

# U-CHARGE™ SAPHION™ TECHNOLOGY

## Family Datasheet

### Kilowatts of Safe Lithium-ion Power

Valence Technology delivers safe Lithium-ion technology in three convenient, standard BCI (Group U1, 24, & 27) Lead-acid replacement sizes for a large variety of applications. The U-Charge Power System is a family of 12-volt Lithium-ion energy storage systems that offers twice the run-time and a third less weight than lead-acid, outstanding calendar float life, and unsurpassed cycling with full depth of discharge, resulting in significantly lower total costs of ownership (TCO).

### Features and Benefits

- Patented Saphion Technology – inherently safe, rechargeable, lithium-ion chemistry with no thermal runaway
- Virtually zero maintenance over the service life of the battery – saves from high maintenance cost and wasted time
- Lightweight, high energy (2 times energy at same size and 3 times energy at same weight as lead acid) – reduces application weight and size; reduces freight costs especially to remote locations
- Outstanding cycling ability – 2,000 cycles at 80% Depth of Discharge; excellent deep discharge capability
- No battery memory effect – no loss of capacity at partial depths of discharge/charge
- No battery damage on full depth of discharge – realize full capacity of battery; no wasteful over-sizing needed
- Low Peukert's Effect (low capacity loss as discharge rates increase) – more usable energy at high discharge rates
- No Coup de Fouet Effect (no temporary voltage droop) – protects sensitive equipment from damage
- Standard CC-CV charge method – can use existing lead acid chargers; no special lithium-ion charger needed
- Sleep mode (low self-discharge) – no seasonal conditioning needed for long term storage
- No sudden death syndrome – linear and predictable battery fade is reliable down to 50% of original capacity
- No explosive hydrogen gassing – eliminates expensive hydrogen monitoring equipment; no separate battery room
- No corrosion on power terminals – reduces costs by eliminating periodic cleaning
- No free electrolyte – no electrolyte re-filling; does away with the eye wash station and goggles requirement
- No equalization charge needed – no more wasted time from “babysitting” batteries
- Flat discharge curve over time – maintains higher voltage/power even towards end of charge
- Environmentally friendly phosphate based chemistry – below EPA's Toxicity Characteristic Leaching Procedure (TCLP); no recycling needed; please follow local laws/regulations for disposal

### Applications and Usage

- Electric & Hybrid Vehicles (automotive, motorcycle)
- Electric Wheelchairs, Scooters, Bicycles
- Unmanned Vehicles & Robots
- Specialized Military Applications
- Uninterruptible Power Supply Systems
- Material Handling & Lift Equipment
- Turf & Ground Support Equipment
- RV & Marine Power Storage
- Emergency Lighting Systems
- Fire Alarm & Security Systems
- Broadband & Network Backup Systems
- Electric, Water, Petroleum, Mining Facility Backup
- Peak Shaving & Load Balancing Applications
- Alternative Energy Storage (Solar, Wind, Hydro)
- Telecommunications Backup
- Portable Remote Power Source



### Available Now At

Valence Technology, Inc.  
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**Detailed Specifications**

U-Charge Family Models		U1-12FN40	U24-12FN100	U27-FN130
Nominal Voltage C/5	V	12.8V		
Capacity 25°C (77°F), C/5	Ah	40Ah	100Ah	130Ah
Reserve Time (BCI std)	@ 25A	95 minutes	239 minutes	312 minutes
Energy 25°C (77°F), C/5	Wh	550Wh	1310Wh	1680Wh
BCI Group Number		Group U1	Group 24	Group 27
Dimensions LxWxH including terminals	mm	198 x 135 x 186 mm	265 x 173 x 225 mm	308 x 173 x 229 mm
	in	7.79 x 5.31 x 7.32 in	10.43 x 6.81 x 8.86 in	12.12 x 6.81 x 9.01 in
Weight	kg (lbs)	6.0 kg (13.2 lbs)	13.4 kg (29.4 lbs)	16.6 kg (36.6 lbs)
Specific Energy	Wh/kg	91.6 Wh/kg	97.8 Wh/kg	101 Wh/kg
Energy Density	Wh/L	130 Wh/L	135 Wh/L	146 Wh/L
Max 30 sec Pulse Discharge Current		150A	200A	200A
Max Continuous Discharge Current		100A	100A	100A
Charge Method	CC-CV	limit Max Charge Current, maintain Min Charge Voltage, let current naturally decay to less than 0.5A, leave on float		
Min Charge Voltage	float	13.8V (for long float life)		
Max Charge Voltage	quick	14.6V (for quick re-charge)		
Optimum Charge Current	life	20A or lower	50A or lower	65A or lower
Max Charge Current	quick	40A	100A	100A
Example Charge Time to 100% (Max Charge Voltage)	12A	230 minutes	575 minutes	747 minutes
	40A	69 minutes	173 minutes	224 minutes
	100A	N/A	72 minutes	92 minutes
OCV Range (0 - 100% SoC)		11.6V to 13.8V (after 30 minutes disconnected from load)		
Discharge Cutoff Voltage		10.5V (recommended voltage for external disconnect)		
Environment Temperature Range	Charge	0°C to 45°C (32°F to 113°F)		
	Discharge	-20°C to 60°C (-4°F to 140°F)		
	Storage	-40°C to 45°C (-40°F to 113°F)		
Terminal Type		"L" terminal with 0.28" hole to accept 0.25" bolt	top mounted, brass female terminal, Type S with 5/16" - 18 thread	
Terminal Torque (do not over tighten)		40 in*lbs (4.5 N*m)	24 in*lbs (2.71 N*m) <b>tighten only enough to compress lock washer</b>	
# Cycles to 80% original capacity		2000 cycles @ 80% Depth of Discharge, 23°C (73°F)		
Capacity Fade Character		linear, shallow fade; reliable to 50% original capacity		
Calendar Float Life @ Min Float V.		10 years at 25°C (77°F) to 60% original capacity		
Battery Management Unit (BMU)	description	separate module provides cell balancing and protection (see user manual)		
	dimensions	355 x 120 x 57 mm (13.97 x 4.72 x 2.24 in)		
Abuse Protection		overcharge, over-discharge, over-temperature		
Protection Devices		Saphion cell chemistry, cell PTC, optional contactor, sleep mode		
Built-in Communications		two RJ45 ports using RS-485 serial interface with Modbus Protocol		
Monitoring Parameters		cell voltage, cell pack temperature		
Status Indicators	3 LEDs	normal, fault condition, communications		
Storage Recharge Interval (months @ average temp)	°C	sleep mode & 50% SoC: -40°C=24mo; 0°C=18mo; 25°C=12mo; 45°C=6mo		
	°F	sleep mode & 50% SoC: -40°F=24mo; 32°F=18mo; 77°F=12mo; 113°F=6mo		
Operating Humidity		5% - 95% relative, non-condensing		
Warranty		application dependent; see Valence Representative		
Flammability Rating		UL 94V-0		
Shipping State of Charge		~90% SoC	~40% SoC	~30% SoC