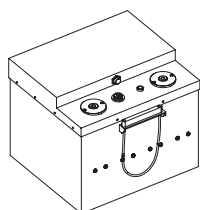


Discover®

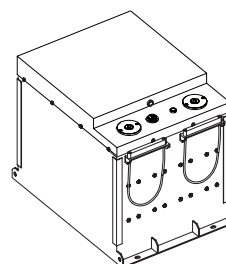
ADVANCED ENERGY

Lithium Ion Battery

Operating Manual



14-24-2800 / 44-24-2800



**12-36-6700
12-48-6650 / 42-48-6650**

| | | | |
|--|---|--|----|
| 1. Safety | 2 | 5.3 Installation | 6 |
| 1.1 Warnings, Cautions and Notes | 2 | 5.4 Parallel Battery Wiring | 6 |
| 1.2 General Warning | 2 | 6. Operation | 7 |
| 1.3 Fire Risk | 2 | 6.1 On-Off | 7 |
| 1.4 Electric Shock Risk | 2 | 6.2 Charging | 7 |
| 1.5 Chemical Risk | 3 | 6.3 Charge Curve | 8 |
| 1.6 Do's | 3 | 6.4 Discharging | 8 |
| 1.7 Do Not's | 3 | 6.5 Storage | 9 |
| 1.8 Transportation Warning | 3 | 7. Protection and Faults | 9 |
| 2. Maximum Operating Limits | 3 | 8. Service & Maintenance | 10 |
| 2.1 Battery Operating Limits | 3 | 8.1 Inspection | 10 |
| 2.2 Recommended Battery Operating Settings | 4 | 9. Troubleshooting | 10 |
| 3. Design Features & Components | 5 | 9.1 Battery Won't Turn On | 10 |
| 3.1 Battery Management System (BMS) | 5 | 10. Recycling and Disposal | 10 |
| 3.2 Fuse | 5 | 11. 14-24-2800 / 44-24-2800 Technical Specifications | 11 |
| 3.3 Terminals | 5 | 12. 12-36-6700 Technical Specifications | 12 |
| 4. Handling | 5 | 13. 12-48-6650 / 42-48-6650 Technical Specifications | 13 |
| 5. Installation - Single Battery | 5 | | |
| 5.1 Tools | 6 | | |
| 5.2 Securing Battery | 6 | | |

1. SAFETY

1.1 Warnings, Cautions, Notes and Symbols

▲ WARNING
Important information regarding possible personal injury.

▲ CAUTION
Important information regarding possible equipment damage.

▲ NOTE
Additional information concerning important procedures and features of the battery.

1.2 General Warning

▲ CAUTION
It is important to operate the device with care to avoid undesirable consequences.



Do not throw in the garbage. Do not dispose in fire.



Use personal protective equipment when working with batteries.



Additional information concerning important procedures and features of the battery. Read all the instructions before installation, operation and maintenance.



This product must be recycled and is made of recycled products.

▲ CAUTION
Do not disassemble or modify the battery. If the battery housing is damaged, do not touch exposed contents.

1.3 Fire Risk

▲ WARNING
Risk of fire - No user serviceable parts.

- Battery has a Battery Management System (BMS) with integrated solid state relay to reduce fire risk.
- Primary suppression for lithium battery fires is water. Secondary suppression is CO₂, powder and halon.

1.4 Electric Shock Risk

▲ WARNING
For wet and electrically uninsulated working conditions, electric shock risk is high, and can cause injury and death.

| Model | Nominal System Voltage | Maximum System Voltage |
|--------------------------|------------------------|------------------------|
| 14-24-2800 44-24-2800 | 24 V | 29.2 V |
| 12-36-6700 | 36V | 43.8V |
| 12-48-6650 42-48-6650 | 48 V | 58.4 V |

1.5 Chemical Risk

▲ WARNING

Lithium batteries are a chemical risk if misoperated, mishandled or abused.

