SUPER B
lithium batteries

LITHIUM BATTERY

13.2V / 160Ah
(2.1kW LiFePO4)

Features

- Traction battery
- Lithium Iron Phosphate (LiFePO4)
  - Safest lithium technology
  - Superior abuse tolerance
- Glass fibre reinforced plastic (GRFP) Casing, Aluminium / PE sandwich side panels
- Terminals for 2 x 95mm2 wire connection per terminal
- Integrated fuse, 32V / 500A
- 3C continuous discharge (480A)
- CANOpen interface for battery monitoring
- Battery monitoring / History Storage
- Adaptive cell balancing
- Serial string equalisation
- Serial string connection up to 1150V DC
- External BMS Relay, latching (bi-stable)
- External BMS cut-off switch, CAN controlled
- External I/O
- 6 patents pending

Traction Battery

- Lithium Iron Phosphate (LiFePO4)
  - Safest lithium technology
  - Superior abuse tolerance
- High capacity
- Low weight
- High cycle count
- Low maintenance
- One on One interchangeable with AGM/GEL lead acid batteries
- High discharge current, 3C continuous, 5C pulse
- Can be charged with regular AGM charger
- Fast charging, 1C

Electrical Characteristics

Nominal voltage (V)	13.2V DC
Charge method	CCCV
End of charge voltage (V)	15.4V DC
End of charge voltage (V) for endurance (cycle life)	14.6V DC
Charge current (A)	160A (1C)
Charge current (A) for endurance (cycle life)	52.8A (C3)
End-of-discharge voltage (V)	8V DC
End-of-discharge voltage (V) for endurance (cycle life)	10V DC
Discharge current (A)	480A (3C)
Discharge current (A) for endurance (cycle life)	52,8A (C3)
Discharge pulse current (A) (10 seconds)	1280A (8C)
Discharge pulse current (A) (60 second)	800A (5C)
Discharge performance at 20 °C (rated capacity)	160Ah
Short-circuit protection (fuse)(A)	500A
Adaptive cell balancing	✓
Over- and under voltage protection	✓
Over temperature protection	✓
External cut-off relay	✓

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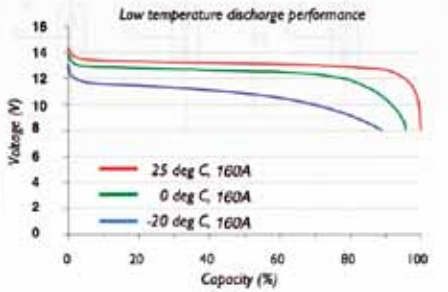
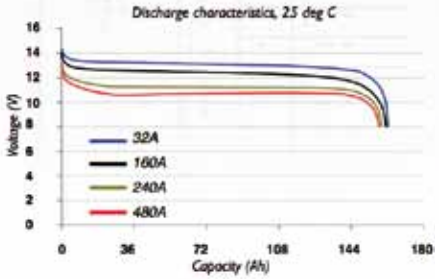
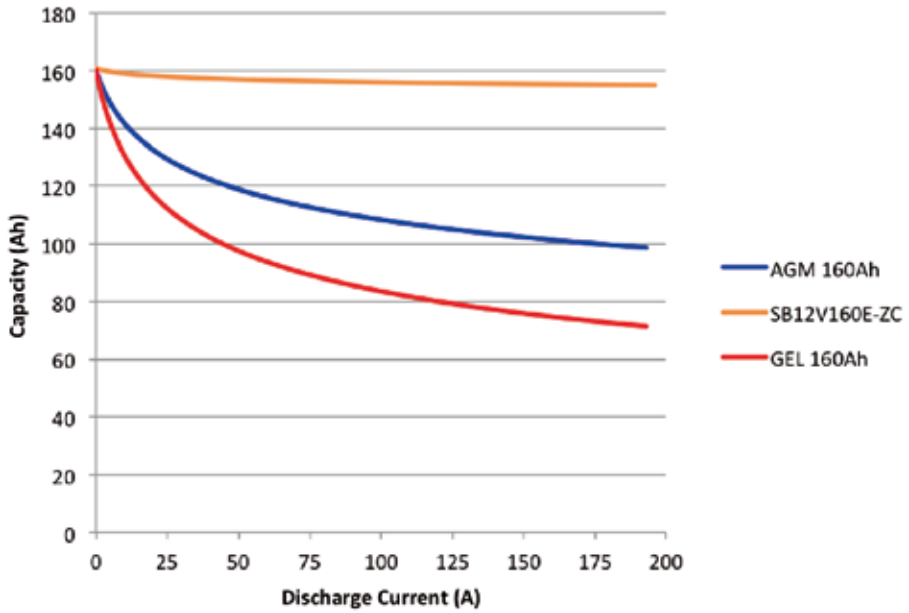
Performance Graphics

