

# EBC 2420M (SMPS Technology)

ENKO Electronic Control Systems - IZMIR / TURKIYE

www.enkoelektronik.com

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

EBC 2420M 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 2420M can deliver continuous charging current of 20A 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 2420M is designed with "Switched Mode" technology.** 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.

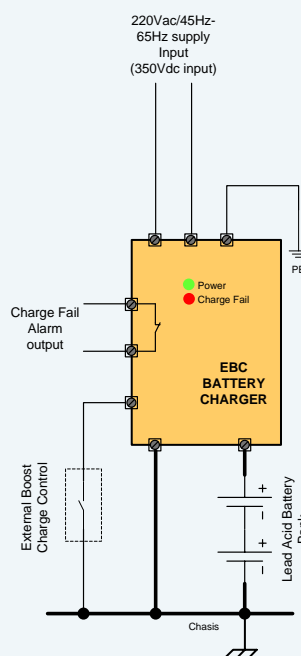
When the required battery terminal voltage is fully reached, the charger keeps supplying just enough current in order to compensate for the internal self-discharge (float charge). This ensures that the battery can maintain its high charge state and deliver its rated output current, when ever required.

The charger is also designed to operate with Constant Power output, where full output power can be delivered into the load up to 60°C ambient temperature. The output power is linearly de-rated down to zero at 70°C. This function ensures that the charger can deliver maximum available power to the load under any operating conditions without reducing charger reliability.

- **CONSTANT OUTPUT POWER OPERATION MODE, WITH DERATING UP TO 70°C**
- **HIGH EFFICIENCY OPERATION WITH LOW HEAT DISSIPATION**
- **OUTPUT OVER-VOLTAGE PROTECTION AND DRY CONTACT ALARM OUTPUT**

## 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:	>90% under full load conditions
Nominal output voltage:	27.6Vdc (factory set, customer adjustable up to 29.4Vdc)
Rated output current:	20.0A dc min.
Output voltage ripple:	10Hz to 100KHz— 100mV pk to pk (noise: <1V pk to pk)
Load regulation:	<400mV (no load to full load)
Line regulation:	<100mV (198 to 264V at full load)
Charge fail output:	Relay dry contact output, energized under normal conditions
Output over voltage protection:	Active when Vout > 32Vdc
Boost charge mode:	Nominal output voltage +1.6Vdc on activation (optional)
Input/output isolation voltage:	4KV DC
Output/Earth isolation voltage:	500Vac



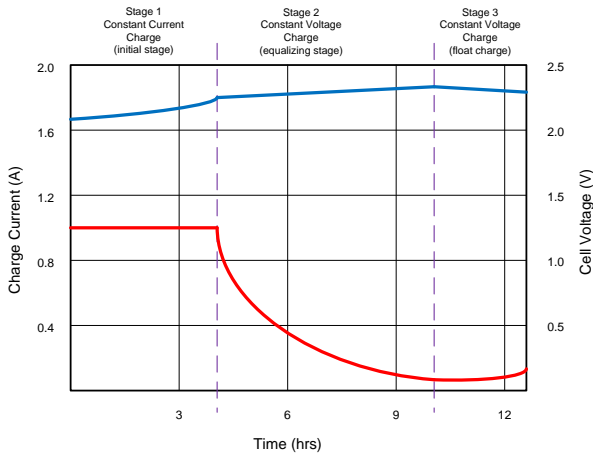
## Main features:

- 198Vac 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 (user adjustable up to 29.4Vdc)
- 20.0A dc 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 >90%	✓
LINE REGULATION OF 0.1V MAX. OVER THE FULL INPUT VOLTAGE RANGE	✓
LOAD REGULATION IS <0.4V OVER NO LOAD TO FULL LOAD RANGE	✓
WIDE OPERATING TEMP. RANGE (-40°C to +60°C), HIGH HUMIDITY RATING UP TO 90% NON-CONDENSING	✓
OUTPUT OVERVOLTAGE PROTECTION FUNCTION	✓
REVERSE OUTPUT POLARITY PROTECTION WITH INTERNALLY FITTED DIODE	✓
USER OPERATED BOOST CHARGE FUNCTION TO EQUALIZE BATTERY CELLS	✓
RELAY CONTACT OUTPUT FOR FAILURE ALARM	✓
NOISE INPUT FILTER FOR EMC REDUCTION	✓

