# User Manual

## SR100*i*....LAN+

***No-Break DC UPS - with Ethernet port (SNMP)***
***100W***


CZ367

*Please refer to separate user manual for full SNMP instructions*

6/08/2013

## 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$^{o}$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. This is particularly important where internal fans are fitted.

## 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. Adequate fuse protection of battery circuits is very important owing to the large potential currents available from batteries. Our ***No-Break DC*** series has an internal ECB for protection of the battery circuit but for all other charging situations should have an external fuse or circuit breaker fitted in the battery circuit.

## Connection polarity

It is critical to check the polarity carefully when connecting batteries and equipment to DC power supplies and chargers. Boost chargers (and some float chargers) made by Innovative Energies have reverse polarity protection, which can be by an electronic switch (non-destructive) or an internal fuse which needs to be replaced if a battery is connected in reverse.

## 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

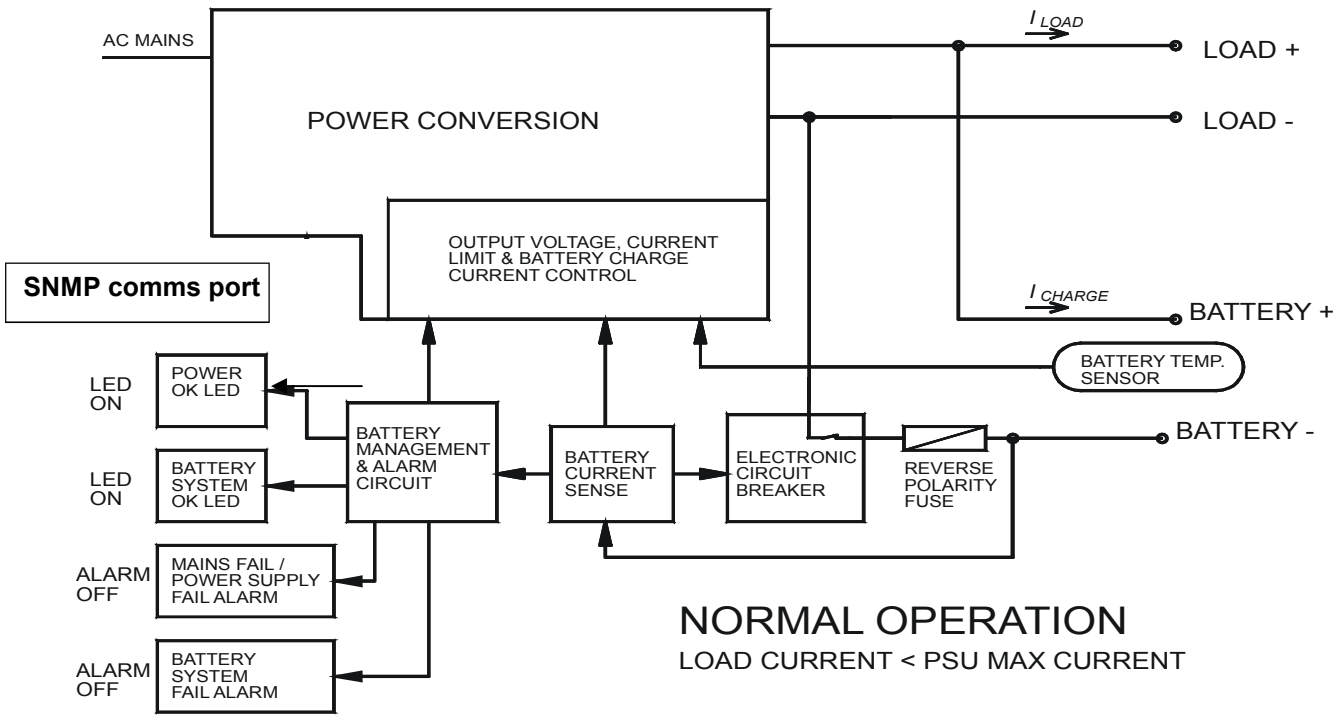
