

Tentative

CE CB  
Pending  
Scheme  
IEC 60950-1

### Features

- ◆ Compact universal 24 VDC power supply with integrated battery controller module
- ◆ Battery protection for over voltage, deep discharge, short circuit and reverse connection
- ◆ Alarm outputs for input, output and battery condition
- ◆ Remote On/Off for battery and power supply
- ◆ Controlled end of charge voltage by temperature sensor
- ◆ International safety approval package
- ◆ 3-year product warranty



TSP-TS battery temperature sensor  
(10 kOhm NTC with 2m cable) included



This power supply provides an integrated professional battery management system to charge and monitor an external lead-acid battery. The result is a complete DC-UPS system in a compact housing with no additional parts needed. The external connected 12 V battery will be charged and held in charged mode by the power supply. In the event of a mains power failure the battery will supply the output power until the battery is discharged. As a consequence, the output voltage of the system is equivalent to the battery voltage. To avoid overcharging the battery, an external temperature sensor adjusts the battery voltage automatically to the required end of charge voltage. This can extend the battery life. The battery is protected against deep discharge. Mains power and battery status are monitored regularly and failures indicated by corresponding LED's and alarm outputs. The module also provides an external On/Off input to switch-off both, power supply and battery.

### Models

Order code	Input voltage range	Output current max.*	Output Power max.	Back up battery
TSPC 240-124 UPS	Low Line : 85 – 132 VAC High Line: 187 – 264 VAC	24 VDC / 12 A	240 W	12V lead acid battery (to purchase on local market, no TRACO POWER stocking item)

\* Maximum current at nominal Vout

## Input Specifications

Input voltage	– nominal ranges	100 – 120 / 220 – 240 VAC by selection switch
	– effective ranges	85 – 132 / 187 – 264 VAC
	– output power derating at input <100 VAC	3.3 %/V
	– boost output power derating at input <115 VAC	1.3 %/V
	– boost output power derating at input <220 VAC	0.6 %/V (at upper input voltage range)
Input voltage frequency		47 – 63 Hz
Harmonic limits		EN 61000-3-2
Holdup time		10 ms min.
Inrush current		40 A
Recommended circuit breaker		10.0 – 16.0 A (characteristic C or fuse, slow blow type)

## Output Specifications

Output voltage / current	– normal mode	24.0 – 26.0 VDC; 10 A (12 A in boost mode)
	– buffer mode	23.4 – 23.8 VDC; 10 A (12 A in boost mode)
	– output power derating above 24 VDC	5 %/V
Efficiency (load >50 % of I <sub>out</sub> max.)	– normal mode	88 – 91 % (battery charged)
	– buffer mode	90 – 92 %
Regulation	– Input variation	1 % max.
	– Load variation (0–100 %)	1 % max.
Ripple and Noise (20MHz bandwidth)		100 mVp-p max.
Overload protection		120 – 140 % of I <sub>out</sub> nom., constant current
Short circuit current		90 % of I <sub>out</sub> nom. (typ.), foldback
Output overvoltage protection		30 V
Overtemperature protection		switch off at overtemperature, automatic restart
Power back immunity		35 V (40 V for 1 sec.)
Power OK signal	– trigger threshold:	21.0 – 22.5 V
	– output signal	open collector 10 mA max.
Max. capacitive load		unlimited

## General Specifications

Operating temperature	– operation	–25°C to +70°C max. derating above +60°C : 2.5%/K
	– normal mode boost output	–25°C to +60°C max. derating above +50°C : 1.67 %/K
	– buffer mode boost output	–25°C to +40°C max.
Storage temperature		–25°C to +85°C max.
Temperature coefficient		0.02 %/K
Cooling		convection cooling, no internal fan
Pollution degree		2
Humidity (non condensing)		95 % rel. H max.
Reliability, calculated MTBF at +25°C acc. to IEC 61709		> 1.5 Mio. h
Battery protection		against over voltage, deep discharge, overcharge, short circuit and reverse connection (built-in fuse)
Signals	– Status	DC OK input, DC OK output, BAT OK all relay contact closed and LED on at status OK
	– Contact rating	30 VDC / 1.0 A max. 60 VDC / 0.5 A max.

All specifications valid at nominal input voltage, full load and +25°C after warm-up time unless otherwise stated.

