

# CMX SERIES

SMART LITHIUM ION BATTERIES + CHARGERS  
FROM ACCUTRONICS



**entellion**  
pre engineered power solutions

Entellion products are smart, innovative portable power products, designed to meet the emerging needs of feature-laden devices in professional markets. Created and manufactured by Accutronics, Entellion combines our expertise in custom OEM battery products with our understanding of professional OEM requirements and market trends. Entellion products are available off the shelf and can also be customised for your application, getting you to market quickly and confidently.

**entellion**  
pre engineered power solutions



# CMX SERIES SMART LITHIUM ION BATTERIES & CHARGERS

## THE MEDICAL MARKET REQUIREMENTS

Rechargeable batteries are usually required in portable and transportable medical equipment, either to power the equipment directly or to provide a back-up power source.

As many hi-tech medical devices such as acute ventilators, anaesthesia workstations and intra-oral scanners free themselves from the confines of mains electricity there is a growing demand for rechargeable batteries with a high power capability that can safely and reliably deliver energy to these devices.

Medical Original Equipment Manufacturers (OEMs) have long looked to battery companies to provide the answers, but have often been let down by a lack of understanding of their requirements, this may be due to increasing regulatory framework, demanding development schedules or the need for products to be truly innovative at a time when medical OEMs are under pressure to reduce costs and increase the value in each product they sell.

It is against this background that Accutronics has developed the Entellion CMX series of Lithium ion batteries and chargers. CMX has been specifically designed for medical OEMs following extensive research and discussion with customers and hospitals. CMX series batteries and chargers are available off-the shelf or can be easily customised to meet a particular OEM requirement.



CMX has been specifically designed for medical OEMs following extensive research and discussion.



# THE TECHNOLOGY: LITHIUM ION

CMX series batteries use rechargeable Lithium ion cell technology throughout. Lithium ion has a proven track record in providing safe, reliable power to devices we use in our everyday lives and is now used to power everything from smart phones to electric cars.

'Lithium ion' is the umbrella term for a battery technology that uses the intercalation of Lithium ions between a graphitic anode and a layered oxide cathode. The technology provides high energy density, excellent safety, low self-discharge and outstanding cycle life.

Through careful selection of cathode formulation and cell construction a wide range of Lithium ion cells have been developed that provide specific performance attributes, such as high discharge capability or high volumetric energy density.

The four batteries in the CMX range use different cell types to provide specific performance attributes which are required for the medical device market.