1.6 Do's

- Do protect terminals from short circuit before, during, and after installation
- Do wear electrically insulated gloves
- Do use electrically insulated tools
- Do wear eye protection
- Do wear safety toe boots / shoes
- Do handle battery carefully
- Do secure battery safely
- Do always assume battery terminals are energized

1.7 Do Not's

- Do not immerse battery in water
- Do not lift or carry the battery during usage or operation
- Do not operate or store battery outside of operating limits
- Do not short circuit battery
- Do not puncture battery
- Do not expose battery to flames, or incinerate
- Do not open battery case or disassemble battery
- Do not wear rings, watches, bracelets or necklaces when handling or working near battery
- Do not drop or crush battery
- Do not lift battery by the terminal cables
- Do not vibrate battery
- Do not expose battery to water or other fluids
- Do not expose battery to direct sunlight
- Do not dispose of battery
- Do not connect with other types of batteries
- Do not expose battery to high temperatures
- Do not install with other battery types or brands

1.8 DC Motor Connection

Direct connection to DC motors without proper safety protection, motor controllers, and external motor voltage clamping systems (such as high power anti-parallel diodes or braking resistor systems) may result in damage to the internal pack protection system which may result in unsafe situations. Please consult Discover technical support before directly connecting any motor loads.

1.9 Transportation

If the battery is not installed in equipment, it must be transported in the original package or equivalent.

Batteries are tested according to UN Handbook of Tests and Criteria, part III, sub section 38.3 (ST/SG/AC. 10/11/Rev.5). For transport the batteries belong to category UN3480, Class 9, Packaging Group II.

2. MAXIMUM OPERATING LIMITS

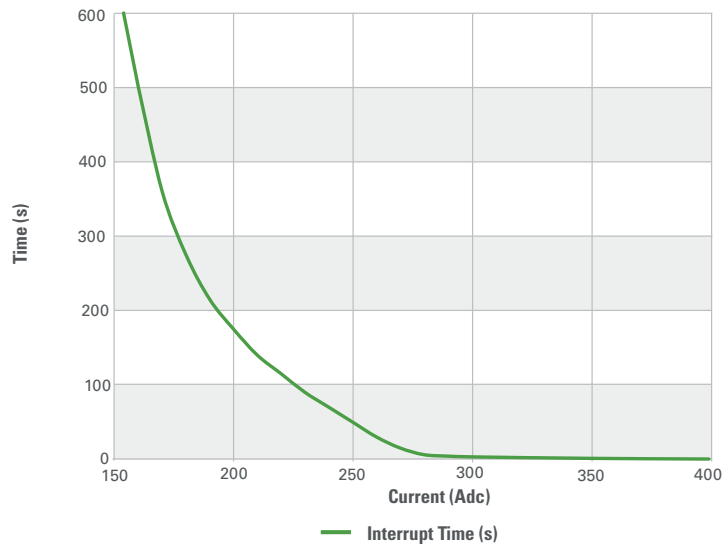
2.1 Maximum Battery Operating Limits

The battery should not be operated outside these operating limits, the BMS will open its internal relay and disconnect the battery if any of these limits are exceeded.

| Maximum Operating Limits | 14-24-2800 44-24-2800 | 12-36-6700 | 12-48-6650 42-48-6650 |
|-----------------------------------|-----------------------------|-----------------|--------------------------|
| Continuous Charge Current* | 110 Adc | 150 Adc | 130 Adc |
| Continuous Discharge Current* | 110 Adc | 150 Adc | 130 Adc |
| Charge Voltage | 27.2 V | 40.8 V | 54.4 V |
| Operating Voltage (Min / Max) | 22.4 V / 29.2 V | 33.6 V / 43.8 V | 44.8 V / 58.4 V |
| Charge Temperature (Min / Max) | 0°C / 45°C (32°F / 113°F) | | |
| Discharge Temperature (Min / Max) | -20°C / 50°C (-4°F / 122°F) | | |
| Storage Temperature (Min / Max) | -20°C / 45°C (-4°F / 113°F) | | |

* Effects of AC Ripple must be taken into consideration when sizing and configuring your system.

Nominal Interruption Time - Peak Current Characteristic of Discover BMS



▲ NOTE!

Intentional bypassing of BMS to operate battery outside maximum and minimum limits voids warranty.