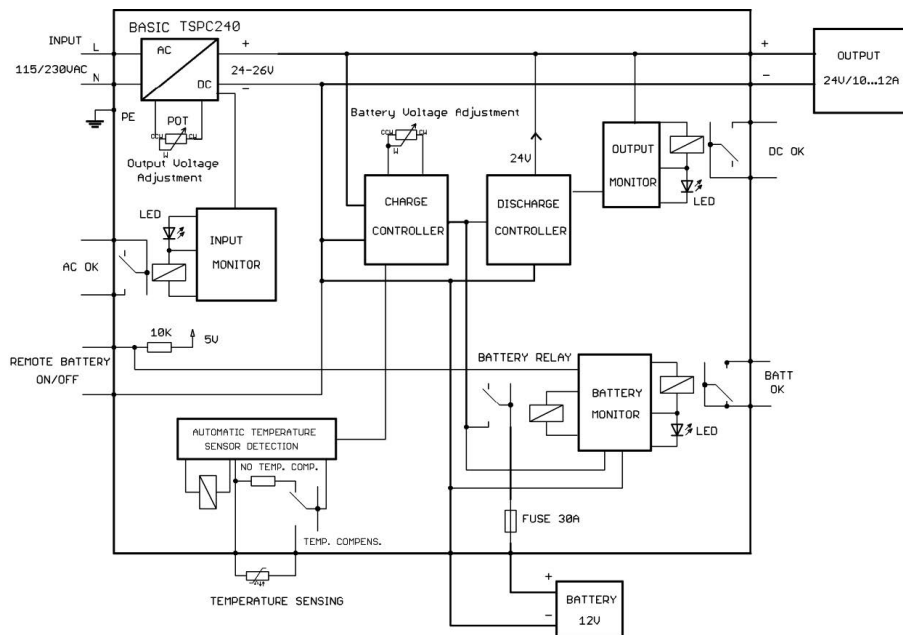
**General Specifications** (continued)

Battery charging current	0.8 – 1.2 A
Nominal battery voltage (at 25°C)	13.6 VDC (factory setting)
Battery voltage adjustment range	13.0 – 14.4 VDC
Battery resistance test	100mOhm min. (normal mode at 25°C)
Battery test current	2.5A / 60ms typ. (normal mode at 25°C)
Battery test interval (acc. to jumper setting)	15s or 10min
Battery warning	10.4 – 11.4 VDC (buffer mode only)
Battery disconnection	9.3 – 10.2 VDC (buffer mode only)
Battery remote Off	disconnects battery in buffer mode (see page 6 - connector)
Automatic battery temperature compensation range	-15°C – 50°C (external sensor included)
Altitude during operation	2000 m
Safety standard	IEC/EN 60950-1, UL 60950-1 (2nd) + Am1:2011 UL508 – requirements
Safety approvals	– CSA (UL60950, UL508) – CB test certificate IEC 60950-1 (SIQ for EN) <a href="http://www.tracopower.com/products/tsp-modules-csa.pdf">www.tracopower.com/products/tsp-modules-csa.pdf</a> <a href="http://www.tracopower.com/products/tspc-240ups-cb.pdf">www.tracopower.com/products/tspc-240ups-cb.pdf</a>
Class of protection	safety class I (IEC 536)
Degree of protection	IP 20 (IEC/EN 60529)
Electromagnetic compatibility (EMC), Emissions	EN 61000-6-3, EN 61204-3 – Conducted RI suppression on input – Radiated RI suppression EN 55011 class B, EN 55022 class B, EN 55011 class B, EN 55022 class B,
Electromagnetic compatibility (EMC), Immunity	EN 61000-6-2, EN 61204-3 – Electrostatic discharge (ESD) IEC/EN 61000-4-2 4 kV / 8 kV criteria B – Radiated RF field immunity IEC/EN 61000-4-3 10 V / m criteria A – Electrical fast transient / burst immunity IEC/EN 61000-4-4 2 kV criteria B – Surge immunity IEC/EN 61000-4-5 1 kV / 2 kV criteria B – Immunity to conducted RF disturbances IEC/EN 61000-4-6 10 V criteria A – Power frequency field immunity IEC/EN 61000-4-8 30 A / m criteria A – Mains voltage dips and interruptions IEC/EN 61000-4-11 criteria B/C
Environment	– Vibration acc. IEC 60068-2-6; – Shock acc. IEC 60068-2-27 3 axis, sine sweep, 10 – 55 Hz, 1 g, 1 oct/min 3 axis, 15 g half sine, 11 ms
Enclosure material	aluminium (chassis) / stainless steel (cover)
Mounting	– DIN-rail mounting – Wall mounting (option) for DIN-rails as per EN 50022-35x15/7.5 (snap-on with self-locking spring) with wall mounting bracket - see page 7
Environmental compliance	– Reach – RoHS <a href="http://www.tracopower.com/products/reach-declaration.pdf">www.tracopower.com/products/reach-declaration.pdf</a> RoHS directive 2011/65/EU
Connection	– Input Output battery – Signal & control screw terminal (plug included) detachable screw terminals (plugs included)
Installation instructions	<a href="http://www.tracopower.com/products/tspc-240ups-inst.pdf">www.tracopower.com/products/tspc-240ups-inst.pdf</a>

