innovative energies

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.

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

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

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

innovative energies

Phone: +64 9 835 0700
Fax: +64 9 837 3446

Email: info@innovative.co.nz
www.innovative.co.nz

verification
ISO9001 Certified

User Manual

SR250J

250W No-Break™ DC UPS with common negative

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

innovative energies

Global Solutions Personal Focus

Installation & Safety

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

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

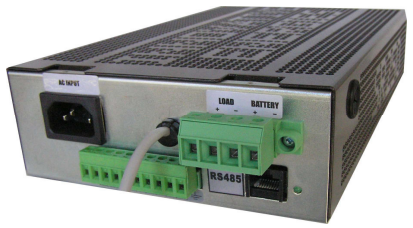
SR250C

incl. SR250M SR250i SR250V SR250J

MODEL TABLE (*i* & M variants available with all models)

MODELS	DC Output				
	Output (V)	PSU Rated (A)	Charge Limit (A) *1	Recomm. Load (A)	Peak load (A)
SR250C12	13.8	18.0	6.0	12.0	27
SR250C24	27.6	9.0	4.0	5.0	13.5
SR250C30	34.5	7.2	3.5	3.7	10.8
SR250C36	41.4	6.0	3.0	3.0	9
SR250C48	55.2	4.5	2.5	2.0	6.7

***1** This is the default setting. Please specify if higher limit reqd. at time of order



SR250***i*** *(please refer to separate data sheet on comms options)*

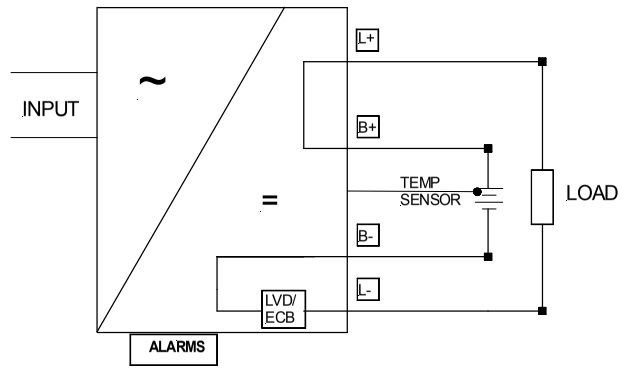
PHYSICAL DETAILS

AC Input connector	IEC320 input socket (included)
DC Output Connections	M6 brass stud or *'Phoenix combicon'* Plug-in style socket & mating screw terminal block:
Alarm Connections	Plug in screw terminal block
Enclosure	Powder coated or zinc plated steel / anodised aluminium
Weight	1.7kg
Dimensions	242 x 150 x 61mm (excluding mounting feet and connections)
19"Rack Mount	2U sub rack option: add **SR-RM2U** Optional V/I meter for subrack**: SR-METER**

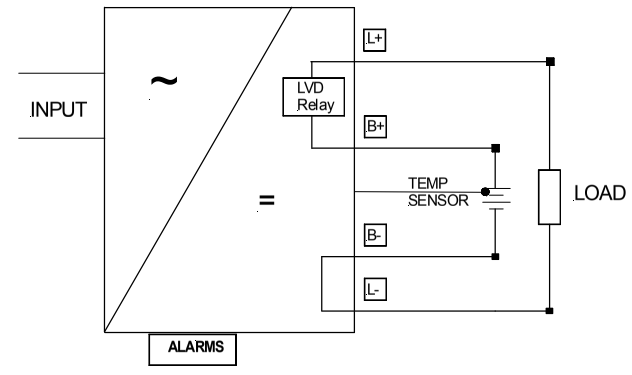
OPTIONS

Battery Condition Test (standard on SR250*i* & SR250V)	Add option **SFMCT xxxxx** on SR250C. SR250***i*** 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 (MODBUS via RS485) with programming port for PC. ***Power MBLink*** setup software supplied. SR250***i:*** -x = blank, x = **-OE** for Ethernet Port SR250**V:** -x = **V**, x = **-OE-V** for Ethernet Port
ECB	Overload protection may be customized. Please call us for further information.