2.2 Recommended Battery Operating Settings

Although the battery is capable of performing at higher operating limits, the following settings are recommended to maximize battery health and account for unforeseen external conditions.

| Recommended Operating Settings | 14-24-2800 44-24-2800 | 12-36-6700 | 12-48-6650 42-48-6650 |
|----------------------------------|--------------------------|------------|--------------------------|
| Max Continuous Charge Current | < 78 A | < 106 A | < 92 A |
| Max Continuous Discharge Current | < 78 A | < 106 A | < 92 A |
| Charge Voltage (Bulk/Absorb) | 27.2 V | 40.8 V | 54.4 V |
| Low Voltage Disconnect | 24 V | 36 V | 48 V |
| Operating Temperature | 20°C (68°F) | | |

3. Design Features & Components

3.1 Battery Management System (BMS)

Monitoring

BMS monitors:

- Cell module voltage
- Battery voltage
- Battery current
- Battery temperature
- Battery state of charge (SOC)

Module Balancing

- BMS performs balancing of cell modules

Protection & Fault Management

- BMS sounds buzzer when fault limits are reached
- BMS generates fault when maximum operating limits are reached
- Fault events cause switch to open and battery to shut down after a 120s delay

Communication Ports

BMS has an isolated USB and CAN communication. Use accessory harness 790-0018 to connect battery to computer with AES Dashboard Software

Data Logging

- Monitoring data
- Fault and warning events

Logged data can be accessed using AES Dashboard software via the USB port (Win32 / Win64 supported)

3.2 Fuse

Fuse provides back-up over-current protection.

Fuse Replacement

A blown fuse requires service from a qualified technician. Contact your Discover supplier for more information.

3.3 Terminals

Terminals are button-type, M8 female.

| | |
|------------------------|-------------------|
| Terminal Torque | 9 Nm / 6.64 ft-lb |
|------------------------|-------------------|

4. Handling

| |
|--|
| ▲ WARNING! |
| Read Safety Section before installing the battery. |

- Battery should be off
- Battery cables should be disconnected
- Battery terminals should be protected
- Battery handle should be used to lift battery
- Battery should be handled by two people or mechanical lift equipment
- Do not lift or carry the battery during usage or operation

5. Installation

| |
|--|
| ▲ WARNING! |
| Read Safety Section before installing the battery. |

▲ CAUTION!
Do not install batteries in series. Select the appropriate AES battery model for the voltage of your system.

5.1 Tools

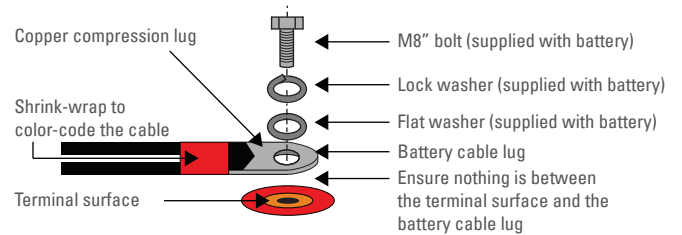
- Insulated tools sized to match nuts, bolts and cables in use
- Voltmeter
- Post cleaner and wire brush
- Personal protective equipment

5.2 Securing Battery

- Battery can be strapped in place with non-conductive nylon straps
- Battery may have hold down brackets at the base of the battery

5.3 Installation

- Check that battery is switched off
- If the battery circuit has a disconnect, open disconnect to isolate battery
- Clean cable connections. Broken, frayed, brittle, kinked or cut cables should be replaced
- Install and secure new battery. Be careful not to ground the terminals to any metal mounting, fixture, or body part
- Connect battery cables. Connect ground cable last to avoid sparks
- Recommended terminal torque is 9.0 Nm (6.64 ft-lb)
- Close circuit disconnect (if open)
- Turn battery switch on



▲ NOTE!
All cable ends must be connected to battery terminals without any washers between terminal bushings and cable ends.

Terminal burnout is caused by:

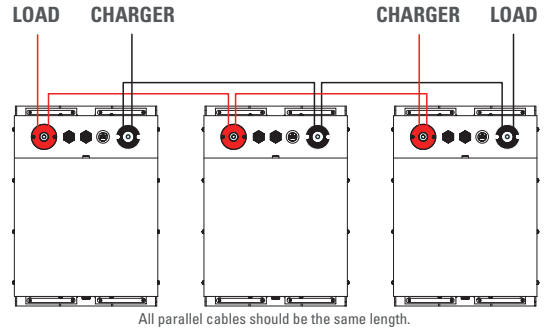
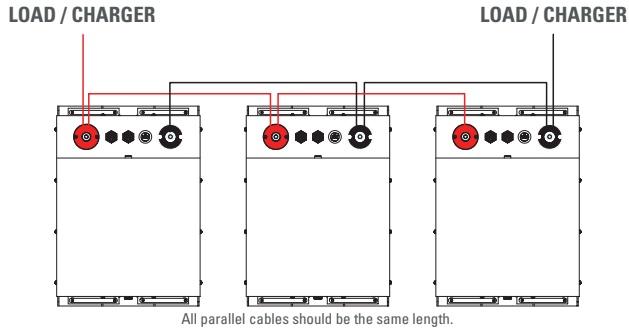
- Discharge currents exceeding allowable limits
- Improper cable installation
- Improper cable sizing
- Improper terminal torque

▲ NOTE!
Without exception, product experiencing terminal burn out will not be warranted.

