

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

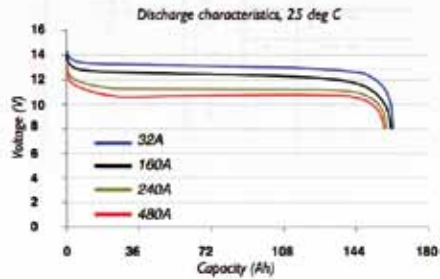
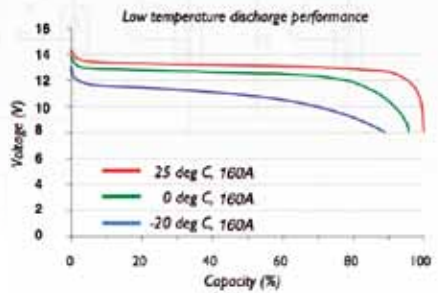
Traction Battery

- 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

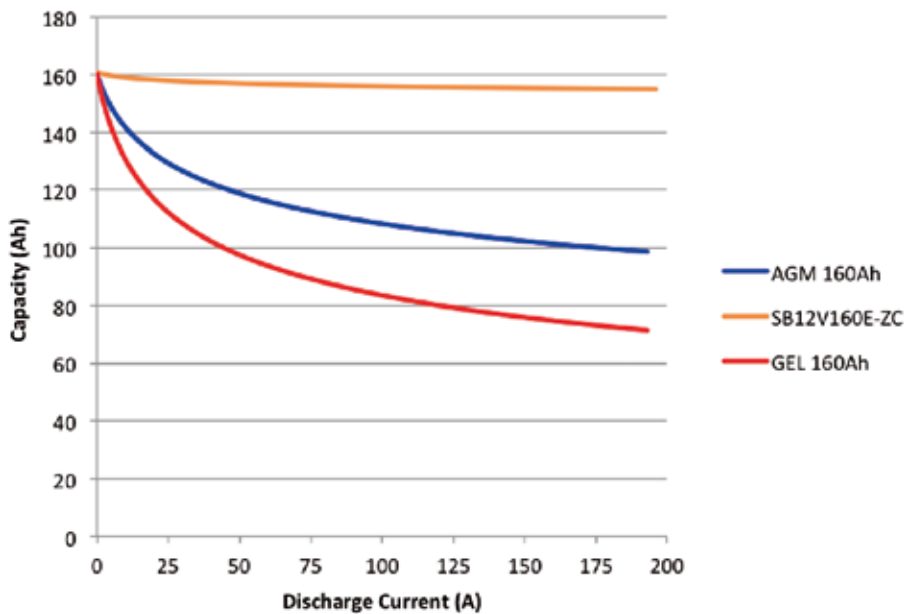
Electrical Characteristics

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	✓

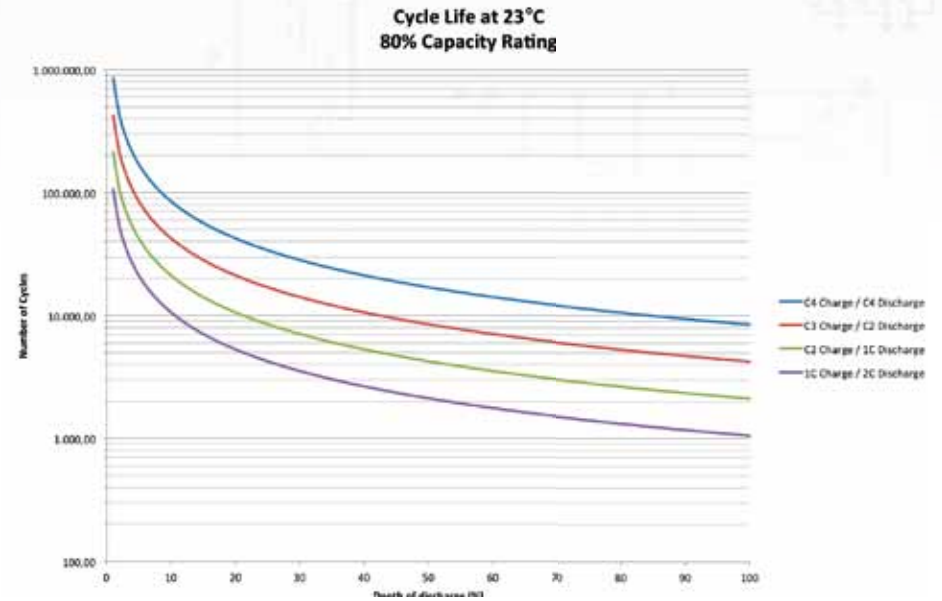
Performance Graphics



Capacity vs Load Peukert



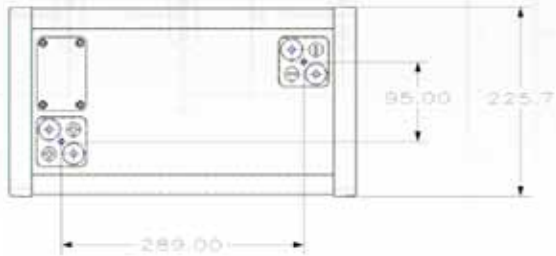
Depth of Discharge vs Cycle Count



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

