

User Manual

SR100C

No-Break™ DC UPS



* Please refer to additional user manual for SR100*i* models with communications options.

Label to be affixed here if battery condition test (BCT) enabled

Safety

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. A low resistance earth connection is essential to ensure safety and additionally, satisfactory EMI suppression (see below).

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

Electrical 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 relevant 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 EMI suppression circuits causes earth leakage currents which may be to the maximum allowable of 3.5mA.

Ventilation

High operating temperature is a major cause of power supply failures, for example it has been well documented that a 10°C rise in the operating temperature of a component will halve its expected life. Therefore always ensure that there is adequate ventilation for the equipment. Batteries and cooling fans also suffer shortened lifetimes if subjected to high ambient temperatures - both should be included in a routine maintenance schedule to check for signs of reduced efficiency.

Water / Dust

Every effort must be made in the installation to minimise the risk of ingress of water or dust. Water will almost always cause instant failure. The effects of dust are slower in causing failure of electronic equipment but all electrical equipment should be cleaned free of any dust accumulation at regular intervals.

Electromagnetic Interference (EMI)

Switching power supplies and converters inherently generate electrical noise. All wiring should be as short as practicable and segregated from all equipment wiring which is sensitive to EMI. 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.

Fuse ratings

Check that the wiring and fuses or MCBs match the rating of the PSU or converter. Note that the Innovative Energies *No-Break™* DC chargers are able to deliver up to 2.5 times the rated current when mains power is on.

Connection polarity

It is critical to check the polarity carefully when connecting DC devices. Some Innovative Energies models have reverse polarity protection (RPP), for example, the *Smartchargers* have electronic (non-destructive) RPP, the *No-Break™* DC range has an internal fuse which needs to be replaced if the battery is connected in reverse. Usually, however, a reverse polarity connection results in instant destruction of the device, especially if there is a battery involved.