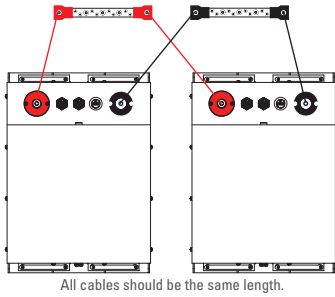
5.4 Parallel Battery Wiring

Parallel wiring examples. Actual wiring requirements may vary. Consult with your local authority having jurisdiction.

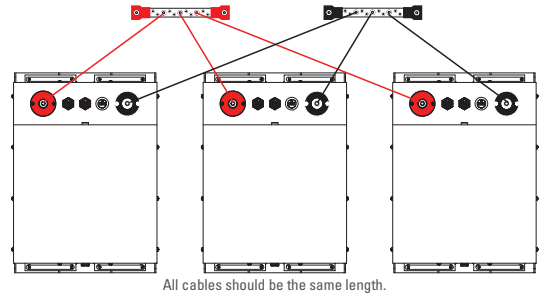




ALTERNATE 1



ALTERNATE 2



6. Operation

▲ NOTE!
Review operating limits.

6.1 On–Off

- To turn the battery on press and hold switch for 2-3 seconds
- To turn the battery off press and hold switch for 2-3 seconds



6.2 Charging

Before operating the charger make sure to read and understand the instructions that come with the charger. Never attempt to charge a battery without first reviewing and understanding the instructions for the charger being used.

▲ CAUTION!
Always make sure the chargers charging curve meets the battery's charging requirement; never charge a visibly damaged battery; never charge a frozen battery.

1. Connect the charger leads to the battery.
2. Make sure that the charger lead, both at the charger and the battery side, connections are tight.
3. Turn the charger on.
4. Turn the battery on (if required).

▲ CAUTION!
NOT ALL CHARGERS ARE CAPABLE OF CHARGING LITHIUM BATTERIES!
During system design CONFIRM that your chosen charger is not capable of transient spikes that exceed the published **MAXIMUM TERMINAL RATINGS** of the battery.

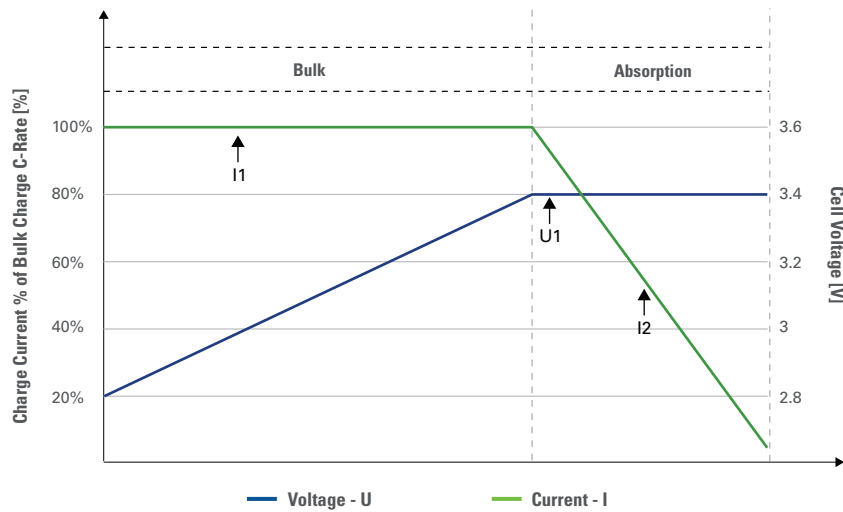
Spikes are fast, short duration electrical transients in voltage (voltage spikes), current (current spikes), or transferred energy (energy spikes) in an electrical circuit. Voltage spikes usually happen when the AC/DC adaptor is plugged in, or charge current is cut off quickly. Multi voltage chargers are made using transformers that may be capable of producing spikes that exceed the maximum ratings of the Discover AES. You must confirm with the charger supplier that the chargers being supplied:

- meet Discover’s recommended charge curve, and
- are not capable of exceeding Discover’s maximum terminal voltages.