**EMI** = electromagnetic interference

**SNMP** = Simple Network Management Protocol

**LAN** = local area network

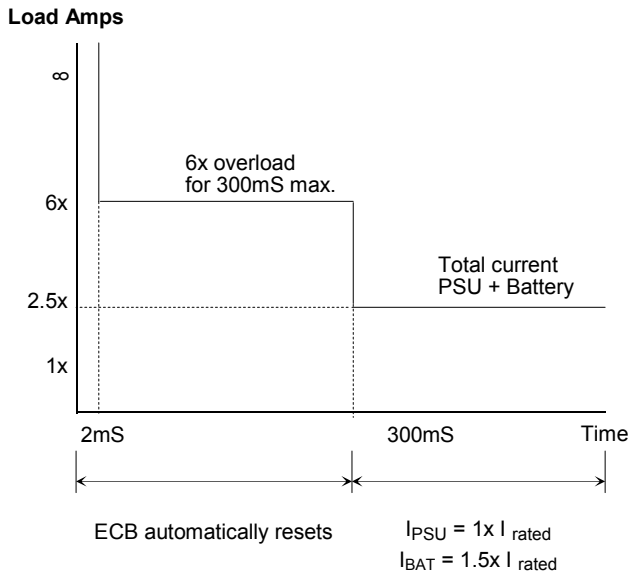
The ***No-Break ™DC*** power supply is designed to provide DC power to lead acid batteries for critical back up applications. In addition to the normal features of the standard **SR100C..** model, the **SR100*i*….-LAN+** has an ethernet communication interface using SNMP protocol to enable user monitoring of the power supply and battery parameters and control of the battery condition test function.

## *No-Break*™ SYSTEM BLOCK DIAGRAM

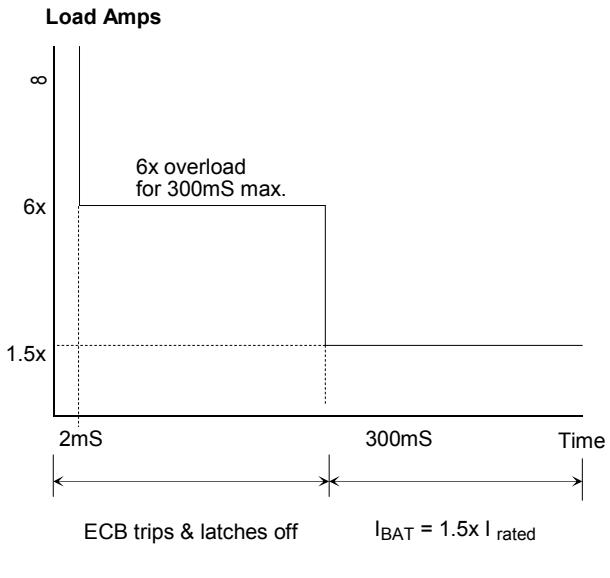



## OPERATION OF ELECTRONIC CIRCUIT BREAKER (ECB)

### Input power on



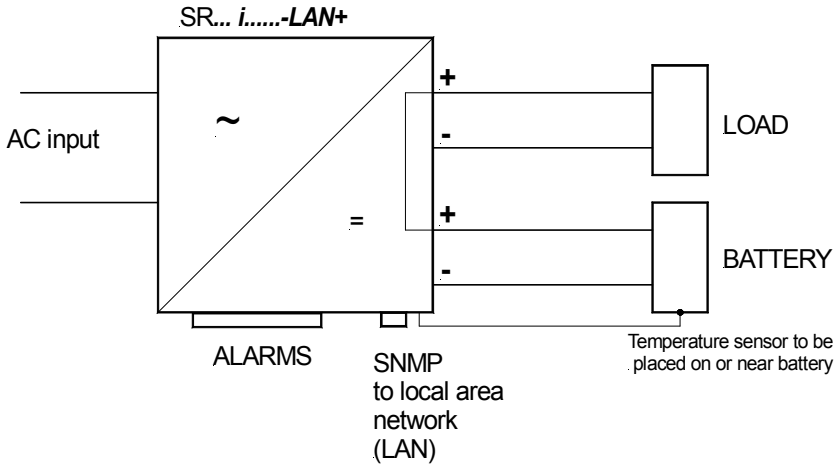

### Input power off




The ECB is activated under the following conditions: 1. battery voltage drops below the Vdisco (1.66V/cell)
2. battery current overload (refer to graphs above)

The ECB will latch open only when there is no input power present. It will reset when input power is restored or can be manually reset by briefly shorting the **BAT-** and **LOAD-** terminals together when there is no input power.

