

Technical Description

EMT 40000 Series

With Battery Temp. Compensation and Relay Output

► **Features:**

- Constant Charging/Loading
- Trip Point Charging
- Temp. Compensated Charge
- Parallel Operation
- Temp. Controlled Fan
- Status LED's
- 185 – 264 VAC Input
- 100 % Fulltime Loading
- Over Voltage Protected
- Over Current Protected
- Reverse Pol. Protected
- Over Temp. Protected
- Coated PCB's
- Solid Housing/connectors
- Operating -30 to +55°C
- Mounting in any direction
- Compact (<3W/inch³)



► **Description:**

EMT 40000-series is a 390-470 W Charger / Power Supply, made for recharging and maintaining lead acid batteries; a professional solution, where the short charge time and the long battery life are essential factors.

An up to-date power supply/charger, developed according to the latest high frequency principals, with an efficiency rate as high as 85-87%, and is supplied with the necessary indicators and protections needed, that allows you to draw the needed current, while the unit is charging the battery. The unit never fails due to over-loading and it can stay ON constantly without any damage to the Battery. It automatically compensates for Battery temperatures and low input-voltage etc.

On the top is added a DIP-switch for changing the Factory setting, so the unit can easily be adjusted for your Battery type/Application.

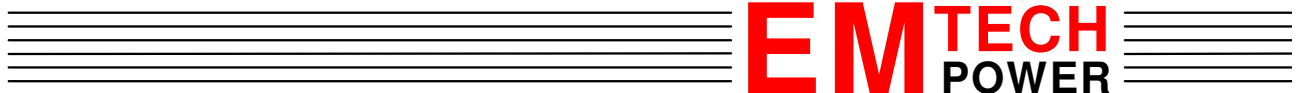
It is possible to connect the units in parallel (max. 10), so you have the opportunity to increase the charge current value to fit into your application.

By connecting the terminals POWER SHARE between the units, all units will share the total charge current. To reassure a proper inside temperature, the front plate is supplied with a temp. controlled fan.

If mounting the unit in an upside position the fan will start at app. 40 % output power, and will speed up according to the increasing current. This means a very silent construction, with a long lifetime and mounting in any other positions possible.

The unit is delivered in seawater proof aluminium boxing, painted in black, with all internal circuit boards protected by a thin coating.

The unit is over voltage protected on in/output, and supplied with an ON/OFF switch and solid in/output connectors.

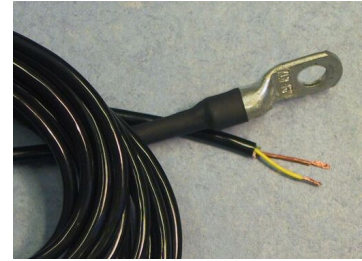


▶ **BTS (Battery Temperature Sensor):**

The Battery Temperature Sensor is sealed into a solid Ring Terminal and delivered with a high Temperature rated cable to ensure implementation in all environments.

With 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.

This mechanical design insures that sensor can be mounted without any glue or other material giving you an easy and safe mounting even under large vibration conditions.



▶ **General:**

To reassure a proper inside temperature, the front plate is supplied with a temp. controlled fan. If mounting unit in a upside position the fan will start at app. 40 % Output Power, and will speed up according to the increasing current. This means a very silent construction, with a long lifetime.

Mounting in any other positions is possible.

If temperature increases to more than maximum, the unit will turn OFF (at mounting in small/closed environments or if unit has been covered up).

When temp. has decreased, and the unit restarted, the *TEMP/POL* indicator will flash,... therefore it is possible to overlook, if the charging has been completed or interrupted.

It is possible to connect the units in parallel (max. 10 pcs.), so you have the opportunity to increase charge current value to fit into your application. By connecting the terminals POWER SHARE between the units, all units will share the total charge current.

As an option, a remote-panel can be connected, having all indicators and an ON/OFF switch. Therefore it is possible to hide the main unit, but at the same time still been able to get the correct information's, or switch ON/OFF.

One remote-panel will function with units in parallel operation, connected to master.

By using the connections to the remote-panel, it is possible to gain logic signals, which can provide other electronics with information around the actual condition, if needed. Please contact EMTECH Power A/S for further information.

Unit is delivered in seawater proof aluminium boxing, painted in black, and with all internal circuit boards protected by a thin coating. Unit is over voltage protected on In/Output, and supplied with an ON/OFF switch, fuse and solid In/Output connectors.

