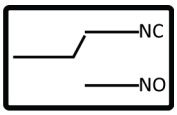
HELIOS
POWER SOLUTIONS

User's Manual

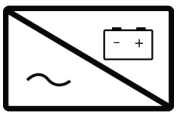
SR750HI Series - 750W DC UPS

No-Break™ DC UPS

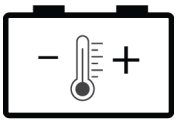
STANDARD FEATURES



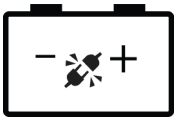
3 Relay Alarms-Form C



Float Charger –Lead Acid Batteries



Temperature Sensor on 1.7m lead with adhesive pad: -4mV / °C /cell ±10%

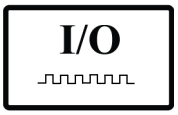


ELVD : Electronic low voltage disconnect

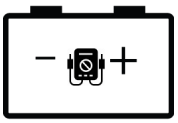
OPTIONAL FEATURES

Comms:

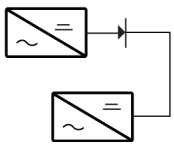
- RS232
- RS485
- Modbus RTU
- SNMP V1 & Webpages



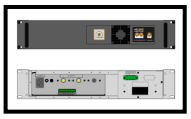
Customizable Digital I/O



BCT: Battery Condition Test.



N+1 Redundancy



Rack Mounting

Internal Meter

7/07/2022

Table of Contents

1. 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

Where fitted, EMC suppression circuits cause earth leakage currents which may be to a maximum of 3.5mA.

Ventilation

High operating temperature is a major cause of power supply failures, for example, 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 in particular suffer shortened lifetimes if subjected to high ambient temperatures.

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 cores (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.

External fuse protection

Fuses or circuit breakers must be used in all battery circuits to protect against short circuits. External fuses should be used for power supplies/ chargers even though they are usually internally protected.

Connection polarity

It is critical to check the polarity carefully when connecting DC devices even with models which have non-destructive reverse polarity protection.