## 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 input power. "**POWER OK" and "BATT OK"** LEDs will light up. **"BATT OK"** will go out in about 10 secs as there is no battery connected. DC output voltage should appear at both load and battery outputs.
4 Turn off input power.
5 Connect battery.
6 Check that ECB (internal electronic circuit breaker) closes by shorting together the **BATTERY –ve** and **LOAD –ve** terminals briefly. 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 **"BAT LOW"** alarm relay energises. The **"POWER OK"** LED stays on for about 30 seconds and then goes out
7 Connect load wiring to **LOAD+** and **LOAD-** terminals.
8 Turn on input power for the system to be operational.
9 Please refer to separate user manual for setting up the SNMP web interface.
10 Connect network cable to monitor power supply parameters (refer to separate instructions for SNMP setup)

## NOTES

**1 Maximum current available**
with input power present: 2.5 x rated PSU current
with no input power: 1.5 x rated PSU 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.

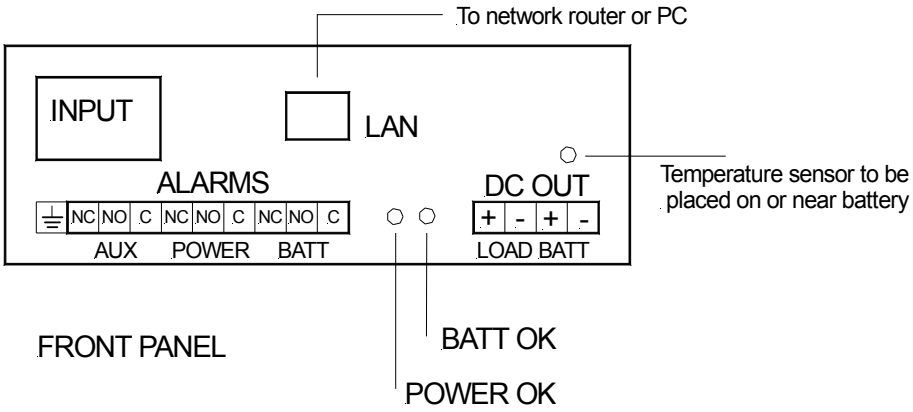
**3 Battery Condition Test (BCT)**
BCT function is disabled on start up and is controlled via the SNMP interface.

**4 BCT fail reset**
If the system fails a BCT the **BAT 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.

## FRONT PANEL LAYOUT

Alarm contacts shown in de-energized state.




## ALARMS

**POWER:** Relay is energized when input power and DC output are present

**BATT:** Relay is de-energized when either:
1. battery voltage < 1.8V/cell (eg. V batlow = 10.8V for a 12V system) - operates only when no input power present or
2. battery missing or fault in battery circuit wiring (alarm does not activate for up to battery detection interval time).

**AUX:** Relay is energized when a BCT is in progress.

## LED INDICATION

| Power OK LED | Battery OK LED | Power Alarm | Battery Low Alarm | Condition |
|---|---|---|---|---|
| ☀ | ☀ | Normal | Normal | System Normal: Input power on, battery circuit is OK |
| ☀ | ◑ | Normal | Normal | Battery detection test in progress |
| ☀ | ○ | Normal | Alarm | Input power on, battery system fault:<br>1. Internal battery fuse has opened ***or***<br>2. Battery circuit wiring open circuit, battery missing, ECB has tripped |
| ○ | ☀ | Alarm | Normal | Input power off *or* PSU has failed.<br>Battery system is OK (battery volts > Vbatl) |
| ○ | ◑ | Alarm | Alarm | Input power off *or* PSU has failed.<br>Battery has discharged to < V batl |
| ○ | ○ | Alarm | Alarm | Input power off *or* PSU has failed.<br>ECB has activated and disconnected battery from load |
| ✳ | ✳ | Normal | Normal | BCT is in progress: LEDs flash slowly |
| ☀ | ✳ | Normal | Alarm | Input power on, battery voltage < Vpres during a BCT (ie. failed BCT) |