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

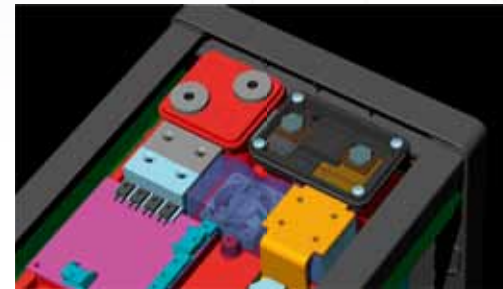


Glass Fiber Reinforced Plastic & Aluminum PE sandwich casing



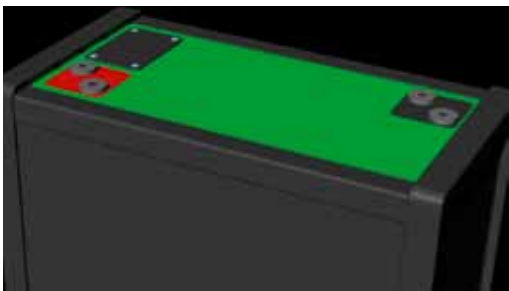
- Lightweight
- Durable
- Flame resistant
- Extremely robust

Integrated Mega fuse 500A/32V



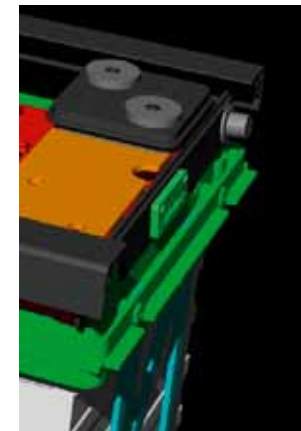
- 480A (3C) continuous load

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

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

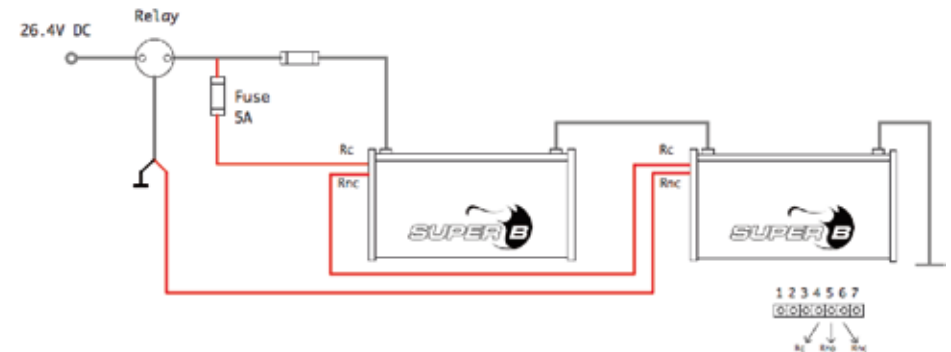


Battery History Log

- 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.



