# The MICROLYTE ML Series

12V Lithium-Ion battery. Incorporating SEC smartphone battery performance indicating technology

# Brute power in a small package





# **MICROLYTE ML**



# **Specification**

Positive electrode:	Nano-LiFePO <sub>4</sub> on Aluminum foil
Negative electrode:	Nano-Carbon on Copper foil
Max. charge current:	0.5C for less than 180min or 0.8C for less than 120min at $25^{\circ}$ C
Max. charge voltage:	14.6V ± 1% at 25°C
Electrolyte:	Lithium electrolyte salt LiPF6 with EC:DMC:EMC solvent
Safety valve:	0.8 MPa opening pressure
Separators:	PE film
Terminals:	Nickel plated Brass terminal for M-Bolts
Electrical:	12V 24Ah - 12V 200Ah at C/2 to 8V @ 25°C

# <image>

# **Design life**

Years:	10 years in float service @ 25°C
Cycles:	>2000 cycles for continuous 0.5C discharge @ 100% DOD at 25°C
Produc	ct compliance
IEC	62133-2012
UL	1642
UN	38.3
Compa	any Accreditation
ISO	9001:2015
ISO	14001:2004

# **Product information**

#### Ideal for space critical applications

The ML is compact, robust and incredibly reliable. It is constructed with world class nano LiFePO<sub>4</sub> cathode material to produce fast charging, stable units that are extremely effective in a wide temperature range. The small volume and high charge/discharge rates make this range an ideal choice where energy density and space are prime requirements.

The MICROLYTE Lithium (ML) range is among the first in the market to utilise Lithium to its true potential. SEC has formed strategic alliances with world-class material and equipment suppliers to create this range, which uses patented nano technology in both positive and negative electrodes to increase uniformity, reliability and performance.

# **Product benefits**

#### Super light and compact

Ideal for space-critical applications, the ML is compact and lightweight. When fully installed it has energy densities two to three times higher than typical Lead Acid batteries.

#### Absolute reliability under harsh conditions

The ML battery from SEC is suitable for use in harsh environments such as those plagued by vibration and high temperature and has a wide operational temperature range between  $-20^{\circ}$ C to  $+60^{\circ}$ C. It tolerates freezing and has an extended lifetime while stationary cycling at high temperatures > 20°C.

#### Performance-indicating technology

The SEC ML battery incorporates a smartphone app with battery performance-indicating technology. Providing instant access to battery status information whenever you need it.

#### The power you need for leisure applications

The ML has notable power density, which makes it perfect for leisure applications like golf carts, electric vehicles, marine and motive applications. Hardworking, small and lightweight, the MICROLYTE Lithium (ML) range offers multiple benefits. The uniformity of the nano-phosphate particle size provides excellent batch stability and enhanced conductivity.

Due to the patented nano material structures, the ML range has very high recharge and discharge rates, higher in fact than leading competitors' Lithium Iron Phosphate technologies. Combine all of this with its ability to fully function at temperatures as low as -20°C and you'll struggle to find a competitor in both price and performance.

#### **Excellent stability and conductivity**

The SEC ML battery has a high uniformity nano material  $\rm LiFePo_4$  cathode which ensures excellent electrical conductivity and batch stability.

#### **Quick charging**

The ML has extremely low internal resistance and low heat generation. This allows quick recharge and operation at cooler temperatures, making it more efficient when your application demands a quick charge/recharge turnaround.

#### Prismatic cell design

Crafted with a prismatic cell design, the ML offers higher energy densities than traditional Lithium cell designs.

"Lithium-lon technology offers high energy and power densities more than double that of Lead Acid. The Lithium Iron phosphate technology used by SEC is the safest and most reliable of all lithium chemistries. Although more expensive than Lead Acid, the ML series is unbeatable where life cycle costs, high performance and reliability under all conditions are required."

# Dr Mike McDonagh, SEC Group

# **Innovative design**

- **9 Extended cycle life means low lifetime cycle costs**
- **9** Needs half the space and weighs less than one third of a comparable Lead Acid battery
- S Flat discharge curve gives more power at all states of charge
- 9 Has a wide operating temperature range without thermal runaway
- **5** High discharge and recharge rates
- **5** Low self-discharge and low operating costs due to higher energy efficiency
- **SEC Smart Battery performance-indicating technology**

# **Applications**



### **Performance-indicating technology**



#### An SEC Smart Battery







# Information

#### The latest bluetooth technology for Lithium batteries

Discover the SEC Smart Battery Application for iPhone and Android. Measure the performance and charge life of your MICROLYTE Lithium with one simple swipe.