**LEGEND :** ☀ =On ◑ = fast flash ✳ = slow flash ○ =Off

**Default Settings** (at 20°C)

| Parameter | Nominal Voltage | | | | | Default Value |
|---|---|---|---|---|---|---|
| | 12V | 24V | 30V | 36V | 48V | |
| *[1] **V out** = Output voltage | 13.8 | 27.6 | 34.5 | 41.4 | 55.2 | 2.3V/cell |
| **V pres** = Voltage threshold for battery detection & battery condition test (BCT). If voltage drops to this level during BCT then the test is aborted and **BATT SYS OK** alarm shows | 12.2 | 24.4 | 30.5 | 36.6 | 48.8 | 2.03V/cell |
| **V shutd** = Output voltage of PSU during battery detection & BCT | 11.5 | 23 | 28.8 | 34.5 | 46 | 1.92V/cell |
| **V batl** = Battery low alarm voltage during mains fail. (**BATT SYS OK** alarm relay de-energizes) | 11 | 22 | 27.6 | 33 | 44 | 1.84V/cell |
| **V disco** = Battery disconnect voltage during mains fail | 10 | 20 | 25 | 30 | 40 | 1.66V/cell |
| **Bccl** = Maximum charge current as % of rated PSU rated current | | | | | | 100% |
| **Comms** = communications mode of PSU: F = continuous data stream of status<br>M = responds only to request made by a controller | | | | | | M |
| **BatDetect** = Battery detection interval time, active only when no battery charge current is detected (the unit may not detect a missing battery for up to this time) | | | | | | 60 min |
| **BCT** = length of battery condition test | | | | | | 20 min |
| **Ret** = retest option: N = after a failed BCT further scheduled BCTs are inhibited<br>Y = after a failed BCT further scheduled BCTs will be allowed | | | | | | Y |
| **CC** = Length of charge cycle in minutes/hours/days. ie. time between battery condition tests | | | | | | 40m/23h/027d |
| **MfiBCT** = time before mains fail check during BCT. A mains fail during a BCT will stop the BCT. If set longer than **BCT** time no mains fail check will occur. | | | | | | 30 min |

**NOTES:**

***1** Output voltage is set by an internal potentiometer.

# *Notes*

innovative energies

# SR100i

*100W No-Break DC UPS System with Communications*

♦ 24 Month Warranty

## Charger

- **Battery detection - regular battery presence and battery circuit integrity checks**
- **Deep discharge protection for battery**
- **Battery circuit overload & short circuit protection**
- **Automatic temperature compensated output**
- **Automatic or manually controlled battery condition test (BCT)**
- **LED flash codes for precise state indication**
- **Alarm relay outputs**
- **Adjustable charge current limit**
- **Reverse battery polarity protection**
- **For use with external lead acid batteries**
- **Optional second DC output -#**

## Protocols

- **SNMP**
- **Modbus RTU, TCP/HTTP (using external protocol converter**
- **Innovative Energies ASCII code**

## Communication interfaces

- **Ethernet**
- **RS485**
- **RS232**

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

### ELECTRICAL

| | |
|---|---|
| **Input voltage** | 230VAC(180-265) 45-65Hz<br>115VAC (88- 32) 45-65Hz |
| **Fusing / protection** | Input fuse & varistor<br>Output fuse & ECB for battery circuit |
| **Isolation** | 1KV DC input - output / earth |
| **Efficiency** | ≥ 85% |
| **Inrush current** | <30A, 1.8ms |
| **Output power** | 100W |
| **Output voltage** | 13.8, 27.6, 34.5, 41.4, 55.2VDC |
| **Voltage adj. range** | 85 - 105% of Vout |
| **Temp. compensation** | Temperature sensor on 1.7m lead with adhesive pad: -4mV / °C / cell ±10% |
| **Current Limit** | **PSU:** 100% rated current<br>**Battery:** 25-100% PSU current |
| **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,<br>load step 20-100%, 400us settling time |
| **Thermal protection** | Yes, self-resetting |
| **Hold-up time** | 15 - 20 ms (nom. - max. Vin) without battery |