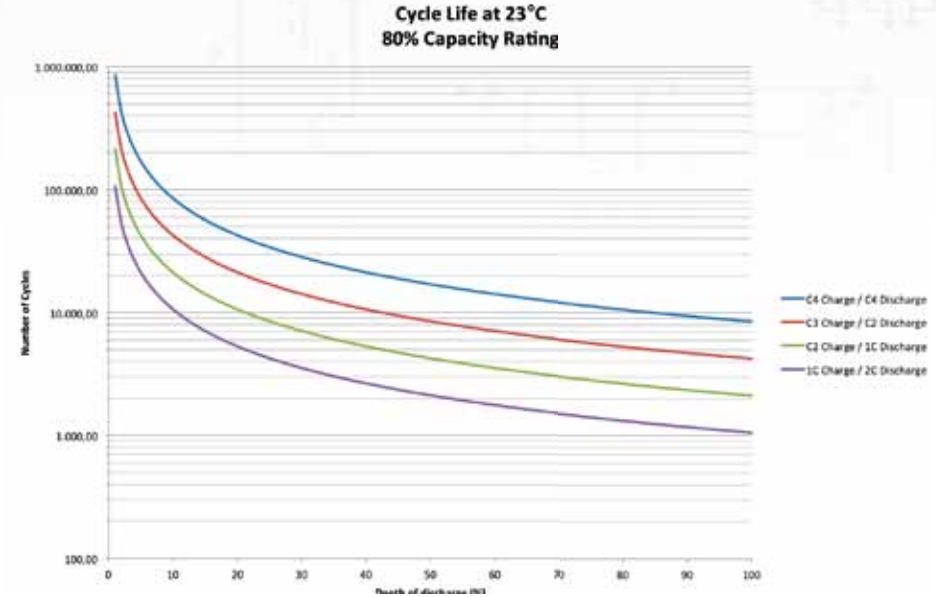




Capacity vs Load Peukert



Depth of Discharge vs Cycle Count



Environmental Conditions

Discharge operating temperature	-20 °C < temp < +60 °C
Charge operating temperature	-20 °C < temp < +60 °C
Storage temperature	-20 °C < temp < +65 °C
Relative humidity	5 .. 85 %, non condensing

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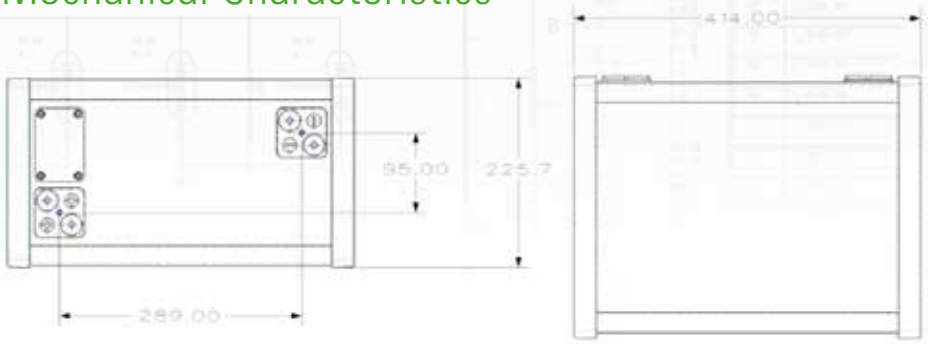
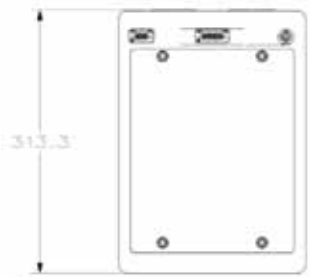
Mechanical Characteristics





