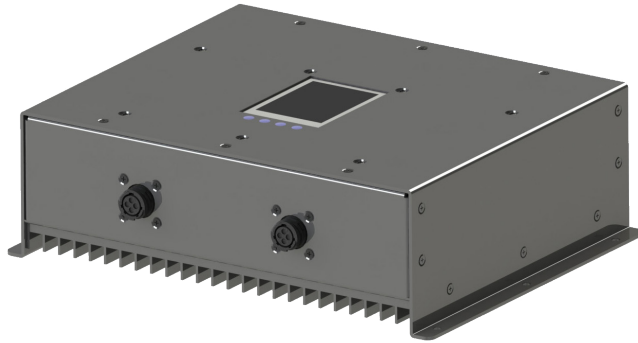


Versatile and Programmable 2-bank Lithium/LiPO Charging System



- **California Energy Requirement compliant**
- **Fully isolated and programmable banks**
- **Sealed Unit with optional fan cooling**
- **Customized charge algorithms**
- **Transient protected input/output**
- **Over temp protection with auto reset**
- **Overcurrent / overvoltage protected**
- **Digital and Ethernet Communications**
- **Remote GUI monitoring**
- **AC and DC input options**
- **Diagnostic Routine**
- **Reverse polarity protected**
- **Four Year Warranty**

Description

The CTMB2 is a 2 bank and versatile and sophisticated charging system for charging lithium and LiPO batteries and battery packs. Each bank can be programmed independently for either type of battery.

With a wide operating temperature range (-20C to 50C) and environmentally rugged design, it is especially suited for high end industrial applications. The CTMB2 precisely controls the charging algorithm to insure a complete recharge every time.

Each bank is electrically isolated with no common negative or positive, and operation is completely automatic. This multibank charging system has six factory standard

battery algorithms that can be customized upon request. A user friendly and very informative LCD display is the programming interface. The display also has a digital volt meter, amp meter, charging status and timing indicators.

The enclosure is completely sealed from dust, other environmental contaminants and is splash proof. The CTMB2 can be connected indefinitely making it ideal for remote and standby applications.

An optional fan can be added for operation in extremely high ambient temperatures, This multibank product can be ordered with input and output power connectors per customer specification.

AC input model specifications

| PARAMETER | DESCRIPTION / CONDITIONS |
|------------------------|--|
| AC input voltage range | 3 input ranges covering 85 VAC - 240 VAC |
| Input AC amps (max) | Model Dependant |
| AC input configuration | AC input: line, neutral , chassis ground |
| Connector | IEC 320 |

DC input model specifications

| PARAMETER | DESCRIPTION / CONDITIONS |
|------------------------|---|
| DC input voltage range | 4 input ranges covering 18 VDC to 140 VDC |
| Input DC amps (max) | Model Dependant |
| DC input configuration | DC input: DC Power, DC Return, Chassis ground |
| Connector | PP-75 Anderson |

2-Bank Charger

Charging specifications

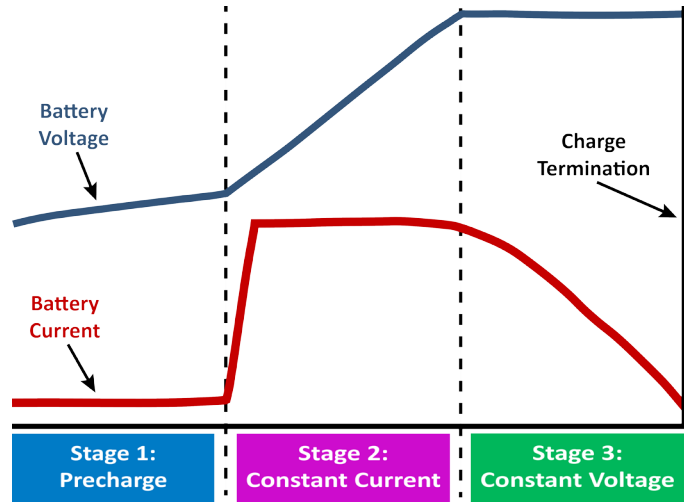
Lithium-ion/LiPO battery charging curve

A three stage charge routine which is recommended by lithium-ion and LiPO battery manufacturers is described below.