### *No-Break*™ FUNCTIONS AND ALARMS

| | |
|---|---|
| **Battery charge current limit** | 100% of PSU rated current unless specified on ordering |
| **Reverse polarity protection** | 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 circuit protection**<br>***- low battery volts*** | Electronic circuit breaker (ECB) operates under the following conditions:<br>• battery voltage drops to 1.67V/cell - auto reset on power on |
| ***- overload*** | • < 300ms for I bat > 6 x I $_{PSU\ rated}$ , allows ~1.5x rated PSU current from battery without acting, |
| ***- short circuit*** | • < 2ms, backed up by fuse |
| **LED indication** | Green: Power OK<br>Green: Battery OK |
| **Alarms** | • Power OK (Mains/PSU fail)<br>• 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 SR100 ***i*** versions<br>BCT relay contact provided to control an external test load. |

### STANDARDS

| | |
|---|---|
| **EMI** | to CISPR 22 / EN55022 class A, C-tick compliance |
| **Safety** | to IEC950 / EN60950 / AS/NZS3260 |

### PHYSICAL

| | |
|---|---|
| **Dimensions** | 147W x 177D x 62H mm |
| **Weight** | 0.95 Kg |

6/08/2013

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

SR100i

### STANDARD MODEL TABLE

| MODELS | DC Output | | | | |
|---|---|---|---|---|---|
| | Output (V) | PSU Rated (A) | Charge Limit (A) *1 | Recomm. Load (A) | Peak load on power fail (A) |
| **SR100*i*12** | 13.8 | 7.5 | 7.5 | 6.0 | 11 |
| **SR100*i*24** | 27.6 | 3.7 | 3.7 | 3.0 | 5.5 |
| **SR100*i*30** | 34.5 | 2.9 | 2.9 | 2.3 | 4.3 |
| **SR100*i*36** | 41.4 | 2.4 | 2.4 | 1.9 | 3.6 |
| **SR100*i*48** | 55.2 | 1.9 | 1.9 | 1.5 | 2.8 |

Versions optional second DC output ***(-#)***

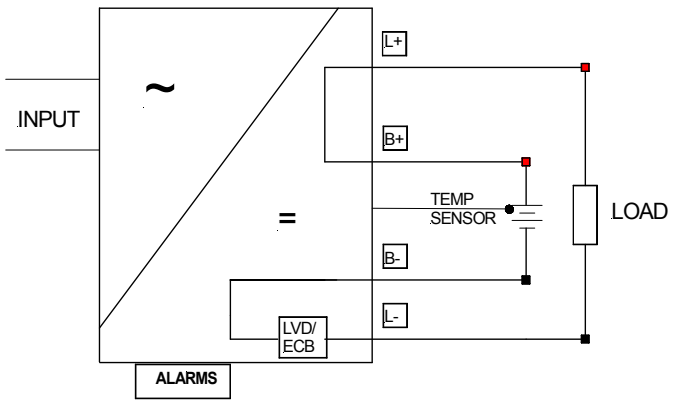
### ENVIRONMENTAL

| | |
|---|---|
| **Operating temperature** | 0 - 50 °C ambient at full load<br>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 1.5m with IEC320 socket & AUS/NZ plug
Mating screw terminal plug for DC output
Mating screw terminal plug for alarms

