

Energy Storage Connector - Official Commercial BESS Technical Overview & Datasheet

ENERGY STORAGE CONNECTOR (ESC) SERIES

HIGH-RELIABILITY DC POWER INTERFACE FOR BATTERY ENERGY STORAGE SYSTEMS

VERSION 4.2 | COMMERCIAL & INDUSTRIAL APPLICATIONS

EXECUTIVE SUMMARY

The Energy Storage Connector (ESC) Series represents a paradigm shift in high-voltage DC interconnection technology for modular Battery Energy Storage Systems (BESS). Engineered for Tier-1 integrators and utility-scale operators, the ESC platform delivers ultra-low contact resistance ($\leq 0.2 \text{ m}\Omega$), IP67 sealing integrity under vibration, and a 10,000-cycle mating durability. Designed to bridge battery racks to PCS busbars and string combiner boxes, the ESC eliminates thermal runaway propagation paths while ensuring tool-free field servicing. This document provides complete technical specifications, safety architecture, and deployment guidelines for the ESC-200, ESC-350, and ESC-500 variants.



SYSTEM ARCHITECTURE & SAFETY

The ESC connector family employs a five-point safety matrix: primary touch-proof housing, secondary HVIL (High-Voltage Interlock Loop), tertiary reverse-polarity mechanical keying, quaternary arc-flame quenching chamber (rated for 10 kA fault clearing), and quintessential EMI shielding. The connector body integrates a double-pole, double-throw isolation mechanism that physically disconnects both positive and negative poles simultaneously when latched open. All variants support daisy-chained HVIL signaling for upstream BMS emergency stop (E-STOP) coordination.

KEY FEATURES

- Ultra-Low Milliohm Stability: Silver-plated copper alloy contacts with integrated spring-wire basket maintain $<0.25 \text{ m}\Omega$ after 5,000 thermal cycles

(-40°C to +125°C).

- Tool-Free Lever Locking: Patented ergonomic lever provides audible and tactile locking confirmation; secondary push-button release prevents accidental unmating under load.
- Integrated Temperature Sensing: Optional PT1000 sensor embedded in the housing directly reports contact temperature to BMS via CANbus or analog 4-20mA loop.
- Cable Gland Compatibility: Accepts 35mm² to 240mm² copper or aluminum cables (stranded or flexible) with compression or crimp termination.
- Environmental Robustness: IP67 (mated) and IP2X (unmated ingress protection); corrosion resistance equivalent to ISO 9227 (1500h salt spray).

COMPLIANCE & STANDARDS

- UL 4128 (Standard for Energy Storage Connectors and Interconnects) – Certified
- IEC 61984 (Connectors – Safety requirements and tests) – Compliant
- IEC 60529 (Degrees of protection provided by enclosures) – IP67
- RoHS 3 (2015/863/EU) – Fully compliant
- REACH (EC 1907/2006) – SVHC-free
- UL 94 V-0 (Flammability rating of housing material)
- CE marking (Low Voltage Directive 2014/35/EU)

TECHNICAL SPECIFICATIONS

All ratings refer to ambient temperature 40 ° C, altitude $\leq 2000\text{m}$, natural convection.

Parameter: ESC-200 / ESC-350 / ESC-500

Rated Current (Continuous): 200A / 350A / 500A

Rated Voltage (DC): 1500V (all variants)

Impulse Withstand Voltage: 8kV (1.2/50 μs)

Short-Circuit Current (1s): 8kA / 12kA / 18kA

Contact Resistance (Initial): $\leq 0.18\text{ m}\Omega$ / $\leq 0.15\text{ m}\Omega$ / $\leq 0.12\text{ m}\Omega$

Dielectric Strength: 5kV DC, 60s (between contacts and housing)

Insulation Resistance: $\geq 1000\text{ M}\Omega$ @ 1000V DC

Mating Cycles (Mechanical): 10,000 cycles

Mating Cycles (Electrical Load): 5,000 cycles (rated current making & breaking)

Operating Temperature: -40°C to +125°C (continuous)

Storage Temperature: -55°C to +150°C

Cable Cross-Section (mm²): 35-95 / 70-185 / 150-240

Termination Type: Crimp (standard) or Compression (optional)