8 CELL MODEL

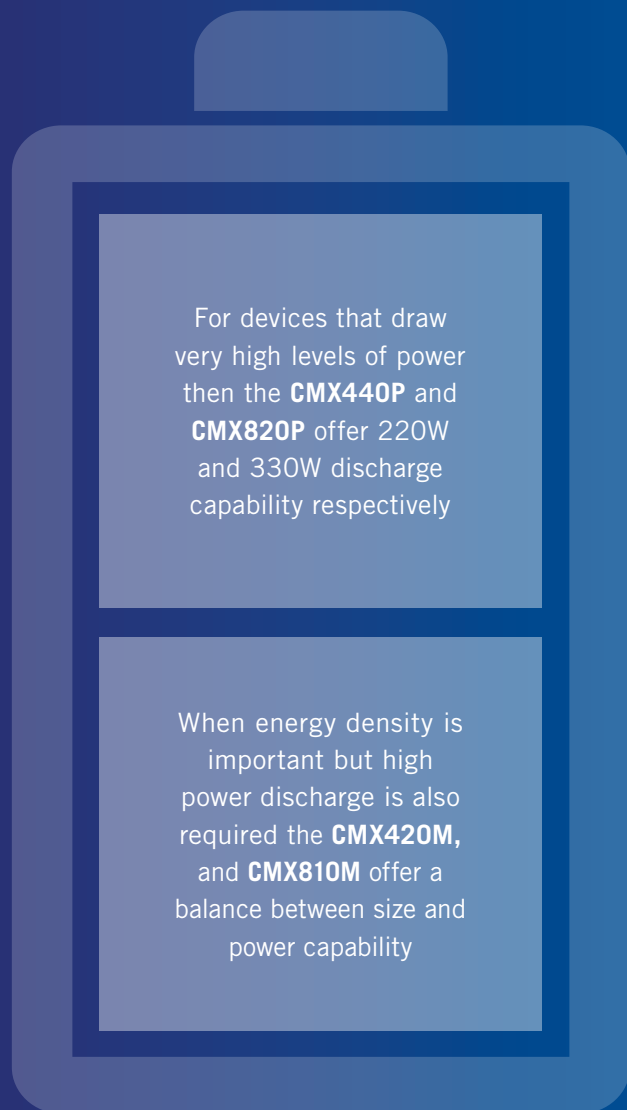


16 CELL MODEL



## POTENTIAL

CMX series batteries are available in two different voltage outputs (14.4V and 28.8V). 14.4V models operate between 16.8V and 11.0V while 28.8V models between 33.6V and 22.0V. These two high voltage options allow medical devices to be powered more efficiently through a reduction in current consumption.



For devices that draw very high levels of power then the **CMX440P** and **CMX820P** offer 220W and 330W discharge capability respectively

When energy density is important but high power discharge is also required the **CMX420M**, and **CMX810M** offer a balance between size and power capability

AVAILABLE IN TWO DIFFERENT VOLTAGE OUTPUTS:

14.4V

28.8V

## CASING

Available in two sizes, CMX series batteries contain either eight or sixteen cells. All cases are manufactured from tough UL94V-0 rated plastic and are coloured 'traffic white' to better complement the medical environment. A pull tab on the end of the battery provides easy removal from the device.

## CONNECTIONS

CMX series batteries feature an industry standard 7W2S connector. Both power and signal connections (battery positive, battery negative, SMBus Clock, SMBus Data, Battery Present and safety sense resistor) are made through this interface. Mating halves are available in numerous configurations to suit any orientation and configuration in the OEM equipment. The connector is protected from accidental damage by two 'tusks' that protrude from the battery casing.



CMX series batteries can be easily customised to meet the specific needs of the OEM.