All specifications valid at nominal input voltage, full load and +25°C after warm-up time unless otherwise stated.

## Function Specification

### Function Diagram:



### General Description

This power supply is supplied by mains voltage and contains an integrated DC uninterruptible power supply feed by an external battery. It is designed to supply the applied load continuously and without interruption, even when the mains power fails. In this case, the energy is supplied from an external 12V battery to provide the required output voltage. The unit is designed to operate with lead-acid batteries.

### Operation

Before the first use, the AC input range should be set by the slide switch. During the normal operation, when the input AC voltage is present, the output DC voltage is delivered by internal AC/DC power supply.

In case of power failure the internal battery discharge regulator is activated. The output voltage will be still maintained at the reduced level of 23.6V (typically) without any interruptions. The battery discharge operation will continue until AC input voltage recovers.

If the input AC voltage does not recover, the battery voltage will continue to drop, while continuously delivering the output power at required voltage level. In order to prevent the deep discharge of the battery, which can lead to battery failure, the battery is disconnected at the deep discharge threshold. The BAT OK signal will be OFF when the battery voltage is approaching the disconnection voltage level. This can enable early warning of the system.

If the input AC is present at the right level, the battery is automatically charged to the set voltage level. This level is factory set for 25°C for lead-acid batteries. The user can change this voltage by using the built-in potentiometer. The adjustment can be made only if the battery is disconnected (after initial operation) to prevent from adjustments errors. The battery test interval should be set to 10 minutes (factory settings). If the battery is operating at a different ambient temperature (not 25°C), the user can adjust the set battery voltage to the required ambient temperature, as recommended by the battery manufacturer.

After adjustments – the battery should be re-connected. It is also possible to use the temperature compensation probe to automatically compensate the end battery charge voltage for any temperature changes. In this case, there is no need to change the potentiometer to compensate for a new ambient temperature.

The internal state of charge of the battery is tested at regular intervals with internal current pulse. The interval is factory set to 10 minutes. It can be changed to 15s for test purposes by changing the slide switch position on the front of the unit as indicated on the label. If the battery OK signal is OFF, even after prolonged charging, the battery pack needs replacement. The buffer function (during input power failure) can be disabled remotely, and the battery is disconnected. It can be achieved by pulling the Remote ON/OFF pin to GND (with contact relay or transistor).

## Function Specification (continued)

### Signals

Following signals are made available as LED indicators and corresponding isolated relay contacts:

- AC-OK**      Indicates if the input AC voltage is present. During operation outside the DC specification (overload), at low input AC levels (below nominal range) it can be OFF. It will indicate that the battery operation has started in order to maintain the output voltage at 24V level.
- BATT-OK:**      Indicates if the battery is charged properly and has low internal resistance. During battery discharge operation this signal monitors the battery voltage. If the battery voltage approaches the disconnection voltage – it is OFF. This enables early warnings of the system. The threshold of this signal is about 1V higher than the battery disconnection voltage. Note that if the battery signal was OFF during the normal operation (when input voltage is present) – it will stay OFF during the battery discharge operation as well.
- DC-OUT-OK:**      Indicates that the output voltage is higher than 82-90% of the nominal output voltage.

### Battery

The battery is protected against short circuit and overload with a built-in fuse 30A, which is accessible from the front panel. The output voltage will be switched off before deep discharge occurs to the battery during buffer operation.

