BALANCELL®

INTELLIGENT ENERGY STORAGE

MODEL P00015

Voltage: 52V

Energy: 14.4kW

Capacity: 277Ah

Battery Specifications and Accountability

Nominal Energy | 14.4kWh | Voltage | 52V | Nominal Amp Hours | 277Ah | Model Number | P15	
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: 28 000 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	270A		1C continuous
Surge Discharge Current - 30 Seconds	800A		3C transient. Typically repeated for every lift or peak load
Electronic Current Trip Limit - Analogue		1000A	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*		1000A	Automatically provided if electronic current limit is enabled
Electronic Overload - Digital			Optional with either, I^2t , max current, or Custom profiles
Internal Battery Fuse	400A		I^2t = 610 000 As
Minimum Battery Voltage	47.2V		Battery will cut out here, regardless of indicated SOC
ABSOLUTE Minimum Battery Voltage		43.4V	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	200A	Preferred range is 130A to 200A, set for constant current CC
End of Charge Voltage	56V	55.6V to 56.0V max set as endpoint CV voltage
Balancing Charge Voltage or Current	56.2V	56.0V-56.3V OR charge at constant current (CC) of 400mA
Charger Voltage Range	48V	Charger voltage must be within normal 48V limits
Battery Maximum Voltage Self Cut Out	56.4V	Battery will cutout, preventing further charging, NOTE 3*
Peak Transient Charger Voltage	100V	*Peak transient voltage after battery self disconnects
Charger Lead Inductive Energy	75J	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 ($1/2\ I^2L < 75J$).

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.

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Mechanical Design

Length - 636 mm | Width - 186 mm | Height - 302 mm | Mass - 52 kg
Specific (Gravimetric) Energy Density - 135 Wh/kg | Volumetric Energy Density - 211 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

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