▶ **Function LED's:**

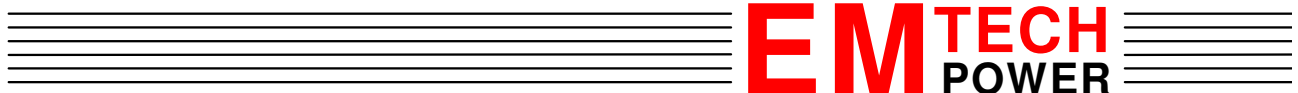
INPUT OK: The ON LED indicates that mains Input is ok and that the charger is running.

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 go OFF while the unit start charging. Furthermore, if the inside temperature gets too high, this LED will be ON and shut down the Charger; this is caused by too high surrounding temperature or if the unit has been covered up. When the inside temperature has decreased, the unit will start charging and the LED will start to flash. This flashing is an indication that the charge period has been interrupted. ... turn OFF the Mains switch, wait app. 5 Sec. Restart the charger and the LED will go OFF.

REGULATION: When Regulation is ON, the Battery (Cell) Voltage is up to the selected voltage and the unit is working in the Voltage mode between 0 to maximum current.

POWER LIMIT: When the current into the Battery/Load is higher than the unit is able to deliver, this LED will be ON, and the unit is working in limit mode. At this point the Regulation LED will be OFF. When the current decreases the LED will go OFF and the Regulation LED will go back ON.

0 – 100 %: 0 – 100 % Power is indicated by 10 LED's showing the Output current into the Battery/Load. Note that this indication is a current flowing into the Battery/Load and not only into the Battery.



BATT. TEMP OK: This LED will be ON if BTS (Battery Temperature Controller) is connected and the measured value is between -35°C and $+110^{\circ}\text{C}$. This indication, placed on the top of the unit, will ensure that the sensor is intact.

External Controls:

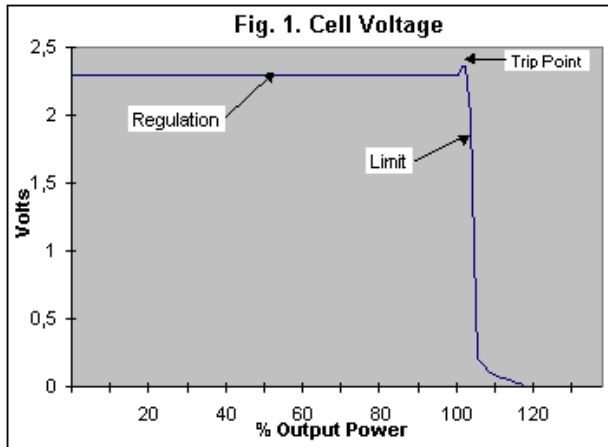
- 1 & 2: SHARE** Connect 1 to 1 and 2 to 2 on between units in parallel, use twisted wires (0,25 – 0,5²mm).
- 3: 5V** Ref. Voltage – not for use.
- 4 to 8: REMOTE** Pin 4 to 8 is for remote indicator and ON/OFF control.
- 9 & 10: CONTACT** Contact set between pin 9 and 10 is closed when the unit is supplied with Input and running. Can be used to generate Mains dropout alarm
- 11 & 12: TEMP.** Connect Battery Temperature Sensor between pin 11 & 12 to obtain temp. Compensated Output voltage. If Battery temperature is between -35 and $+110^{\circ}\text{C}$ the **OK LED** will be ON.

A to F: This Dipswitch will allow you to select other Voltages, Trip-points, Master/Slave and Temp. Comp. Use underneath tables to select the appropriate values. If any doubt, contact your Battery Supplier for detailed information around CV charging.

Select Temp. Comp: A		Select Trip-Point: C & D				Select Output Voltage: E & F				
Cell Voltage / $^{\circ}\text{C}$		Trip0	Trip1	Trip2	Trip3	V0	V1	V2		
A OFF	A ON	C=OFF	C=ON	C=OFF	C=ON	E=OFF	E=OFF	E=ON		
3 mV	4 mV	D=OFF	D=OFF	D=ON	D=ON	F=OFF	F=ON	F=OFF		
		Cell	0,0	0,033	0,066	0,100	Cell	2,11	2,203	2,300
		12V	0,0	0,200	0,400	0,600	12V	12,660	13,215	13,800
		24V	0,0	0,400	0,800	1,200	24V	25,325	26,245	27,600
		48V	0,0	0,800	1,600	2,400	48V	50,650	50,995	55,200

= Factory Setting

Basic Charging:



The Basic charging technique used (Fig.1), supply a totally regulated DC Voltage to the battery with 2,30V/cell (13,8V / 27,6V / 55,2V).

