

# Smart DC UPS

Snaptec Australia Smart DC UPS represent a truly unique, comprehensive approach to providing uninterruptible and secure DC power when you need it. At the same time the system maximises the integrity of standby battery installations whilst optimizing the life and availability of the back up batteries.

A Smart DC UPS consists of the DC power supply, together with backup battery which is usually installed as the last line of defence in the event of loss of mains power.

The system incorporates common sense features providing a vastly improved solution over the traditional methods of float charger plus battery. The battery is accurately charge current limited and you cannot overload the charger or overheat the battery.

The Smart DC UPS unit is the ideal solution for:

- ◆ Critical systems from 100W to 750+ W
- ◆ Applications having standing load with back up standby battery installed
- ◆ Systems which require no transition from mains to battery backup
- ◆ Providing cost effective management of your battery system investment



*“State of the art design and circuitry”*

Our Smart DC UPS systems ensure maximum uptime of the system, and life of the battery, by providing:

- ◆ Independent battery charge current limit
- ◆ Monitoring of the battery status and availability at all times
- ◆ Independently limiting the charge current to the battery, thus ensuring load receives priority (most units can have load : charge ratio altered to suit battery size).
- ◆ Protecting against overload, short circuit and reverse polarity connection, incorporating ELCB (electronic circuit breaker , series III only)
- ◆ Deep discharge protection by disconnecting at low battery voltage.
- ◆ Temperature compensation of battery charge voltage - essential for battery health where ambient temperatures fluctuate.
- ◆ Alarm contacts to enable interfacing with monitoring equipment such as PLCs, SCADA, security, telemetry and myriad others - standard alarms are Power OK and Battery System OK.
- ◆ Optionally, performing regular battery condition testing at a predetermined interval and providing an alarm in the event the battery is suspect.

All of the features are customisable to your needs and additionally we offer a range of packaging options to provide utmost flexibility:

- All of our standard enclosures enable installation in any normal location without safety concerns.
- Rack mounting to standard 19" enclosures
- Wall mounting with battery accommodation to house complete system including batteries - see wall mount cabinet

NB: Temperature compensated charge voltage is a critical factor in the longevity and capacity of (lead-acid) batteries, especially sealed types, and particularly where considerable variance in ambient temperatures occur. Our temperature probes are designed to be placed on the battery or as close to it as practical.

## Connections

Always connect the positive output of the charger to the positive terminal of the battery. Use only lead acid type batteries.

## Initial Testing with no mains power present

To close ELVD with no ac power present, briefly short together the BAT –ve and LOAD –ve terminals.

## Fuses

There are two internal user replaceable fuses inside this unit:

- ac input fuse
- battery circuit fuse.

If there has been a fault condition please check that **both** fuses are still intact and there is current flow in the battery circuit.



- Deep discharge protection
- Controls load and charge current independently
- Wide input voltage window tolerance
- Overload, short circuit & reverse polarity protect
- Automatic temperature compensation
- Detects battery low voltage
- High efficiency switch mode design
- No transition switching to backup battery
- Alarm contacts & LEDs for precise fault indication
- Suitable for use with all types of lead acid batteries (batteries external to power supply)

### SPECIFICATIONS All specifications are typical at nominal input, full load and at 20°C unless otherwise stated.

#### ELECTRICAL

<b>Input</b>	180V - 264VAC 45-65Hz or 200 - 375V DC (standard)
	88V - 132VAC 45-65Hz or 110-180VDC (on request)
<b>Fusing / Protection</b>	Internal AC input fuse Internal DC battery fuse
<b>Isolation</b>	3.5KVAC 1 min. input / output, 1KV DC input / earth
<b>Efficiency</b>	≥ 85%
<b>Inrush current</b>	<30A, 1.8ms
<b>Output Power</b>	100W continuous (0 - 50°C)
<b>Output Voltages</b>	13.8V, 27.6V, 41.4V, 55.2V Other voltages by request.
<b>Voltage adj. range</b>	85 - 105% of Vout
<b>Temp. Compensation</b>	Temperature sensor on 1.7m lead with adhesive pad: -4mV / °C / cell ±10%
<b>Current Limits</b>	Straight line profile –refer model table for values
<b>Line Regulation</b>	<0.04% over AC input range
<b>Load Regulation</b>	<0.5% open circuit to 100% load
<b>Noise</b>	<0.3%
<b>Transient response</b>	200mV over / undershoot, load step 20-100%, 400us settling time
<b>Hold-up time</b>	15 - 20 mS (nom. - max. Vin) without battery