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

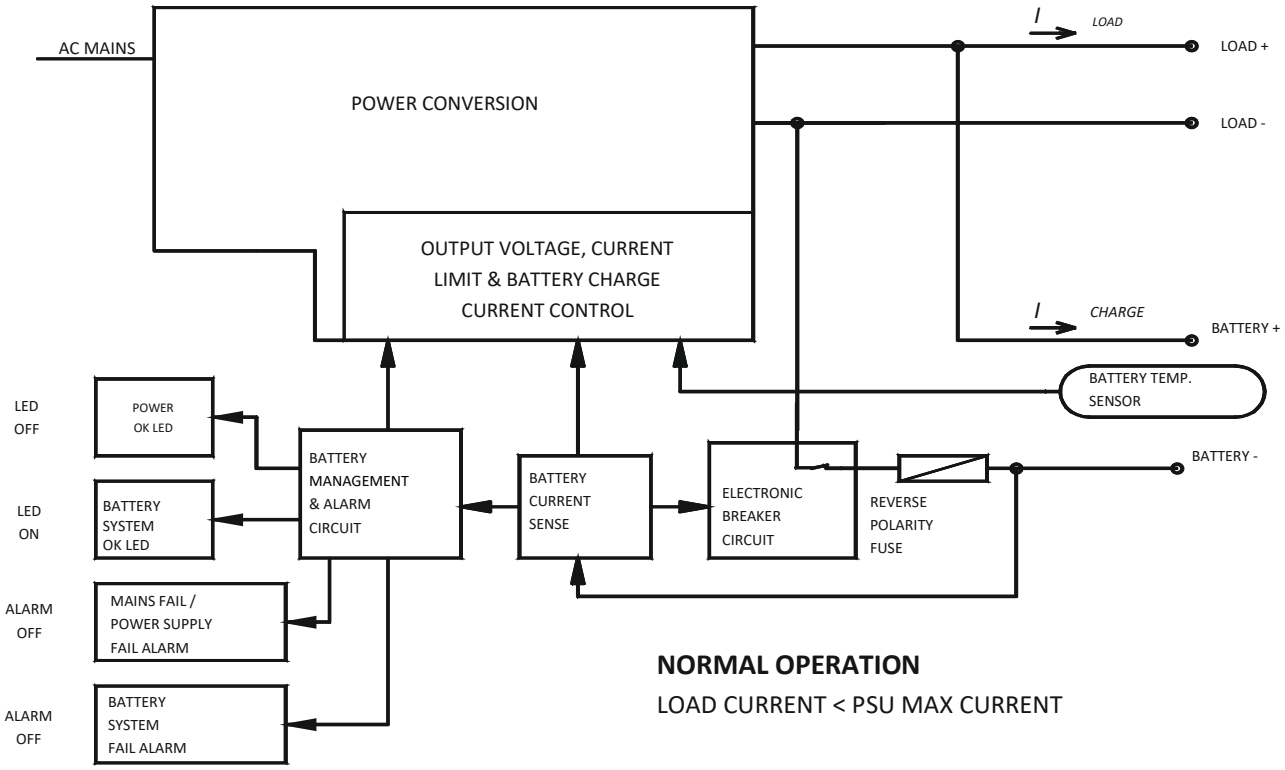
EMC = Electromagnetic compatibility

DOD = depth of discharge

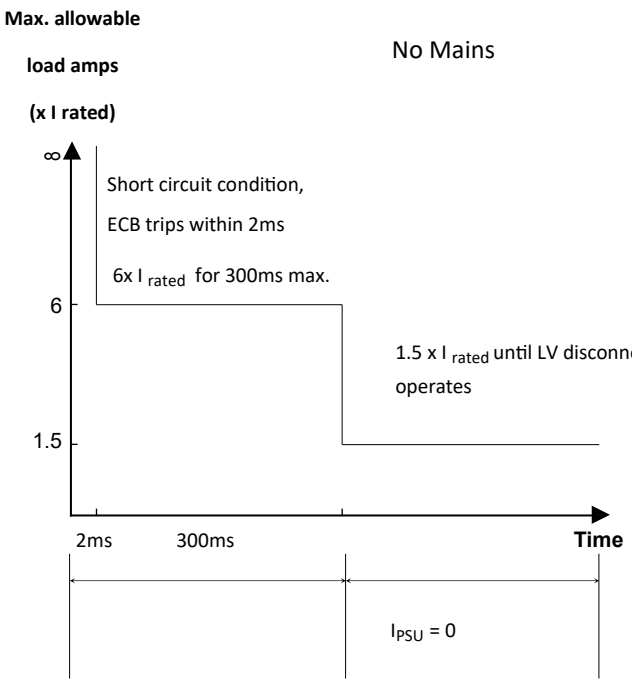
2. INTRODUCTION:

The ***No-Break ™DC SR750Hi*** switch mode power supply is designed to provide DC power to lead acid batteries for critical back up applications.No-Break ™ DC UPS systems maximise the integrity of standby battery installations, whilst optimising the life and availability of back up batteries. A built in Low Voltage Disconnect (LVD) will protect the battery from over discharge after extended periods of backup operation when AC power has failed.

3. SR750HI Series - SYSTEM BLOCK DIAGRAM



4. OPERATION OF ELECTRONIC CIRCUIT BREAKER (ECB) FOR PROTECTION OF BATTERY CIRCUIT & BATTERY

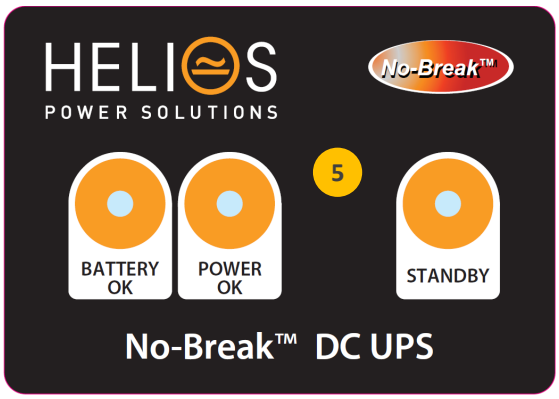


The ECB will operate on overcurrent as above & is also activated for the low voltage disconnect function on mains fail (no input power). It will reset when input power is restored, or can be manually reset by briefly shorting the **BAT-** and **LOAD-** terminals together when there is no input power.