## REGULATORY CERTIFICATION

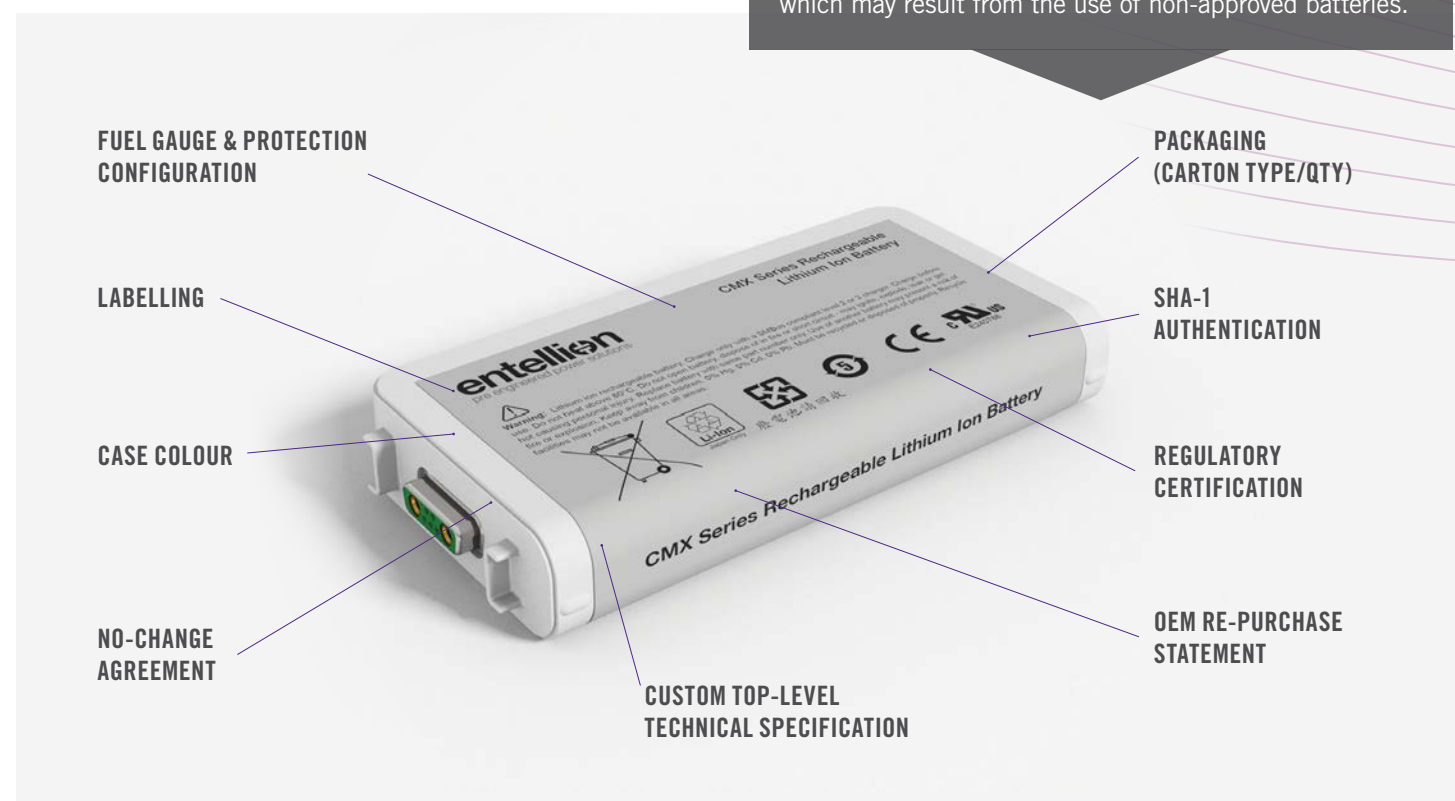
CMX series batteries comply with the regulatory certifications necessary for use in medical devices. In terms of safety they meet the requirements of IEC 62133:2012, UL 62133 and CAN CSA E62133:13 which allows seamless integration into any battery powered medical device being certified to UL / IEC 60601-1.

All CMX series batteries meet the requirements of The Transport of Dangerous Goods, Methods of Tests and Criteria, UN ST/SG/AC.10.11 Rev5 Section 38.3 which is a mandatory requirement for the transportation of Lithium ion batteries.

Having a energy rating less than 100 watt hours means all CMX series batteries are more easily offered for transport whether shipped by road, sea, air or rail.

## CUSTOMISATION

CMX series batteries are available as a standard product with Entellion branding or can be easily customised to meet the specific needs of the OEM. Customisation options include product labelling, case colour and software set-up. Custom versions of CMX series batteries can also be programmed to include a unique 'authentication key' which allows your device to interrogate your customised battery and determine if it is a valid part thus enabling batteries not deemed to be valid to be rejected by the host device. SHA-1 authentication helps protect your aftermarket sales revenue and can prevent fraudulent warranty claims which may result from the use of non-approved batteries.





## ACTIVE AND PASSIVE PROTECTION

Product safety is of paramount importance. Accutronics follow industry best practise when implementing battery protection. All CMX series batteries feature active and passive protection systems to ensure they remain totally safe during transportation, storage and use. Batteries are internally protected from being overcharged, over discharged, overloaded or short circuited. Thermal sensing provides alarms if the battery is too hot and will remove the battery from circuit if its temperature during charge or discharge exceeds safe levels. A redundant, secondary active protection circuit permanently disables the battery if an unsafe condition exists. These 'nested' levels of protection ensure that CMX Series batteries remain safe under all conditions.