Type Approval

- The testing requirements for Lithium Batteries in Section 38.3; Part III; of the UN Recommendations on the TRANSPORT OF DANGEROUS GOODS, Manual of Tests and Criteria, Fourth revised edition;[ST/SG/AC.10/11/Rev.4].
- IEC 62281, Transportation IEC Compliance
- SP 230, Special provision
- SP 188 / PI965, Part II IATA , Packing instructions
- DIRECTIVE 2006/66/EC, Environmental EU Compliance
- IEC 62133, Safety IEC Compliance
- IEC 61000-4-2, EMC Compliance
- IEC 61960{ed2.0}, Performance IEC Compliance
- CANOpen

LiFePO4

- Excellent Safety
  - Safest lithium technology currently
  - Superior abuse tolerance
- High Power
  - Higher charge and discharge rates for better performance and efficiency
- Higher Usable Energy
  - Wide SOC (State of Charge) range enables greater battery utilization
- Extended Cycle Life
  - Long battery life for both deep and shallow cycling

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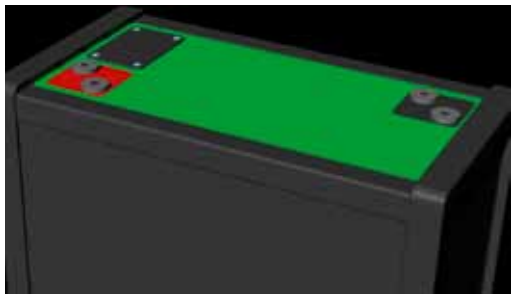
Glass Fiber Reinforced Plastic & Aluminum PE sandwich casing

- Lightweight
- Durable
- Flame resistant
- Extremely robust

Integrated Mega fuse 500A/32V

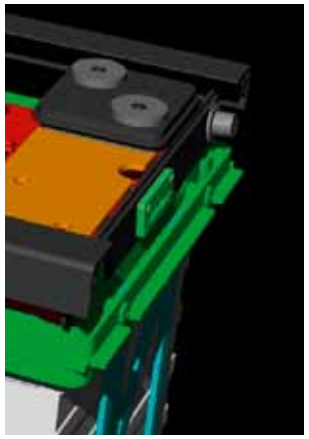
- 480A (3C) continuous load

Terminals for 2 x 95mm2 wire connection



- Diagonally placed
- 2 wires per terminal
- M8
- 2 x 95mm2

CANOpen interface for battery monitoring



- MICRO Change connector
- Standard protocol
- Stock cables, connectors and back bones

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Battery Monitoring

Battery voltage	✓
Individual cell voltage	✓
Individual cell temperature	✓
Battery casing temperature	✓
Battery current monitoring	✓
State of charge	✓
Fuse status	✓
Heat sink temperature status	✓
BMS switch status	✓
Fan status	✓