5. BACK & FRONT PANEL LAYOUT

BACK PANEL

FRONT PANEL



1. **AC INPUT IEC60320 - C13 10A**
2. **Digital Inputs (pins 1,2)/ Input or Output (pin 3)/ Return (pin 4)** I/O terminals are customizable and if used, the product will have a unique code.
3. **ALARMS RELAY FORM C**

AUX : Activated by BCT (Battery Condition Test)

POWER (Mains Fail):

- Loss of mains input power. This alarm has 30 seconds delay before activation upon mains failure.
- PSU fails

BATTERY:

- Battery Low: 1.8V/cell (for 2V cells) - operates only when no mains power present.
- Battery Missing or fault in battery circuit wiring (alarm does not activate for up to battery detection interval time.
- BCT fail

4. **LOAD & BATTERY CONNECTION** (M8 brass stud, plug-in style phoenix & plug-in style Anderson connector options)
5. **LED INDICATIONS CODE** (For full list of LED flash codes please refer to the next page)

   Battery OK: LED on: Battery present and above V batl

   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 the **STANDBY** button briefly to put into standby mode.

6. **Comms Port (if installed) , for models with communications please refer to**

- RS232 (ASCII) https://www.heliosps.com/sr-series-downloads/#rs232-rs485-commands-sr-series
- RS485 (ASCII) https://www.heliosps.com/sr-series-downloads/#rs232-rs485-commands-sr-series
- Modbus RTU https://www.heliosps.com/sr-series-downloads/#serial-modbus-rtu-sr-series
- SNMP, Webpages https://www.heliosps.com/sr-series-downloads/#snmp-sr-series

NOTES

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

6. CONNECTION AND 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, "BATT 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. Check that the load does not exceed 110% of the unit. Any peak loads which are > 110% must be connected to the B+ and B-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.

7. LED INDICATION

LEGEND :  =on  =fast flash  =slow flash ◯ =off

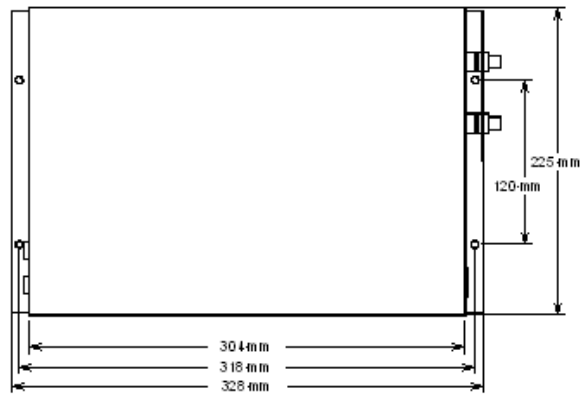
Battery System OK LED	Power OK LED	Stand-by LED	Battery System OK Alarm	Power OK Alarm	Condition
☀	☀	◯	Normal	Normal	System Normal: Input power on, battery circuit is OK
◑	☀	◯	Normal	Normal	Battery detection test in progress
◯	☀	◯	Alarm	Normal	Input power on, battery system fault: 1. Internal battery fuse has opened ***or*** 2. Battery circuit wiring open circuit, battery missing, ECB has tripped
☀	◯	◯	Normal	Alarm	Input power off, battery system is OK (battery volts > Vbatl)
◑	◯	◯	Alarm	Alarm	Input power off and battery has discharged to ≤ V batl
◯	◯	◯	Alarm	Alarm	Input power off, ELVD has activated and disconnected battery from load.
✳	✳	◯	Normal	Normal	BCT is in progress: LEDs flash slowly
✳	☀	◯	Alarm	Normal	Input power on, battery condition unserviceable- battery voltage < Vpres during a BCT
☀	☀	☀	Normal	Normal	PSU in standby, input power on, battery system OK
◯	◯	☀	Alarm	Alarm	PSU in standby, input power present, battery missing.
✳	☀	◯	Alarm	Normal	PSU in standby and system has failed previous BCT
☀	✳	◯	Normal	Normal	Fan fail/stall, Aux relay will toggle every 5 seconds and the POWER Ok LED will slow flash during this 5 second period
☀	✳	◯	Normal	Normal	Fan fail/stall occurs at the same time as BCT, the BCT talks priority until the BCT is finished. The Aux relay will then resume toggling every 5 second to show fan fail/stall

