

Power Supply / Battery Charger

EMT 42000 Series

Features

- **Input Voltages:**
100V – 264V AC
- **Output Voltages:**
12V (30A) or 24V (15A)
- **Advanced 4-step Charging**
For Lead Acid, Gel & AGM batteries
- **Sustains Continuous 100% Load**
- **Active PFC Regulation**
- **Temperature Compensation**
- **Parallel Operation**
- **Protected against:**
 - Over Voltage
 - Over Current
 - Reverse Polarity
 - Over Temperature
- **Temperature Controlled Fan**
- **Status LEDs**
- **Coated PCB´s**
- **Durable Housing & connectors**
- **Operating Temperature –30 - 55° C**
- **Can be mounted in any direction**



Description

EMT 42000-series is a wide range of power supplies, made for charging and maintaining multiple types of batteries. A professional solution, designed to give short charge times and a long battery life.

The built-in PFC will ensure that the current drawn follows the voltage waveform supplied, resulting in a power factor close to unity. The PFC makes the unit comply with international standards and will reduce the power drawn from the grid.

This state of the art power supply is developed according to the latest principles, with an efficiency as high as 87% and all the necessary indicators and protection needed allows you to draw the needed current - while the unit is charging the battery. This power supply can stay ON constantly without any damage to the battery. It automatically compensates for battery temperatures, low input-voltages etc..

DIP-switches can change the factory settings, so the unit can easily be adjusted to specific applications or batteries.

It is possible to connect these units in parallel (max. 10), to increase the charge current value to fit your application. By connecting the "Power Share" terminals between the units, all units will equally share the total charge current.

To ensure a proper inside temperature, the front plate is supplied with a temperature controlled fan. The fan has magnetic bearings and a 10 year minimum lifetime. It starts at approx. 40% output power and will regulate the cooling needed. This gives a mostly silent operation, with a long lifetime and freedom to mount the unit in any direction.

The unit is delivered in a seawater-proof aluminium housing with a protective black coating. The unit is over-voltage protected on inputs & outputs and is supplied with an On-Off switch & durable connectors.

Battery Temperature Sensor

The Battery Temperature Sensor is sealed into a strong Ring Terminal and delivered with a cable rated for high Temperatures, allowing use in most environments.

By using the Ø8 mounting hole the sensor can be mounted directly on the battery clamp or at any mechanical structure in thermal contact with the battery.

The design allows the sensor to be mounted without any glue or other fixing material, giving you an easy and safe mounting, also under vibration.

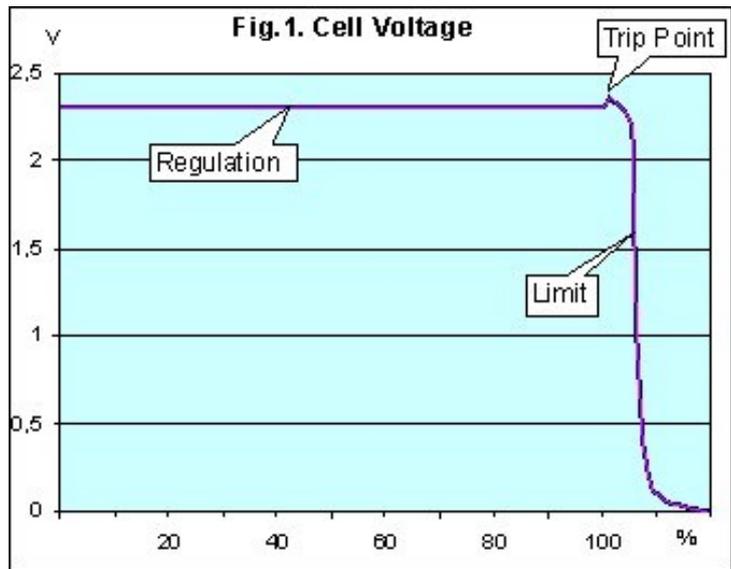
Battery Charging

The Basic Charging technique (Fig.1), supplies a regulated DC Voltage to a battery with 2,30V per cell, resulting in 13,8V, 27,6V or 55,2V charge voltages. These levels will be higher (after the Trip Point), if your battery was empty (equivalent to approx. 0,066V per cell), resulting in 14,2V, 28,4V or 56,8V charge voltages.