This level will be higher (Trip Point) if your battery is completely down/empty with app. 0,066V/cell (14,2V / 28,4V / 56,8V).

This method of charging ensures that the battery never reach its gasification level, which gives your battery a much longer lifetime, and a very low level of gassing during charging. Furthermore, it means that your battery can never be charged so fast, that it will be damaged or worn out, because the battery will only receive charging in accordance with its own needs.

By looking at Fig. 1 you can observe, that total 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 V, and charging will continue into a Voltage-Controlled condition (regulation). Trip Point refers therefore to 100 % maximum Power... charging will continue, and the output current will slowly decrease until the Battery will be fully charged, until it reaches 0 %.

When charging the last 10 – 20 %, the charging time will be proportionally longer.

► Temperature Compensated Charge (TCC):

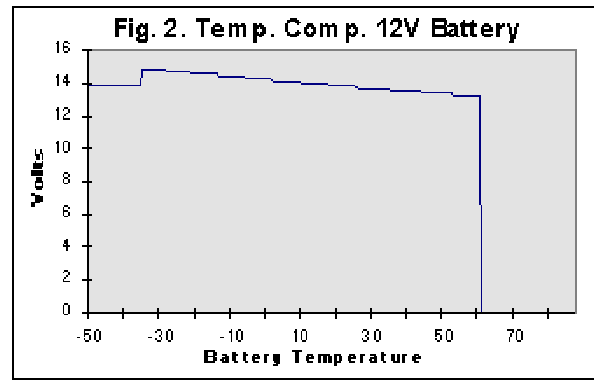
Charging Lead-Acid Batteries lower than +10°C and higher than +35°C require a temperature compensated charging, to obtain fully charge at low temp. and to protect against overcharging at high Temp.

By using the EMT 40000 Series and external Battery Temperature Sensor (BTS), unit is able to compensate Output Voltage with 3 or 4 mV/Cell/°C.

If no BTS is connected, the unit will not accept the Temp. measurement as true... no compensating will take place and the OK LED will be OFF.

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

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



► Charging over time:

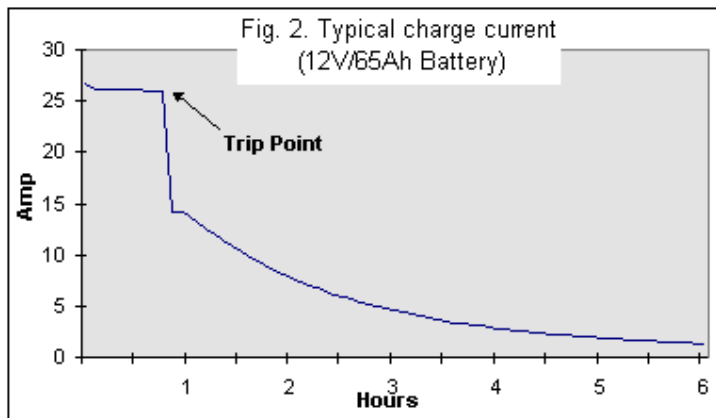


Fig. 3 shows a typical charge current over time, for a totally empty 12V/65Ah Battery. In case of large Batteries, it will take a longer period of time, before reaching the Trip Point. Therefore there are no limits, in respect to Battery capacity.

By observing the figure, the total 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, and charging will continue into a voltage-controlled condition

(Regulation). Trip Point refers therefore to 100% Power on the indicator.... charging will continue, and then the Output current will slowly decrease until the Battery will be fully charged until it reaches 0%. When charging the last 10-20%, the charging time will be proportionally longer.

► Parallel Operation:

Operating units in parallel, observe following:

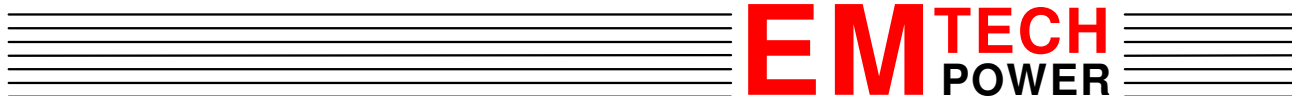
Mount the number of units you will run in parallel (max 10) and connect AC Input to the units. Connect output terminals to a common tie point with the same length of wire and connect small twisted wires (0,25 – 1,0 mm) from the external Connector on all units going from Pin 1 to Pin 1 and from Pin 2 to Pin2.