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



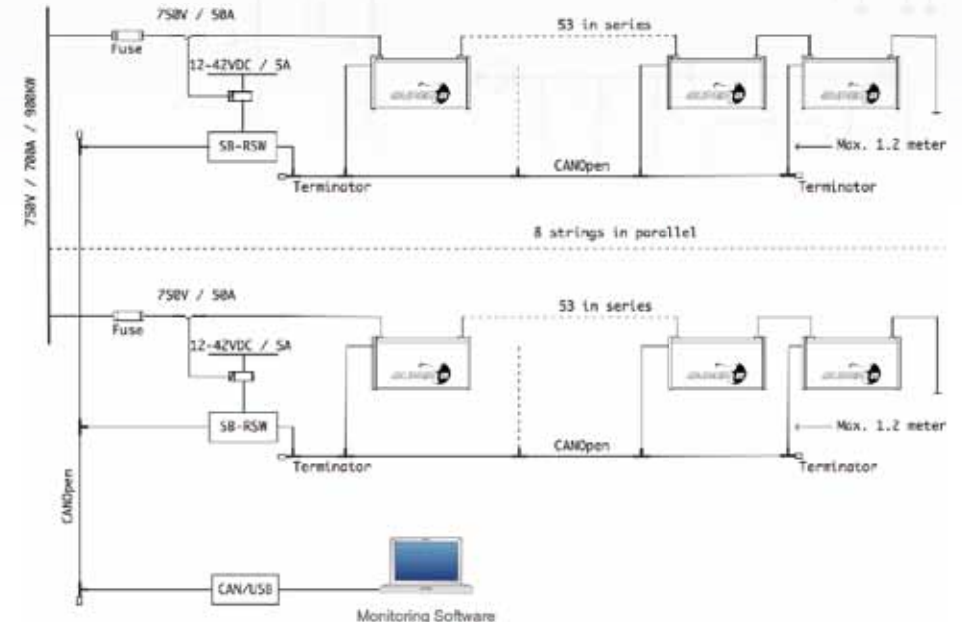
Relay
1150V DC
800A

External I/O

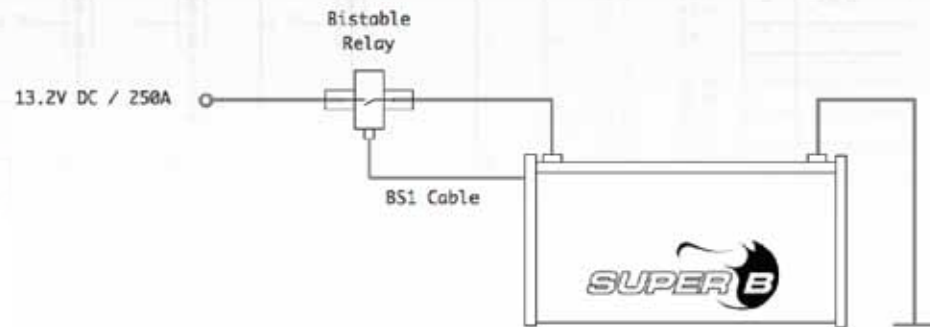
- Status contact, Alarm output
 - Relay 250VDC, 5A, NO, NC
- Analogue State of Charge
- Reset button (in fuse box)



External BMS cut-off switch, CAN controlled

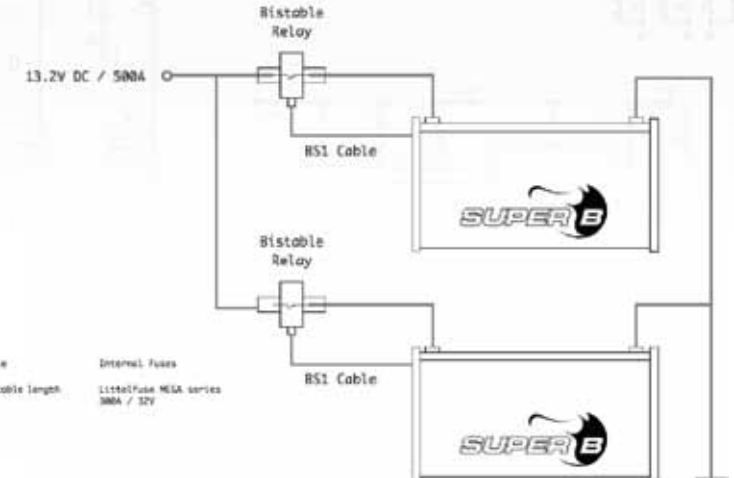


Configuration example 1 (max. 250A load)



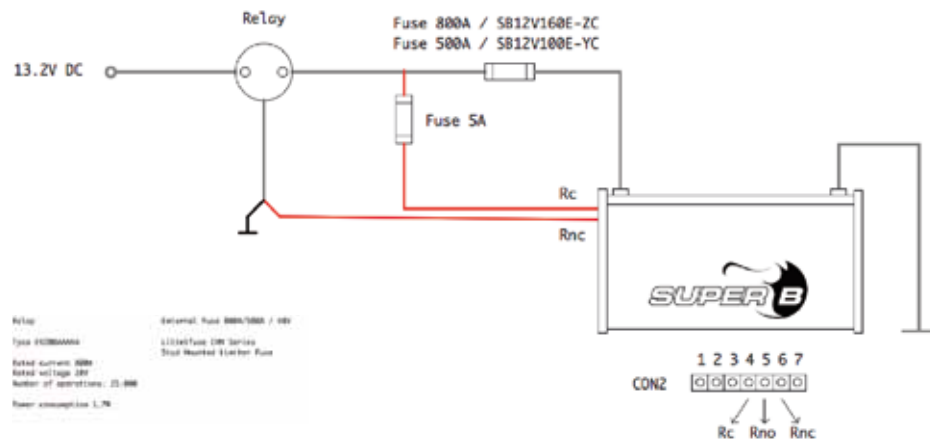
Bistable Relay	BS1 Cable	Internal Fuse
Tyco V23130-C2821-0412 1-1414939-4	100 cm cable length	ListellFuse MEGA series 300A / 32V
Rated current: 200A Rated voltage: 42V		