Stage 1: Precharge. If the battery is deeply discharged, a precharge of approximately 300mA is applied until the voltage is 2.8 volts/cell.

Stage 2: Constant current mode. The charger provides constant current until the battery voltage is V_{tpf} volts/cell.

Stage 3: Top off mode. This is the final stage of the charging routine. The battery voltage is maintained at approximately V_{tpf} volts/cell. When the charging current decreases to 300mA, the charge is terminated until the next discharge cycle



Standard LCD Displays

| CHARGETEK Model CTMB10 | | | | |
|---------------------------|------|-----|--------------|------|
| Bank | Volt | Cur | Charge State | Temp |
| 1 | --- | --- | No Response | o |
| 2 | --- | --- | No Response | o |
| 3 | --- | --- | No Response | o |
| 4 | --- | --- | No Response | o |
| 5 | --- | --- | No Response | o |
| 6 | --- | --- | No Response | o |
| 7 | --- | --- | No Response | o |
| 8 | --- | --- | No Response | o |
| 9 | --- | --- | No Response | o |
| 10 | --- | --- | No Response | o |

Select Down Select Up Config Bank 1

| Bank 1 Configuration-No Battery | | | |
|---------------------------------|---------|----|----|
| Volts | 11 | 12 | 13 |
| Amps | 0 | 2 | 4 |
| Battery Type: | AGM 1 | | |
| Equalization: | None | | |
| Max Absorb Time: | 10.0 Hr | | |
| Max Equalize Time: | 8 Hr | | |
| Diagnostic Mode: | Off | | |
| Return to Main | | | |

Select Up Select Down Modify Next Value Prev

| | | | | | |
|--------------------------|----|----|----|----|--------|
| 11 | 12 | 13 | 14 | 15 | Mode |
| Volts | | | | | AC On |
| 0 | 15 | 30 | 45 | 60 | Fast |
| Amps | | | | | Absorb |
| Mode Time Charge Time | | | | | Float |
| Temperature: ----- | | | | | |
| Alerts: Comm Fault | | | | | |

2 bank Lithium/LiPO Common Specifications

| CHARGING PARAMETERS | DESCRIPTION |
|------------------------------------|---|
| Termination current (I_{trm}) | 500mA +/- 50mA standard or defined by program selection |
| Termination transition time-out | 3 hours |
| Minimum battery start voltage | 2.5V/cell |
| Standby battery drain | <400uA with input power off |
| Termination V_{bat} rate (dv/dt) | $V_{bat} < 0.9 * V_{tpf}$, $I_{bat} > 0.5A$, dv/dt < 200mv/hour |
| Max charging time | Terminate if $> I_{max}/3 > 15$ hours |
| Overvoltage protection | Maximum Charging Voltage + 1.0V |
| Output noise and ripple (PARD) | <150mV, 100MHz BW |
| Regulation | ± 0.5% |
| Efficiency | Minimum 80% at max load |