Adaptive Balancing

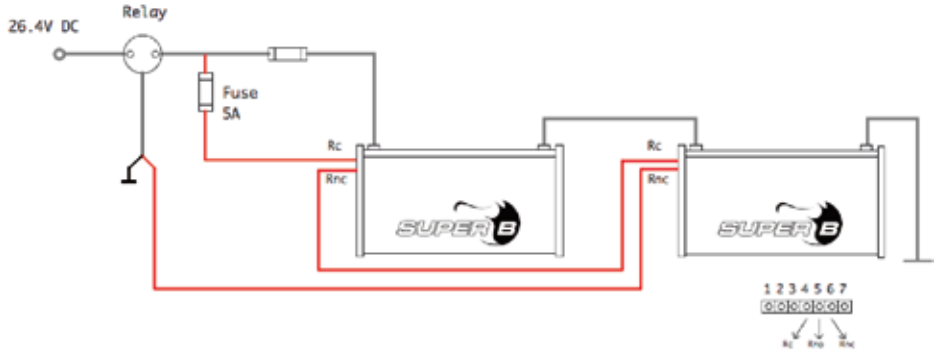
- Balance current adapts to cell requirement
- Less heat generation
- Less wear and tear on the cells
- Less deviation between cells

Battery History Log

- Max individual cell voltage
- Min individual cell voltage
- Max individual cell voltage
- Average cell charge voltage
- Individual cell over voltage count
- Individual cell under voltage count
- Average cell discharge voltage
- Max individual cell temperature
- Min individual cell temperature
- Average cell temperature
- Individual cell over temperature count
- Individual cell under temperature count
- Cycle count
- Max charge current
- Average charge current
- Max discharge current
- Average discharge current
- Over charge current count
- Over discharge current count
- Max heat sink temperature
- Heat sink over temperature count
- Max case temperature
- Min case temperature
- Average case temperature
- Max case temperature count
- Min case temperature count
- Fan switch count
- BMS Switch count
- RST input counter

Serial string equalisation

Automated equalisation of individual batteries, placed in a serial string.



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External BMS Relay, latching

- Battery cut-off in case of fault condition
- External Latching relay driver
  - Max. 2.7A continuous
  - Max. 15A pulse 100ms
  - 12V DC
- External relay driver
  - Max. 250V DC
  - Max. 5A

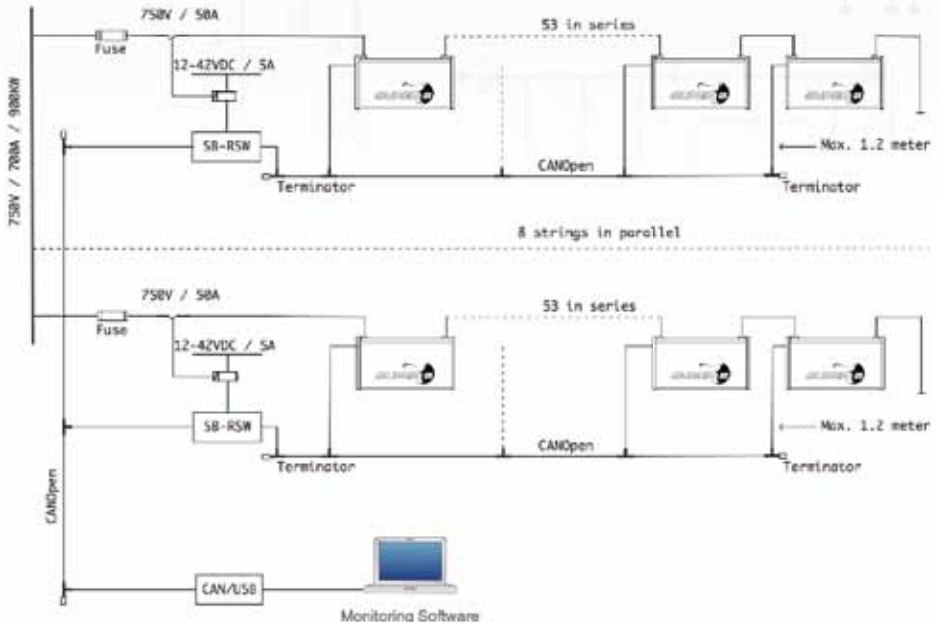
Latching / bi-stable relay
42V DC
250A

Relay
1150V DC
800A

External I/O

- Status contact, Alarm output
  - Relay 250VDC, 5A, NO, NC
- Analogue State of Charge
- Reset button (in fuse box)