Then you have to select a master that will control other unit(s) as slave(s) in parallel.

On the unit(s) you want to run as slave, switch the **MASTER (B)** on the Dip-switch to the **OFF** position, this will set this unit to SLAVE function.

Now your system is set-up for parallel operation and only the Master will display all functions. The slave will only display AC OK and any failure indicated by TEMP. / POL.

If the system goes into Power Limit lower than 2,0V/cell, POWER and LIMIT LED's will be ON. The Temperature Compensating by the BTS in a parallel system should be connected to the master.



EMT 40000 Series SPECIFICATIONS

@ 25°C/Factory setting

GENERAL			
INPUT VOLTAGE (X)	185-264 VAC/ 260-375 VDC	P/S CAPACITY	< 2,5 nF
INPUT VOLTAGE (Y)	90-130 VAC	HOLD-UP TIME	> 15 mSec.
INPUT POWER	Max. 650 VA	EMC	EN 55022 curve B
INPUT FREQUENCY	45 – 65 Hz	SAFETY	EN 60950
FILTER	High efficiency Comm. Mode Filter	OUTLINE	230 x 133 x 78 mm
FUSE INTERNAL (X)	T 3,15 A – 5 x 20mm	WEIGHT	APP. 1,35 Kg.
FUSE INTERNAL (Y)	T 5 A – 5 x 20mm	OPERATING TEMP.	-30 to +55°C
INRUSH	< 30A	STORAGE TEMP.	-40 to +85°C
PROTECTION	275 / 150 VAC VARISTOR	PREFUSING	> 30 A
EFFICIENCY	App. 87 %	OVERTEMP.	PROTECTED/Restart
FREQUENCY	70 KHz	REVERSE POLARITY	PROTECTED max. 10 sec.
ISOLATION	3000 V – PRIM./SEC.	REVERSE CURRENT	< 0,0025 A
RELAY CONTACT's DC	200VDC/1,0A	REGULATION	0 to 100% Load-Range
RELAY CONTACT's W	15W max	COOLING	Conv./Temp. Controlled FAN

OUTPUT				
	EMT 40012	EMT 40024	*EMT 40036	EMT 40048
CHARGE VOLTAGE	+ 13,8 VDC	+ 27,6 VDC	+ 41,4 VDC	+ 55,2 VDC
POWER	375 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
CURRENT LIMIT	> 25,0 A	> 15,0 A	> 10,0 A	> 7,5 A
ADJUST RANGE	11,5 – 14,2 VDC	23,5 – 28,5 VDC	34,5 – 42,6 VDC	47,0 – 57,0 VDC
RIPPLE	< 1,3 %	< 0,9 %	< 0,9 %	< 0,6 %
LOAD REG.	< 1,5 %	< 1,0 %	< 1,0 %	< 0,6 %
LINE REG	< 0,4 %	< 0,4 %	< 0,4 %	< 0,4 %
PARALLEL OPR.	ACTIVE App. 100 %	ACTIVE App. 100 %	ACTIVE App. 100 %	ACTIVE App. 100 %
FACTORY ADJ. (25°C)	13,8 VDC No Load	27,6 VDC No Load	41,4 VDC No Load	55,2 VDC No Load
OVP.	16,0 – 17,5 V	32,0 – 34,0 V	48,0 – 52,0 V	64,0 – 66,0 V
INDICATORS	2,5 A / LED	1,50 A / LED	1,00 A / LED	0,75 A / LED

LED INDICATORS			
ON	AC Supply - OK	TEMP./POL	Overtemp./ Wrong Polarisisation
REGULATION	Charger in Regulation (Voltage)	LIMIT	Charger in Current Limit
OUTPUT POWER	0 – 100 % Output Power (10 LED's)	BATT. TEMP.	Battery Temperature OK

► Charger Order Codes:

	12V / 25A	24V / 15A	36V / 10A	48V / 7,5A
230 VAC Units:	EMT 40012X	EMT 40024X	*EMT 40036X	EMT 40048X
115 VAC Units:	EMT 40012Y	EMT 40024Y	*EMT 40036Y	EMT 40048Y

► Battery Temperature Sensor (BTS) Order Codes:

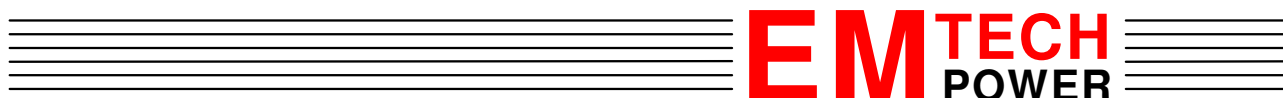
Wire Length	1 m	2 m	3 m	6 m
Order Codes:	BTS 01	BTS 02	BTS 03	BTS 06