SR250C Block Diagram



SR250J Block Diagram



MODEL IDENTIFICATION CODES

SR250*C*12 T F S L-485 — Optional Communications Interface Port: **485** = RS485 **232** = RS232 **LAN** = ETHERNET; Blank = no comm. port

- Input voltage and front Panel standby switch: 230V AC + switch = **L** 230V AC no switch = blank; 110V AC + switch = **U** 110V AC no switch = **G**; 110V DC + switch = **H** 110V DC no switch = **J**; 230V AC + switch + 300V MOV = **M** (To be used with IE OVP HV AC)
- Output DC Connector type: Stud = **S** Phoenix combicon (plug in screw terminal block) =
- Fan cooled: With fan = **F** No fan = blank
- Temperature Compensation: Yes = **T** No = blank
- DC output: Nominal voltage: 12, 24, 30, 36, 48
- Function: ***C* = *No-Break™*** DC PSU/charger , **M** = **C** with load output at nominal voltage (eg 24V); ***i*** = **C** with serial communications port & BCT included; **V** = ***i*** with dual battery output; **J** = **C** with **LOAD- & BATT- common** (**Note:** no battery detection function)
- Power: 250W

innovative energies

Global Solutions Personal Focus

SR250C

incl. SR250M SR250i SR250V SR250J

Options:
- battery condition test
- communication interface port, SR250i

Optional **+PROTOCONMB** RS485 converter for use with SR250***i -485*** versions

- **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 for batteries**
- **Battery condition test (BCT) standard for models with communication port option**
- **Overload, short circuit & reverse polarity protection for battery**
- **Automatic battery temperature compensation**
- **Optional serial communication interface allows remote monitoring & user control of BCT function - *i* and V versions**
- **No transition switching between PSU & battery**
- **LED flash codes for precise state indication**
- **"Mains" & "Battery System" alarm relay outputs**

♦ 24 Month Warranty

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

ELECTRICAL

Input Voltages	
▪ standard	180V - 264V, 45-65Hz
▪ optional	88V - 132VAC (internal link select) 88-135VDC (specify at time of order)
Fusing / Protection	Internal input fuse, output battery fuse
Isolation	1KV DC input - output / earth
Efficiency	≥ 85%
Inrush current	Soft start circuit
Output Power	250W continuous (0 - 50°C)
Output Voltages	13.8/ 27.6/ 34.5/ 41.4/ 55.2V
Voltage adj. range	85 - 105% of Vout
Temp. Compensation	Temperature sensor on 1.7m lead with adhesive pad: -4mV / °C / cell ±10%
Current Limit	Straight line profile
Line Regulation	<0.2% over AC input range
Load Regulation	<0.4% open circuit to 100% load
Noise	<1%
Drift	0.03% / °C
Hold-up time	15 - 20 ms (nom. - max. Vin) without battery
Thermal Protection	Automatic current de-rating if >50°C. Self-resetting.
Overvoltage protection	Over-voltage protection on output at ~ 130% of nominal output voltage
EMI	CISPR 22 / EN55022 class A
Safety	IEC950 / EN60950 / AS/NZS3260

No-Break™ FUNCTIONS AND ALARMS*

Battery Charge Limit	See Model Table for default settings - may be increased to PSU rated current
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
Indication LEDs	**Green:** Battery System OK, Power OK **Red:** Standby
Alarms	• Mains Fail (Mains or PSU fail, standby mode) • 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 1A /50V DC, 32VAC
Battery Condition Test (BCT)	Standard on **SR250*i* & *V*** - 20mins/28days unless otherwise specified on ordering.
Standby Mode	Turns off DC output of PSU & allows load to run off battery