## CELL BALANCING

CMX series batteries contain cell balancing circuitry which works to minimise the minor differences in cell capacity, boosting available capacity and extending battery life.

## SMART BATTERY FUNCTIONALITY

CMX series batteries are intended to be integrated into medical devices as part of a smart power management system. In such a system the battery, smart charger and the host device communicate with each other to maximise product safety, efficiency and performance.

By only requesting charge when they need it, smart batteries charge more efficiently and use less power.

Smart batteries maximise the runtime per discharge cycle because they tell their host device when to shut down based on a highly accurate remaining capacity prediction. This method is superior to dumb systems that use a fixed voltage cut-off.

Host medical systems that use smart battery technology can provide accurate, meaningful runtime information to users – of vital importance in a medical environment where power failure is not an option.

## SMART FUEL GAUGING

Each CMX series battery constantly tracks its own capacity whether it is being charged, discharged or stored. The battery fuel gauge uses an impedance tracking algorithm to predict remaining capacity so OEMs can provide users with a device runtime they can trust. Battery capacity is reported in milli-ampere hours (mAh) to a resolution of 1mAh. The real time capacity is reported in both mAh and as a percentage (of the original design capacity and of the last time the battery was charged). An LCD bar-graph visual state of charge indicator on the battery displays battery capacity in 20% increments.

## SMART CHARGE CONTROL

CMX series batteries maximise charge efficiency and safety by requesting their own charge voltage and current from a compatible smart charger. This method ensures that batteries are only charged when they need to be, and at the most appropriate voltage and current for the prevailing environmental conditions. Smart charging future-proofs the system as it allows for future batteries to be developed with higher storage capacity and different charging regimes without having to replace the chargers in the field.

## SMART COMMUNICATION

Being SMBus (System Management Bus) and SBDS (smart battery data specification) compliant means that CMX Series batteries comply with an open standard which is easily accessible by OEM device developers. Along with the SBCS (Smart battery charger specification) and the SBSMC (Smart Battery System Manager Specification) the SBS standard describes all of the information that can be communicated between smart batteries, chargers and host devices.

“  
The battery, smart charger  
and host device communicate  
with each other to maximise  
product safety, efficiency and  
performance.”



# CHARGER OPTIONS

Depending on the device user profile it may be necessary to charge CMX batteries outside the equipment, inside or a combination of both.

Accutronics has two off-the-shelf options for charging CMX series batteries which cater for either scenario.

50ABB002

## INTERNAL SINGLE CHANNEL CHARGER

50ABB002 is PCBA level charging module which has been designed to offer single channel smart charging of a single CMX series battery at currents up to 2500mA. An I<sup>2</sup>C interface allows host control of the charger and for the host to interrogate the battery. Up to eight charger modules can be integrated into a system as each has its own programmable I<sup>2</sup>C address. Each charger module can have both its charging voltage and current programmed by the host device, offering increased flexibility. The charger has a footprint of just 120mm x 60mm and weighs <74g, allowing it to be easily designed into OEM devices with minimal effort.

An evaluation PCBA is also available (part number EVAL008) which allows easy connection to 50ABB002 during testing.

CX9024

## EXTERNAL DUAL BAY DESKTOP CHARGER/CALIBRATOR

The CX9024 is the ideal accessory to charge and maintain CMX series batteries.

CX9024 is fully SMBus (System Management Bus) and SBSC (Smart Battery Charger Specification) compliant, which allows for seamless interoperability between compliant batteries and chargers. CMX series batteries communicate their desired charging voltage and current to the charger which responds accordingly allowing charging to be under the control of the battery. This method of operation is extremely safe and efficient thereby maximising battery life and negating the need for a charger upgrade when new versions of CMX series batteries become available.

The CX9024 dual bay charger/calibrator can perform a maintenance check on batteries where they are cycled through a calibration regime – *optimising fuel gauge accuracy and examining state of health*. This function allows hospitals maintenance departments to perform routine checks on batteries without the need to remove medical devices from service.