2-Bank Charger

2-bank Charger Ordering Guide,p/n Mx2ab-cd-r

| P/N Field | Definition | Options | Description | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|----------------|------------------------------------|---|--|-------------------|------------------------|-----------|----------------|-------------------|---------------|--------------|--------------|---------|------------------------|-------|--------------|----|-------------|----|-------------|--------------|--------------|---------|----|-------|-------------------|----|---------|----|-------|-------------------|----|---------|----|-------|-------------------|----|--------|---|--------|-----------------------|----|---------|----|--------|-----------------------|----|--------|---|--------|-----------------------|----|--------|---|---------|-------------------------|----|---------|----|---------|-------------------------|----|--------|---|---------|------------------------|----|--------|---|
| a | Battery Chemistry | T - Lithium L - LiPo | Battery Chemistry | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| x | Enclosure Options | A - High Power Enclosure B - Medium Power Enclosure | Describes the enclosure type, see Output and Mounting section for descriptions. The enclosure is a factor of voltage and current options, see the description of options c, d below. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| b | Input Power Type and Ranges | For AC input chargers, three options; A, B and V are available For DC input chargers, 4 options; 08, 09, 10 and 11 are available | AC Input Voltage Range Options: <table border="1" style="margin-left: 20px;"> <thead> <tr> <th>Option</th> <th>AC Input Voltage Range</th> </tr> </thead> <tbody> <tr> <td>A</td> <td>85 - 140 VAC</td> </tr> <tr> <td>B</td> <td>180 - 300 VAC</td> </tr> <tr> <td>C</td> <td>85 - 300 VAC</td> </tr> </tbody> </table> DC Input Voltage Range Options: <table border="1" style="margin-left: 20px;"> <thead> <tr> <th>Option</th> <th>DC Input Voltage Range</th> </tr> </thead> <tbody> <tr> <td>08</td> <td>18 - 36 VDC</td> </tr> <tr> <td>09</td> <td>30 - 50 VDC</td> </tr> <tr> <td>10</td> <td>38 - 75 VDC</td> </tr> <tr> <td>11</td> <td>72 - 140 VDC</td> </tr> </tbody> </table> | Option | AC Input Voltage Range | A | 85 - 140 VAC | B | 180 - 300 VAC | C | 85 - 300 VAC | Option | DC Input Voltage Range | 08 | 18 - 36 VDC | 09 | 30 - 50 VDC | 10 | 38 - 75 VDC | 11 | 72 - 140 VDC | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Option | AC Input Voltage Range | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| A | 85 - 140 VAC | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| B | 180 - 300 VAC | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| C | 85 - 300 VAC | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Option | DC Input Voltage Range | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 08 | 18 - 36 VDC | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 09 | 30 - 50 VDC | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10 | 38 - 75 VDC | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 11 | 72 - 140 VDC | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| c, d | Output Voltage and current options | For each output voltage several output current models are available for each enclosure type, choose voltage (c) and current options (d) for the table the right | Charging Current vs Output Voltage and Enclosure Type <table border="1" style="margin-left: 20px;"> <thead> <tr> <th>Output Voltage</th> <th>Voltage Option(c)</th> <th>Enclosure</th> <th>Output Current</th> <th>Current Option(d)</th> </tr> </thead> <tbody> <tr> <td>1S-3S</td> <td>1S, 2S or 3S</td> <td>MA</td> <td>40 Amps</td> <td>40</td> </tr> <tr> <td>1S-3S</td> <td>1S, 2S or 3S</td> <td>MB</td> <td>20 Amps</td> <td>20</td> </tr> <tr> <td>1S-3S</td> <td>1S, 2S or 3S</td> <td>MB</td> <td>10 Amps</td> <td>10</td> </tr> <tr> <td>4S-8S</td> <td>4S,5S,6S,7S or 8S</td> <td>MA</td> <td>20 Amps</td> <td>20</td> </tr> <tr> <td>4S-8S</td> <td>4S,5S,6S,7S or 8S</td> <td>MB</td> <td>10 Amps</td> <td>10</td> </tr> <tr> <td>4S-8S</td> <td>4S,5S,6S,7S or 8S</td> <td>MB</td> <td>5 Amps</td> <td>5</td> </tr> <tr> <td>9S-13S</td> <td>9S,10S,11S,12S or 13S</td> <td>MA</td> <td>12 Amps</td> <td>12</td> </tr> <tr> <td>9S-13S</td> <td>9S,10S,11S,12S or 13S</td> <td>MB</td> <td>7 Amps</td> <td>7</td> </tr> <tr> <td>9S-13S</td> <td>9S,10S,11S,12S or 13S</td> <td>MB</td> <td>3 Amps</td> <td>3</td> </tr> <tr> <td>14S-18S</td> <td>14S,15S,16S, 17S or 18S</td> <td>MA</td> <td>10 Amps</td> <td>10</td> </tr> <tr> <td>14S-18S</td> <td>14S,15S,16S, 17S or 18S</td> <td>MB</td> <td>5 Amps</td> <td>5</td> </tr> <tr> <td>14S-18S</td> <td>14S,15S,16S, 7S or 18S</td> <td>MB</td> <td>3 Amps</td> <td>3</td> </tr> </tbody> </table> | Output Voltage | Voltage Option(c) | Enclosure | Output Current | Current Option(d) | 1S-3S | 1S, 2S or 3S | MA | 40 Amps | 40 | 1S-3S | 1S, 2S or 3S | MB | 20 Amps | 20 | 1S-3S | 1S, 2S or 3S | MB | 10 Amps | 10 | 4S-8S | 4S,5S,6S,7S or 8S | MA | 20 Amps | 20 | 4S-8S | 4S,5S,6S,7S or 8S | MB | 10 Amps | 10 | 4S-8S | 4S,5S,6S,7S or 8S | MB | 5 Amps | 5 | 9S-13S | 9S,10S,11S,12S or 13S | MA | 12 Amps | 12 | 9S-13S | 9S,10S,11S,12S or 13S | MB | 7 Amps | 7 | 9S-13S | 9S,10S,11S,12S or 13S | MB | 3 Amps | 3 | 14S-18S | 14S,15S,16S, 17S or 18S | MA | 10 Amps | 10 | 14S-18S | 14S,15S,16S, 17S or 18S | MB | 5 Amps | 5 | 14S-18S | 14S,15S,16S, 7S or 18S | MB | 3 Amps | 3 |
| Output Voltage | Voltage Option(c) | Enclosure | Output Current | Current Option(d) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1S-3S | 1S, 2S or 3S | MA | 40 Amps | 40 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1S-3S | 1S, 2S or 3S | MB | 20 Amps | 20 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1S-3S | 1S, 2S or 3S | MB | 10 Amps | 10 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4S-8S | 4S,5S,6S,7S or 8S | MA | 20 Amps | 20 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4S-8S | 4S,5S,6S,7S or 8S | MB | 10 Amps | 10 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4S-8S | 4S,5S,6S,7S or 8S | MB | 5 Amps | 5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 9S-13S | 9S,10S,11S,12S or 13S | MA | 12 Amps | 12 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 9S-13S | 9S,10S,11S,12S or 13S | MB | 7 Amps | 7 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 9S-13S | 9S,10S,11S,12S or 13S | MB | 3 Amps | 3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 14S-18S | 14S,15S,16S, 17S or 18S | MA | 10 Amps | 10 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 14S-18S | 14S,15S,16S, 17S or 18S | MB | 5 Amps | 5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 14S-18S | 14S,15S,16S, 7S or 18S | MB | 3 Amps | 3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| r | Options | List of Available Options, listed separated by '-' characters, some options are mutually exclusive. | An: External Interface, choose n as follows: 0 - RS-232, 1 - RS-485, 2 - Wired Ethernet, 3 - CAN, 5 - Wireless Ethernet, 99 - Special, Consult factory for others | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

