

# EBC 2410M (SMPS Technology)

ENKO Electronic Control Systems - IZMIR / TURKIYE

www.enkoelektronik.com

## Lead-Acid Battery charger (with Boost Charge and Alarm functions)

EBC 2410M is designed and optimized for charging all types of Lead Acid batteries (including jell type sealed Lead Acid batteries), protecting the battery and extending its useful life time.



**Charging Lead-Acid batteries in three controlled stages for best performance...**

EBC 2410M can deliver continuous charging current of 10A into 24V battery system (voltage is set to 27.6Vdc, with an option of up to 29.4Vdc) These battery chargers are designed with performance in mind and special care is taken for protecting and extending the life-time of the battery.

EBC 2410M is designed with "Switched Mode" technology, where the switching transistor has only two states, ON or OFF, which increases the overall efficiency, hence reduces the excess heat dissipation and in return, increasing the device life-time and reliability.

The control system is also designed in such a way that; battery is charged in three stages:

- Constant current mode (protecting battery cells)
- Constant voltage mode (reducing the charge current)
- Float charge (compensation of internal self-discharge)

Constant current mode makes sure that; when the battery is drained down below its rated capacity, the high charge current flow into the battery is limited in order to protect the cells and reduce damage to the plates. Charging characteristics are compliant to DIN41772/ DIN41773; power limited.

As the battery capacity is recovered, each cell voltage reaches up to 2.30Vdc to 2.45Vdc level, which means that the required charging current starts to reduce.

When the required battery terminal voltage is fully reached, the charger keeps supplying just enough current in order to compensate for the internal self-discharge (float charge). This ensures that the battery can maintain its high charge state and deliver its rated output current, when ever required.

### Main features:

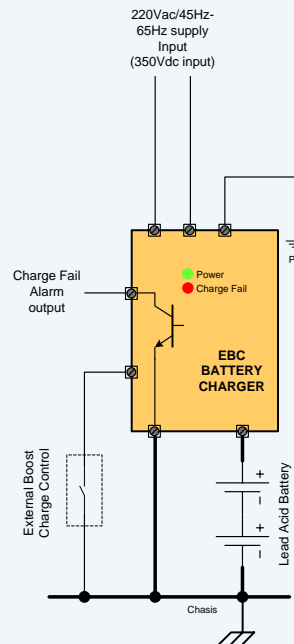
- 195Vac to 264Vac input voltage range
- 45Hz to 440Hz input supply frequency range
- Capability to work direct from 240Vdc to 365Vdc supply voltage
- 27.6Vdc factory set DC output terminal voltage (option up to 29.4Vdc)
- 10.0Adc continuous output current into load
- Capability to work continuously into short-circuit
- Parallel connection for higher output current rating and redundant operation
- Series connection capability for higher output voltage requirements
- No cooling fans used for high operational reliability
- Aluminum alloy case for robust handling and easy mounting

### Additional features:

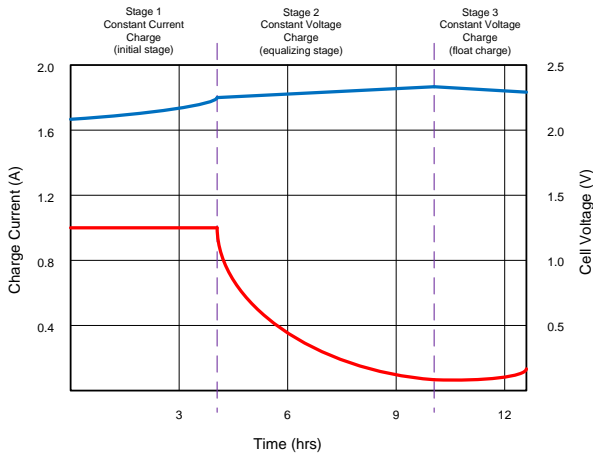
- OVERALL EFFICIENCY >82% ✓
- LINE REGULATION OF 0.1V MAX. OVER THE FULL INPUT VOLTAGE RANGE ✓
- LOAD REGULATION IS <0.2V OVER NO LOAD TO FULL LOAD RANGE ✓
- WIDE OPERATING TEMP. RANGE (-40°C to +60°C), HIGH HUMIDITY RATING UP TO 90% NON-CONDENSING ✓
- INPUT FUSE PROTECTION ✓
- REVERSE OUTPUT POLARITY PROTECTION WITH INTERNALLY FITTED DIODE ✓
- USER OPERATED BOOST CHARGE FUNCTION TO REPLENISH THE BATTERY CHARGE STORAGE CAPACITY TO HIGH LEVELS (optional function) ✓
- NOISE INPUT FILTER FOR EMC REDUCTION ✓

### Technical specifications:

|                                 |   |
|---------------------------------|---|
| Input supply voltage range:     | 198Vac to 264Vac / 45Hz to 440Hz (250VDC to 380VDC)       |
| Operating temperature range:    | -40°C to +60°C (Storage: -45°C to 80°C)                   |
| Relative humidity:              | 20%rH to 90%rH, non condensing                            |
| Efficiency:                     | >85% under full load conditions                           |
| Nominal output voltage:         | 27.6Vdc (factory set, adjustable)                         |
| Rated output current:           | 10.0A DC (Typical: 10.4A) (Short circuit current: <10.8A) |
| Output voltage ripple:          | 10Hz to 100KHz— 150mV pk to pk (noise: <1V pk to pk)      |
| Load regulation:                | <200mV (no load to full load)                             |
| Line regulation:                | <100mV (198Vac to 264Vac at full load)                    |
| Charge fail output:             | Solid state output, sinking 50mA                          |
| Boost charge mode:              | Nominal output voltage +1.6Vdc                            |
| Input/output isolation voltage: | 4KV DC  |
| Output/Earth isolation voltage: | 500Vac  |



## Typical Cell charging characteristics



Typical **Cell charging** characteristics of the charger is shown in the table. The **Cell** is part of the battery and 24V batteries contain 12 cells.

