American Battery Solutions

ALLIANCE™ INTELLIGENT BATTERY SERIES

American Battery Solutions' latest product, **ALLIANCE Intelligent Battery Series™** is designed as scalable building blocks and offer versatility across a variety of uses needing a robust, safe and high-performance Li-Ion battery.

- Highest quality and reliability
- Ultimate safety and robustness
- Most versatile and easy to use

E48-2.0
48 Volts

Automotive Quality.

Industrial Robustness.

HIGHEST QUALITY AND RELIABILITY

- ✓ Manufactured in world-class battery systems facility *in the USA*
- ✓ Automotive-grade system design and AECQ-qualified components
- ✓ Automotive engineering & validation (vibration, shock, life …)
- ✓ Highest quality automotive cells from partnership with world-class cell makers

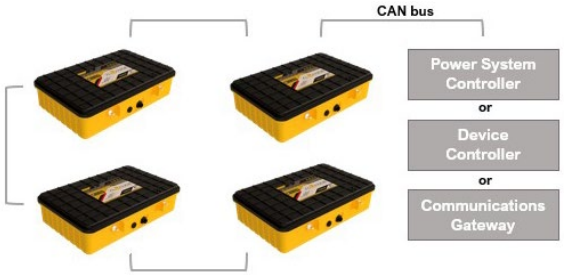
ULTIMATE SAFETY AND ROBUSTNESS

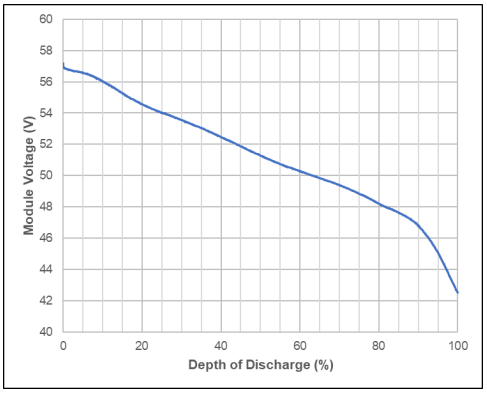
- ✓ IP67 water and dust proof, constructed for harsh industrial and motive environments, Laser-welded cell interconnects
- ✓ Layers of protection (cells, interconnects, fuses, BMS HW and SW, non-propagation, and integration)
- ✓ ISO-26262 (ASIL-B) Functional Safety
- ✓ Verified software compatibility with leading chargers
- ✓ Integrated cell CID and fusible links

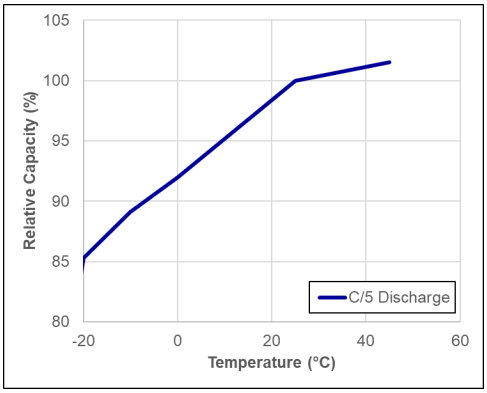
APPLICATIONS

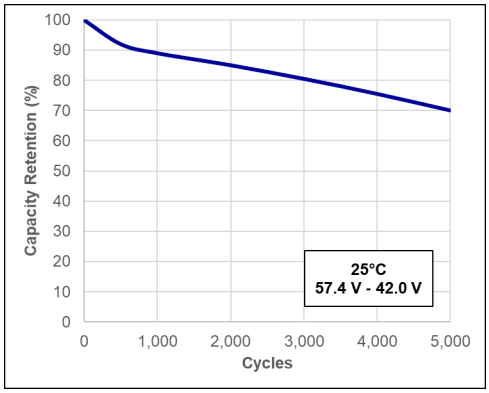
MOST VERSATILE AND EASY TO USE

- ✓ Scalable modules expand systems up to 20 kWh
- ✓ Small size and feature-rich, suitable for entire portfolio of machines and market applications
- ✓ Easy integration without complex and expensive battery pack development effort
- ✓ OEM and after-market friendly; easy replacement of lead acid



