



# SAFEFlex PLUS Material Handling Batteries

## Overview

With an enhanced feature set developed based on 10 years of experience with the ground breaking Lithium SAFEFlex product line, Lithium SAFEFlex PLUS is a comprehensive battery solution designed to meet the cost, performance, efficiency and durability requirements of the rugged warehouse environment. It is fabricated from modular systems designed to facilitate family level safety certifications. Lithium SAFEFlex battery systems are high cycle life, low maintenance solutions for industrial vehicles with a broad specification range to fulfill the most demanding requirements. The drop in replacement batteries make upgrading from Lead Acid to Lithium simple. The batteries are sized to fit the standard material handling lead acid battery compartment, along with meeting the truck battery weight requirements.

## Safety & Protection

- Higher safety Lithium Iron Phosphate chemistry cells utilized in the battery systems
- Voltage, Current, and Temperatures are continuously monitored by Green Cubes Technology's custom Battery Management System (BMS) which controls the internal safety contactors and disconnect fuse

## Energy Savings

- Recharge efficiency of 98% or higher helps save electricity and also reduce damaging effects of heating the batteries
- Improvements in runtime capacity efficiency of 10% or higher

## Features

### Improved Robustness, Reliability and Serviceability

- Modular design with individual cell monitoring
- Distributed BMS intelligence and datalogging
- Galvanic isolation of signal interfaces
- Advanced WiFi connectivity & Network Security Protocols
- Resilient FW Bootload and OTA FW Upgrades
- Charge ports or single point battery connection replicates today's lead acid without special truck or charger modifications
- Family level UL certification and EE rating

### Flexible Design for Optimized Truck Applications

- Green Cubes custom Battery Management System (BMS) can be adjusted for different performance based upon the application
- High current trucks with accessories
- Extreme low temperature cold storage operations
- Fast Opportunity Charging without effecting cycle life
- Fully ballasted battery for heavy counterbalance trucks or non-ballasted batteries for light application

## Benefits: Low Total Cost of Ownership

- High cycle life
- True fast charge/ Opportunity Charge
- Low Maintenance
- Drop in Lead Acid replacement
- No watering
- No equalization charging
- No battery watering or washing

# Specifications

## SAFEFlex PLUS


Chemistry	Lithium Iron Phosphate			
Cycle Life	4000 Cycles			
Voltage Class	24V	36V	48V	80V
Nominal Capacity	420 - 630 Ah 11 - 16 kWh	525 - 945 Ah 20 - 36 kWh	525 - 840 Ah 26 - 43 kWh	315 - 735 Ah 26-61 kWh
Nominal Voltage	25.6 V	38.4 V	51.2 V	83.2 V
Operating Voltage	24 - 28.8 V	36 - 43.2 V	48 - 57.6 V	78 - 93.6 V
Discharge Current continuous (max RMS incl. peaks)	SB 175 connector: 250A all other connector options: 320 A	320 A		315Ah: 300 A ≥420Ah: 320 A
Discharge Current peak (max)	600 A	1200 A		1200 A 800 A
Charge Current continuous (max RMS)	320 A			315Ah: 240 A ≥420Ah: 320 A
Tray Material	Powder coated steel			
	24V	36V	48V	80V
Operating Temperature (with heater)	-4 to +129°F -20 to +54°C	-4 to +131°F -20 to +55°C	-4 to 122°F -20 to +50°C	-4 to +127°F -20 to +53°C
Operating Temperature (without heater)	32 to 129°F 0 to +54°C	32 to 131°F 0 to +55°C	32 to 122°F 0 to +50°C	32 to 127°F 0 to +53°C
Storage Temperature	32 to +95°F (0 to +35°C)			
Storage Humidity	≤ 70% RH			
Ingress Protection	IP 2X			
Battery Modes	Active (Charging, Discharging, Idle) Disabled (Sleeping, Ship/Storage)			
Cycle Life	CANBus, USB, Wi-Fi Separate CAN Bus for Truck and Charger All interfaces are isolated			
Charger	Multiple charger protocols supported			
Vehicle	Multiple vehicle protocols supported			
Short circuit protection	Yes - recoverable without service intervention			
Functional Safety Certified Protections	Cell Over- and Undervoltage Protection Cell Over- and Undertemperature Protection Module Overcurrent Protection Module Overvoltage Protection		Cell Over- and Undervoltage Protection Cell Over- and Undertemperature Protection Module Overcurrent Protection Module Overvoltage Protection Manual Service Disconnect	
Agency Approvals	UL 2580:2020 (MH66684) ISO 13849-1:2023/13849-2:2012 (MH66684) UN 38.3 Revision 7 Type EE			


### ABOUT GREEN CUBES TECHNOLOGY


Green Cubes Technology develops and manufactures a complete portfolio of lithium power systems that enable our OEM and enterprise customers to transition from Lead Acid and Internal Combustion Engine (ICE) power to Lithium-ion battery power. We utilize proven hardware and software platforms to build the most reliable lithium battery systems in our industries. With over 300 employees across five countries, Green Cubes has been producing reliable, high performance and high quality products for over 40 years.


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