ENVIRONMENTAL

Operating temperature	0 - 50 °C ambient at full load De-rate linearly >50 °C to 0 load @ 70 °C
Storage temperature	-10 to 85 °C ambient
Humidity	0 - 95% relative humidity non-condensing
Cooling	Natural Convection except for 12V model (fan)

innovative energies

Global Solutions Personal Focus

Introduction

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

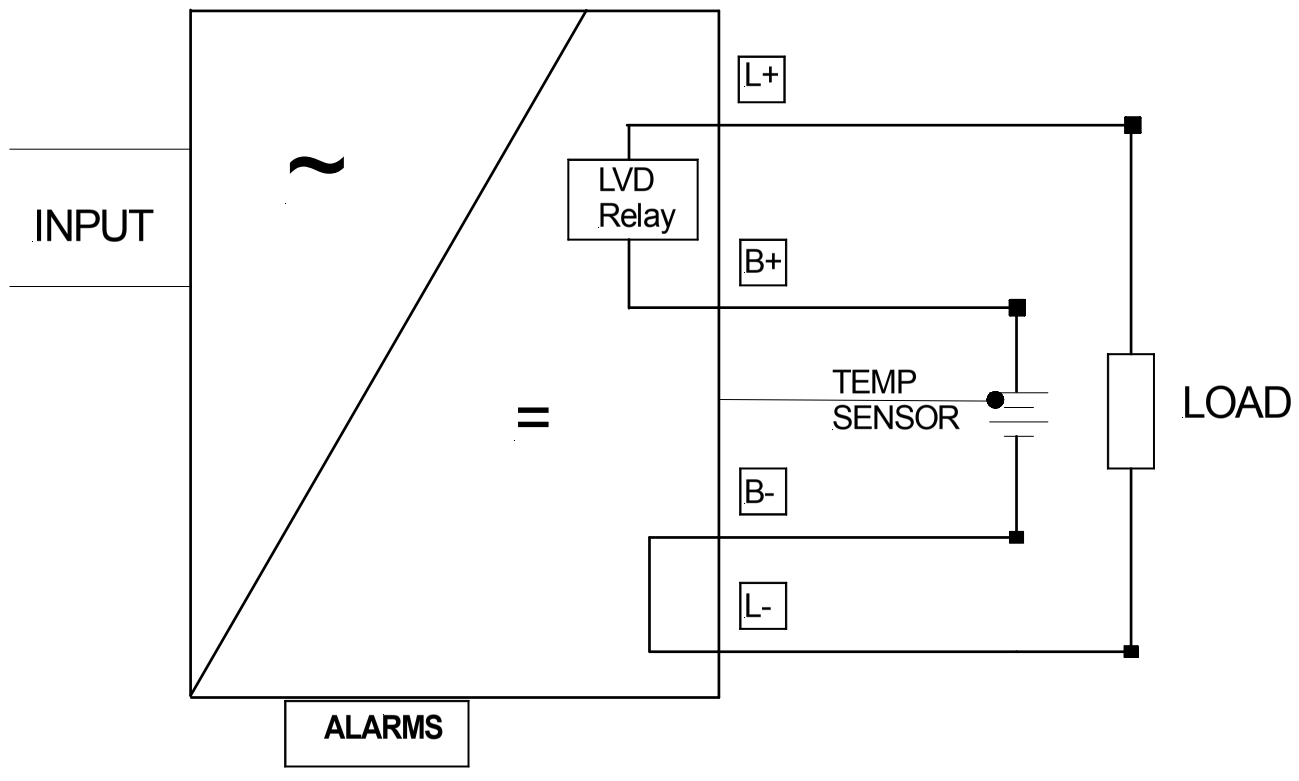
No-Break™ DC *systems* ensure maximum uptime of the system, and life of the battery, by providing:

- Independent battery charge current limit
- Monitoring of the battery status and availability at all times
- Automatically limiting the charge current to the battery, thus ensuring load receives priority Battery overcurrent protection and reverse polarity connection, using an electronic circuit breaker (ECB). With input (mains) power present, the ECB acts to limit the battery current but does not latch open. If no mains power is present then the ECB will latch open on battery circuit overcurrent.
- Deep discharge protection by disconnecting the load 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

Optional features:

- Optional battery condition test (BCT) at preset intervals. BCT is standard on models with communication port
- Optional serial communication interface, model codes SR250***i***…, (option of RS232, RS485, Ethernet) to enable user monitoring of the power supply and control of the battery condition test function.
- Modbus protocol converter for use with the RS485 model
- Dual battery string version (SR250***V***..), enables 50% discharge of each battery bank to determine the battery condition - has communication interface as standard

No-Break™ SYSTEM BLOCK DIAGRAM



ELECTRONIC CIRCUIT BREAKER (ECB)