It's the first of its kind in the world, and perfect for everyone from weekend leisure users to those supervising industrial applications. With the SEC Smart Battery, you'll always know where you stand.

#### **Developer notes**

The SEC Smart Battery APP runs via bluetooth on Android 4.3 and ios 6.0 or later. It is effective within 5 metres.

Appropriate mobile phone or tablet hardware is needed to support this low energy bluetooth application.

Install the latest version of The SEC Smart Battery App by scanning below or by visiting the Apple Store or Google Play.

Ca	pa	bil	liti	es
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- **S** Voltage reading
- **S** Capacity reading
- **5** Discharge status
- **S** State of charge (SOC)
- **Series specification**

S	Temperature	
S	Lapsed cycles	
\$	Error notification	
S	Events recorder	



# Engineering

#### **Battery outline**



# **Cell dimensions**

Dimensior	ns/ Weights	/ Data									
SEC	Nominal	Battery	Overall	<b>Overall battery dimension</b>		Internal	Maximum	Support	Support	80%	Terminal
model type*	capacity C/2 to 8V	weight	Length	Width	Total	resis- tance	series/ parallel	max charging	max discharge	SOC charge	Bolt
		kg	mm	mm	mm	<b>(m</b> Ω)	connection*	current**	current **	current	
12-ML-24	12V 24Ah	3.50	165	125	175	≤ 40	4S4P	24A	20A	20A/ 57.6min	M6
12-ML-40	12V 40Ah	5.50	198	166	170	≤ 30	4S4P	40A	40A	40A/ 48min	M6
12-ML-50	12V 50Ah	7.50	229	138	228	≤ 30	4S4P	40A	40A	40A/ 1hr	M6
12-ML-60	12V 60Ah	10.0	260	168	227	≤ 20	4S4P	40A	40A	40A/ 1.2h	M6
12-ML-80	12V 80Ah	12.5	307	169	215	≤ 15	4S4P	80A	80A	80A/ 48min	M8
12-ML-100	12V 100Ah	13.0	329	173	215	≤ 10	4S4P	80A	80A	80A/ 1h	M8
12-ML-125	12V 125Ah	16.0	341	173	283	≤ 10	4S3P	80A	80A	80A/ 1.2h	M8
12-ML-200	12V 200Ah	25.0	532	207	240	≤ 10	4S2P	80A	80A	80A/ 2h	M8

# Capacity

Ampere Hour at 25°C								
SEC	Discharge capacity at 25°C							
model type	End volts			Discharge time in hour	S			
	-	2hr @	60min @	30min @	20min @	12min @		
		0.5C	1C	2C	3C	5C		
12-ML-24	8V	24.0		BMS limited, refer to	over-current protection			
12-ML-40	8V	40.0	40.0	BMS limit	ed, refer to over-current	protection		
12-ML-50	8V	50.0	49.9	BMS limit	ed, refer to over-current	protection		
12-ML-60	8V	60.0		BMS limited, refer to	over-current protection			
12-ML-80	8V	80.0	79.9	BMS limit	ed, refer to over-current	protection		
12-ML-100	8V	100.0	99.9	BMS limit	ed, refer to over-current	protection		
12-ML-125	8V	125.0		BMS limited, refer to	over-current protection			
12-ML-200	8V	200.0		BMS limited, refer to	over-current protection			

# Current

Amperes at 25°C	;							
SEC	Discharge amps at 25°C							
model type	End volts		Discharge time in hours					
	-	2hr @	60min @	30min @	20min @	12min @		
		0.5C	1C	2C	3C	5C		
12-ML-24	8V	12		BMS limited, refer to	over-current protection			
12-ML-40	8V	20	40 BMS limited, refer to over-current protection			t protection		
12-ML-50	8V	25	50	BMS limi	ted, refer to over-curren	t protection		
12-ML-60	8V	30		BMS limited, refer to	over-current protection			
12-ML-80	8V	40	80	BMS limi	ted, refer to over-curren	t protection		
12-ML-100	8V	50	100	BMS limi	ted, refer to over-curren	t protection		
12-ML-125	8V	63		BMS limited, refer to	over-current protection			
12-ML-200	8V	100		BMS limited, refer to	over-current protection			

# Power

Watts at 25°C						
SEC			Discharge	watt at 25°C		
model type	End volts			Discharge time in hou	rs	
		2hr @	60min @	30min @	20min @	12min @
		0.5C	1C	2C	3C	5C
12-ML-24	8V	152		BMS limited, refer to	over-current protection	
12-ML-40	8V	254	499 BMS limited, refer to over-current protection			t protection
12-ML-50	8V	317	624	BMS limi	ted, refer to over-current	t protection
12-ML-60	8V	381		BMS limited, refer to	over-current protection	
12-ML-80	8V	508	898	BMS limi	ted, refer to over-current	t protection
12-ML-100	8V	635	1248	BMS limi	ted, refer to over-current	t protection
12-ML-125	8V	793		BMS limited, refer to	over-current protection	
12-ML-200	8V	1267		BMS limited, refer to	over-current protection	