#### STANDARDS

<b>EMI</b>	to CISPR 22 / EN55022 class A
<b>Safety</b>	to IEC950 / EN60950 / AS/NZS3260

#### No-Break™ FUNCTIONS AND ALARMS

<b>Battery Charge Current Limit</b>	See Model Table for default settings. Charge current may be set to a max. of $I_{PSU} - I_{LA}$ where $I_{LA}$ is actual load current
<b>Reverse Polarity</b>	Battery reverse connection will open internal fuse (and produce alarm)
<b>Electronic Low Volts Disconnect (ELVD)</b>	Disconnects battery when battery voltage drops to 1.67V/cell (10, 20, 30, 20, etc) - auto reset
<b>Temperature Compensation</b>	For accurate battery charging/float output voltage is automatically adjusted according to ambient temperature
<b>LED Indication</b>	Green: Power OK Green: Battery OK
<b>Alarms</b>	<ul style="list-style-type: none"> <li>• Power OK (alarms on mains or PSU fail)</li> <li>• Battery Low - alarms when battery ≤ 1.83V/cell (11, 22, 33, 44V , etc)</li> </ul>
• <b>Relay contacts</b>	C - NO - NC full changeover rated 1A /50V DC, 32VAC

#### PHYSICAL

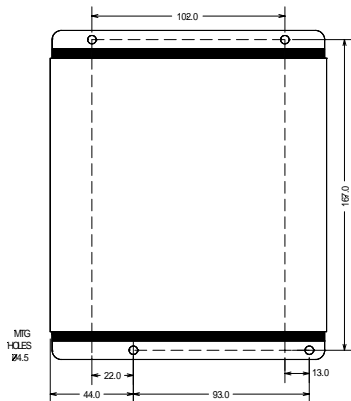
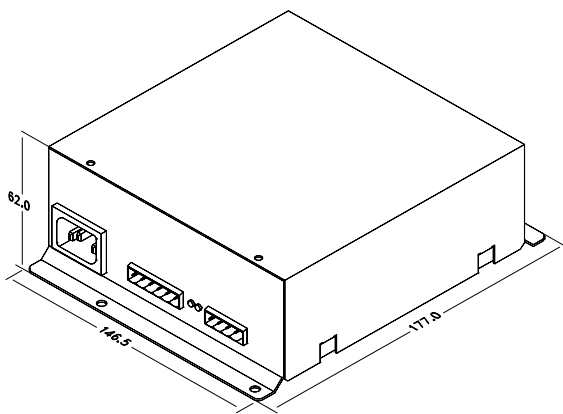
<b>AC Input connector</b>	IEC320 input socket (similar to PCs etc.)
<b>DC Connections</b>	Plug-in style socket & mating screw terminal block: (max. wire 2.5mm <sup>2</sup> / way)
<b>Alarm Connections</b>	Plug in screw terminal block
<b>Enclosure</b>	Zinc plated steel / powder coated lid
<b>Cooling</b>	Natural Convection
<b>Weight</b>	0.95 Kg

### STANDARD PREFERRED MODEL TABLE

MODELS	DC Output			
	Output Voltage (Load/Charger)	Max. Recomm.* Load Current (I <sub>LOAD</sub> )	Charge Current Limit (minimum)	PSU Rated Current (I <sub>PSU</sub> )
SR100U-12	13.8V	6.0A	1.5A	7.5A
SR100U-24	27.6V	3.0A	0.7A	3.7A
SR100U-36	41.4V	1.9A	0.5A	2.4A
SR100U-48	55.2V	1.5A	0.4A	1.9A

\* to allow for adequate charging current as load take precedent over charging of battery