6.3 Charge Curve

Charge sequence

1. Charge at constant current to 3.4V per cell module (Bulk).
2. Maintain constant voltage 3.4V per cell module (Absorption).
3. Terminate when charge current drops below 2A.



▲ CAUTION!
Do not charge battery higher than 3.4 V per cell module.

▲ NOTE!
Recommended charge current is 0.5C.

| Model | Cell Modules in Series | I1 | U1 | Termination Charge Current |
|------------|------------------------|-----------------|--------|----------------------------|
| 14-24-2800 | 8S | 110 Adc maximum | 27.2 V | I2 ≤ 2 A |
| 44-24-2800 | | | | |
| 12-36-6700 | 12S | 150 Adc maximum | 40.8 V | |
| 12-48-6650 | 16S | 130 Adc maximum | 54.4 V | |
| 42-48-6650 | | | | |

6.4 Discharging

- Turn on battery
- Turn on load

▲ NOTE!
Do not discharge battery below recommended minimum operating voltages.

▲ NOTE!

Do not discharge battery at rates greater than recommended operating currents.

6.5 Storage

Systems should be stored out of direct sunlight under the following temperature conditions:

| | |
|-----------------------------|--------------|
| Minimum Storage Temperature | -20°C / -4°F |
| Maximum Storage Temperature | 45°C / 113°F |

Systems should be put into storage at 80% SOC and checked monthly to ensure the system SOC does not fall below 20%. At 20% SOC the battery will self discharge in approximately 2 months.

▲ CAUTION!

Do not store a discharged battery. Recharge battery after every use. Batteries that have self-discharged to a severely discharge state are not recoverable.

7. Protection & Faults

- BMS generates faults when maximum operating limits are reached.
- BMS sounds a buzzer when fault limits are triggered.
- BMS monitors the following information for faults and warning:
 1. Cell module voltage
 2. Battery current
 3. Battery temperature

▲ NOTE!

Refer to device technical specification tables at the end of this manual for Fault Limits.

CORRECTIVE ACTIONS

| | |
|------------------|--|
| High Temperature | <ul style="list-style-type: none"> • Stop discharge or charge • Leave the battery to cool |
| Low Temperature | <ul style="list-style-type: none"> • Stop discharge or charge |
| High Voltage | <ul style="list-style-type: none"> • If charging stop the charge • Confirm proper charge algorithm is being used |
| Low Voltage | <ul style="list-style-type: none"> • Do not discharge the battery. Any discharge current detected will force the battery into Low Voltage Fault • The user can charge the battery in Low Voltage Recovery • If no charge current is detected within 2 minutes the BMS will turn off the battery |
| Over Current | <ul style="list-style-type: none"> • Reduce current |
| Low SOC | <ul style="list-style-type: none"> • Stop discharge • Charge the battery |

8. Service & Maintenance

Batteries should be carefully inspected on a regular basis in order to detect and correct potential problems before they can do harm. This routine should be started when the batteries are first received.

8.1 Inspection

- Look for cracks in the case
- Check the battery, terminals and connections to make sure they are clean, free of dirt, fluids and corrosion
- All battery cables and their connections should be tight, intact, and NOT broken or frayed
- Replace any damaged batteries
- Replace any damaged cables
- Check torque on terminal bolts

8.2 Firmware Updates

Consult Discover's website for firmware updates that may include significant improvements.

9. Troubleshooting

9.1 Battery Won't Turn On

| | |
|-------------|--|
| Symptom | Does the battery turn on for a short time then turns itself off? |
| Description | The battery is likely in a low voltage or low SOC. |
| Action | Connect to charger and turn on the battery. |

| | |
|-------------|---|
| Symptom | Was the battery left on or stored for extended periods of time? |
| Description | The battery will turn itself off at 5% SOC. If left sitting at a low SOC, the battery may have discharged itself completely and cannot be used. |
| Action | Do not use. Replace and recycle. |

10. Recycling and Disposal

Batteries must not be mixed with domestic or industrial waste. Discover's Advanced Energy Systems are recyclable and must be processed through a recognized recycling agency or dealer. Please contact Discover[®] or your servicing dealer for details.



