

DC Power Connector - Official Commercial BESS Technical Overview & Datasheet

DC POWER CONNECTOR FOR BESS & C&I STORAGE SYSTEMS

TIER-1 HARSH-ENVIRONMENT ELECTRICAL INTERFACE SPECIFICATION

EXECUTIVE SUMMARY

The DC Power Connector series represents the definitive low-resistance, high-durability interconnection standard for utility-scale Battery Energy Storage Systems (BESS) and Commercial & Industrial (C&I) storage racks. Engineered to exceed UL 4128 and IEC 62852 requirements, this connector family ensures reliable operation at nominal currents up to 300A and voltages up to 1500V DC. The housing incorporates IP68 ingress protection and an integrated secondary lock with touch-proof design, enabling safe field assembly and maintenance under extreme temperature and humidity conditions.



SYSTEM ARCHITECTURE & SAFETY

The connector system adopts a finger-proof, reverse-polarity-preventive geometry with a clearly identifiable high-voltage interlock loop (HVIL) circuit option. The crimp barrel supports fine-stranded copper cables from 25 mm² to 95 mm², with a voltage drop below 0.25 mV/A and contact resistance $\leq 0.2 \text{ m}\Omega$ after accelerated thermal cycling (1000 hours at 125 °C). A double-seal grommet and bayonet-style coupling provide vibration resistance up to 5g (20–200 Hz), making the product compatible with mobile storage containers and dynamic grid support applications.

KEY FEATURES

- Feature 1: Ultra-low contact resistance ($\leq 0.15 \text{ m}\Omega$) with silver-plated copper

alloy terminals, ensuring $\leq 0.2\%$ additional system losses over a 20-year lifecycle.

- Feature 2: Integrated HVIL circuit for real-time connection status monitoring, forcing PCS or BMS to shut down upon unintended disconnection.
- Feature 3: Tool-less secondary lock with audible click verification, preventing accidental unmating under vibration or thermal expansion.
- Feature 4: IP68 (mated, 1 m / 72h) and IP2X finger protection when unmated, meeting OSHA and IEC 60529 touch-safe requirements.
- Feature 5: Wide operating temperature range from -40°C to $+125^{\circ}\text{C}$, with UV-resistant housing (F1 class per UL 94 V-0).

COMPLIANCE & STANDARDS

- UL 4128 (Standard for Connectors for Use in Photovoltaic Systems and Energy Storage Systems)
- IEC 62852 (Connectors for DC application in photovoltaic systems, up to 1500 V DC)
- IEC 61984 (Connectors – Safety requirements and tests)
- RoHS 3 (2015/863/EU) and REACH compliant
- UL 94 V-0 flammability rating for housing materials
- IP68 / IP69K (optional high-pressure washdown variant)
- TUV SUD certification for 1500 V DC / 300 A continuous operation

TECHNICAL SPECIFICATIONS

Nominal Voltage: 1500 V DC

Nominal Current (90 mm² cable, 40°C ambient): 300 A continuous

Short-circuit current capability: 20 kA for 1 second

Contact resistance (initial): $\leq 0.15 \text{ m}\Omega$

Contact resistance after 500 mating cycles: $\leq 0.25 \text{ m}\Omega$

Mating cycles durability: 500 (minimum)

Cable cross-section range: 25, 35, 50, 70, 95 mm² (fine-stranded copper, Class 5 or 6)

Termination type: Crimp (standard) or screw-clamp (field-repairable variant)

Insertion / extraction force: $\leq 65 \text{ N}$ / $\leq 75 \text{ N}$

Temperature rise (rated current): $\leq 55 \text{ K}$ above ambient

Dielectric withstand voltage: 6000 V DC (1 minute, between contacts and shell)

Insulation resistance: $\geq 1000 \text{ M}\Omega$ at 1000 V DC

Housing material: Thermoplastic, glass-fiber reinforced, UV stabilized

Contact material: Silver-plated copper alloy (CuZn39Pb3)

Sealing material: Silicone rubber (VMQ), -40°C to +125°C

Flammability rating: UL 94 V-0

Ingress protection (mated): IP68 (1 m / 72 hours), IP69K (optional)

Ingress protection (unmated): IP2X

Operating altitude: ≤ 4000 m (derating above 2000 m, refer to table)

Vibration resistance: 5g, 20–200 Hz, 3 axes, IEC 60068-2-6

Salt mist resistance: ≥ 1000 hours, IEC 60068-2-52, severity 5

Parameter	Specification
Nominal Current (70 mm ² , 40°C)	240 A
Nominal Current (95 mm ² , 40°C)	300 A
Voltage Rating	1500 V DC
Contact Resistance (max)	0.20 mΩ
Temperature Range	-40°C to +125°C
Mating Cycles	500
Ingress Protection	IP68 / IP69K (optional)
Safety Interlock	Integrated HVIL circuit

INDUSTRIAL DEPLOYMENT

DC Power Connectors are deployed in high-availability BESS strings, DC combiner boxes, PCS DC input stages, and battery rack disconnects. The asymmetric keyed design prevents polarity reversal, while the integrated HVIL loop provides a fail-safe interlock signal to the Battery Management System (BMS) or Power Conversion System (PCS). For C&I applications where frequent

module swapping occurs, the ergonomic bayonet coupling requires only a 1/3 turn for locking, reducing arc flash risks during field maintenance. When used in containerized ESS, the connector body supports stacking torques up to 4 N·m on the cable gland without seal deformation.



ADDITIONAL DERATING NOTES

For ambient temperatures above 40°C, a linear current derating of 2.5% per 5° C applies up to a maximum of 70° C ambient. For altitudes above 2000 m, reduce the nominal current by 1% per 100 m due to reduced convective cooling. All stated electrical parameters assume clean, unoxidized contact surfaces and proper crimp tool calibration per manufacturer specification.

WARRANTY SUMMARY

20-year operational warranty under correct installation and application

conditions, provided that original manufacturer crimp tools and approved cable types are used. Annual contact resistance monitoring recommended for extreme duty cycles (> 100 full-load disconnections per year).