### MOUNTING DETAILS / DIMENSIONS



### ENVIRONMENTAL

<b>Operating temperature</b>	0 - 50 °C ambient at full load De-rate linearly >50 °C to no load @ 70 °C
<b>Storage temperature</b>	-10 to 85 °C ambient
<b>Humidity</b>	0 - 95% relative humidity non-condensing

### ACCESSORIES SUPPLIED

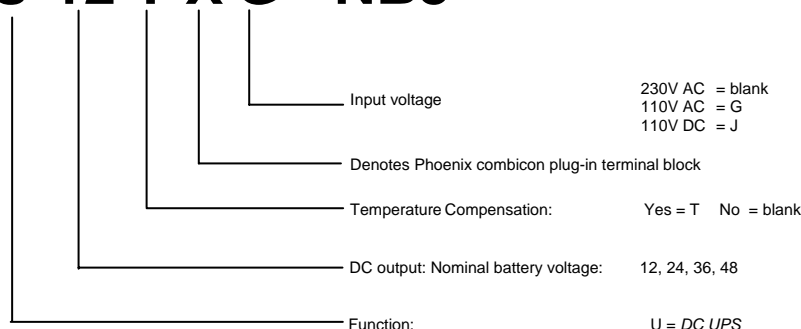
Mounting Feet together with screws  
AC power cord Standard 1.5m lead with IEC320 socket / local plug  
DC connector with mating screw-terminal plug  
Alarm connector with mating screw-terminal plug

### OPTIONS

<b>19" Rack Mount</b>	2U subrack available, with optional digital V/I meter.
<b>Wall Mount Enclosure</b>	PSU may be fitted into enclosure with MCBs and terminals.
<b>Temperature Probe</b>	Can be deleted or specify different length when ordering
<b>Parallel Redundancy</b>	Use 15A output diode assembly part no. <b>+P15</b>
<b>Battery Condition Test (BCT)</b>	Available as an option, please specify duration, interval & any other special requirements when ordering
<b>Remote monitoring &amp; Communication via serial interface</b>	Monitoring of PSU status, output parameters available to special design—please contact our sales office for further information.

### MODEL CODING AND SELECTION CHART

## SR100U-12 T X G - NB5



## General Specifications (at 20°C)

Parameter	V/cell	12V nom	24V nom	48V nom
Output (Float) Voltage	2.3V	13.8	27.6	55.2
Battery low alarm level (Batt Sys OK*) when no mains voltage present	1.84V	11	22	44
Battery disconnect level (ELVD)	1.66V	10	20	40

\* **Note:** Refer to LED flash codes on Page 5 to see which condition has activated the Batt Sys OK alarm

## Settings for Battery Detection

Automatic / manual detection	Automatic
Battery detection interval time	1 hour
Flash battery system LED for 10sec before battery detection test	No
Voltage level for battery detection alarm (Batt Sys OK*)	2.03V/cell (12.2,24.4, 48.8 for 12,24,48V nom)

**Settings for Battery Condition Test** (if no values are entered below then this feature is disabled)

**UNIT SERIAL NUMBER: 241785**

Time between battery condition test	7 DAYS
Length of battery condition test	20 Minutes
Max. length of a mains fail without resetting to full test interval	4 hours (default = 4 hours if not specified)
Battery condition test will be aborted if mains failure during test is greater than:	5 mins
Allow retest after battery condition bad at next battery condition test	YES
Voltage level for battery condition good / bad alarm - Batt System OK* (if voltage drops to this level during BCT then the test is aborted)	2.03V/cell (12.2, 24.4, 48.8 for 12,24,48V nom)

**Battery Charge Current Limit:** If this has been set to a higher value than the default setting then it will be noted on a separate label on the unit.

**Battery Condition Test Fail Reset:** If the system fails the BCT the LEDs continue flashing and BATT SYS OK alarm latches (de-energized state) until either both the mains power input or if enabled the system passes the next BCT

## CONNECTIONS

- Always connect the positive output of the charger to the positive terminal of the battery.

It is essential to periodically check the electrolyte level of flooded cells as there is always some evaporation.