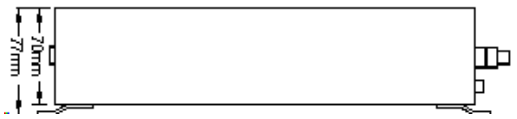
8. SR750HI – DC SETTINGS (at 20 degrees C)

Parameter	Nominal Voltage					Default Value
	12V	24V	30V	36V	48V	
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 a **BATLOW** alarm generated	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 voltage when **BATLOW** alarm generated during mains fail	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% *[1]
Comms = communications mode of PSU: F = continuous data stream of status M = responds only to request made by a controller						F
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 jumper: if fitted automatic BCT is enabled						Not fitted
BCT = length of battery condition test						20 min
Ret = retest option: N = after a failed BCT further scheduled BCTs are inhibited 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

*1 Except for 12V which is set at 50%

9. MOUNTING DETAILS



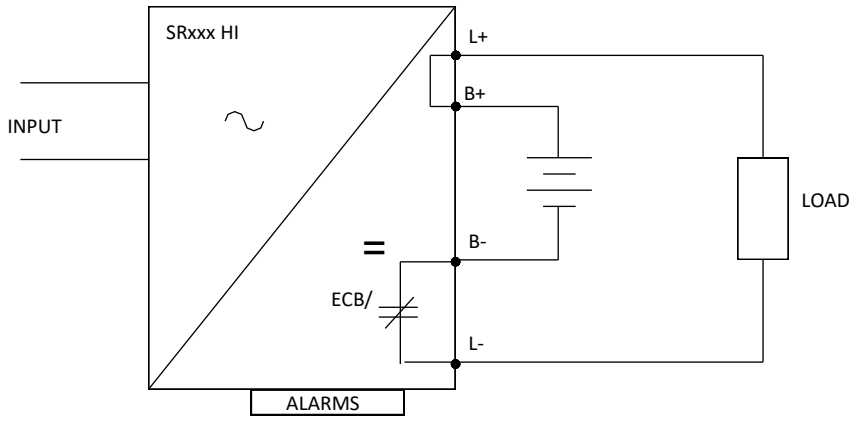


Stud terminal output

10. SR750HI – CONNECTIONS - Typical Examples

- **Standard *No-Break™DC* charger and battery bank**

This is the basic connection which is most commonly used, and provides adequate protection for the majority of systems requiring DC back up in the event of a mains power failure.

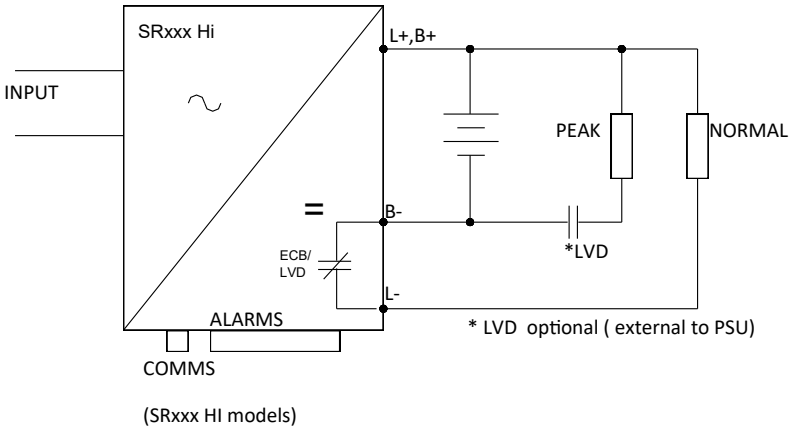


Alarms Available	
Input Fail	YES
Battery Missing	YES
Battery Low	YES
Battery Condition Test Fail	YES

