

# BALANCELL®

INTELLIGENT ENERGY STORAGE



## MODEL P00024

**Voltage:** 81V  
**Energy:** 33.4kW  
**Capacity:** 412Ah

### Battery Specifications and Accountability

Nominal Energy | 33.4kWh | Voltage | 81V | Nominal Amp Hours | 412Ah | Model Number | P24

|                          |   |
|--------------------------|---|
| Real Amp hour Capacity   | This is viewable and measurable in the battery history for every discharge throughout lifetime                              |
| History and Data Logging | All data is recorded for every minute up to 30 years internally (and sent to gateway if online)                             |
| Energy Output Logging    | The Total Energy Output in kWh, or total lifetime operating hours are all recorded, and visible online                      |
| Warranty                 | Energy output: 66 000 kWh   Calendar time - 5 yrs   Operating Hours - 20 000 hrs - If matched to machine                    |
| End of Warranty          | Battery capacity at 80% or more of full nominal capacity  |
| Battery Cycle Life       | Unlimited cycles up until the total energy output or Calendar time, whichever comes first (100% Depth of Discharge allowed) |
| Recycling - End of Life  | EnviroServe - Our partner recycling company   |

### Discharge Limits (Voltage & Current)

|  | Battery | Protection | Notes   |
|--|---------|------------|---|
| Continuous Discharge Current             | 400A    |            | 1C continuous   |
| Surge Discharge Current - 30 Seconds     | 1200A   |            | 3C transient. Typically repeated for every lift or peak load            |
| Electronic Current Trip Limit - Analogue |         | 1500A      | If the electronic current limit option is enabled - NOTE 1*             |
| Electronic trip Retry Time - Analogue    |         | -          | Time taken after current trip to retry connection                       |
| Pre-Charge Current Limit - NOTE 1*       |         | 1500A      | Automatically provided if electronic current limit is enabled           |
| Electronic Overload - Digital            |         |            | Optional with either, I <sup>2</sup> t, max current, or Custom profiles |
| Internal Battery Fuse                    | 500A    |            | I <sup>2</sup> t = 610 000 As   |
| Minimum Battery Voltage                  | 73.75V  |            | Battery will cutout here, regardless of indicated SOC                   |
| ABSOLUTE Minimum Battery Voltage         |         | 67.8V      | Internal electronics Disabled! Please see battery protection            |

NOTE 1\*. Electronic current limit is optional and adjustable between 500-1000A. It will act as a automatic pre-charge for connection to inverters. For motive applications, in particular old lead machines, pre-charge or current limit prevents startup, and not desirable.

## Charge Limits - (and charger settings)

|                                      |       |  |
|--------------------------------------|-------|--|
| Maximum Continuous Charging Current  | 300A  | Preferred range is 200A to 300A, set for constant current CC             |
| End of Charge Voltage                | 87.5V | 86.8V to 87.5V max set as endpoint CV voltage                            |
| Balancing Charge Voltage or Current  | 87.8V | 87.5V-88.0V OR charge at constant current (CC) of 400mA                  |
| Charger Voltage Range                | 80V   | Charger voltage must be within normal 80V limits                         |
| Battery Maximum Voltage Self Cut Out | 88.2V | Battery will cutout, preventing further charging, NOTE 3*                |
| Peak Transient Charger Voltage       | 130V  | *Peak transient voltage after battery self disconnects                   |
| Charger Lead Inductive Energy        | 150J  | NOTE 4*. However, Typical 2m length lead installations are of no concern |

NOTE 3\*. If battery self cuts out from over voltage it will still be available for discharge through reverse diode.

NOTE 4\*. This is the maximum charger lead Inductive energy battery cutout can absorb (  $1/2 I^2 L < 75J$  ).