During the normal operation, the connected 12V battery is charged with constant charging current. This current will be reduced if the battery reaches the temperature dependant end of charge voltage. This voltage is factory set to suit most lead acid battery manufacturers at 25 °C. If the external temperature compensation probe is connected, the end of charge voltage will follow the plot – Figure 1 (only for factory settings 13.6V/ 25 °C).

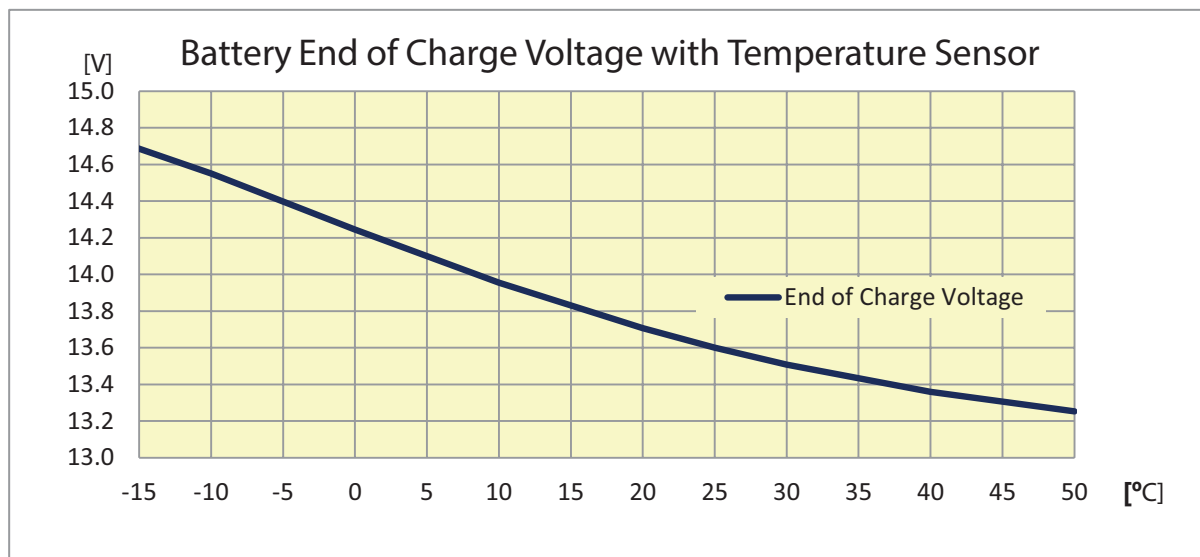


Figure 1

### Remote On/Off

The battery can be switched-off with the remote ON/OFF input. The battery will be disconnected with the relay. In normal mode the output voltage will be present; however in buffer mode the output will be disconnected.

## Function Specification (continued)

### Ambient temperature and power rating

The unit is specified to operate at temperatures between -10°C and 70°C. Minimum temperature for start-up is -25°C. In normal mode, when input AC voltage is present, the module can deliver full power up to 60°C.

The boost current of 12A is available at ambient temperature up to 40°C. In buffer mode, the boost 12A current is available with a fully charged battery. Minimum required battery voltage is 12V.