Powered directly from an AC wall outlet via a standard IEC socket – the CX9024 requires no external power adapter which simplifies set-up and prevents vital parts from being mislaid. The charger includes a 'K-slot', enabling the fitment of a Kensington lock to prevent unauthorised removal when in use.

KENSINGTON  
SLOT FOR  
SECURITY

CUSTOMISABLE  
FOR OEMS

GLOSS  
WHITE, EASY  
TO CLEAN

“

The maintenance department of hospitals can perform routine checks without having to remove the medical device from service.

”



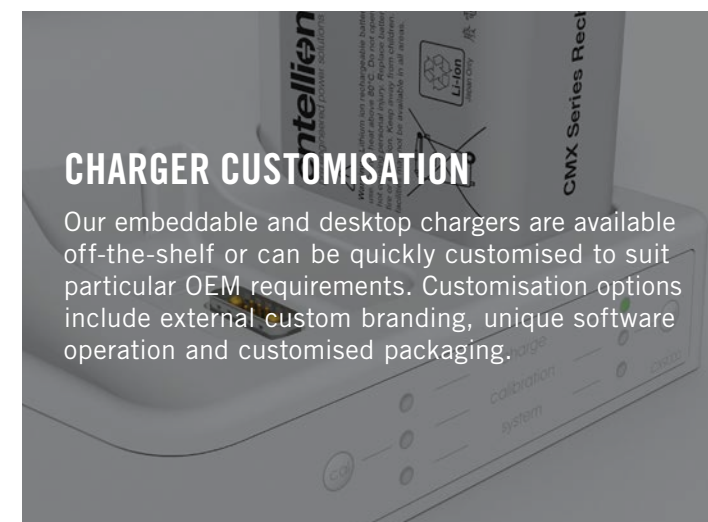
CX9024



CHARGER MODULE (50ABB002) MOUNTED  
ON EVALUATION MODULE (EVAL008)

## CHARGER CUSTOMISATION

Our embeddable and desktop chargers are available off-the-shelf or can be quickly customised to suit particular OEM requirements. Customisation options include external custom branding, unique software operation and customised packaging.



# TECHNICAL SPECIFICATIONS



**MADE IN THE UK**  
CMX series batteries and chargers are designed and assembled in the United Kingdom by Accutronics Ltd.

CMX SERIES BATTERIES		CMX820P	CMX810M	CMX440P ◆	CMX420M ◆
<b>Voltage</b>	0.2CmA (Typical)	28.8V		14.4V	
<b>Capacity</b>	0.2CmA (Typical)	3200mAh	2550mAh	6400mAh	5100mAh
	0.2CmA (Minimum)	3000mAh	2500mAh	6000mAh	5000mAh
<b>Energy</b>	0.2CmA (Typical)	92.2Wh	73.4Wh	92.2Wh	73.4Wh
<b>Charging</b>	Voltage (Maximum)	33.6V		16.8V	
	Current (Maximum)	2500mA	2500mA	4000mA	4000mA
	Temperature (Range)	0°C to +40°C (ambient inside host device)			
<b>Discharging</b>	Cut-Off Voltage	22.0V		11.0V	
	Current (Maximum)	15A	10A	20A	20A
	Power (Maximum)	330W	220W	220W	220W
	Temperature (Range)	-20°C to +50°C (ambient inside host device)			
<b>Storage</b>	Temperature (Range)	-10°C to +50°C			
	Humidity	<95%			
<b>Lifetime</b>	Cycle Life	>500 cycles (to 80% of minimum capacity based on 0.5CmA charge and 0.5C discharge at +20°C)		>500 cycles (to 80% of minimum capacity based on 0.5CmA charge and 0.5C discharge at +20°C)	
<b>Mechanics</b>	Length (Nominal)	170.5mm			
	Width (Nominal)	85.0mm			
	Height (Nominal)	48.0mm	28.0mm	48.0mm	28.0mm
	Weight (Nominal)	880g	530g	880g	530g
	Material and Colour	UL94V-0 rated injection moulded plastic in 'Traffic White'			
<b>Electronics</b>	Fuel Gauge	SMBus (System management Bus) / SBDS (Smart Battery Data Specification) compliant with an impedance tracking fuel gauge			
	Active Protection	Primary active protection for over-voltage, under-voltage, over-current, short circuit and over temperature. Secondary active protection for over-voltage, over temperature and cell failure			
	Connector interface	D-Sub 7W2S mixed power/signal connector			
<b>Certification</b>	Transportation	UN ST/SG/AC.10.11 Rev5 Section 38.3			
	Safety	IEC 62133:2012, UL 62133 and CAN CSA E62133:13			
	CE	Compliant with applicable directives			