External BMS cut-off switch, CAN controlled



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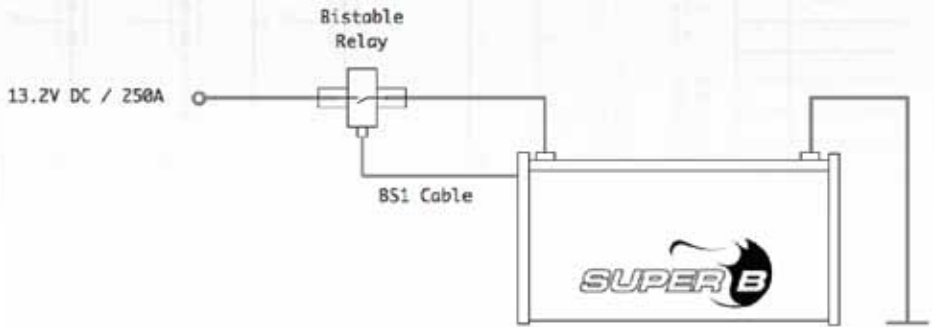
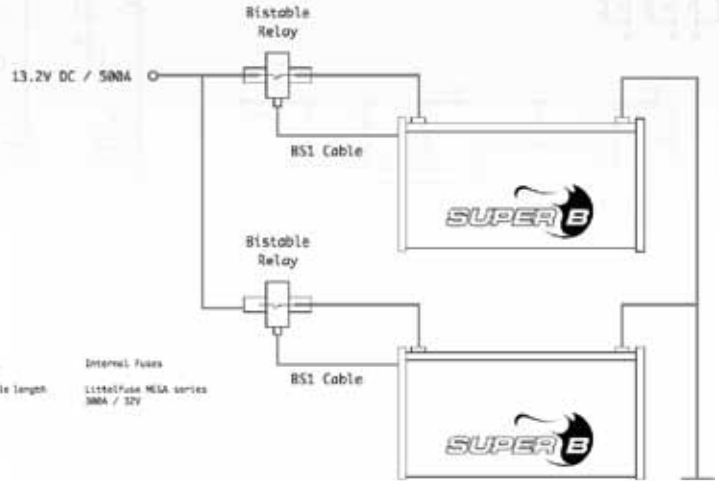
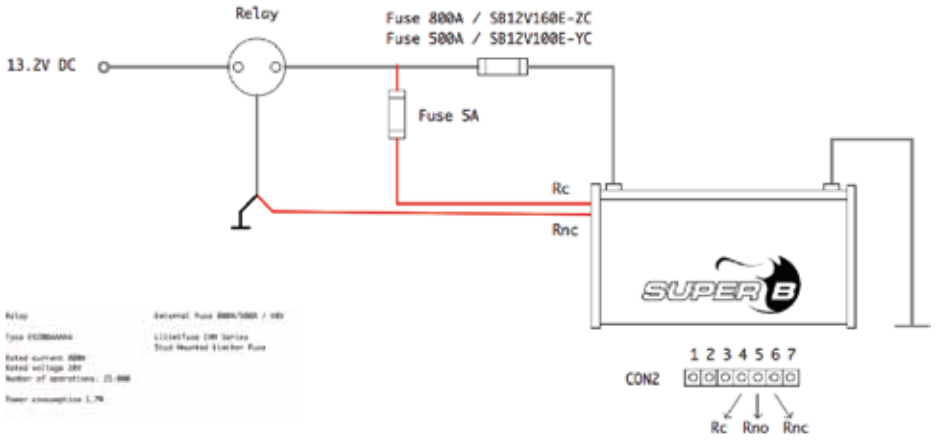
Configuration example 1 (max. 250A load)