Note: On stud connected output models the L+/B+ is one stud labelled "+ COMMON"

- **Peak load connection using *No-Break™DC* charger**

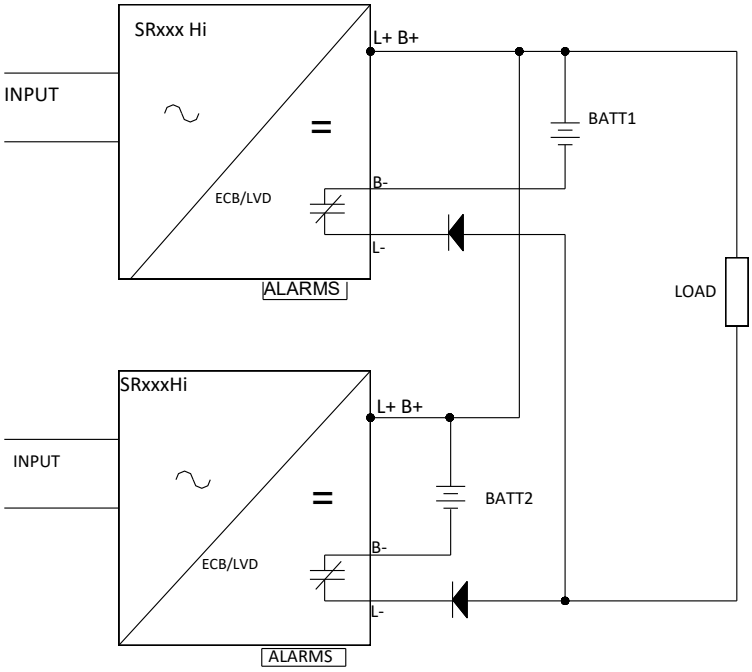
Peak loads which may exceed 1.5 x max. charger output can be connected to bypass the internal overcurrent trip circuit.



(SRxxx HI models)

Alarms Available	
Input Fail	YES
Battery Missing	YES
Battery Low	YES
Battery Condition Test Fail	YES

- **N+1 connection using two complete *No-Break™DC* systems with each one capable of supplying the loads- positive common**



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

*1 interlock circuit required for automated BCT

11. MODEL CODING AND OPTIONS

SR750HI 12 T F X L DC - 485+

Optional Communication Interface Port

485 = RS485 **232** = RS232 **LAN+= Ethernet** /SNMP-Webpages **485+=**Modbus RTU

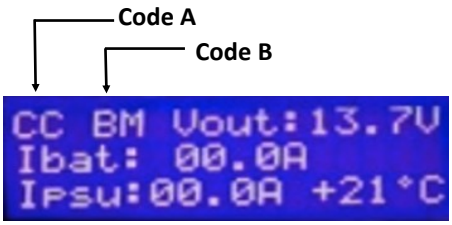
DC = 90-135VDC input (blank = AC input) **U =** 110VAC optional input voltage

Standby Button	Turns output on/off
Output DC connector	**X** = Pluggable connector **S**= Stud **A**= Anderson connectors
Type of cooling	**F** = Fan
Temperature Compensation	**T** = Yes
DC output (nominal battery voltage)	**12, 24, 30, 36, 48V**
Function	**HL** = DC PSU/charger - 2 terminal output **HI** = ***No-Break™*** DC UPS - 3 terminal output (separate battery output)
Power	**750W**

12. H-SERIES INTERNAL METER OPTION

SR500H & SR750H L & I models both have the internal meter option and the parameters displayed vary depending on the model.

The H-Series internal meter shows the status of the PSU and Battery which has certain meanings. Check below each one of them to understand the information displayed.



H-Series internal meter example display

SR500/750H model with Internal meter:

Code A:

CC – charge cycle (normal operation)

MF – mains fail (mains failure, system on battery power)

OL – system overloaded, output voltage is below Vpres setting

BCT – battery condition test is in progress

Code B:

M? – possible mains fail, ie. No mains detected but brown out timer not expired (30sec)

m? – possible mains fail, ie. No mains detected but brown out timer not expired (30sec). But has failed the previous BCT

BP – battery present, system OK

bP – battery present, system OK. But has failed the previous BCT

B? – No battery charge current detected, up to the next scheduled battery detection, uncertainty about the presence of the battery exists.

b? - No battery charge current detected, up to the next scheduled battery detection, uncertainty about the presence of the battery exists. But has failed the previous BCT.