Example: P/N MA2T10-12S12-R1 specifies a 2-bank Lithium charger with an DC input voltage range of 38 - 75 VDC using enclosure A, and has 12S (50.4V) voltage rated outputs rated at 12 amps each. An optional RS-485 interface is included.

2-Bank Charger

Certifications and Compliance (model dependant - consult factory)

| | |
|---|---|
| a | UL CSA |
| b | CE mark |
| c | California Energy Compliant |
| d | RF emissions: US FCC Part 15 Class A, CISPR 22:2009 |
| e | IEC 555, power factor |
| f | IEC 61000-4-5; Class 4 Severity Level, Surge |
| g | IEEE C2-2012 National Electrical Safety Code |
| h | NFPA 70-2014 National Electric Code |
| i | IEC 60950 Safety of IT Equipment; Pollution Degree 2 |
| j | WEEE and Restriction of Hazardous Substances (ROHS) Directives 2002/95/EC |
| k | T-Mark |

Workmanship specifications

| | |
|----------------|--|
| IPC-610 | Acceptability of electronic assemblies IPC J-STD-006 Requirements for electronic grade solder alloys and fluxed and non-fluxed solid solders for electronic soldering applications |
| IPC-2221 | FR4, 130C 94V-0 |
| IPC/WHMA-A-620 | Requirements and acceptance of wiring and cabling |