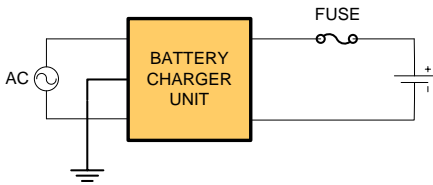
Factory setting of the charger allows each **Cell** to be charged to 2.30Vdc, which corresponds to 27.60Vdc terminal voltage. User can use an option up to 2.45Vdc per **Cell**, which corresponds to 29.40Vdc battery terminal voltage.

Each charging stage can be seen on the table. Initial cell charging is achieved with constant current mode, which limits the current such that it does not damage the cell plates. Normal charging time should be calculated as 10hr to 12hr. This requires typical charging current rating of 10% of the rated battery current capacity.

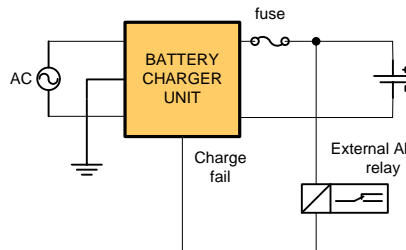
After the initial charging stage is completed, charge current starts to decrease as the cell voltage approaches 2.30Vdc. This takes approximately 60% of the charging period and is necessary to equalize each **Cell** voltage within the battery. During this period, the charger ensures stable constant voltage across the battery terminals.

After the charging is completed, the battery keeps draining current from the charger in order to compensate its internal resistive losses, called *Self Discharging* of the battery. This needs to be compensated in order to keep the battery charge at its highest condition.

### Reverse polarity protection



### Charge fail alarm connection



If reverse polarity protection is required, user has to fit an external fuse in the charge circuit with the indicated rating in the table.

Charge failure output can be used with a relay, connected to V+ so that other devices can be controlled with the alarm relay. Under normal operating conditions, the relay will be energized.

The alarm output is solid state relay, which can sink up to 50mA DC current.

| MODEL                   | Fuse Rating |                     |
|-------------------------|-------------|---------------------|
|                         | Current     | Capacity            |
| EBC 2410M<br>EBC 2410MR | 15A         | 350A <sup>2</sup> s |

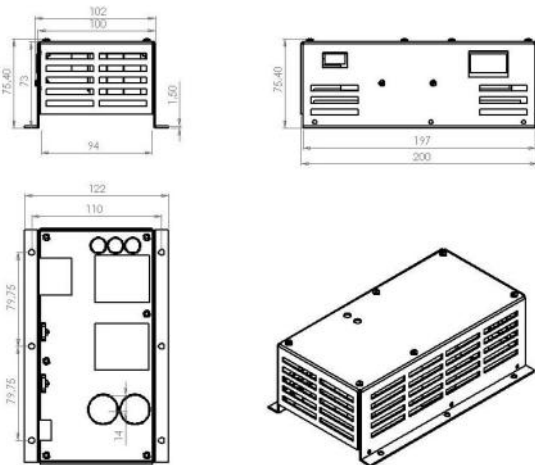
The charger enclosure is made from Aluminum alloy metal sheet and can either be screw fitted directly on the panel or it can be used together with rail mounting kit. **Rail mounting kit is an option** and has to be decided during purchase. Total weight is 700gr.

Care should be taken in order to make sure that the perforations on the metal enclosure is not covered and free air ventilation is maintained within the panel. Otherwise, excess accumulated heat will degrade the overall efficiency of the charger unit.

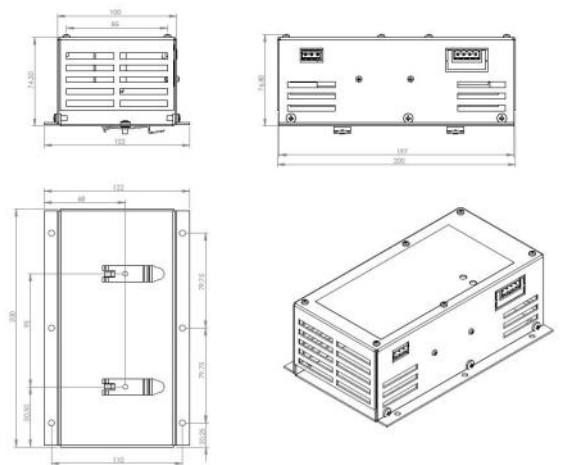
Earth connection has to be made securely as the case is made from metal. Also proper noise filtering can only be active with a good earth connection of the charger unit.

## Mechanical dimensions

Panel mounted version EBC2410M



Rail mounted version EBC2410MR



**Built-in boost charge function allows batteries to be refreshed periodically...**

**Output current is limited for constant current charging and it is also short circuit protected...**



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