

Insulated Terminal - Official Commercial BESS Technical Overview & Datasheet

INSULATED TERMINAL FOR ENERGY STORAGE SYSTEMS

OFFICIAL COMMERCIAL BESS TECHNICAL OVERVIEW & DATASHEET

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EXECUTIVE SUMMARY

The Insulated Terminal represents a critical safety and performance component within high-voltage DC battery energy storage systems (BESS). Designed to provide reliable electrical isolation between battery rack busbars, power conversion system (PCS) inputs, and downstream distribution equipment, this terminal eliminates stray current paths, mitigates ground fault risks, and ensures long-term dielectric integrity under continuous operational stress. Manufactured from glass-reinforced polyamide with precision-tinned copper conductors, the Insulated Terminal supports up to 1500 V DC and 400 A continuous current, making it suitable for utility-scale containers, C&I outdoor cabinets, and modular rack assemblies. All units comply with IEC 60664-1 insulation coordination and UL 94 V-0 flammability standards.



SYSTEM ARCHITECTURE & SAFETY

The Insulated Terminal integrates directly into the main DC busbar circuit, positioned at each battery cluster output before the common DC bus or PCS isolation switch. Its double-insulated housing provides two independent layers of protection: primary creepage distance of 18 mm (pollution degree 3) and reinforced insulation rated for impulse withstand voltage of 9.5 kV. An integrated touch-proof cover prevents accidental contact during maintenance, while the IP20 ingress protection rating keeps dust and solid objects away from live parts. Terminals feature M8 stainless steel studs with captive spring washers, ensuring vibration-resistant torque retention (20 N·m recommended). Internal arc quenching chambers suppress switching transients, reducing contact degradation and extending service life beyond 10,000 connect-disconnect cycles.

KEY FEATURES

- High-Voltage DC Isolation: Rated for 1500 V DC continuous operation, impulse withstand 9.5 kV per IEC 60664-1, suitable for 1000–1500 V DC BESS topologies.
- Dual Material Construction: Glass-reinforced polyamide housing (UL 94 V-0, -40°C to +125°C) combined with electro-tinned copper conductor (conductivity $\geq 58 \text{ MS/m}$).
- Visual Safety Indicators: Mechanical green-red status window shows contact position (open/closed) without removing insulation cover.
- Finger-Safe Design: IP20 touch-proof terminals with IP2X probe rejection, reducing arc flash PPE requirements for routine inspection.
- Long-Term Reliability: Salt spray test (ISO 9227) > 720 hours, damp heat cyclic (IEC 60068-2-30) 56 cycles, no corrosion or insulation resistance drop.

COMPLIANCE & STANDARDS

IEC 60664-1:2020 – Insulation coordination for equipment within low-voltage systems

IEC 60947-7-1:2019 – Terminal blocks for copper conductors

UL 1059 – Standard for terminal blocks

UL 94 V-0 – Flammability of plastic materials

IEC 60529 – Degrees of protection provided by enclosures (IP20)

CE Marking – Low Voltage Directive 2014/35/EU

RoHS 3 – Restriction of Hazardous Substances (2015/863/EU)

TECHNICAL SPECIFICATIONS

Parameter	Specification
Rated insulation voltage (Ui)	1500 V DC
Rated continuous current (Ith)	400 A (ambient 40°C)
Short-time withstand current (Icw)	8 kA / 1 s
Impulse withstand voltage (Uimp)	9.5 kV (1.2/50 µs)
Pollution degree	3
Material group (CTI)	CTI ≥ 600 (Group I)
Connection type	Stud terminal M8 (ring lug or busbar)
Number of poles	Single pole (modular for multi-pole assemblies)
Housing flammability rating	UL 94 V-0
Operating temperature range	-40°C to +85°C

MECHANICAL DIMENSIONS

- Terminal width: 54 mm (2.13 in)

- Terminal height: 42 mm (1.65 in) excluding stud
- Terminal depth: 76 mm (2.99 in)
- Mounting hole pitch: 32 mm (M4 screw to panel)
- Stud size: M8 × 16 mm stainless steel
- Recommended busbar hole: 8.5 mm diameter
- Weight per terminal: 0.18 kg (0.40 lb)

THERMAL & ELECTRICAL PERFORMANCE

- Ambient temperature range: -40°C to +85°C (continuous)
- Storage temperature: -50°C to +90°C
- Relative humidity: 5% to 95% non-condensing
- Altitude derating: Full rating up to 2000 m; reduce current 1% per 100 m above 2000 m to max 4000 m
- Contact resistance (initial): $\leq 0.3 \text{ m}\Omega$
- Contact resistance after 1000 thermal cycles: $\leq 0.5 \text{ m}\Omega$
- Dielectric test voltage (1 min): 3750 V AC (between live parts and ground)
- Insulation resistance (500 V DC): $\geq 1000 \text{ M}\Omega$

INSTALLATION TORQUES

- M8 stud nut: 20 N·m $\pm 10\%$
- M4 panel mounting screws: 2.5 N·m $\pm 10\%$
- Conductor crimp (if using ring lug): Use Class 2 die, compression to 12 tons

force



INDUSTRIAL DEPLOYMENT & ORDERING INFORMATION

Each Insulated Terminal is supplied with two stainless steel M8 nuts, two spring washers, one flat washer, and an IP20 touch-proof cap. For 1500 V DC BESS configurations, install one terminal per battery cluster positive and negative rail. Multiple terminals can be mounted side-by-side on a common DIN rail (35 mm per IEC 60715) with 12 mm center-to-center spacing for thermal dissipation. For high-vibration environments (e.g., mobile energy storage or marine applications), apply thread-locking compound (Loctite 243 or equivalent) to the M8 stud nut. Routine maintenance includes annual torque verification and visual inspection of housing for cracks or carbon tracking.

Order Code: IT-BESS-1500-400-M8

Minimum order quantity (MOQ): 10 units

Standard packaging: 50 units per carton with anti-static foam

Lead time: 2–4 weeks ARO

Warranty: 5 years or 20,000 operational hours, whichever occurs first