Glossary of terms used in our user manuals

PSU = power supply unit

BCT = battery condition test

ECB = electronic circuit breaker

ELVD = electronic low voltage disconnect

RPP = reverse polarity protection

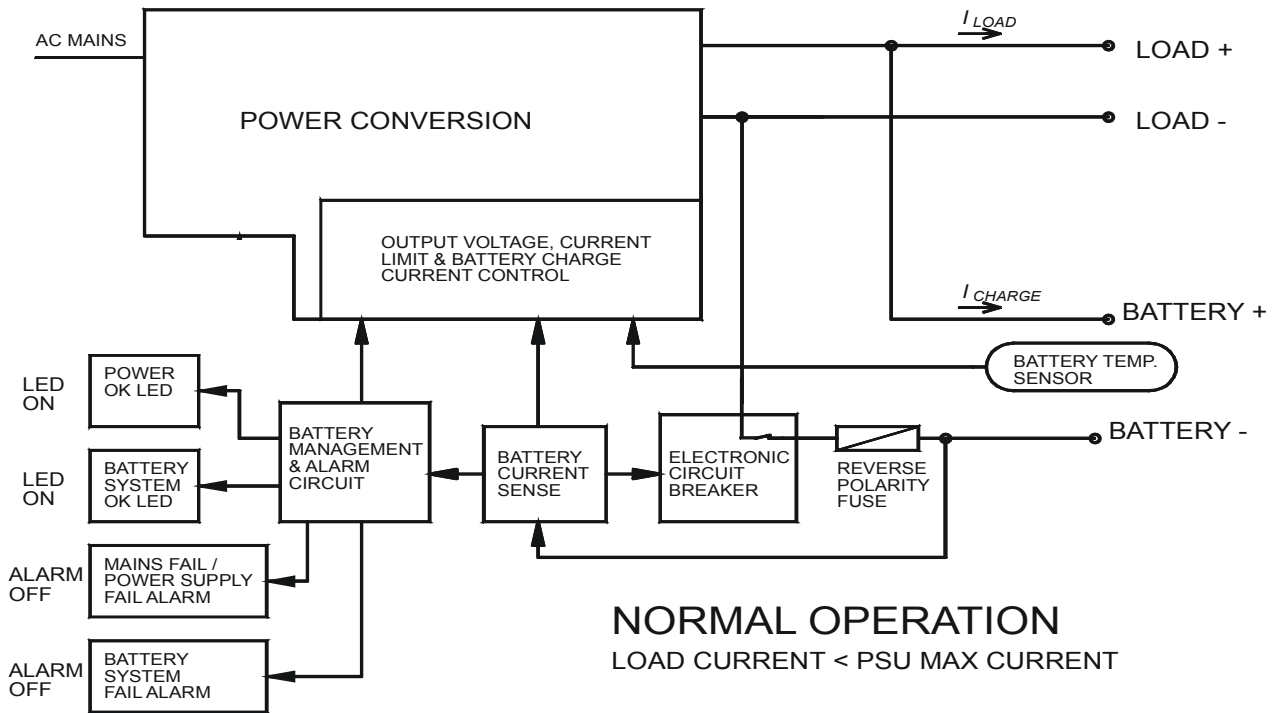
EMI = electromagnetic interference

SNMP = Simple Network Management Protocol

LAN = local area network

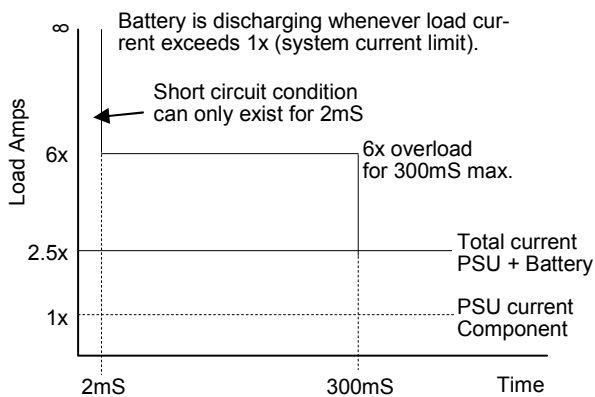
The **No-Break™ DC** power supply is designed to provide DC power to lead acid batteries for critical back up applications.

No-Break™ SYSTEM BLOCK DIAGRAM

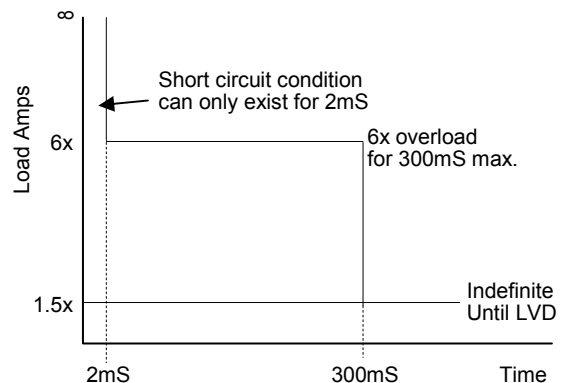


OPERATION OF ELECTRONIC CIRCUIT BREAKER (ELCB)

System Current Limit (AC mains on)



System Current Limit (during AC fail)



ELCB operates after 2mS under short circuit condition and after 300mS of sustained overload. At all times the ELCB allows 50-60% system overload.



Options:
 - battery condition test
 - communication interface port,
 SR100i

Optional
+PROTOCONMB
 RS485 converter for
 use with SR100i -485
 versions

◆ 24 Month Warranty

- High performance **No-Break™** DC UPS system
- Separate outputs for load and battery
- Battery detection - regular battery presence and battery circuit integrity checks
- Deep discharge protection
- Independent load and charge current limits
- Overload, short circuit & reverse polarity protect
- Automatic temperature compensation
- Low battery voltage alarm on mains fail
- 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	
Input Voltages	
▪ standard	180V - 264VAC 45-65Hz
▪ optional	88V - 132VAC 45-65Hz
Fusing / Protection	Internal input fuse DC battery output fuse
Isolation	1KV DC input - output / earth
Efficiency	≥ 85%
Inrush current	<30A, 1.8ms
Output Power	100W continuous (0 - 50°C)
Output Voltages	13.8V, 27.6V, 41.4V, 55.2V Other voltages by request.
Voltage adj. range	85 - 105% of Vout
Temp. Compensation	Temperature sensor on 1.7m lead with adhesive pad: -4mV / °C / cell ±10%
Current Limit	Output current limit set at rated FLC
Line Regulation	<0.04% over AC input range
Load Regulation	<0.5% open circuit to 100% load
Noise	<0.3%
Transient response	200mV over / undershoot, load step 20-100%, 400us settling time
Thermal Protection	Automatic current de-rating if >50°C. Self-resetting (see Operating Temperature)
Hold-up time	15 - 20 ms (nom. - max. Vin) without battery