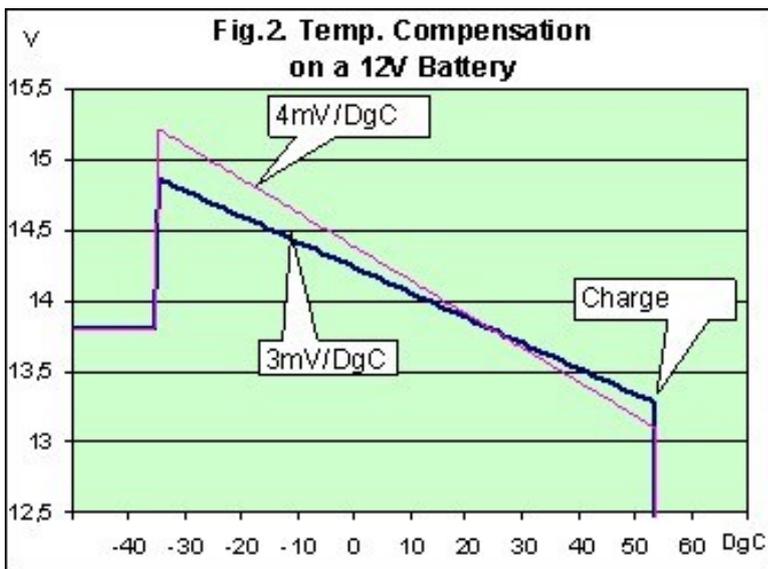
This method of charging ensures that the battery will never reach its gasification level, giving your battery a longer lifetime and a lower level of off-gassing during charging. Furthermore your battery can't be charged too fast, as the battery will only receive charge in accordance with its own needs.

In Fig. 1 it can be observed that an empty battery will start charging at a low point on the Limit-Curve, while the cell voltage is increasing. When the battery reaches its Trip-Point (Current Limit), the cell voltage will go down from 2,365V to 2,30V and charging will continue with a Voltage-Controlled regulation.

The Trip Point is the point of maximum charging power. As charging continues past the trip point, the Voltage-Controlled charging current will slowly decrease until the battery is fully charged.



Temperature Compensated Charging



Charging lead-acid batteries at lower than 10° C or at higher than 35°C, requires temperature compensated charging. Temperature compensated charging can fully charge a battery at low temperatures and protects against overcharging a battery at high temperatures.

By using the external battery temperature sensor (BTS) and connecting it to an EMT 42000 Series unit, charging voltage will be compensated with 3 to 4mV/Cell/°C.

If the BTS is not connected, then no compensating will take place and the OK LED will be OFF.

If the BTS is damaged or wires are broken, the unit will remove the compensation to protect the batteries.

The unit is factory set to compensate with 3mV/Cell/°C, if the DIP-switch A is switched to ON, this value will be set to 4mV/Cell/°C.

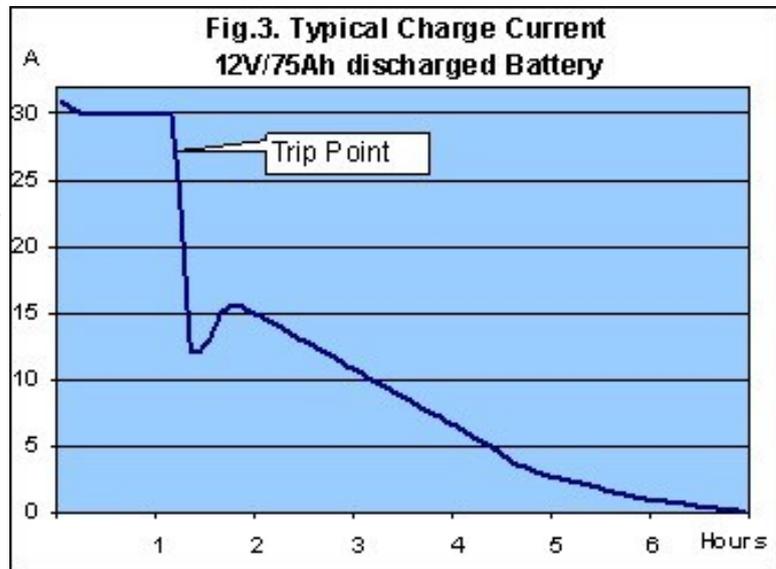


Extended Charging

Fig. 3 shows a typical charge current over longer time, for an empty 12V/65Ah battery. In case of larger batteries, charging takes more time before reaching the Trip Point. There are no limits with respect to battery capacity.