Configuration example 3 (max. 500A load)



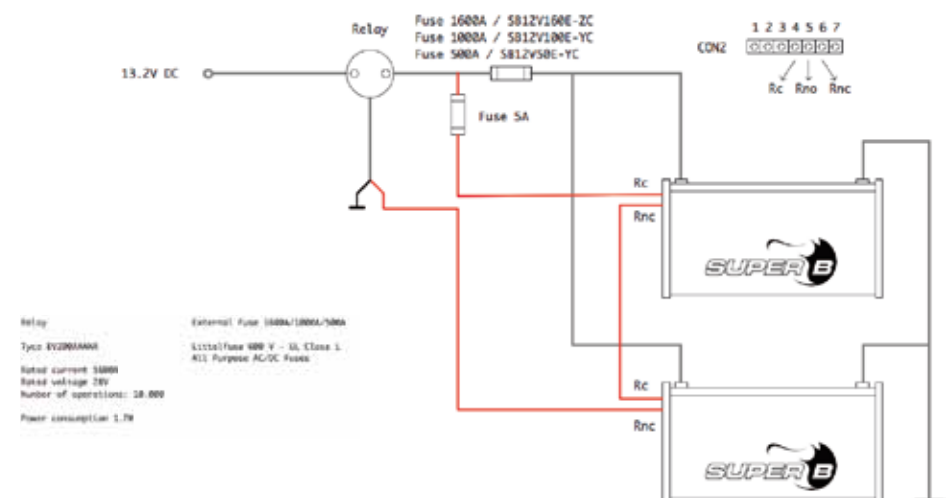
Bistable Relay	BS1 Cable	Internal Fuses
Tyco V23130-C2821-0412 1-1414939-4	100 cm cable length	ListellFuse MEGA series 300A / 32V
Rated current: 200A Rated voltage: 42V		

Configuration example 2 (max. load)



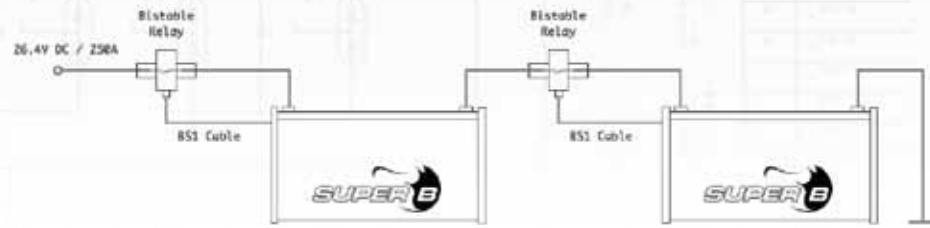
Relay	External Fuse 800A/1000 / 60V
Tyco KY2001A0001	ListellFuse DM Series Stud Mounted Studer Fuse
Rated current: 800A Rated voltage: 28V Number of operations: 10,000 Power consumption: 1.7W	

Configuration example 4 (max. load)



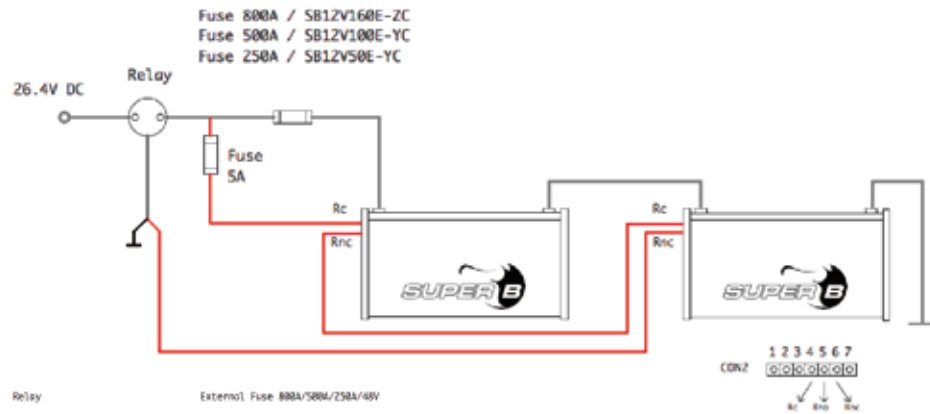
Relay	External Fuse 1600A/1200V/500A
Tyco KY2001A0001	ListellFuse 400 V - UL Class 1 All Purpose AC/DC Fuses
Rated current: 8000A Rated voltage: 28V Number of operations: 10,000 Power consumption: 1.7W	