STANDARDS	
EMI	to CISPR 22 / EN55022 class A
Safety	to IEC950 / EN60950 / AS/NZS3260

No-Break™ FUNCTIONS AND ALARMS	
Battery Charge Current Limit	See Model Table for default settings. (25% & 50% settings available on request)
Reverse Polarity	Battery reverse connection will open internal fuse (and produce alarm)
Battery Monitoring	Detects for presence of battery on start up, then every 60 minutes when charge current < 200mA
Battery Protection	Electronic Circuit Breaker (ECB) operates under the following conditions:
- battery discharged	ELVD (electronic low voltage disconnect) activates when battery voltage drops to 1.67V/cell (adjustable) - auto reset
- overload (*refer to options - ECB)	Allows ~150% load from battery without acting, operates within 300ms for total load > 600%
- short circuit	Acts within 2ms, backed up by fuse
LED Indication	Green: Power OK Green: Battery OK
Alarms	<ul style="list-style-type: none"> • Power OK (Mains/PSU fail) • Battery System OK - alarms when battery voltage low (on mains fail) , battery missing, battery circuit wiring faulty, BCT fail (if enabled)
Alarm Relay contacts	C - NO - NC full changeover rated 30VDC,2A /110VDC,0.3A/125VAC,0.5A
Battery Condition Test (BCT)	Standard on SR100i - 20mins/28days unless otherwise specified on ordering.

PHYSICAL	
AC Input connector	IEC320 input socket (similar to PCs etc.)
DC Connections	Plug-in style socket & mating screw terminal block: (max. wire 2.5mm² / way)
Alarm Connections	Plug in screw terminal block
Enclosure	Zinc plated steel / powder coated lid
Dimensions	147W x 177D x 62H mm
Weight	0.95 Kg

100 Watt No-Break™ DC charger for lead acid batteries

SR100C

incl. SR100i

STANDARD PREFERRED MODEL TABLE					
MODELS	DC Output				
	Output (V)	PSU Rated (A)	Charge Limit (A) *1	Recomm. Load (A)	Peak load (A)
SR100C12	13.8	7.5	7.5	6.0	11
SR100C24	27.6	3.7	3.7	3.0	5.5
SR100C36	41.4	2.4	2.4	1.9	3.6
SR100C48	55.2	1.9	1.9	1.5	2.8

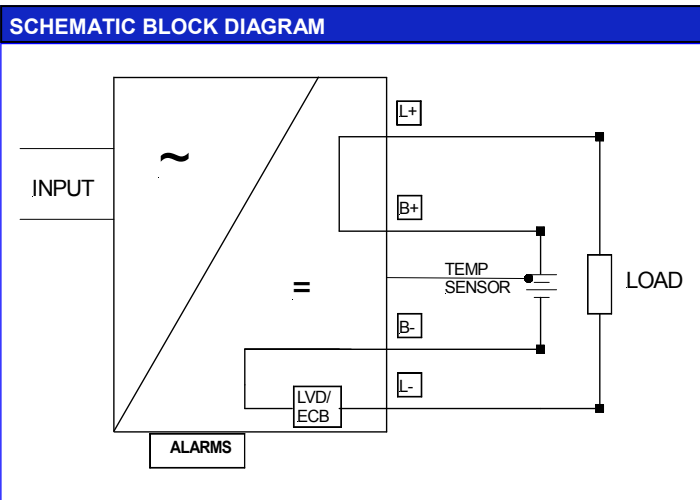


SR100i with RS485 serial port

*1 25% & 50% settings available. Please specify when ordering.

ENVIRONMENTAL	
Operating temperature	0 - 50 °C ambient at full load De-rate linearly >50 °C to no load @ 70 °C
Storage temperature	-10 to 85 °C ambient
Humidity	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	
Battery Condition Test (standard on SR100i)	Add option SFMCT xxxxx on SR100C. SR100i has default setting 20mins/28 days. BCT relay provided to control an external test load. Please refer to the BCT application notes on page 11 or ask our sales staff for assistance with system design.
Communication Port for -i & V versions	Choice of RS485, RS232, Ethernet
+PROTOCONMB-x	Protocol Converter (RS485 to MODBUS) with programming port for PC. Power MBLink setup software supplied -x = blank x = -OE for above plus Ethernet Port
Parallel Redundancy	Use 15A output diode assembly, Code: +P15
ECB	Overload protection may be customized. Please call us for further information.