10. 14-24-2800 / 44-24-2800 TECHNICAL SPECIFICATIONS

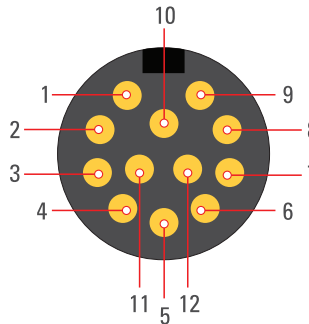
| Electrical Specifications | |
|----------------------------------|--|
| Nominal Voltage | 25.6 V |
| Charge Voltage | 27.2 V |
| Maximum Voltage | 29.2 V |
| Minimum Voltage | 20 V |
| Nominal Capacity | 110 Ah |
| Nominal Energy | 2816 Wh |
| Max Continuous Charge Current | 110 Adc |
| Max Continuous Discharge Current | 110 Adc |
| Fuse | 150 A Internal Fuse. Provides backup over-current protection |
| Cell Chemistry | LiFePO ₄ |
| Cell Modules | 8S 22P |
| Self-Discharge 25°C / 77°F | < 3% per month (battery off) |

| Fault Limits | |
|--|------------------------------------|
| OverTemperature - Discharge Protection | > 60°C/140°F for 120s |
| OverTemperature - Charge Protection | > 60°C/140°F for 120s |
| LowTemperature - Discharge Protection | < -20°C/-4°F for 120s |
| LowTemperature - Charge Protection | < -20°C/-4°F for 120s |
| Over Voltage Protection | > 3.7 V in any cell module for 60s |
| Under Voltage Protection | < 2.5 V in any cell module for 5s |
| Over Current Protection | > 150 Adc |

| Mechanical Specifications | |
|-----------------------------|--|
| Battery Dimensions (HxWxD) | 276 x 347.5 x 329.5 mm |
| Battery Weight | 40 kg |
| Shipping Dimensions (HxWxD) | 470 x 430 x 390 mm |
| Shipping Weight | 48.4 kg |
| Terminal | M8 |
| Terminal Hardware | M8 Stainless Steel Bolt, Flat Washer, Lock Washer (Supplied) |
| Terminal Torque | 9.0 Nm +/- 3 |
| Case Material | Powder Coated Cold Rolled Steel |
| Enclosure IP Rating | IP 55 |
| Charge Temperature Range | 0°C/45°C (32°F/113°F) |
| Discharge Temperature Range | -20°C/50°C (-4°F/122°F) |
| Storage Temperature Range | -20°C/45°C (-4°F/113°F) |

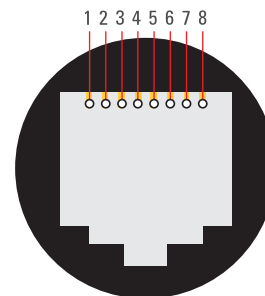
| Operational Specifications | |
|---------------------------------|--|
| Battery Management System (BMS) | Integrated, with Solid State Relay (SSR) |
| Cell Balancing | Passive balancing during charge when Cell Voltage > 3.35 V |
| Non-Volatile Memory | Yes |
| Lifetime Logged Data | <ul style="list-style-type: none"> • Time • High/low average cell module voltage • Balancing, Fault and Relay State • Battery SOC, Current, Voltage, Temperature • Charge Energy In/Out |
| Communication Ports | <ul style="list-style-type: none"> • Isolated USB • Isolated CAN (AEBus) • Isolated XANBUS (44-24-2800 only) |
| Communication Connector | USB Type A Female Circular 12 Pin Standard (14-24-2800 only) RJ45 Jack x2 (44-24-2800 only) |

Circular 12 PIN (14-24-2800)



| | |
|--------|----------------|
| Pin 3 | AEBus CAN GND |
| Pin 4 | AEBus CAN High |
| Pin 5 | AEBus CAN Low |
| Pin 6 | LED GND |
| Pin 7 | LED +5V |
| Pin 8 | Key/Reset + |
| Pin 9 | Key/Reset - |
| Pin 11 | AEBus CAN +5V |