### SCHEMATIC BLOCK DIAGRAM




### OPTIONS

| | |
|---|---|
| **Battery Condition Test** | Add option **SFMCT xxxxx** for SR100C. Default setting 20mins/28 days.<br><br>**SR100*i* :** default setting is scheduled BCT disabled at start up |
| **Communication Port for *-i* & V versions** | Choice of RS485, RS232, LAN+ (SNMP), LAN (ASCII) |
| **Modbus converter** | For **SR100*i* ... 485**, use protocol converter, with programming port for PC. ***Power MBLink*** setup software supplied.<br>add **+PROTOCONMB** or<br>add **+PROTOCONMB-OE** with ethernet port |
| *1 **Charge current limit** | 25% & 50% settings available |

### CABINET OPTIONS

| | |
|---|---|
| **19"Rack Mount** | 2U sub rack option: add **SR-RM2U**<br>Optional V/I meter for subrack**: SR-METER** |
| **Wall Mount Enclosure** | PSU may be fitted into enclosure with MCBs and terminals: add **SEC-SR** |

### MODEL CODING AND SELECTION CHART

**SR100*i* 12 T X G-LAN+ #**

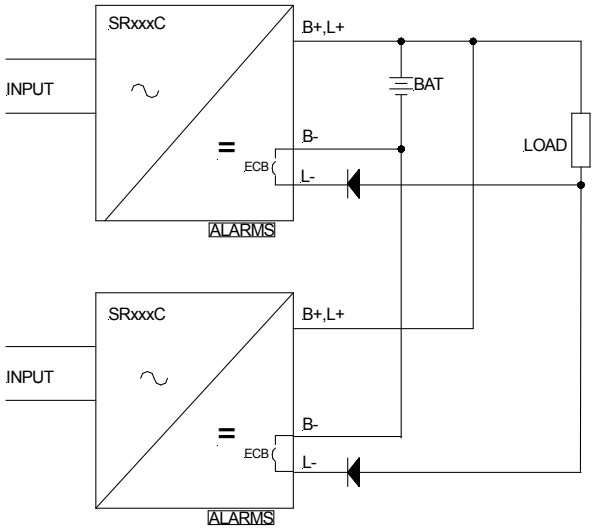
**# = Additional DC output:** **1** = 12V **2**= 12.5V **4** = 24V Blank = none

| | |
|---|---|
| Optional Communications Interface Port | **Blank** = no comms. port **485** = RS485 **232** = RS232<br>**LAN+** = Ethernet (SNMP) **LAN** = Ethernet (ASCII) |
| Input voltage and front panel standby switch | **Blank** = 230V AC **J** = 88-135VDC<br>**G** = 110V AC |
| Output DC connector | **X** = Plug in /screw terminal block |
| Temperature Compensation | **T** = Yes Blank = No |
| DC output (nominal battery voltage) | **12, 24, 30, 36, 48V** |
| Function | ***i*** = **No-Break DC UPS** with serial or ethernet communications port |
| Power | **100W** |

## *No-Break DC connections for N+1 redundancy & peak loads*

### #1 N+1 for *No-Break™DC* charger and single battery bank

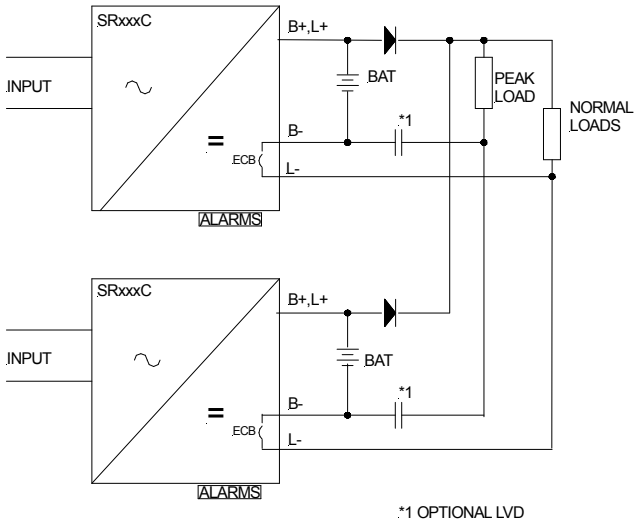
This connection provides for redundancy of the charger and retains most of the No-Break functions.




| *Alarms available* | |
|---|---|
| Power OK | YES |
| Battery missing | NO |
| Battery low | YES |
| Battery condition test fail*1 | YES |

### #2 N+1 for *No-Break™DC* charger and N+1 for battery bank (use this connection for high peak loads)

All *No-Break* alarms are available and the low voltage disconnect for the peak load is optionally implemented with an external relay.