CABINET OPTIONS	
19" Rack Mount	2U sub rack option: add SR-RM2U Optional V/I meter for subrack: SR-METER
Wall Mount Enclosure	PSU may be fitted into enclosure with MCBs and terminals. Code: SEC-SR

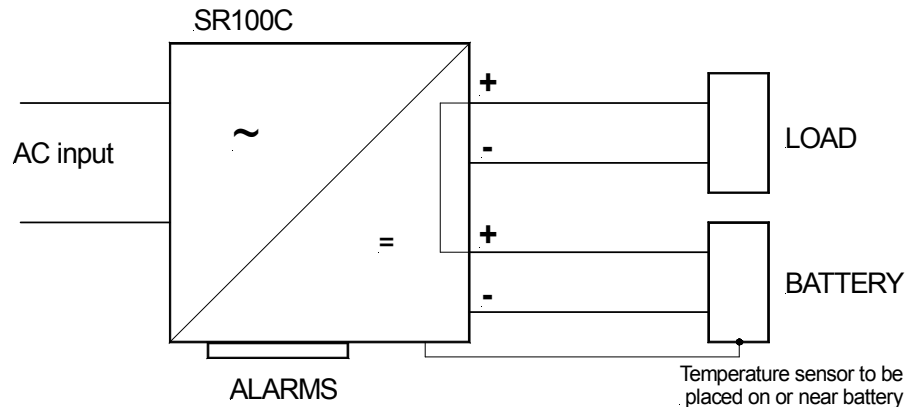
MODEL CODING AND SELECTION CHART

SR100C 12 T X G-485

Optional Port Communications Interface 485 = RS485 232 = RS232 LAN = ETHERNET
Blank = no comm. port Blank = no comm. port

- Input voltage: 230V AC = blank, 110V AC = G
- Phoenix combicon plug-in terminal block
- Temperature Compensation: Yes = T, No = blank
- DC output: Nominal battery voltage: 12, 24, 36, 48
- Function: C = No-Break™, i = No-Break™ + interface
- Power: 100W

CONNECTION DIAGRAM



CONNECTION & INITIAL TESTING

- 1 Check input and output voltages of system, ensure that they match the equipment. All loads should be isolated.
- 2 Check polarity of all wiring. Place temperature sensor probe near or on batteries.
- 3 Plug in ac input and turn power on. Both LEDs will light up after approx. 4 sec, "BATTERY OK" LED will go out after another 10 secs (since there is no battery connected). DC output voltage should appear at both load and battery outputs (ensure screws are tightened down on the connector block).
- 4 Turn off input power.
- 5 Connect battery.
- 6 Check that ELCB (internal electronic circuit breaker) closes by shorting together the BATTERY –ve and LOAD –ve terminals for about 2-3 sec. You will hear a relay operate and both LEDs will light up. If this does not happen, there is a fault in the wiring or the internal battery protection fuse is ruptured (see Note 2 below). The battery voltage will then appear at the load terminals and the "BATTERY OK" relay energises. The "POWER OK" LED stays on for about 30 seconds.
- 7 Connect load wiring to **LOAD+** and **LOAD-** terminals.
- 8 Turn on ac power.
- 9 After the batteries are fully charged, check that the battery continues to power up the load when the input power is turned off.

NOTES

1 Fuse Ratings

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

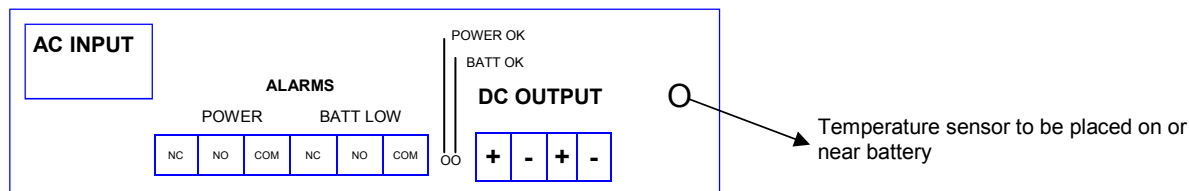
The complete system is capable of delivering 2.5 x rated PSU current to the load and all load cabling should be rated for this current.

2 Reverse polarity protection

If the battery is connected in reverse, the internal battery protection fuse may be ruptured and the unit should be returned to the manufacturer for repair. If the fuse is good, the voltage measured as at step 3 above should be exactly the same on both the load and battery outputs.