## 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.

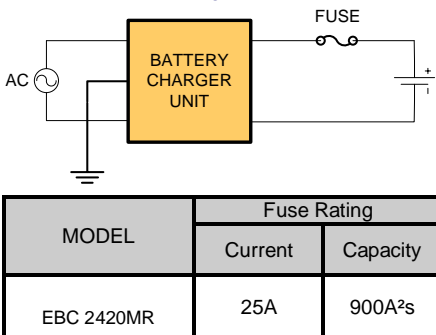
Factory setting of the charger allows each *Cell* to be charged to 2.30Vdc, which corresponds to 27.60Vdc terminal voltage. User can use an option up to 2.45Vdc per *Cell*, which corresponds to 29.40Vdc battery terminal voltage.

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.

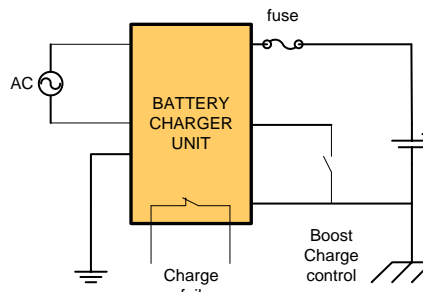
After the initial charging stage is completed, charge current starts to decrease as the cell voltage approaches 2.30Vdc. This takes approximately 60% of the charging period and is necessary to equalize each *Cell* voltage within the battery. During this period, the charger ensures stable constant voltage 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 and Boost charge 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 alarm relay is built in and no need for an external relay use. The alarm output is a dry contact, potential free relay output with 3A/250Vac rating, which is energized in normal operation.

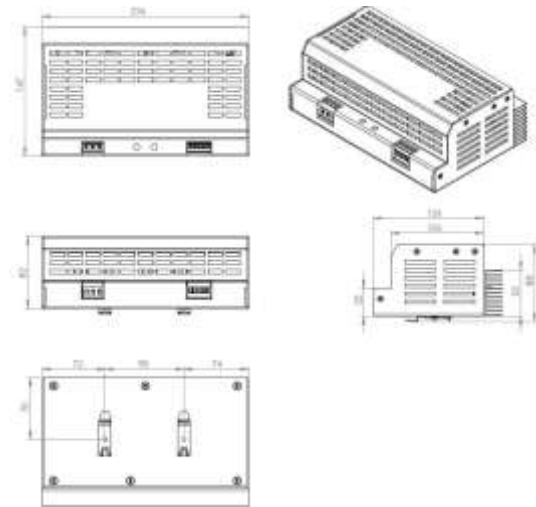
Boost charge can be initiated by pulling the "Boost Charge" input to ground with a relay contact. Boost will be in operation as long as the contact is closed.

The charger enclosure is made from Aluminum alloy metal sheet and the unit can only be fitted as rail mounting. Total weight is 1400gr.

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 achieved with secure case earth connection.

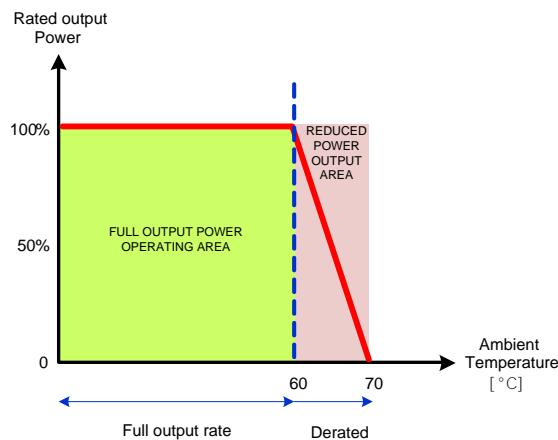
## Mechanical dimensions



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

Output Power de-rating allows the charger to work safely in high temperature environment conditions...

## Output Power de-rating curve (safe operating area)



EBC2420M is a power protected device, where the output available power is automatically controlled according to the ambient temperature. This provides the charger to operate within the "Safe Operating Area" under any condition.

The diagram shows the safe operating area for full output power. Maximum output power can be delivered to the load up to 60°C and it is linearly de-rated down to zero at 70°C.

High temperature power de-rating ensures safe operation under all ambient conditions.



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