RJ45 AEBus (44-24-2800)



| | |
|-------|----------------|
| Pin 3 | AEBus CAN GND |
| Pin 4 | AEBus CAN Low |
| Pin 5 | AEBus CAN High |
| Pin 6 | AEBus + 5V |

| | |
|----------------------|--------------------------------------|
| Regulatory Approvals | UN 38.3, IEC 62133, UL 2271, UL 1973 |
|----------------------|--------------------------------------|

UN38.3 PASSED
TRANSPORT SAFETY CERTIFIED



11. 12-36-6700 TECHNICAL SPECIFICATIONS

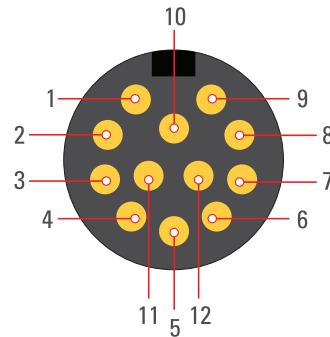
| Electrical Specifications | |
|----------------------------------|--|
| Nominal Voltage | 38.4 V |
| Charge Voltage | 40.8 V |
| Maximum Voltage | 43.8 V |
| Minimum Voltage | 30 V |
| Nominal Capacity | 175 Ah |
| Nominal Energy | 6720 Wh |
| Max Continuous Charge Current | 150 Adc |
| Max Continuous Discharge Current | 150 Ad |
| Fuse | 150 A Internal Fuse. Provides backup over-current protection |
| Cell Chemistry | LiFePO ₄ |
| Cell Modules | 12S 35P |
| Self-Discharge 25°C / 77°F | < 3% per month (battery off) |

| Fault Limits | |
|--|------------------------------------|
| OverTemperature - Discharge Protection | > 60°C/140°F for 120s |
| OverTemperature - Charge Protection | > 60°C/140°F for 120s |
| LowTemperature - Discharge Protection | < -20°C/-4°F for 120s |
| LowTemperature - Charge Protection | < -20°C/-4°F for 120s |
| Over Voltage Protection | > 3.7 V in any cell module for 60s |
| Under Voltage Protection | < 2.5 V in any cell module for 5s |
| Over Current Protection | > 150 Adc |

| Mechanical Specifications | |
|-----------------------------|--|
| Battery Dimensions (HxWxD) | 375 x 347.5 x 471.5 mm |
| Battery Weight | 88 kg |
| Shipping Dimensions (HxWxD) | 570 x 440 x 570 mm |
| Shipping Weight | 99.9 kg |
| Terminal | M8 |
| Terminal Hardware | M8 Stainless Steel Bolt, Flat Washer, Lock Washer (Supplied) |
| Terminal Torque | 9.0 Nm +/- 3 |
| Case Material | Powder Coated Cold Rolled Steel |
| Enclosure IP Rating | IP 55 |
| Charge Temperature Range | 0°C/45°C (32°F/113°F) |
| Discharge Temperature Range | -20°C/50°C (-4°F/122°F) |
| Storage Temperature Range | -20°C/45°C (-4°F/113°F) |

| Operational Specifications | |
|---------------------------------|--|
| Battery Management System (BMS) | Integrated, with Solid State Relay (SSR) |
| Cell Balancing | Passive balancing during charge when Cell Voltage > 3.35 V |
| Non-Volatile Memory | Yes |
| Lifetime Logged Data | <ul style="list-style-type: none"> • Time • High/low average cell module voltage • Balancing, Fault and Relay State • Battery SOC, Current, Voltage, Temperature • Charge Energy In/Out |
| Communication Ports | <ul style="list-style-type: none"> • Isolated USB • Isolated CAN (AEBus) |
| Communication Connector | USB Type A Female Circular 12 Pin Standard |

Circular 12 PIN (12-36-6700)



| | |
|--------|----------------|
| Pin 3 | AEBus CAN GND |
| Pin 4 | AEBus CAN High |
| Pin 5 | AEBus CAN Low |
| Pin 6 | LED GND |
| Pin 7 | LED +5V |
| Pin 8 | Key/Reset + |
| Pin 9 | Key/Reset - |
| Pin 11 | AEBus CAN +5V |

| | |
|----------------------|---------|
| Regulatory Approvals | UN 38.3 |
|----------------------|---------|