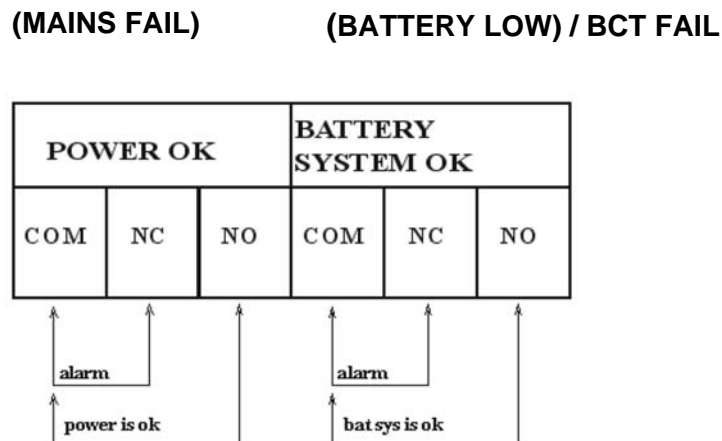
- To minimize the volt drop at the output connections use all the terminals provided ie. Connect output wires in parallel.

### Initial Testing with no mains power present

To close ELCB (internal electronic circuit breaker) with no ac power present, briefly short together the **BAT -ve** and **LOAD -ve** terminals.

### Layout of alarm & battery condition test relay connections

Note that relays are **energised** when: Battery condition test is on, DC output is present, Battery System OK



- NOTES:**
- POWER OK alarm has 30 second delay before activation upon mains failure.
  - POWER OK alarm is also activated when the PSU is in STANDBY mode.

### Fuse Ratings

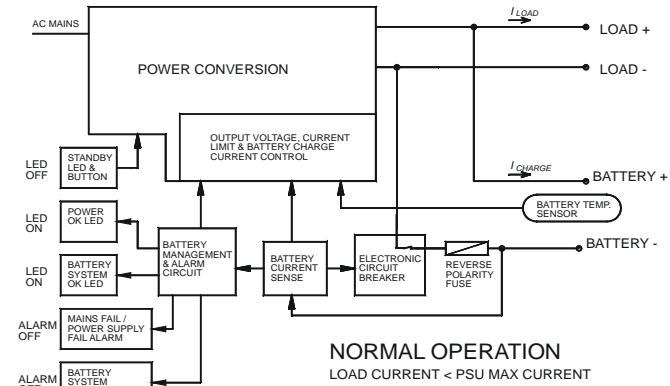
The battery fuse and wiring should be rated at 1.5 x the rated PSU current.

The complete system is capable of delivering 2.5 x rated PSU current to the load and all load cabling should be rated for this current unless fused otherwise.

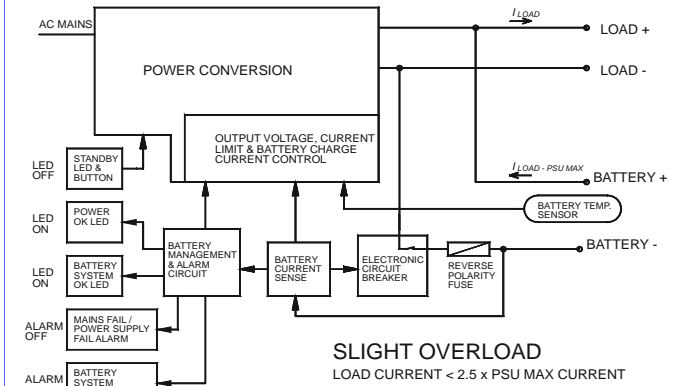
### STATE DIAGRAMS

These charts are system status diagrams showing current flows, alarm status & LED indication status for each state