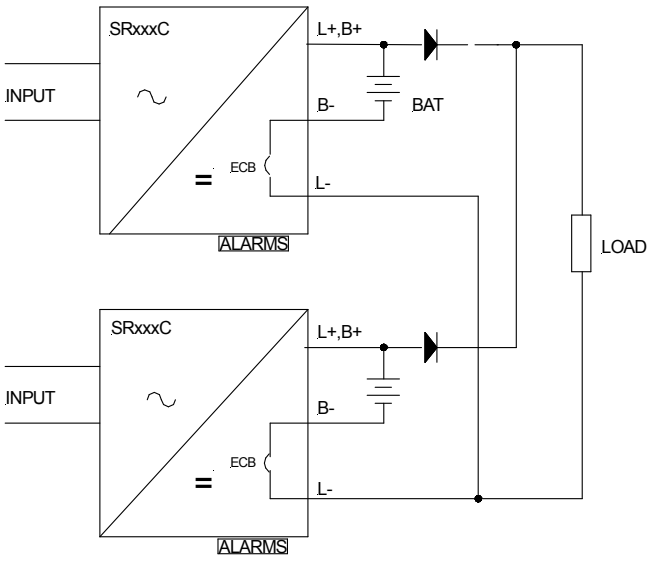



*1 OPTIONAL LVD

| *Alarms available* | |
|---|---|
| Power OK | YES |
| Battery missing | YES |
| Battery low | YES |
| Battery condition test fail *1 | YES |

### #3 2 x *No-Break™DC* chargers and 2 x battery banks

***2 x No-Break™DC*** chargers 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 isolate the units from one another in the event of a short circuit appearing at the other output and aid current sharing.

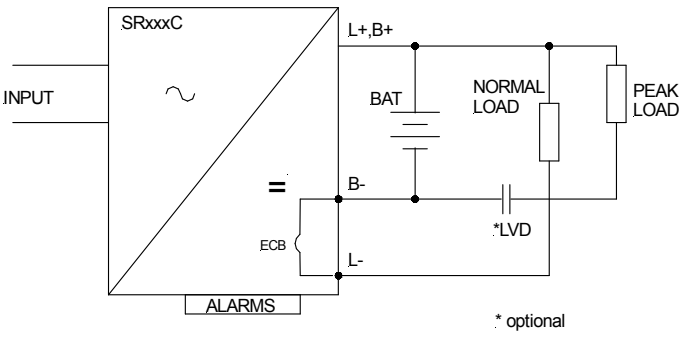



| *Alarms Available* | |
|---|---|
| Power OK | YES |
| Battery Missing | YES |
| Battery Low | YES |
| Battery Condition Test Fail*1 | YES |

*1 interlock circuit required for automated BCT

### #4 1 x *No-Break™DC* Connection for high peak loads

This is a basic connection which is used when there is a connected load with a peak current greater than 1.5 times the rated current of the charger. Standing loads are connected normally and an optional external low voltage disconnect may be used for the peak load.




* optional

| *Alarms Available* | |
|---|---|
| Power OK | YES |
| Battery Missing | YES |
| Battery Low | YES |
| Battery Condition Test Fail | YES |

# Notes

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**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.


## Innovative Energies Limited

Phone: +64 9 835 0700
Freephone: 0800 654 668 (New Zealand)
1800 148 494 (Australia)

Fax: +64 9 837 3446

Email: info@innovative.co.nz

Online: www.innovative.co.nz or www.innovative-energies.com

In Person: 1 Heremai Street, Henderson, Auckland, New Zealand

By Post: PO Box 19-501, Auckland 1746, New Zealand


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