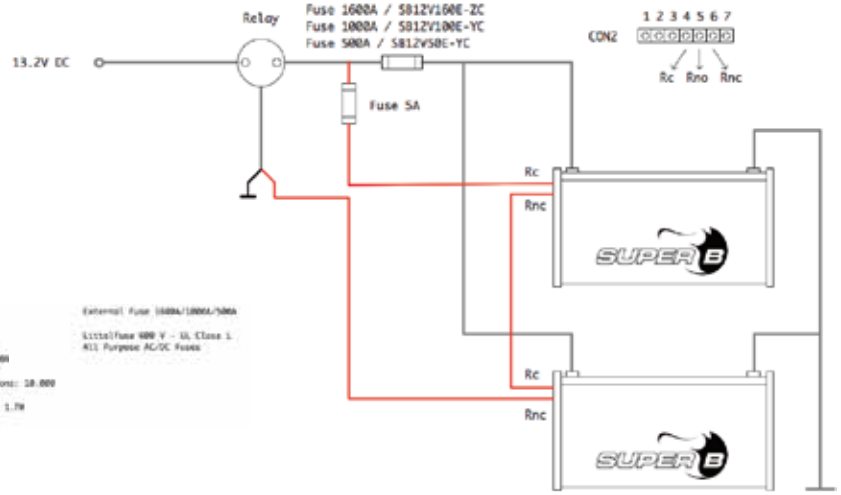
Configuration example 3 (max. 500A load)



Configuration example 2 (max. load)



Configuration example 4 (max. load)



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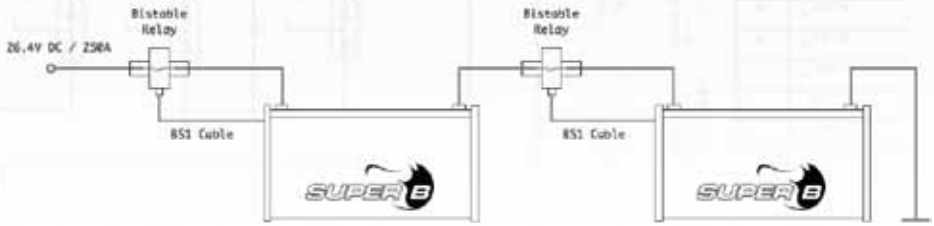
Configuration example 5 (max. 250A load)



Bistable Relay

Tyco V23130-C2021-A412
1-1414939-4

Rated current 250A
Rated voltage 42V

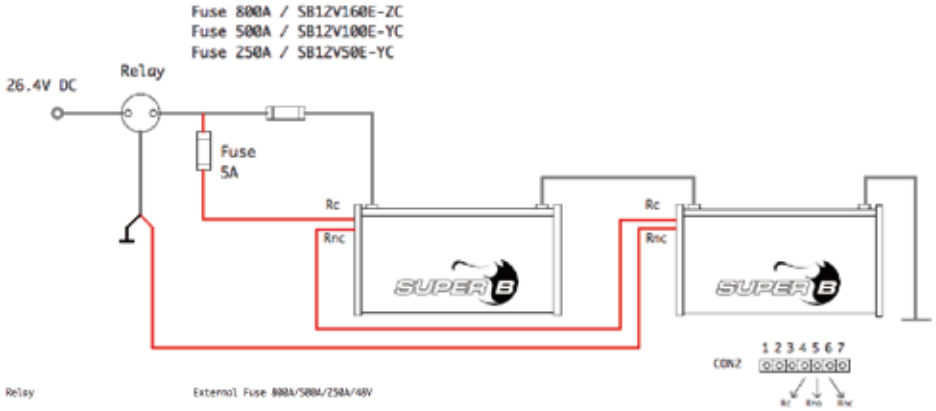
BS1 Cable

100 cm cable length

Internal Fuses

Littelfuse MEGA series
500A / 32V

Configuration example 6 (max. load)