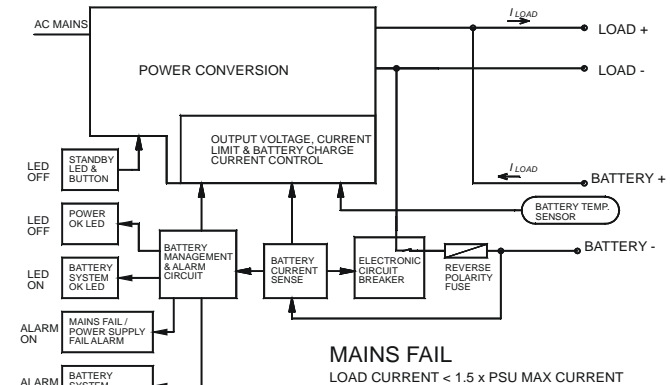
#### Normal Operation



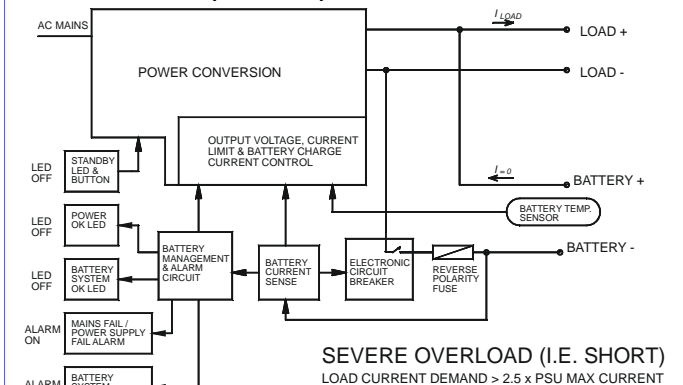
#### Slight Overload



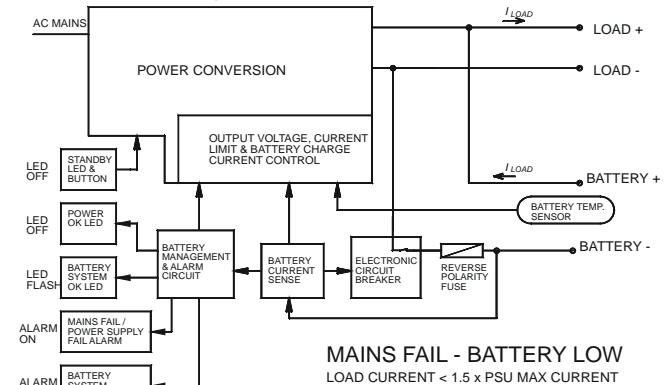
#### Mains Fail



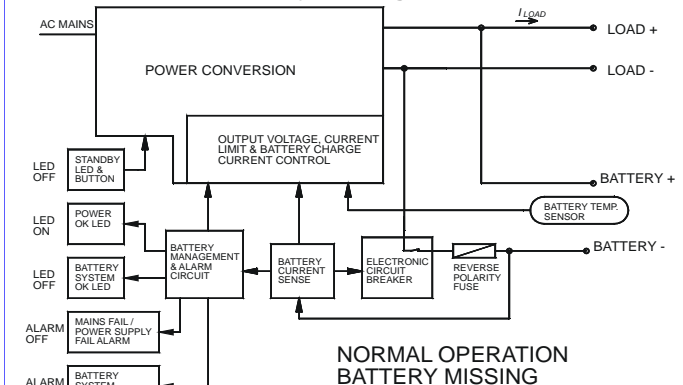
#### Severe Overload (i.e. Short)