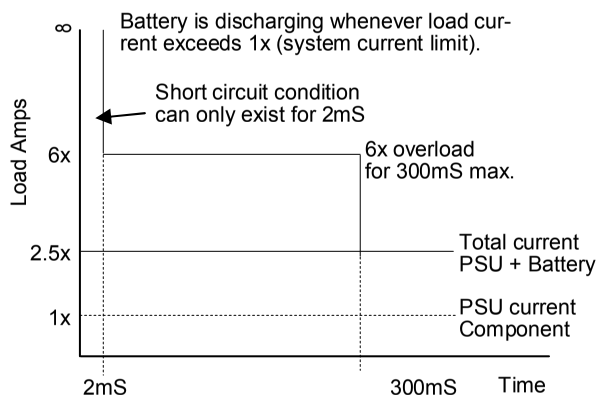
The ECB is activated under the following conditions:

1. battery voltage drops below the Vdisco (1.66V/cell)
2. battery overcurrent or overload (refer to page 3)

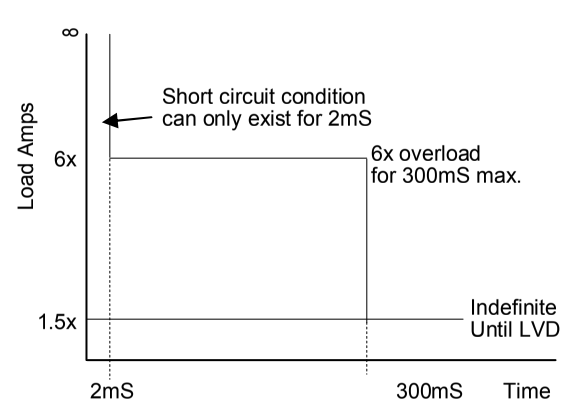
The ECB will latch open only when there is no mains input present. It will reset when mains power is restored or can be manually reset by following the procedure in step 6 on page 8 of this manual.

OPERATION OF ELECTRONIC CIRCUIT BREAKER (ELCB)

System Current Limit (AC mains on)



System Current Limit (during AC fail)

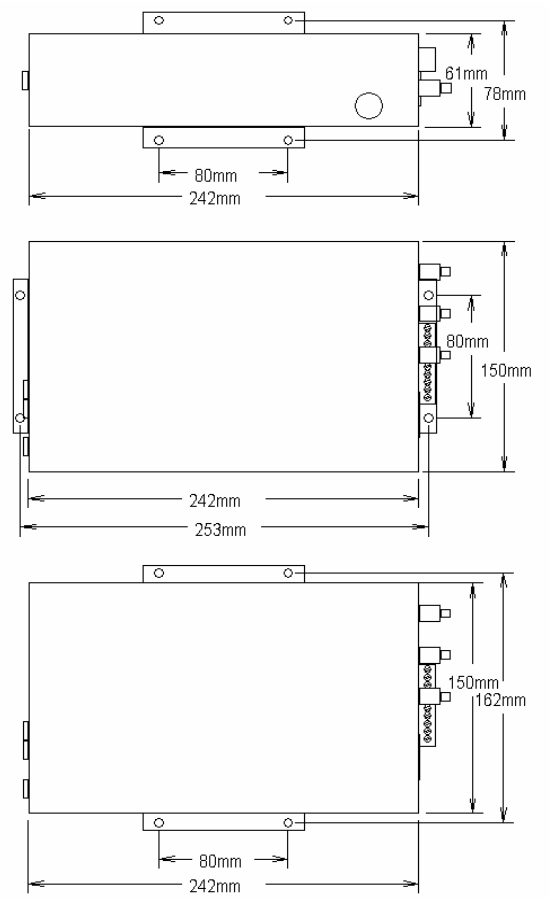


ELCB operates after 2mS under short circuit condition and after 300mS of sustained overload. At all times the ELCB allows 50-60% system overload.