Relay

Tyco EV200AAANA

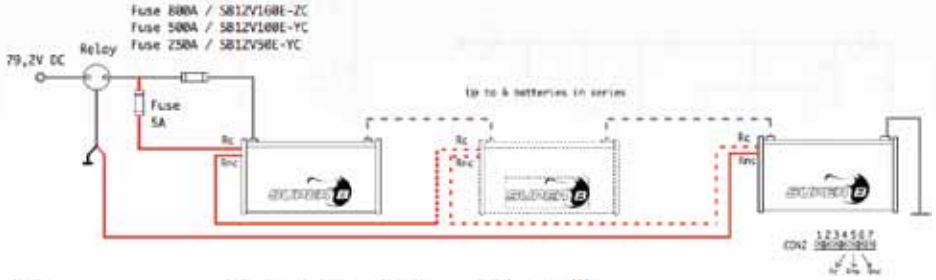
Rated current 800A
Rated voltage 28V
Number of operations: 25.000

Power consumption 1.7W

External Fuse 800A/500A/250A/48V

Littelfuse CNN Series
Stud Mounted Limiter Fuse

Configuration example 7 (Up to 6 batteries in series, max.)



Relay

2 batteries in series:
Tyco EV200AAANA

3 to 6 batteries in series:
Tyco EV200ABANA

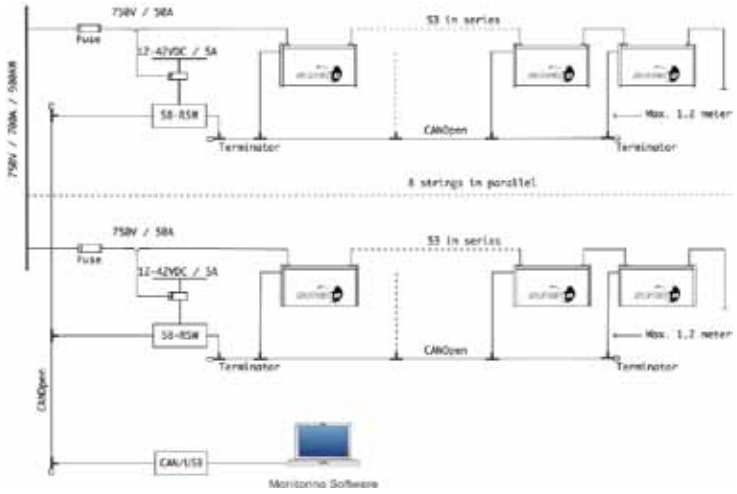
External Fuse 800A/500A/250A/48V

Littelfuse CNN Series
Stud Mounted Limiter Fuse

Rated current 800A
Rated voltage 28V
Number of operations: 25.000

Power consumption 1.7W

Configuration example 8 (Up to 1150V, max. load, CANOpen)



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Battery Monitoring Software

Read individual battery status	✓
Read individual battery history	✓
Save / print battery status	✓
Save / print battery history	✓
Reset battery alarm	✓

Microsoft Windows

Applications

- Automotive
  - Ambulances
  - Fire trucks
  - Police cars
  - Motor homes
  - Service vehicles
  - Luxurious horse trailers
  - Military vehicles
  - Broadcasting vehicles
- Marine
  - Utility
  - Hybrid electric drive
  - Full electric drive
  - Backup
- Industrial
  - UPS
    - Telecom
    - Off-grid
    - Data centre
    - Grid-Tie UPS
  - Renewable Energy
  - Remote power
  - AGV
  - Mining

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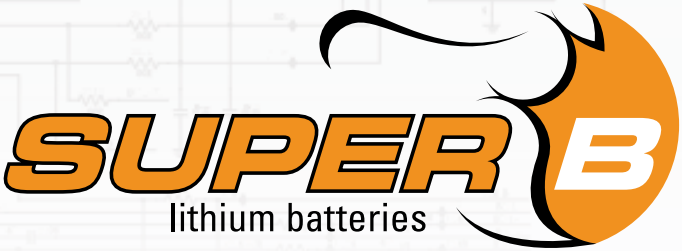

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