UN38.3 PASSED
TRANSPORT SAFETY CERTIFIED

12. 12-48-6650 / 42-48-6650 TECHNICAL SPECIFICATIONS

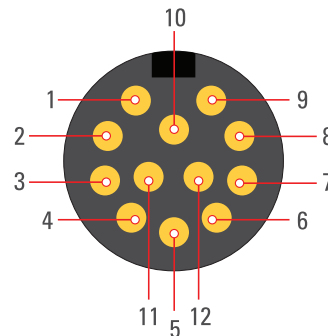
| Electrical Specifications | |
|----------------------------------|--|
| Nominal Voltage | 51.2 V |
| Charge Voltage | 54.4 V |
| Maximum Voltage | 58.4 V |
| Minimum Voltage | 40 V |
| Nominal Capacity | 130 Ah |
| Nominal Energy | 6656 Wh |
| Max Continuous Charge Current | 130 Adc |
| Max Continuous Discharge Current | 130 Adc |
| Fuse | 150 A Internal Fuse. Provides backup over-current protection |
| Cell Chemistry | LiFePO ₄ |
| Cell Modules | 16S 26P |
| Self-Discharge 25°C / 77°F | < 3% per month (battery off) |

| Fault Limits | |
|--|------------------------------------|
| OverTemperature - Discharge Protection | > 60°C/140°F for 120s |
| OverTemperature - Charge Protection | > 60°C/140°F for 120s |
| LowTemperature - Discharge Protection | < -20°C/-4°F for 120s |
| LowTemperature - Charge Protection | < -20°C/-4°F for 120s |
| Over Voltage Protection | > 3.7 V in any cell module for 60s |
| Under Voltage Protection | < 2.5 V in any cell module for 5s |
| Over Current Protection | > 150 Adc |

| Mechanical Specifications | |
|-----------------------------|--|
| Battery Dimensions (HxWxD) | 375 x 347.5 x 471.5 mm |
| Battery Weight | 87 kg |
| Shipping Dimensions (HxWxD) | 570 x 440 x 570 mm |
| Shipping Weight | 98.9 kg |
| Terminal | M8 |
| Terminal Hardware | M8 Stainless Steel Bolt, Flat Washer, Lock Washer (Supplied) |
| Terminal Torque | 9.0 Nm +/- 3 |
| Case Material | Powder Coated Cold Rolled Steel |
| Enclosure IP Rating | IP 55 |
| Charge Temperature Range | 0°C/45°C (32°F/113°F) |
| Discharge Temperature Range | -20°C/50°C (-4°F/122°F) |
| Storage Temperature Range | -20°C/45°C (-4°F/113°F) |

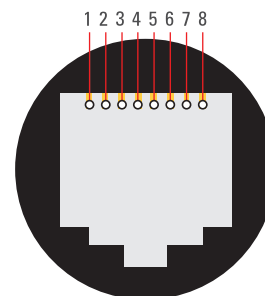
| Operational Specifications | |
|---------------------------------|--|
| Battery Management System (BMS) | Integrated, with Solid State Relay (SSR) |
| Cell Balancing | Passive balancing during charge when Cell Voltage > 3.35 V |
| Non-Volatile Memory | Yes |
| Lifetime Logged Data | <ul style="list-style-type: none"> • Time • High/low average cell module voltage • Balancing, Fault and Relay State • Battery SOC, Current, Voltage, Temperature • Charge Energy In/Out |
| Communication Ports | <ul style="list-style-type: none"> • Isolated USB • Isolated CAN (AEBus) • Isolated XANBUS (42-48-6650 only) |
| Communication Connector | USB Type A Female Circular 12 Pin Standard (12-48-6650 only) RJ45 Jack x2 (42-48-6650 only) |

Circular 12 PIN (12-48-6650)



| | |
|--------|----------------|
| Pin 3 | AEBus CAN GND |
| Pin 4 | AEBus CAN High |
| Pin 5 | AEBus CAN Low |
| Pin 6 | LED GND |
| Pin 7 | LED +5V |
| Pin 8 | Key/Reset + |
| Pin 9 | Key/Reset - |
| Pin 11 | AEBus CAN +5V |

RJ45 AEBus (42-48-6650)



| | |
|-------|----------------|
| Pin 3 | AEBus CAN GND |
| Pin 4 | AEBus CAN Low |
| Pin 5 | AEBus CAN High |
| Pin 6 | AEBus + 5V |

| Regulatory Approvals |
|-------------------------------------|
| UN 38.3, IEC62133, UL 2271, UL 1973 |

UN38.3 PASSED
TRANSPORT SAFETY CERTIFIED