BM – battery is missing, the battery detection routine did not find a battery to be present. This will also reset the 'battery condition not good' of any failed BCT.

BO – battery is in 'OK' state during mains fail

bO – battery is in 'OK' state during mains fail. But has failed the previous BCT

BL – battery is in 'LOW' state during mains fail

bL – battery is in 'LOW' state during mains fail. But has failed the previous BCT

SD – system will shut-down if no mains present and output voltage stays below Vdiscon for 30 seconds.

Displayed values following Code B:

Vout = output voltage of PSU
Ibat = battery charging/discharging current
Ipsu = Total PSU output current
+20^{o}C = temperature measured by temp. sensor

12. TECHNICAL SPECIFICATIONS

Output power	750W
Input Voltage	180V-264VAC 88V-132VAC (on-request)
Output Voltages	12V, 24V, 30V, 36V, 48V
Voltage Adj. Range	85% - 120% of Vout
Frequency	45-65Hz
Fusing/Protection	Input fuse and varistor Battery fuse plus ECB for battery circuit
Overcurrent protection	Constant current limit under overload and short circuit conditions
Isolation	Input – earth – 2.5KVdc / Output – earth - 750Vdc
Efficiency	> 85%
Noise	<1%
Operating temperature	-20 to 50 °C ambient at full load
OVP	Over-voltage protection on output at ~130% of nominal output voltage
Humidity	0 - 95% relative humidity non - condensing
Cooling	Fan cooled (2 fans)
LED Indication	Green: Batt OK Green: Power OK Flash code for different operating states
Alarms Relay	Form C contacts 30VDC,2A/110VDC,0.3A,125VAC, 0.5A **AUX** (Activated by BCT, Fan fail/stall (toggle every 5 sec)) **POWER** (main fails, PSU fails) **BATTERY** (batt missing , batt low, BCT fail)
Temp. Compensation	Temperature sensor on 1.7m lead with adhesive pad: -4mV/ °C / cell ± 10% (customizable)
Battery Charge Current Limit	Customizable on request.
Battery Monitoring	Detects for presence of battery on start up, then every 60 minutes when charge current < 200mA
Battery Circuit Protection	Electronic circuit breaker (ECB) operates under the following conditions: **Low Battery Volts:** Battery Voltage drops to 1.67V/cell **Overload:** Max load must not exceed 110% of rated current. Peak loads must be connected to B+ & B– terminals. **Short Circuit:** <2ms, backed up by fuse

OPTIONS

Input Voltage	88 - 132VAC
DC Input Voltage	110VDC (88V –135VDC)
Communication Options	· RS232 (ASCII) · RS485 (ASCII) · Modbus RTU · SNMP, Webpages
Digital Inputs/Outputs	Digital Input (pins 1,2) / Input or Output (pin 3) / Return (pin 4)
Battery Condition Test (BCT)	Option auto test enabled on start-up
Mounting	· Standalone
	· 19”Rack Mount . *Optional V/I meter for subrack : SR-Meter*
	· Wall - Floor Mount Cabinet
Internal Meter	Internal V/I meter displaying PSU operating states. Add code **+INT-METER**
N+1 Redundancy	Using 2 chargers & output diodes
Boost Charger	Customizable feature on request for boost charging capabilities
Conformal Coating	For harsh environments

STANDARDS

EMC	To CISPR 22 / EN55022 class A
Safety	To IEC950 / EN60950 / AS/NZS3260

13. CUSTOMISED MODELS

Model code	BASE MODEL	SPECIAL FEATURES
CSR186	SR750HI24TFSL	Custom SR750HI24TFSL with Conformal Coating
CSR128	SR750HI24TFSL	SR750HI24TFSL with Int H-Meter

14. TERMS OF WARRANTY

Helios Power Solutions warrants this product for 24 months from date of shipment against material and workmanship defects. 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.