The empty battery will start charging at a low point on the Limit-Curve, while the cell voltage is increasing.

When the battery reaches its Trip-Point (Current Limit), the cell voltage will go down from 2,365 to 2,30 Volts. Charging will continue with voltage-controlled regulation. The Trip Point is the point of maximum charging power. As charging continues past the trip point, the Voltage-Controlled charging current will slowly decrease until the battery is fully charged. Charging after the trip point is more time-consuming, as the battery must be protected.



Protection and Communication

If the charger's temperature rises above the maximum limit, the unit will turn Off automatically. Therefore the unit should not be covered or mounted in very small or closed enclosures.

Once the temperature has decreased to safe levels, the unit restarts and the Temp/Pol indicator will flash. From this it can be seen, if the charging operation has been interrupted.

By using the logic outputs, it is possible to provide other electronics with information about the charger's operation.

LED's displaying function

- INPUT OK:** The On LED indicates that mains Input is OK and that the charger is running.
- TEMP/POL:** This LED will be ON if the polarisation of the Battery is wrong and the charger will shut off. Correct the polarisation of the battery and the LED will switch off as the unit starts charging. If the units temperature gets too high, this LED will switch on and the charger will shut down. When the temperature has decreased sufficiently, the unit will start charging and the LED will start to flash. The flashing LED is an indication that the charge period has been interrupted. Restart the charger to reset and the LED will switch off.
- REGULATION:** When the Regulation LED is on, the battery (Cell) voltage is at the selected voltage and the unit is working in the Voltage-Controlled mode.
- POWER LIMIT:** When the current demanded by the battery or load is higher than the unit is able to deliver, this LED will be on and the unit is working in the Current-Limit mode. At this point the Regulation LED will be off, when the current decreases below the limit, the Power Limit LED will turn off and the Regulation LED will turn on.
- 0 – 100 %:** 0 – 100 % Power is indicated by 10 LEDs showing the output current to the battery & load. Please note, that this is an indication of the current flowing into both the battery & the load, not only to the battery.
- BATT. TEMP OK:** This LED will be ON if a Battery Temperature Controller (BTS) is connected and the measured value is between -40°C and +110°C. This indicator, placed on the top of the unit ensures that the sensor is intact.



External Controls & Sensor

- 1 & 2: SHARE Connect 1 to 1 and 2 to 2 between units in parallel, use twisted wires (0,25 – 0,52mm).
- 3 to 8: REMOTE Pin 3 to 8 is for remote indication and ON/OFF control.
- 9 & 10: CONTACT Contact set between pin 9 and 10 is closed when the unit is supplied with mains power and is running. Can be used to generate a Mains dropout alarm.
- 11 & 12: TEMP. Connect Battery Temperature Sensor between pin 11 & 12 to obtain a temperature compensated output voltage. If Battery temperature is between –35 and +110°C the BATT. TEMP. OK LED will be ON.
- A to F: This DIP-switch will allow you to select other output voltages, trip-points, Master/Slave operation and Temp. Comp. Use the tables below to select the appropriate values. If in doubt, contact your battery supplier for detailed information around CV charging.