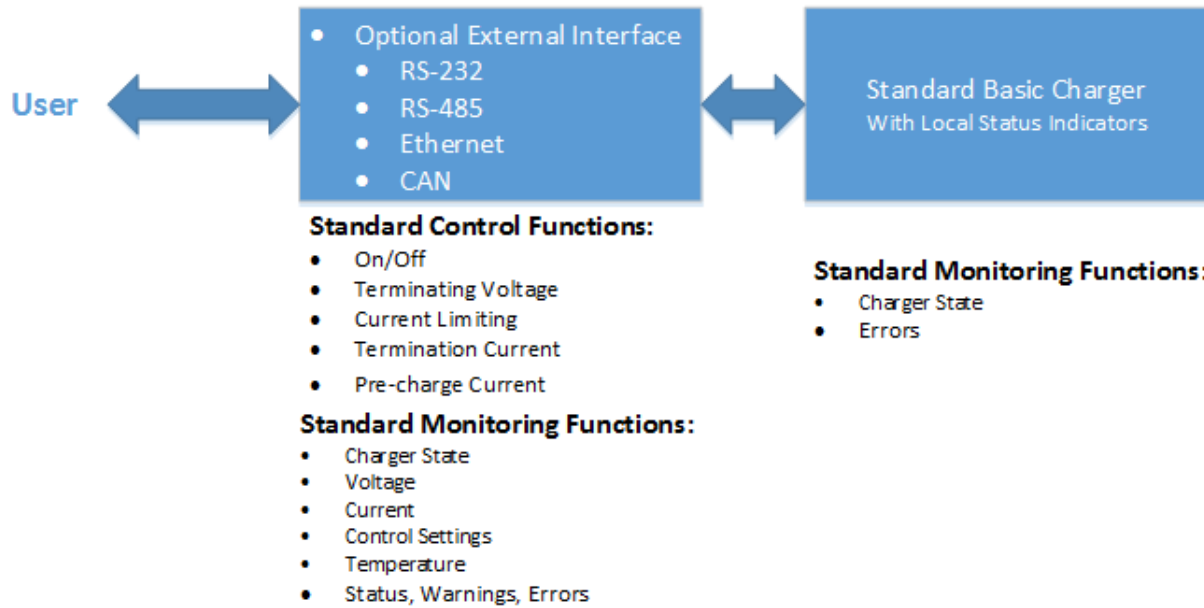
Mechanical specifications

| PARAMETER | (units are in inches and pounds) |
|-------------------------|--|
| Dimensions | Enclosure A/B: 11.0 (L) x 8.5 (W) x 3.34 (H) |
| Chassis material | Aluminum |
| Chassis finish | Black anodized |
| Clearance | 15 inches all sides |
| Mounting | #6 screws at six locations |
| Battery connection | 4 foot cables with ring terminals |
| Fan connector | Molex P/N 53048-0310 |
| Weight | Twelve pounds |
| Fan noise at full speed | < 45dBA at 10 feet |

Environmental specifications

| PARAMETER | DESCRIPTION / CONDITIONS |
|-----------------------|---|
| Operating environment | Indoor/outdoor - IP67 -not submersible |
| Storage temp. | -40°C to +80°C |
| Operating temp. | -20°C to +50°C at maximum output over entire DC voltage range |
| Humidity | 0°C to +95°C relative humidity (non-condensing) |
| Operational altitude | 10,000 feet |
| Vibration | MIL-STD-810 or IEC60068-2-6 and -2-64 as applicable |
| Shock | MIL-STD-810 or IEC60068-2-27 as applicable |
| Isolation | Input - chassis: 2KVDC Input - output: 2KVDC Output - chassis: 500VDC |
| DC leakage current | Input - chassis: < 200uA at 2KVDC Input - output: < 100uA at 2KVDC |
| AC leakage current | < 3.5mA at 264VAC, 60Hz |

Control and Monitor Interfaces



Outline and mounting (Enclosure A)