ALARM CONNECTIONS

Relay contacts shown in **de-energised** state (ie when there is a fault condition).
Alarm relays are **energised** when system is operating normally.



















ALARMS

POWER: Loss of mains input power
NOTE: This alarm has 30 second delay before activation upon mains failure.

BATTERY LOW:

1. battery voltage = 1.8V/cell (for 2V cells) - operates only when no mains power present.
2. battery missing or fault in battery circuit wiring (alarm does not activate for up to battery detection interval time).

LED INDICATION

Power OK LED	Battery OK LED	Power Alarm	Battery Low Alarm	Condition
		Normal	Normal	System Normal: AC power is on, PSU output is OK, battery circuit is OK and battery voltage is > V Battery Low.
		Normal	Normal	Battery detection test imminent (LED begins flashing prior to test).
		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), or 2. Battery circuit open - battery missing, or fuse / circuit breaker / wiring fault.
		Alarm	Normal	Either AC power has failed, or PSU has failed. Battery system is OK
		Alarm	Alarm	AC Power is off / DC has failed and 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 and ELVD has activated and disconnected battery from load. Residual current drain on battery following ELVD <1 mA.
		Normal	Normal	Battery Condition Test is in progress: LEDs flash alternately
		Normal	Alarm	Battery Condition Unserviceable: failed to maintain terminal voltage during battery condition test

LEGEND :  =On  =Flashing  =Flashing Slowly  =Off

Please note that the last three conditions apply only if the battery condition test option is enabled.

Voltage Settings (at 20°C)

Parameter	V/cell	Nominal Voltage				
		12V	24V	30V	36V	48V
Output (Float) Voltage	2.3V	13.8	27.6	34.5	41.4	55.2
Battery low alarm level when no mains voltage present (fault activates BATT LOW relay)	1.84V	11	22	27.6	33	44
Battery disconnect level (ELVD)	1.66V	10	20	25	30	40

Settings for Battery Detection & Battery Condition Test *¹ (if enabled)

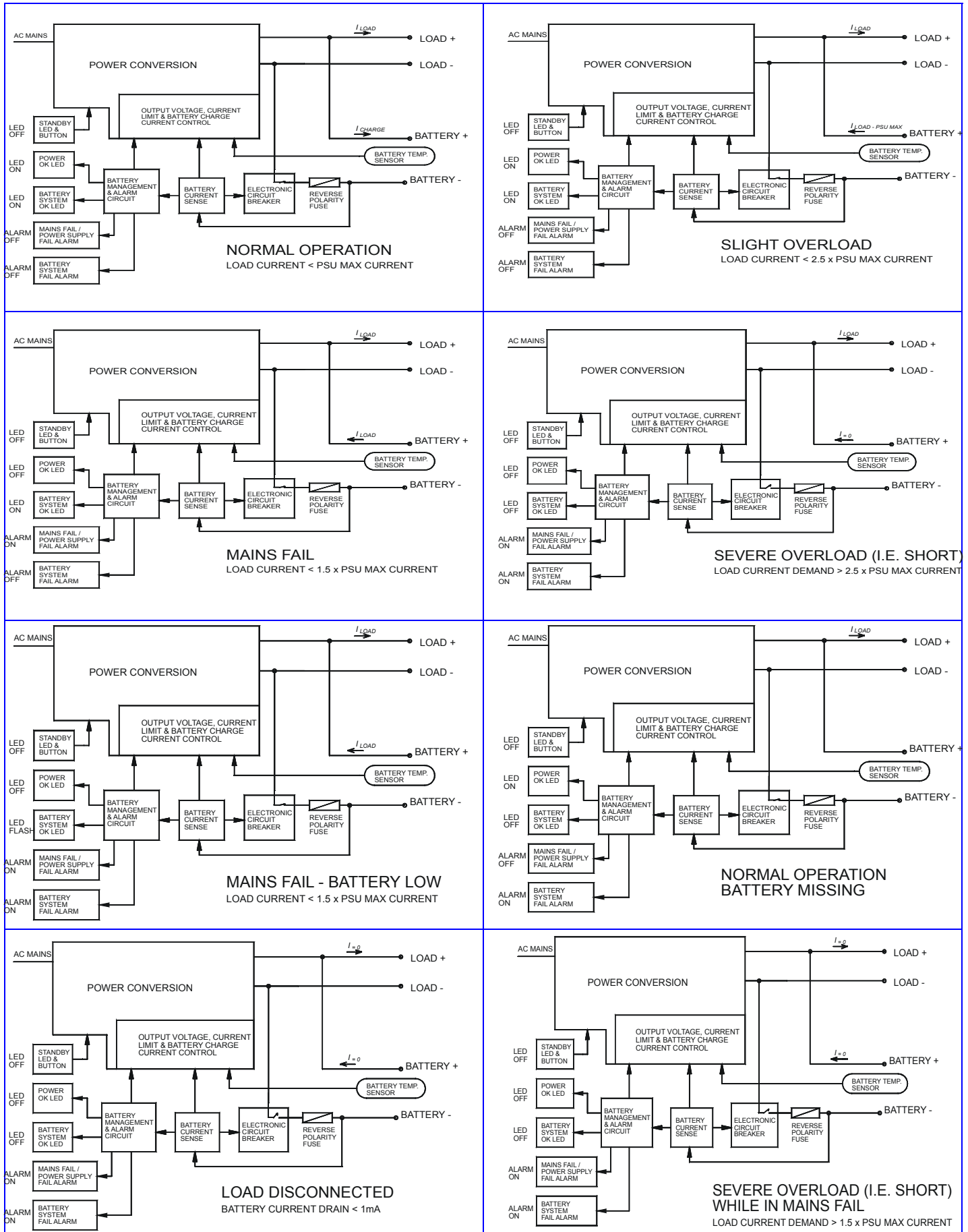
Parameter	Default settings	Actual Settings
Microprocessor version:	SFMCT-0A-12	
Time between battery condition test	23hours	
Length of battery condition test	60min	
Max. time of a mains fail without resetting to full test interval	4 hours	
Max. time of mains fail before battery test is discontinued	5 mins	
Allow retest after battery condition bad (at next programmed time)	Yes	
Voltage level for determining battery condition good / bad (if voltage drops to this level during BCT then the test is aborted and BATT SYS OK alarm activated). This is also the voltage level for battery detection.	2.03V/cell (eg. 12.2V)	
Battery detection interval time (the unit may not detect a missing battery for up to this time)	1 hour	