* Only on special request, not in running production

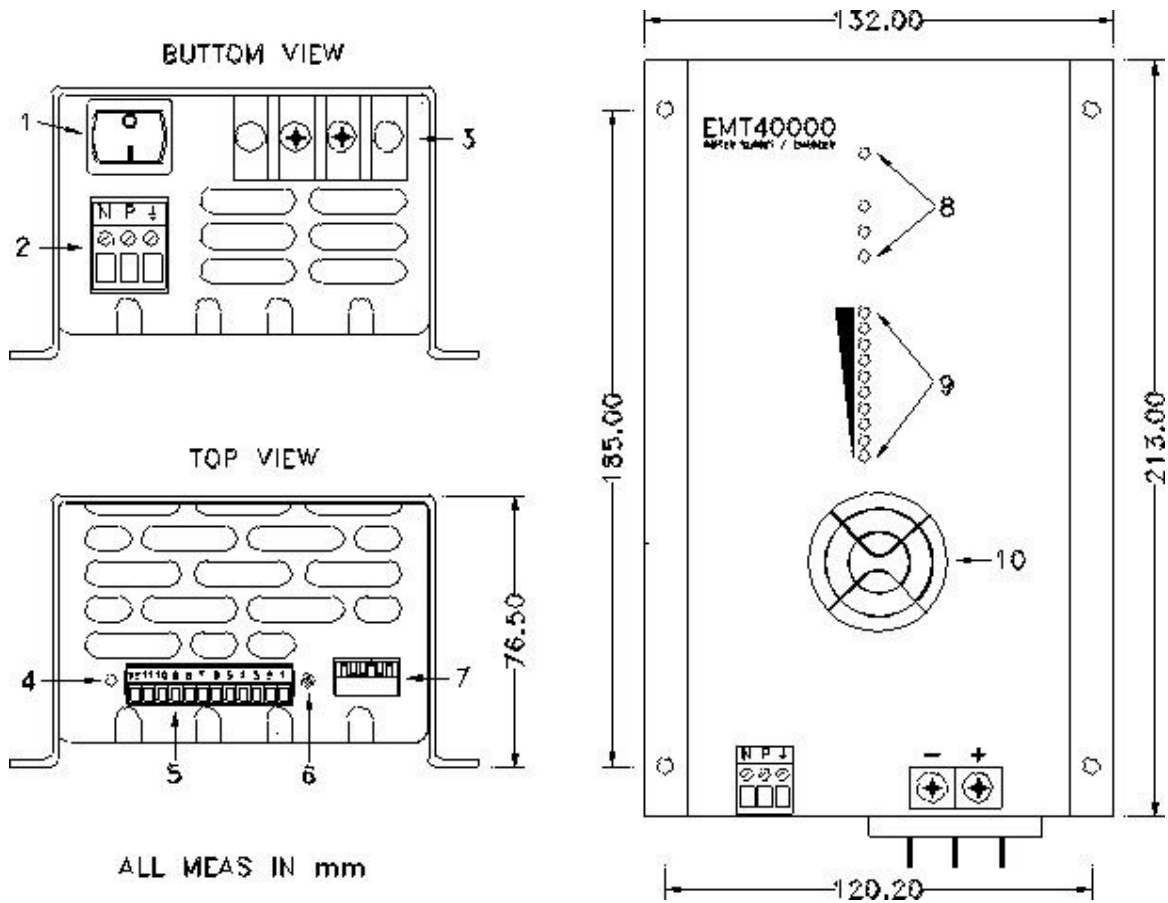
As an option, a remote-panel can be connected, having all indicators and an ON/OFF switch. In this way it is possible to hide the main unit, but at the same time still being able to get the correct information or switch ON/OFF. One remote-panel will function with units in parallel operation.

REMOTE PANEL: All indicators + ON/OFF.

By using the connections to the remote-panel, it is possible to gain logic signals, which can provide other electronics with Information around the actual condition.....*If needed.* – Please contact EMTECH Power A/S for further information.



Dimensions:



1. Mains Switch ON/OFF
2. Input Connector
3. Output Connector
4. Temp. OK LED
5. External Connector

6. Adjust
7. Dip-Switch Set-up
8. Function LED's
9. Power LED's 0 - 100%
10. Air Intake

