor with neoprene insulation.
				2. Remote grounding receptacle panels and grounding junction boxes shall be supplied in quantities and locations in accordance with the layout drawings. A copper ground bus with 18 terminals for wire sizes #14 to 1/0 shall be included.
				3. (optional) Ground jacks shall be provided on the front of isolation panel. Quantity (7 max.) and configuration shall be according to layout drawings.
			3. Remote Annunciator
				1. Remote LIM signal annunciators shall be supplied as indicated on layout drawings. Remote annunciators shall be compatible with system Line Isolation Monitor and shall provide visual and audible indication of LIM alarm status. Visual indication shall include LED's for "SAFE", "HAZARD", and "SILENCE".
				2. Where the layout drawings call for the isolated power panel to be installed outside of the operating room or patient care area, a remote annunciator must be installed inside the area being protected, or alternately at a continuously monitored area such as a nurse's station.
				3. ***{optional}*** Master Remote Annunciator Panel(s) shall be furnished to provide centralized monitoring of all installed isolated power systems for a particular area. The panel shall include one remote signal annunciator for each LIM present. Master remote annunciator panel shall include a stainless steel front trim with a #4 satin finish.
1. Installation
	1. Wiring
		1. All energized branch circuit conductors of the isolated power system shall be stranded copper having a cross‑linked polyethylene insulation, or equivalent with a dielectric constant of 3.5 or less. Type XHHW is suitable for this purpose. Each branch circuit conductor shall be color‑coded in accordance with NFPA 70 - National Electrical Code – Article 517.160. Isolated conductor L1 shall be orange and conductor L2 shall be brown. Each branch circuit conductor shall also contain a distinctive colored stripe along the entire length of the wire.
		2. Equipment grounding conductors shall be installed with each branch circuit in accordance with bonding requirements found in NFPA 70 - National Electrical Code – Article 517. Equipment grounding conductors shall be insulated type and green in color.
		3. Wire pulling compound adversely affects the dielectric constant of conductor insulation and shall not be used when pulling the wire of the isolated power system. Use of dry talcum powder is permitted. No more than six wires in a ¾” conduit will be allowed.
	2. TEST AND CERTIFICATION
		1. Upon completion of the installation, a qualified factory technician shall inspect and test the equipment to verify that it is properly installed and operating as specified. A field test report and written certification that the system was installed and operating properly shall be furnished. The factory technician shall also instruct the hospital personnel in the proper use and maintenance of the equipment.