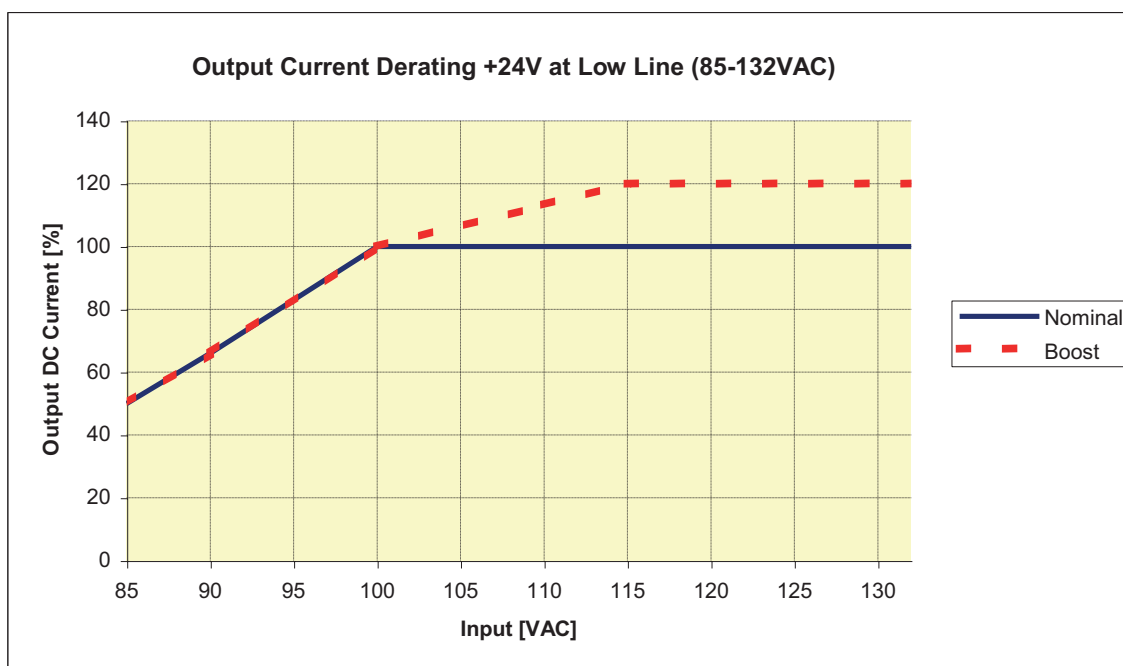


Figure 2

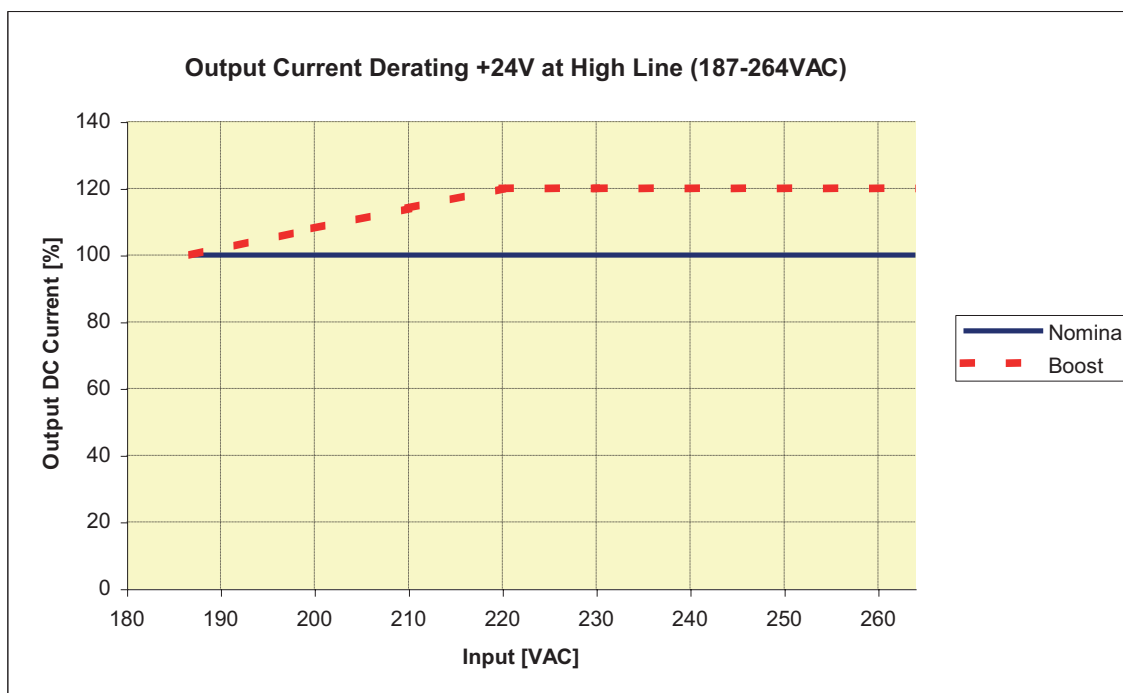


Figure 3

**Connector Position**

**Pending**

**Outline Dimensions**

TSPC-240UPS

**Pending**

## TSP-WMK Wall Mounting Bracket

Ordercode of Kit	For Models	Content of Kit
TSP-WMK03	TSPC-240UPS	1 bracket

### TSP-WMK03