Configuration example 5 (max. 250A load)



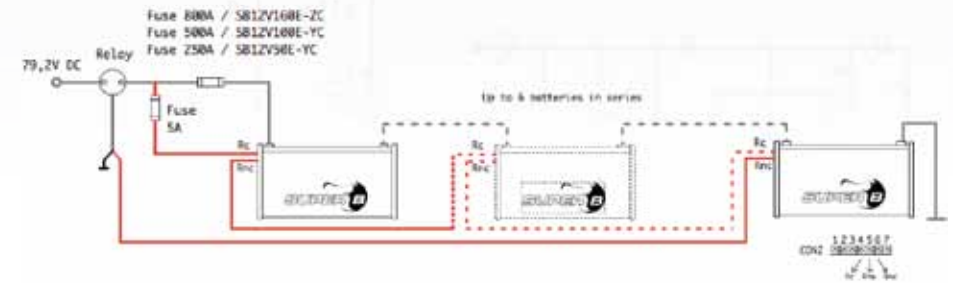
Bistable Relay	851 Cable	Internal Fuses
Tyco V23130-C2801-0412 1-1414839-4	100 cm cable length	Littelfuse MSA series 300A / 32V
Rated current: 200A Rated voltage: 42V		

Configuration example 6 (max. load)



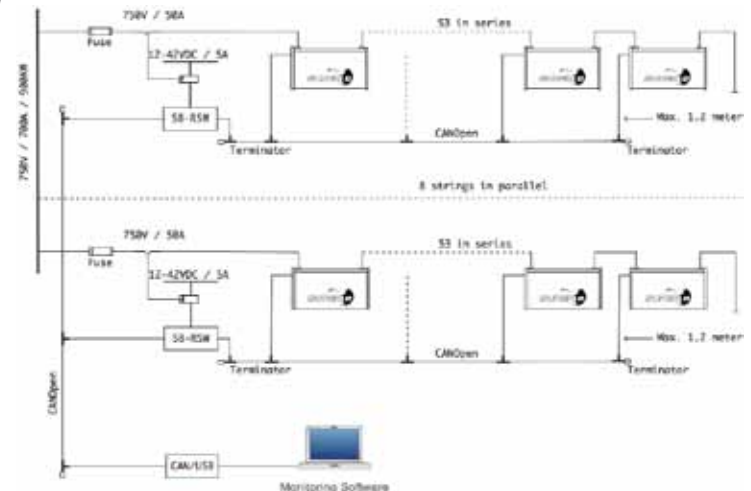
Relay	External Fuse 800A/500A/250A/48V
Tyco EV200AANA	Littelfuse CM Series Stud Mounted Limiter Fuse
Rated current: 800A Rated voltage: 28V Number of operations: 25,000	
Power consumption 1.7W	

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



Relay	External Fuse 800A/500A/250A/48V	Rated current 800A Rated voltage 28V Number of operations: 25,000 Power consumption 1.7W
2 batteries in series: Tyco EV200AANA	Littelfuse CM Series Stud Mounted Limiter Fuse	
3 to 6 batteries in series: Tyco EV200AANA		

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



Battery Monitoring Software

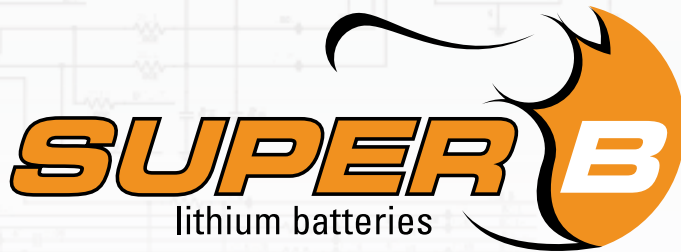
Read individual battery status	✓
Read individual battery history	✓
Save / print battery status	✓
Save / print battery history	✓
Reset battery alarm	✓



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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