## Operating SOC and Temperature

|                         | Minimum | Maximum | Notes   |
|-------------------------|---------|---------|---|
| Usable SOC Range        | 0%      | 100%    | NOTE! battery Cutout can be configured from 0 - 25%                 |
| Recommended SOC Range   | 10%     | 100%    | Preferred good practice to prevent cut out while in use             |
| Storage SOC             | 20%     | 100%    | NOTE! Battery should be fully charged before Storage                |
| SOC Accuracy            | -0.1%   | +0.1%   | Typical accuracy in normal daily use                                |
| SOC Daily Drift         | -0.1%   | +0.1%   | Daily Drift while not in use. Will reset at Top or bottom of charge |
| Charging Temperature    | 5°C     | 55°C    | Battery cuts out at beyond these. Preferred range 10°C - 45°C       |
| Discharging Temperature | -15°C   | 55°C    | Battery cuts out at beyond these. Preferred range 10°C - 45°C       |
| Storage Temperature     | 0°C     | 25°C    | Preferred for optimum lifetime is 5-10°C                            |

## Protection

### Individual Cell

### Battery Level

|                     |   |  |
|---------------------|---|--|
| Over Voltage        | Digital   | Analogue and Secondary Digital cutout  |
| Over Discharge      | Digital   | Digital SOC and Digital under voltage  |
| Deep Over Discharge |   | Analogue cut out of internal electronics to prevent further discharge. NOTE 1* |
| Over Temperature    | Digital   | Digital and Secondary Analogue   |
| Under Temperature   | Digital   | Digital  |
| Charge Rate         | Digital   | Digital  |
| Short Circuit 1*    | Optional* - Analogue electronic protection, 40ns response time, with automatic hiccup retry |  |
| Short Circuit 2     | Fuse is always installed on all batteries   |  |

NOTE 1\*. When the internal electronics are disabled, the battery enters a dormant state. In this state the battery will be inactive, not connected and not available for normal recharge or use. It can be recharged but it MUST be recharged with a constant current that must not exceed 500mA (450mA preferred) and voltage less than 65V (e.g. Balancell hockey PUK charger). If left for more than 6 months in this dormant state, then it should NOT be recharged and battery needs to be returned for a service and cell checkup.

## Mechanical Design

Length - 890 mm | Width - 622 mm | Height - 302 mm | Mass - 236 kg

Specific (Gravimetric) Energy Density - 140 Wh/kg | Volumetric Energy Density - 213 Wh/l

Cell Insulation - Standard with Additional PET 300 micron cover added to all cells for safety and vibration tolerance

Cell Compression - ~3000N | G-shock tolerance - > 5 times IEC 61485 | Environmental - IP61

Interlinks, Cell to Cell, Cell to Terminal: Flexible laminated tin plated copper

## Communication Options

|        |  |                    |
|--------|--|--------------------|
| GSM    | Global sim with lifetime connectivity (15yrs), Standard on Industrial Motive Batteries | (2G, 3G or NB-IoT) |
| Serial | RS232 standard, (default connection to SOC display), RS485 converter optional          | Isolated to 1000V  |
| CANbus | CANOpen standard, 5V@200mA available, OEM comms on request, MODBUS optional            | Isolated to 2500V  |
| Wifi   | Standard   |                    |

## Certification and Standards

|                                       |     |  |
|---------------------------------------|-----|--|
| Cell Certifications                   | GB  | Certified to - GB31484, GB31485, GB31486, UL1973, MSDS UN38.3                |
| Cell Manufacturing                    | ISO | Certified to - ISO9001, ISO14001, TS16949                                    |
| Battery Manufacturing                 | ISO | In process - ISO9001 certification   |
| Battery Electromagnetic Compatibility | CE  | Certified to - EN 301 489-1: V2.2.3, EN 301 489-52: V1.1.0, EN / IEC 61326-1 |
| Battery Standards                     | IEC | Designed to meet - IEC 62485-6, IEC 63056, IEC 61619, IEC 62660-2            |
| Battery Standards                     | UL  | Designed to meet - UL 2580   |

## Ancillaries

|                                    |   |
|------------------------------------|---|
| OLED SoC% Display                  | 0-100%, Error msgs, Power & Charging LEDs. Configurable Buzzer at low SOC                     |
| Fast Charge Safety Disconnect Plug | Fast charging point safety forklift disconnect to prevent driving away with charger connected |
| 3P Charger                         | 9kW - 26V, 39V, 52V   |
| 1P Charger                         | 3kW - 26V, 39V, 52V   |
| Hockey PUK Charger                 | 400mA CC, For float charging, balancing, and recovery from a deep discharge dormant state     |