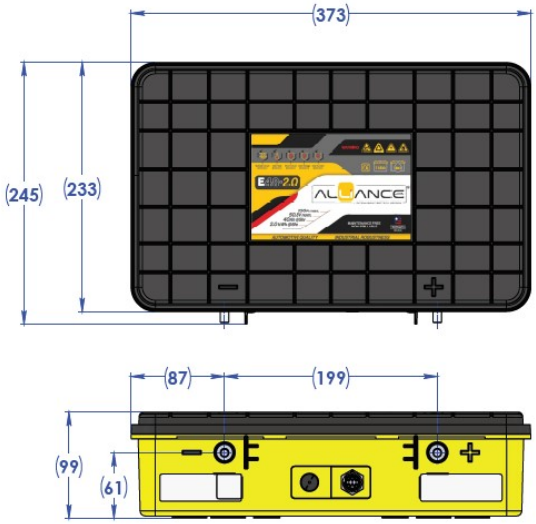






SERIES / MODEL: ALLIANCE E48-2.0

Battery Type	Lithium Ion
Nominal Voltage	50.8 V
Nominal Capacity[1]	40 Ah
Nominal Energy[2]	2.0 kWh
Cycle Life[6]	5,000 cycles
Mass	10.2 kg



ELECTRICAL CHARACTERISTICS AT 25ºC

Nominal Capacity - 5-Hr rate	40 Ah
Nominal Capacity - 20-Hr rate	41 Ah
Nominal Energy - 5-Hr rate	2.0 kWh
Nominal Energy - 20-Hr rate	2.1 kWh
Max Charging Voltage	57.4 V
Minimum Discharge Voltage	42.0 V
Float Voltage	51.1 V – 57.4 V
Max. Cont. Charging Current[5]	12 A
Max. Charge Current (2 s, 10 s)[5,7]	64.8 A, 50.4 A
Max. Cont. Discharge Current[4]	80 A
Max. Discharge Current (2, 10, 30. 120s)[5,7]	150, 120, 104, 80 A
Max. Inrush Current	250 A (FETs open)
Pre-Charge Circuit	100 ohms (Pre-charge 2 mF in 1 s)

BMS FEATURES

Communications: CAN 2.0 or CAN OPEN
Functions: Microprocessor, State of Charge and State of Health reporting, Integrated FET disconnect on charge and discharge, current sensor, resettable fuse, cell balancing.
Safety systems: Cell CID, cell fusible link, protections for over-charge, over-discharge, over-current, over-temperature, under-temperature, temperature imbalance, and voltage imbalance.
Parallel configurations: Up to 10 modules in parallel with self-identify master. **Do not connect modules in series.**

MECHANICAL CHARACTERISTICS

Case Material	ABS
Case Material Flammability Rating	UL 94 V-0
Environmental Protection	IP 67
Storage Temperature Range[3]	-30 ºC to 60 ºC
Operating Temperature Range[3]	Charge: 0 °C to 50 °C Discharge: -20 °C to 6 °C

BMS OPERATING LIMITS

Charge limits (per cell)	4.10 V (warning) / 4.15 V (disconnect)
Discharge limits (per cell)	3.00 V (warning) / 2.75 V (disconnect)
Absolute minimum operating Voltage (pack)	38.5 V
Minimum BMS current draw (active)	24 mA
Minimum BMS current draw (sleep)	125 µA

SAFETY AND COMPLIANCE

Cell safety certification	UL 1642
Shipping certification	UN 38.3
Safety compliance	UL 2271
Environmental compliance	REACH, RoHS and Battery Directive (2006/66/EC)
EMC/EMI compliance	Meets FCC Title 47 CFR 15 Class B
CE Certification	Complies with EU Directive, IEC 61000-6-1 & IEC 61000-6-3

System Considerations

As outlined in the User's Guide, Alliance batteries will automatically shut down under excessive use conditions in order to prevent damage to the battery and connected equipment. This will generally result in total loss of power to equipment. Systems must be implemented to ensure that sudden loss of power to the system does not result in undesired system behavior.

Please Recycle Li-ion

RECYCLE RESPONSIBLY
Do not mix with lead acid batteries when recycling

1. Minimum nominal capacity – 38.8Ah at beginning of life (BOL)
2. Minimum nominal energy – 1.9kWh at beginning of life (BOL) Usable energy limited by voltage limits to 1.7kWh to optimize cycle life
3. Storage and operation at higher temperatures reduces battery life
4. Duration of maximum constant current is thermally limited by internal components and depends on ambient temperature, approximate duration of 5 minutes starting at 25ºC.
5. Charge and discharge power, current, and energy availability will be limited at the low and high ends of the specified operating temperature range
6. To 70% of initial capacity with usable energy limits
7. Current dependent on SOC and temperature. See user manual for tables.

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