

480kW Isolated Air-Cooled DC Charging Station - Official Commercial BESS

Technical Overview & Datasheet

PRODUCT OVERVIEW & SYSTEM POSITIONING

The 480kW Isolated Air-Cooled DC Charging Station represents a paradigm shift in high-power electric vehicle (EV) fleet and commercial depot charging infrastructure. Designed for demanding duty cycles, this platform integrates galvanically isolated DC fast charging with advanced thermal management, targeting heavy-duty vehicles, public transportation hubs, and logistics centers. Unlike conventional grid-tied chargers, this unit features an integrated isolated power stage that decouples the vehicle battery from grid transients, harmonics, and ground faults, ensuring maximum safety and battery longevity.



SYSTEM ARCHITECTURE & SAFETY ISOLATION

At the core of the station lies a modular, high-frequency isolated DC-DC converter topology utilizing silicon carbide (SiC) MOSFETs. This design provides complete electrical separation between the AC grid input and the DC output to the EV, eliminating common-mode leakage currents and enabling unrestricted operation on ungrounded or high-resistance grounded DC microgrids. The front-end active rectifier ensures a unity power factor ($PF > 0.99$) and low total harmonic distortion ($THDi < 3\%$), while the isolated DC stage delivers stable, low-ripple charging current.

KEY FEATURES

- True Galvanic Isolation: 1500Vdc input-output isolation per IEC 61851-23, ensuring zero DC injection into the grid and protecting EV batteries from ground faults.
- High-Density Air-Cooled Thermal Architecture: Forced-air cooling with IP54-rated fan arrays and redundant airflow path; operates from -30°C to $+55^{\circ}\text{C}$ without liquid coolant maintenance.
- Dynamic Power Sharing: 480kW total power configurable across 2 to 6 independent DC output ports (CCS1, CCS2, or CHAdeMO), with automatic load balancing per ISO 15118.
- Wide Output Voltage Range: 150Vdc to 1000Vdc, compatible with 400V and 800V class EV batteries, including future 1000V architectures.

- Grid-Support Functions: Reactive power compensation, voltage ride-through, and export limitation as standard.
- Cybersecurity Ready: Secure boot, encrypted communication (TLS 1.3), and role-based access control.

TECHNICAL SPECIFICATIONS

AC INPUT (Grid Side)

- Nominal Voltage: 480V AC $\pm 10\%$, 3-phase + PE
- Frequency: 50/60 Hz ± 5 Hz
- Max Input Current: 600A
- Power Factor: >0.99 (full load)
- THDi: $<3\%$ (full load)

DC OUTPUT (EV Side)

- Total Rated Power: 480 kW continuous
- Output Voltage Range: 150 – 1000 Vdc
- Max Output Current (single port): 500A (liquid-cooled cable) / 300A (air-cooled cable)
- Voltage Accuracy: $\pm 0.5\%$ of full scale
- Current Accuracy: $\pm 1\%$ of setpoint
- Isolation Type: Galvanic, high-frequency transformer

- Efficiency (Full Load): >94.5% (incl. auxiliary loads)

| Parameter | Specification |
|----------------------------|--|
| Rated Output Power | 480 kW continuous |
| Max Output Voltage | 1000 Vdc |
| Max Output Current (total) | 960A (dual ports fully loaded) |
| Number of DC Ports | 2 to 6 (configurable) |
| Cooling Method | Forced air, redundant fans |
| Operating Temperature | -30°C to +55°C (derated above +45°C) |
| AC Input Voltage | 480V AC \pm 10%, 3-phase |
| Peak Efficiency | >94.5% |
| Isolation Voltage Rating | 1500Vdc primary-secondary |
| Standards | IEC 61851-23, -24, ISO 15118, OCPP 2.0.1 |

PROTECTIONS & COMPLIANCE

- Protections: Input over/under voltage, output overcurrent, short circuit (hardware and software), DC ground fault, overtemperature (winding and heatsink), reverse polarity, surge protection (Type 1+2 on AC, Type 2 on DC).

- Standards Compliance: IEC 61851-23 (DC charging), IEC 61851-24 (communication), ISO 15118 (plug & charge, V2G ready), UL 2202 (pending), IEC 61000-6-2/4 (EMC immunity/emission).
- Environmental: IP54 (indoor/outdoor installation), IK10 (impact resistant enclosure), altitude up to 2000m (derated above).
- Noise Emission: <65 dB(A) @ 1m (fan at full speed).

OPERATIONAL & USER INTERFACE

- Local HMI: 10.1" industrial touchscreen with fault diagnostics, energy metering per session, and RFID/NFC reader.
- Remote Management: 4G/LTE, Ethernet (Modbus TCP, OCPP 1.6J/2.0.1), optional Wi-Fi.
- Backend Compatibility: OCPP-compliant any central system (charge point management system).
- Metering: MID-compliant DC energy meter (accuracy class B).
- Firmware Update: Over-the-air (OTA) with rollback protection.

MECHANICAL

- Dimensions (W x H x D): 1600 x 2200 x 900 mm
- Weight: 1250 kg (excluding cables and accessories)

- Enclosure Material: Galvanized steel with anti-corrosion coating (C5-M optional)
- Cooling: Forced air, rear intake / front exhaust, removable washable air filters.
- Cable Management: Integrated hangers and strain relief for up to 6 DC cables (5m each, optional 10m).



INSTALLATION & DEPLOYMENT NOTES

- Minimum clearances: 800mm front (access), 300mm rear (air exhaust), 500mm each side.
- Electrical connection: Bottom entry AC cable (3x 240mm² + PE) and DC cables via gland plates.
- Foundation: Level concrete pad (min 1600 x 2200 mm) with anchor bolts.
- Ambient Conditions: -30°C to +55°C operational (derating >45°C), 5% to 95%

RH non-condensing.

- Compliance: CE, UKCA, CB Scheme certificate ready. RCM, EAC available on request.