Battery Condition Test Fail Reset

If the system fails the **BCT** (battery condition test) the **BATT LOW** alarm latches (de-energized state) until either: both the mains power input and the battery are disconnected briefly
or: the system passes the next **BCT**.

Note *1: Settings are reprogrammable, please contact Innovative Energies for details.

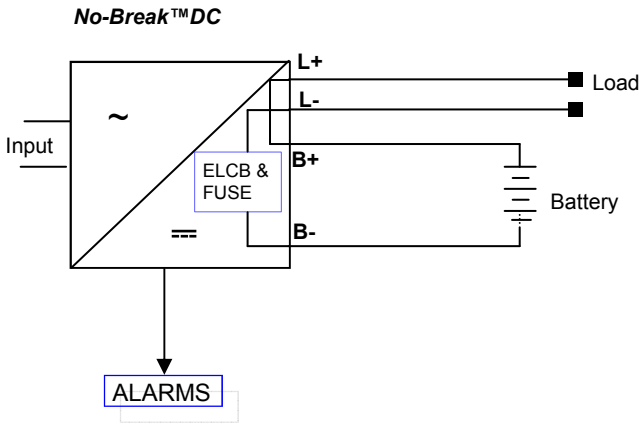
These charts are system status diagrams showing current flows, alarm status & LED indication status for each state



No-Break™ DC CONNECTIONS

Application Solution #1 — Normal Connection

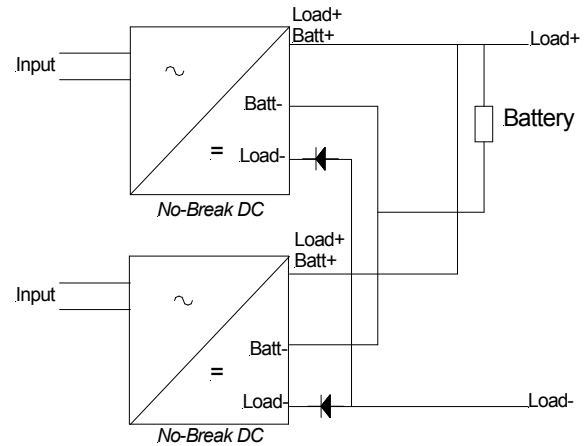
No-Break™ DC with single battery output - SRxxxC or I



Alarms Available	
Power OK (Mains/PSU fail)	YES
Battery Missing	YES
Battery Low	YES
Battery Condition Test Fail (if BCT enabled)	YES

Application Solution #2 — N+1 for charger — Single battery bank

2 x No-Break™ DC units, eg SRxxxC or SRxxx i connected in parallel with output diodes with single battery bank.