# **Operating temperature**

Recommended operating temperature charge	0 to +45°C
Cell exterior when charging	<65°C at ambient temp 25°C
Discharge	-20 to +60°C
Cell exterior when discharging	<80°C at ambient temp 25°C

# **Charging method**

End of charge voltage	14.6V at CC mode
Maximium charge voltage	14.6V at CC mode
End of charge current	0.05C at CV mode
Standard charge method*	0.5C at CC/CV mode for less than 180min
Fast charge method*	0.8C at CC/CV mode for less than 120min

# **Battery management system**

Protection Item	Description	Model						
		12-ML-24	12-ML-40	12-ML-50 12-ML-60	12-ML-80	12-ML-100 12-ML-125 12-ML-200		
Over charge	Cell over charge protection	3.75V	3.75V	3.75V	3.75V	3.75V		
	Over-charge protection delay time	2s	2s	2s	2s	2s		
	Over-charge protection recovery voltage	3.60V	3.60V	3.60V	3.60V	3.60V		
Over discharge	Cell over-discharge protection	2.00V	2.00V	2.00V	2.00V	2.00V		
	Over-discharge protection delay time	2s	2s	2s	2s	2s		
	Over-discharge protection recovery voltage	2.50V	2.50V	2.50V	2.50V	2.50V		
Charge over-current	Charge over current protection 1	25A	40A	55A	80A	110A		
protection 1	Over current delay time	15s	15s	15s	15s	15s		
Charge over-current protection 2	Charge over current protection 2	50A	70A	90A	150A	150A		
	Over current protection delay time	3s	3s	3s	3s	3s		
Charge over-current protection 3	Charge over current protection 3	100A	140A	140A	400A	400A		
	Over current protection delay time	200µs	200µs	200µs	200µs	200µs		
Discharge over-current	Discharge over current protection 1	25A	40A	55A	85A	110A		
protection 1	Over current protection delay time	15s	15s	15s	15s	15s		
Discharge over-current	Discharge over current protection 2	70A	70A	90A	200A	400A		
protection 2	Over current protection delay time	3s	3s	3s	3s	3s		
Discharge over-current	Discharge over current protection 3	80A	140A	140A	440A	440A		
protection 3	Over current protection delay time	10ms	10ms	10ms	30ms	30ms		
Short circuit protection	Short circuit protection	100A	210A	210A	500A	500A		
	Short circuit protection delay time	200µs	200µs	200µs	200µs	200µs		
Temperature protection	Over temperature protection	65°C	65°C	65°C	65°C	65°C		
	Recovery temperature	50°C	50°C	50°C	50°C	50°C		
	Under temperature protection	-10°C	-10°C	-10°C	-10°C	-10°C		
	MOSFET temperature protection	103°C	103°C	103°C	103°C	103°C		
	MOSFET temperature recovery	75°C	75°C	75°C	75°C	75°C		

Working condition of BMS

Temperature range	-20 to 60°C
Relative humidity	< 75%

# **Cycle life**

#### Relationship between depth of discharge and life

Ambient temperature 25°C



The depth of discharge critically affects the number of cycles which a battery will complete during its life time. The Lithium-Ion battery outperforms conventional Lead Acid by at least a factor of two.

# **Discharge characteristic**

#### Discharge current VS discharge time curve

Ambient temperature 25°C



# **Charge method**

#### Continuous current/voltage charge characteristic



# Join the SEC Partner Grid Programme for increased profits

The energy storage market is booming. From 2012 to 2016, the market has tripled from 6 billion to 18 billion US dollars, driven in large part by renewable energy needs. With more than half of the world's energy supply destined to come from renewable energy sources in the near future, continued rapid growth is a certainty. The opportunities are immense.

Let us help you expand your share of this expanding market and maximise your profits with the SEC Partner Grid Programme. We provide our partners with quality leads generated by our global marketing efforts.

Partners also receive free technical and sales marketing training, discounts, software, rewards for developing new sources of repeat business, and even subsidies for marketing efforts.



# **Benefits**

#### Lead generation

**Technical training** 

**Product discounts** 

Market growth incentives

Sales and marketing training

Partner performance awards

Customer recruitment rewards

On demand technical and sales support

Online tools for easy direct access to SEC



Contact us today to learn more about how you can grow your profits in the booming market for energy storage with the SEC Partner Grid Programme.

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