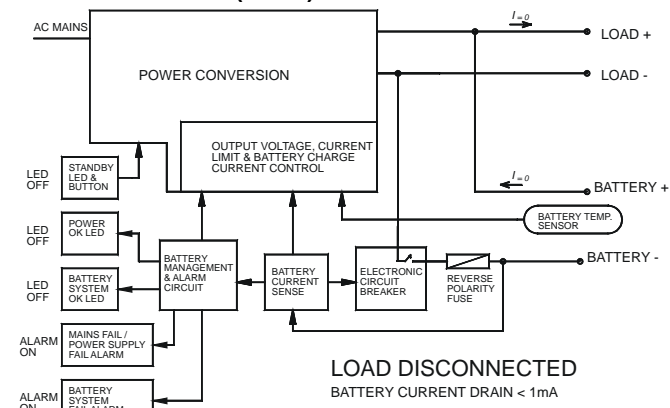
#### Mains Fail - Battery Low



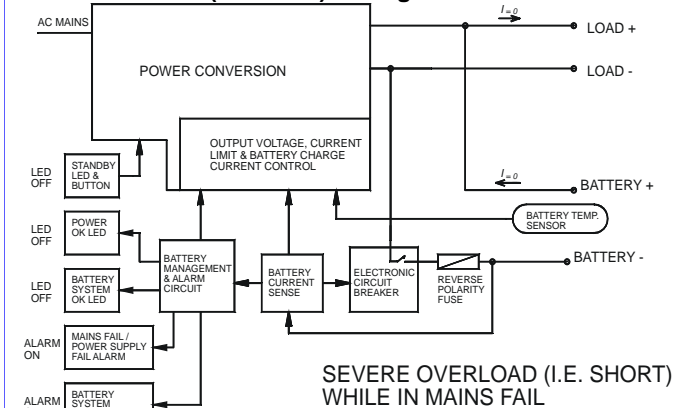
#### Normal Operation, Battery Missing



#### Load Disconnected (ELVD)










































#### Severe Overload (i.e. Short) During Mains Fail



### POSSIBLE ALARM AND INDICATOR CONDITIONS

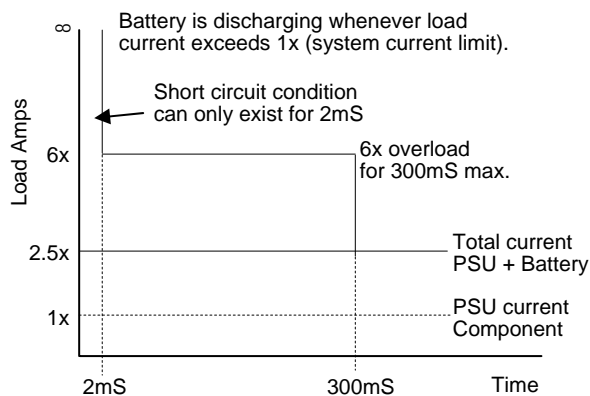
Notes: \*1. Applicable only if the battery condition test option is enabled \*2. Standby function not available on SR100C

Battery System OK LED	Power OK LED	*2 Power Stand-by LED	Power OK Alarm	Battery System OK Alarm	Condition
			Normal	Normal	<b>System normal</b> AC power is on, PSU output is OK, battery circuit is OK and battery voltage is > V Battery Low.
			Normal	Normal	<b>Battery Detection test in progress / imminent</b> (LED begins flashing 10 sec. prior to test of < 1 sec).
			Normal	Alarm	System AC power is on, PSU output is OK but either: 1. Internal battery fuse has opened (only if battery has been reverse polarity connected), <b>or</b> 2. Battery circuit open - battery missing, or fuse / circuit breaker / wiring fault.
			Alarm	Normal	Either: 1. AC power has failed, <b>or</b> 2. PSU has failed
			Alarm	Alarm	AC Power is off / DC has failed <b>and</b> battery has discharged to $\leq$ V Battery Low, unit will continue delivering battery current until low level initiates ELVD.
			Alarm	Alarm	AC Power is off / DC has failed <b>and</b> ELVD has activated and disconnected battery from load. Residual current drain on battery following ELVD < 1 mA.
			Alarm	Normal	*2 System is in standby mode due to : 1. Operator pressed standby button, <b>or</b> 2. PSU has internal fault
			Alarm	Alarm	*2 PSU is in standby <b>and</b> battery has discharged to $\leq$ Battery Low, unit will continue delivering battery current until next level initiates ELVD.
			Alarm	Alarm	*2 PSU is in standby <b>and</b> ELVD has activated and disconnected battery from load. Residual current drain on battery following ELVD < 1mA
*1 			Normal	Normal	Battery Condition Test is in progress: LEDs flash alternately
*1 			Normal	Alarm	<b>Battery Condition Unserviceable:</b> failed to maintain terminal voltage during battery condition test
*1 			Alarm	Alarm	<b>Battery Condition Unserviceable:</b> failed to maintain terminal voltage during battery condition test <b>and</b> System AC power or PSU has failed
*1 			Alarm	Alarm	*2 PSU is in standby <b>and</b> battery condition is determined as unserviceable: failed to maintain terminal voltage during battery condition test