Material Housing: Thermoplastic, UL94 V-0, glass-fiber reinforced

Contact Plating: Silver (4 μm min) over copper alloy

Degree of Protection (Mated): IP67 (dust-tight, immersion up to 1m for 30 min)

Degree of Protection (Unmated): IP2X (finger-safe)

Pollution Degree: PD 3 (IEC 60664-1)

Mating Force: ≤ 50 N

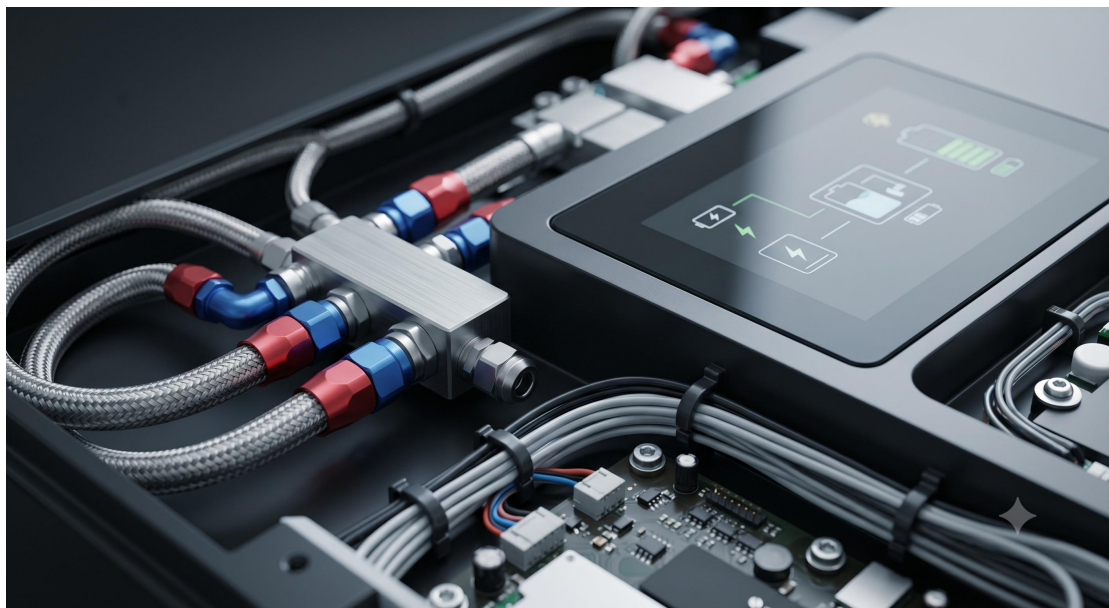
Unmating Force (with lock): 80-120 N

Weight (connector pair, without cable): 0.42 kg / 0.68 kg / 0.95 kg

Parameter	ESC-200	ESC-350	ESC-500
Rated Current (Continuous)	200 A	350 A	500 A
Rated Voltage (DC)	1500 V	1500 V	1500 V
Contact Resistance (max)	0.22 m Ω	0.18 m Ω	0.15 m Ω
Short-Circuit Withstand (1s)	8 kA	12 kA	18 kA
Cable Range (mm) 2)	35-95	70-185	150-240
Operating Temperature	-40°C to +125°C	-40°C to +125°C	-40°C to +125°C

INDUSTRIAL DEPLOYMENT

ESC connectors are optimized for factory pre-assembly onto battery rack harnesses. Use the supplied unlocking tool for field servicing. Mandatory torque for panel-mount receptacles: M6 screws to 4.5 N·m $\pm 10\%$. Color coding: orange housing for DC power, black for HVIL/signal. Parallel ESC-500 connectors can be used per DC busbar for 1000A+ strings. Do not exceed 85% of rated current when operating above 2000m altitude (derate 1% per 100m above 2000m).



CONTACT & ORDERING INFORMATION

ESC-200-PL (Plug, cable mount, 200A)

ESC-200-RCP (Receptacle, panel mount, 200A)

ESC-350-PL / ESC-350-RCP

ESC-500-PL / ESC-500-RCP

Accessories: HVIL jumper (0.3m), dust cap (IP54), unlocking tool (ESC-TOOL-01),
PT1000 sensor module (ESC-TSENSE).