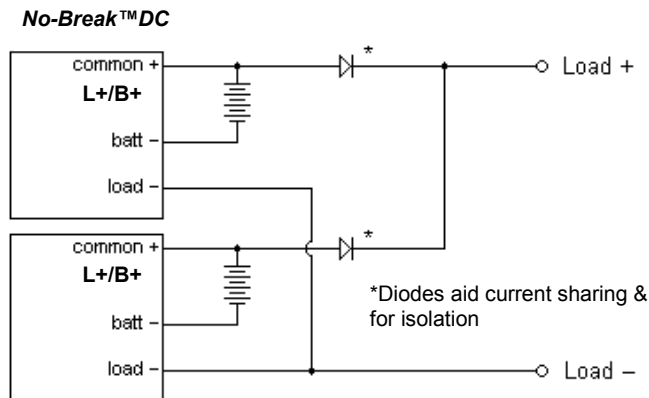


*1 Alarm contacts must be monitored individually to detect mains fail. Both alarms must be activated to indicate a real mains fail, since inadequate loading may cause a spurious alarm of one of the units.

Alarms Available	
Power OK (Mains/PSU fail)	*1YES
Battery Missing	NO
Battery Low	NO
Battery Condition Test	NO

Application Solution #3 — N+1 for charger — N+1 for battery bank

No-Break™ DC with single battery output - SRxxxC or SRxxx i connected in parallel with separate battery banks & output diodes. This solution provides an extremely high level of redundancy for very critical applications, with redundancy of the battery in addition to the power supply. The diodes also aid current sharing and isolate the units from one another in the event of a short circuit appearing at the other output.

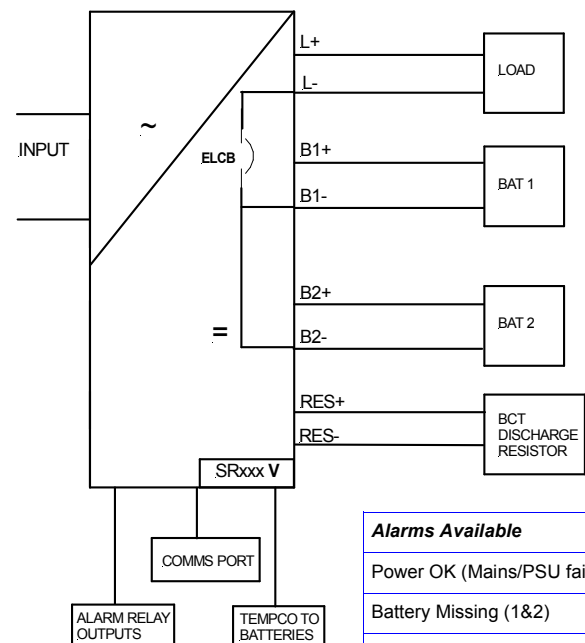


Alarms Available	
Power OK (Mains/PSU fail)	YES
Battery Missing	YES
Battery Low	YES
Battery Condition Test Fail (if BCT enabled)	YES

*If BCT function is enabled, then an interlock circuit is required to control the sequencing of the tests.

Application Solution #4 — Dual output charger — N+1 for battery bank

No-Break™ DC with dual battery output - SR250V only



Alarms Available	
Power OK (Mains/PSU fail)	YES
Battery Missing (1&2)	YES
Battery Low (1&2)	YES
Battery Condition Test Fail (1 & 2)	YES



Global Solutions Personal Focus

TERMS OF WARRANTY

Innovative Energies Ltd warrants its power supplies for 24 months (two years) from date of shipment against material and workmanship defects.

Innovative Energies' liability under this warranty is limited to the replacement or repair of the defective product as long as the product has not been damaged through misapplication, negligence, or unauthorized modification or repair.

Thank you for purchasing from Innovative Energies.

We trust your power supply will exceed your expectations and perform for years to follow.

Sincerely,
The Innovative Energies team.

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