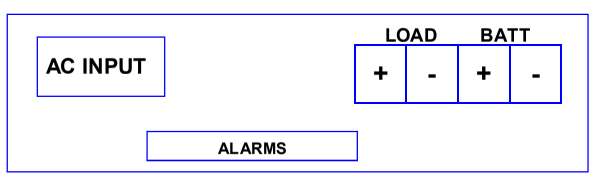
Notes

Mounting Details

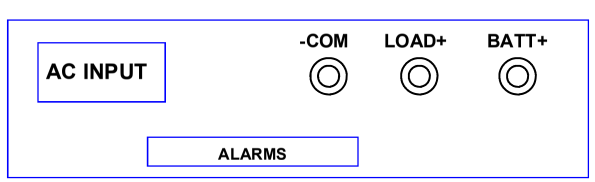
DIMENSIONS



SR250 CONNECTION LAYOUT (PHOENIX TERMINALS)



SR250 CONNECTION LAYOUT (STUD TERMINALS)



NOTE: LOAD- / BATT- terminals are linked internally and are connected to the **-COM** terminal on the stud connection versions.

Installation Instructions

CONNECTION PROCEDURE

1 Check input and output voltages of system, ensure that they match the equipment.
2 Connect battery /batteries to **BATTERY +** and **BATTERY -** terminals. Although there is built in reverse polarity protection, under some circumstances reverse polarity connection will not only result in the rupture of the internal battery protection fuse but destroy the input circuitry of the unit.
3 The ECB and battery circuit may be tested at this point. To close the **ECB** with no mains power present, briefly short together the **BATTERY –ve** and **LOAD –ve** terminals. The battery voltage will then appear at the load terminals, **BATT LOW** relay energises & **BATT SYSTEM OK** LED turns on. The **POWER OK** LED stays on for about 30s. Disconnect one battery lead briefly to open the ECB.
4 Connect load/s to **LOAD+** and **LOAD-** terminals.
5 To minimize the volt drop at the output connections always use all the terminals provided by linking them together.
6 Place temperature sensor probe near or on batteries.
7 Connect input power. Charger should be fully operational at this stage.

FRONT PANEL LEDS (WITH BUILT IN SWITCHES)

BATTERY SYSTEM OK: LED on: Battery present and above V batl.
If the battery condition test function is enabled, pushing this switch for approx. 2 sec will manually initiate a battery condition test.

POWER OK: LED on: Charger output present
LED off: no mains input or charger in standby mode

STANDBY: LED on: Charger in standby mode (no output from charger)
Push standby button to turn off charger & allows load to run off battery. Push button again to turn on charger.

ALARM & BCT RELAYS

Relay contacts shown in **de-energised** state (ie when there is a fault condition).
Alarm relays are **energised** when power supply is operating normally. **BCT** relay is energised when battery condition test is in progress; this relay is not fitted in the ***-i*** versions - indication is via the communication interface.

AUX (BCT- if enabled)			MAINS FAIL (POWER OK)			BATTERY LOW (BATT SYS OK)			
COM	NC	NO	COM	NC	NO	COM	NC	NO	⏚

FG

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.

General Specifications (at 20°C)

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

Settings for Battery Detection & Battery Condition Test

	Default Settings *[1]	Actual Settings (if different from default values shown)
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	
V pres: 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)	
BatDetect: 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 SYS OK** LED continues flashing and **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: The default settings are for testing fire alarm systems to the NZ code of practice and are reprogrammable to suit other applications.

LED FLASH CODES

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

Battery System OK LED	Power OK LED	Power Stand-by LED	Power OK Alarm	Battery System OK 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 in progress / imminent** (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), ***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 < 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.
☀	○	☀	Alarm	Normal	System is in STANDBY mode due to : *1.* Operator pressed standby button, ***or*** 2. PSU has internal fault
◐	○	☀	Alarm	Alarm	PSU is in standby **and** battery has discharged to < Battery Low, unit will continue delivering battery current until next level initiates ELVD.
○	○	☀	Alarm	Alarm	PSU is in standby **and** ELVD has activated and disconnected battery from load. Residual current drain on battery following ELVD < 1mA
✳	✳	○	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
✳	○	☀	Alarm	Alarm	PSU is in standby mode **and** battery condition is determined as unserviceable: failed to maintain terminal voltage during battery condition test

LEGEND : ☀ =On ◐ =Flashing ✳ =Flashing Slowly ○ =Off