◆ CONTACT US FOR AVAILABILITY

EMBEDDABLE CHARGER		50ABB002			
<b>Battery Compatibility</b>					
<b>Communication</b>	I <sup>2</sup> C interface allows host control of the charger and for the host to interrogate the battery				
<b>Charge Voltage</b>	Programmable over I <sup>2</sup> C. Maximum charge voltage = 33.6V				
<b>Charge Current</b>	Programmable over I <sup>2</sup> C. maximum charge current = 2.5A				
<b>Dimensions</b>	Length	120mm			
	Width	60mm			
	Height	26mm (including header pins)			
<b>Weight</b>	<74g				
<b>Connectors</b>	Battery	Harwin M20-7830846 16 way (8 + 8 Way) socket, 2.54mm pitch			
	Host	Harwin M20-7831046 20 way (10 + 10 Way) socket, 2.54mm pitch			

DESKTOP CHARGER		CX9024			
<b>Compatibility</b>					
<b>Communication</b>	SMBus (System Management Bus) and SBDS (Smart Battery Charger Specification) compliant				
<b>No. of Charging Bays</b>	2				
<b>Battery Connection</b>	D-Sub 7W2P mixed power/signal connector				
<b>Charging</b>	Voltage (Range)	16.8V to 33.6V			
	Current (Maximum)	2500mA			
	Temperature (Range)	0°C to +40°C			
<b>Storage</b>	Temperature (Range)	-10°C to +55°C			
<b>Dimensions</b>	Length (Nominal)	250.0mm			
	Width (Nominal)	250.0mm			
	Height (Nominal)	80.0mm			
<b>Weight</b>	<2700g				
<b>IP rating</b>	41				
<b>Colour</b>	Traffic white				
<b>Power Supply</b>	Internal PSU accepts 90-264VAC supply				
<b>Mains Connection</b>	IEC C14 type				
<b>Cooling</b>	Integrated temperature controlled cooling fan with service department replaceable filter				
<b>Status Indication</b>	LED indicates the presence of external power to the charger. Additional LEDs for each bay indicate the charging, calibration and operational status of each battery.				
<b>Calibration Time</b>	24 hours maximum				
<b>Certification</b>	Safety	UL60950-1 and IEC60950-1			
	CE	Compliant with applicable directives			

◆ CONTACT US FOR AVAILABILITY

- Specification details are correct at the time of printing.
- For the latest data please refer to published specifications which are available on our website at [www.accutronics.com](http://www.accutronics.com)
- Accutronics® and Entellion® are European Community registered trade marks of Accutronics Ltd
- Operator & regional variations may apply to the transport of Lithium Ion batteries. Check with your operator.

**entellion**  
pre engineered power solutions

**ACCUTRONICS LTD**

Unit 20 Loomer Road  
Chesterton  
Newcastle under Lyme  
Staffordshire  
ST5 7LB  
United Kingdom

**TEL** +44 (0) 1782 566622  
**FAX** +44 (0) 1782 576640  
**EMAIL** [sales@accutronics.co.uk](mailto:sales@accutronics.co.uk)  
**WEB** [www.accutronics.com](http://www.accutronics.com)

**accutronics**  
AN ULTRALIFE COMPANY

Battery  
solutions  
you can  
trust