A: Select Temp. Comp.	
ΔCell Voltage / °C	
3 mV	Off
4 mV	On

Factory Setting is 3mV

B: Select Master/Slave	
SLAVE	Off
MASTER	On

Factory Setting is On

C & D: Select Trip-Point				
Trip0	Trip1	Trip2	Trip3	
C=OFF	C=ON	C=OFF	C=ON	
D=OFF	D=OFF	D=ON	D=ON	

Cell	0	0,033	0,066	0,1
12V	0	0,2	0,4	0,6
24V	0	0,4	0,8	1,2
36V	0	0,6	1,2	1,8
48V	0	0,8	1,6	2,4

Factory Setting is Trip2

E & F: Select Output Voltage			
V0	V1	V2	V3
E=OFF	E=OFF	E=ON	E=ON
F=OFF	F=ON	F=OFF	F=ON

Cell	2,11	2,203	2,3	2,392
12V	12,66	13,22	13,8	14,35
24V	25,33	26,25	27,6	28,7
36V	37,98	39,65	41,4	43,06
48V	50,65	51	55,2	57,38

Factory Setting is V2

Gel batteries (2,20 to 2,25 per cell) typically uses the V1 setting, check specific battery data for standby voltage.
 AGM batteries (2,20 to 2,25 per cell) typically uses the V1 setting, check specific battery data for standby voltage.

Specifications

Measured at 25°C, factory settings and 230VAC mains.

General

Input voltage	100 – 264 VAC
Input power	Max 650 VA
Input Frequency	45 – 65 Hz
Filter	Dual Common-Mode
Fuse	T 8,0 A – 5 x 20 mm
Power Factor	>0,98
Inrush	< 50 A
Protection	275 VAC Varistor
Efficiency	~88 % @ 230VAC Input
Frequency	140/70 KHz
Prim.-Sec. Capacitance	< 2,5 nF
Isolation	3000 V – Prim./Sec.
Hold-Up Time	> 10 ms
Regulation	> 0 W

Standards	EN 60950-1 : 2001 EN 55022 : 2006 EN 55024 : 1998+A1+A2 EN 61000-6-1: 2007 EN 61000-6-3: 2007
Outline	230 x 133 x 78 mm
Weight	< 1,40 kg
Operating Temp.	-30 - 55° C
Storage Temp.	-40 - 85° C
Prefusing	< 30 A
Over-temp.	Protected, restart
Reverse Polarity	Protected, max. 10 s
Reverse Current	< 0,0025 A
Cooling	Convection or Forced

LED Indicators

ON	AC supply OK
Regulation	Voltage-Controlled charging
Output Power	0 – 100 % output power

Temp./Pol.	Overtemp./Wrong polarisation
Limit	Current-Limited charging
Batt.Temp.	Battery temperature OK

Specifications

Measured at 25°C, factory settings and 230VAC mains.

Output

	EMT 42012	EMT 42024	EMT 42036*	EMT 42048
Voltage Max	+15,70 VDC	+31,40 VDC	+47,10 VDC	+62,80 VDC
Power	425 W Max	425 W Max	425 W Max	425 W Max
Trip Point	+ 14,2 VDC	+ 28,4 VDC	+ 42,6 VDC	+ 56,8 VDC
Trip Point Delay	3 – 5 s	3 – 5 s	3 – 5 s	3 – 5 s
Current Limit	> 30,0 A	> 15,0 A	> 10,0 A	> 7,5 A
Adjust Range	13,3 – 15,5 VDC	26,6 – 31,0 VDC	39,9 – 46,5 VDC	53,2 – 62,0 VDC
Ripple	< 1,0 %	< 0,5 %	< 0,5 %	< 0,5 %
Load Reg.	< 1,5 %	< 0,8 %	< 0,8 %	< 0,6 %
Line Reg.	< 0,4 %	< 0,4 %	< 0,4 %	< 0,4 %
Parallel Opr.	Yes	Yes	Yes	Yes
Factory Adj.	13,8 VDC, No Load	27,6 VDC, No Load	41,4 VDC, No Load	55,2 VDC, No Load
OVP	17,0 – 18,0 V	34,0 – 36,0 V	51,0 – 54,0 V	68,0 – 72,0 V
Power Indication	3,0 A / LED	1,50 A / LED	1,00 A / LED	0,75 A / LED

* Made to order

Battery Temperature Sensor (BTS)

Length:	1 m	2 m	3 m
Order codes:	BTS 01	BTS 02	BTS 03

Dimensions

- 1. Input supply
- 2. Input Fuse
- 3. Output
- 4. Temp. OK LED
- 5. Signals & sensor
- 6. Adjust
- 7. DIP switch
- 8. Function LED
- 9. Power indicator
- 10. Air intake