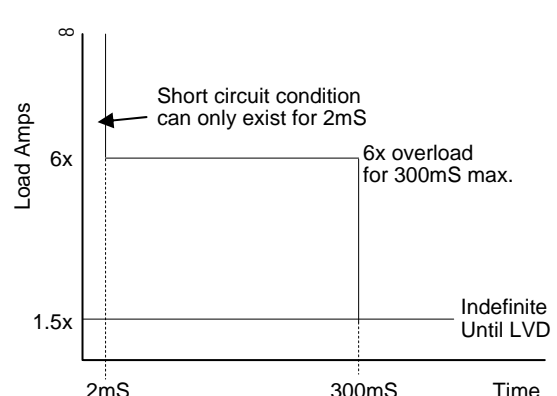
LEGEND :  =Off  =Flashing  =On \*  =Flashing Slowly

### ELECTRONIC CIRCUIT BREAKER (ELCB) (CHARACTERISTICS CHART)

System Current Limit (AC mains on)



System Current Limit (during AC fail)



In both the above examples, the ELCB operates after 2mS under short circuit condition (battery connected). After 300mS of sustained overload, the ELCB operates. At all times the ELCB allows 50-60% system overload.

### Safety

This equipment is designed to comply with information technology/business equipment standard IEC950.

As stand alone equipment, the design allows for simple connection to mains and output.

The user is responsible for ensuring that input and output wiring segregation complies with local standards and that in the use of the equipment, access is confined to operators and service personnel.

**HAZARDOUS VOLTAGES EXIST WITHIN A POWER SUPPLY ENCLOSURE AND ANY REPAIRS MUST BE CARRIED OUT BY A QUALIFIED SERVICEPERSON.**

### Electrical Isolation Testing

Electric strength tests: Components within the power supply responsible for providing the safety barrier between input and output are constructed to provide electrical isolation as required by the standard. However EMI filtering components could be damaged as result of excessively long high voltage tests between input, output and ground. Please contact our technicians for advice regarding electric strength tests.

### Earth Leakage

The internal interference suppression circuit causes earth leakage currents which may be to the maximum allowable of 3.5mA. A low resistance earth connection is essential to ensure safety and additionally, satisfactory interference suppression.

### Ventilation

High operating temperature is the cause of the majority of power supply failures. For example a 10°C rise in the operating temperature of a capacitor may halve its expected life. The rated operating temperature of the equipment is the highest test temperature at which internal components will provide maximum lifetime consistent with flexibility in application.

A switchmode power supply with a rated efficiency of 85% at full load draws 1.18 times the output power from the input. This extra power is lost as heat within the circuitry of the unit. Case and heatsinks are designed to provide maximum transfer of heat to the surrounding air. However, if airflow is constrained within a cabinet, a unit will heat its environment and operate at an elevated temperature. The final operating temperature therefore must be considered in the design of a system for maximum trouble free service life.

Batteries housed in the same enclosure as a power supply / charger may also suffer drastically shortened lifetime if subjected to high ambient temperatures - the same life degradation as for capacitors above apply.

### Water / Dust

Every effort must be made in the installation to minimise the risk of ingress of water or dust. Dust settling on internal heatsinks will degrade their ability to radiate heat and will also attract moisture, thus possibly causing leakage currents and circuit damage.

### Electromagnetic Interference (EMI)

Switching power supplies and DC-DC converters inherently generate electrical noise.

A major aim at the design stage is to suppress switching noise to at least the levels required by the various standards.

Residual noise is nevertheless capable of causing interference in associated equipment if susceptible.

Generally, power supply and susceptible equipment wiring should be well segregated, as short as practicable and all equipment well earthed.

Residual noise can be reduced by looping DC wiring through ferrite cable sleeves. These are most effective as close to the power supply as possible and as many turns of the wire taken through the core (+ and - in the same direction) as the core will accommodate.

For more information, contact our sales office or your distributor.