CCL

Industrial battery chargers, power supplies and controls

Sentinel Battery Charger
OPERATION & MAINTENANCE GUIDE

THIS MANUAL REFERS TO THE FOLLOWING MODELS

SNSUL70 12V 5A
SNSUL140 12V 10A
SNSUL140 24V 5A

SNLUL70 12V 5A
SNLUL140 12V 10A
SNLUL 24V 5A

ESNSUL70 12V 5A
ESNSUL140 12V 10A
ESNSUL140 24V 5A

ESNLUL70 12V 5A
ESNLUL140 12V 10A
ESNLUL 24V 5A

For safe and correct use of the unit read the safety instructions which precede the operating instructions for the above units.

THIS GUIDE CONTAINS 6 PAGES (including this one) IF ANY PAGES ARE MISSING - CONTACT THE BATTERY CHARGER SUPPLIER OR MANUFACTURER

COMPUTRONIC CONTROLS
A division of Frank W Murphy Ltd.

41 – 46 Railway Terrace, Nechells, Birmingham, B7 5NG, United Kingdom
tel: +44 121 327 8500
fax: +44 121 327 8501
email: sales@computroniccontrols.com
web: www.computroniccontrols.com

IMPORTANT SAFETY INSTRUCTIONS - SAVE THESE INSTRUCTIONS - SAFETY INSTRUCTIONS

This manual contains important safety and operating instructions for models SNSUL70, SNSUL140, SNLUL70, SNLUL140 ESNSUL70, ESNSUL140, ESNLUL70 and ESNLUL140.

- Do not expose charger to rain or snow
- Use of an attachment not recommended or sold by the battery charger manufacturer may result in risk of fire, electric shock, or injury to persons.
- Do not operate charger if it has received a sharp blow, been dropped, otherwise damaged in any way; return to supplier.
- Do not disassemble charger, return to supplier when service or repair is required. Incorrect reassembly may result in a risk of electric shock or fire.

WARNING - RISK OF EXPLOSIVE GASES

WORKING IN VICINITY OF A LEAD-ACID BATTERY IS DANGEROUS. BATTERIES GENERATE EXPLOSIVE GASES DURING NORMAL BATTERY OPERATION.

To reduce the risk of battery explosion, follow these instructions and those published by battery manufacturers and manufacturer of any equipment you intend to use in vicinity of the battery. Review cautionary marking on these products and on any attached equipment.

PERSONAL PRECAUTIONS

- *(i) Someone should be within range of your voice or close enough to come to your aid when you work near a lead-acid battery.*
- *(ii) Have plenty of fresh water and soap nearby in case battery acid contacts skin, clothing or eyes.*
- *(iii) Wear complete eye protection and clothing protection. Avoid touching eyes while working near batteries.*
- *(iv) If battery acid contacts skin or clothing, wash immediately with soap and water. If acid enters eyes, immediately flood eyes with running cold water for at least 10 minutes and get medical attention immediately.*
- *(v) NEVER smoke or allow a spark or flame in vicinity of battery.*
- *(vi) Be extra cautious to reduce risk of dropping a metal tool onto battery. It may spark or short-circuit the battery or other electrical part that may cause explosion.*
- *(vii) Remove personal metal items such as rings, bracelets, necklaces, and watches when working with a lead-acid battery. A lead-acid battery can produce a short-circuit current high enough to weld a ring or the like to metal, causing a severe burn.*
- *(viii) Use charger only for charging batteries as stated on the charger. Do not use battery charger for charging dry-cell batteries that are commonly used with home appliances. These batteries may burst and cause injury to persons and damage to property.*
- *(ix) NEVER CHARGE A FROZEN BATTERY*

PRIOR TO INSTALLATION / COMMISSIONING

- *Clean battery terminals. Be careful to keep corrosion from coming in contact with eyes.*
- *Add distilled water in each cell until battery acid reaches level specified by battery manufacturer. This helps purge excessive gas from cells. Do not overfill. For a battery without cell caps, carefully follow manufacturer's recharging instructions.*
- *Study all battery manufacturer's specific precautions such as removing or not removing cell caps while charging and recommended rates of charge.*
- *Determine voltage of battery by referring to engine manual and ensure matches charger's output voltage.*

CHARGER LOCATION AND CONNECTION

- *Never place charger directly above battery being charged, gases from battery will corrode and damage charger.*
- *Never allow battery acid to drip on charger when reading specific gravity or filling battery.*
- *Do not operate charger in a closed-in area or restrict ventilation in any way.*
- *The battery charger should be connected to a grounded, metal, permanent wiring system; or an equipment-grounding conductor should be run with circuit conductors not connected to equipment-grounding terminal on battery charger.*
- *Connections to battery charger should comply with all local codes and ordinances.*
- *Open Frame Models - These battery chargers should be installed so that they are not likely to be contacted by people.*
- *Enclosed Models - The AC wiring should be independent of the DC and alarm wiring. Use 2.5mm² (Charger to battery) leads. Use 2.5mm² For input and ground connections.*

For safe and correct use of the unit follow the following steps, should you have any problems and the unit does not function as expected consult our troubleshooting guide at the end of these instructions.

- Visually inspect unit for any signs of damage, caused by transport or storage
- Mount charger as outlined above, paying attention to ambient temperature
- Ensure mains supply is isolated and connect observing the correct rated input voltage
- Ensure unit is earthed at the marked earth stud
- Check batteries in accordance with manufacturer guidelines
- Check charger is correct for battery type and voltage
- Connect unit to batteries, observing correct polarity and ensuring a secure and tight connection
- Switch on unit at mains supply

CCL

Industrial battery chargers, power supplies and controls

Sentinel Battery Charger
Installation Instructions

GENERAL INFORMATION

Please read the following information before installing. A visual inspection of this product for damage during shipping is recommended before installation. It is your responsibility to ensure that qualified mechanical and electrical technicians install this product. If in doubt, please contact your local Computronic representative.

WARNING

BEFORE BEGINNING INSTALLATION OF THIS PRODUCT

- Disconnect all electrical power to the charger
- Make sure the charger cannot operate during installation
- Follow all safety warnings of charger and battery manufacturers
- Read and follow all installation instructions

Description

The Sentinel range provides automatic, current limited and voltage controlled charging of vented lead acid, VRLA and NiCd batteries. The units may be used in a wide range of industrial charging applications, including standby engines, pumps and generators.

The charger is supplied in either an open frame construction, designed for surface mounting in an enclosed panel or as a wall mounted enclosure with charging indication via an ammeter.)

The control circuit ensures the charger maintains a battery voltage at the pre-calibrated float level, while supplying any additional load current up to the specified maximum.

Auto Boost (Equalising) Operation - SNLUL & ESNLUL Ranges Only

Auto boost operation provides an increased output voltage when batteries are below a preset point. Once the batteries have reached the boost voltage the charger reverts to its float voltage. This operation equalises the batteries, maximising battery life and capacity.

Boost Initiate Operation - SNLUL & ESNLUL Ranges Only

The boost initiate switch forces the charger to enter an auto boost cycle *(see above)* even if battery voltage is above the preset point, once this operation is completed the charger returns to it's float voltage.

Temperature Compensation

The remote temperature compensation provides control of the output voltage based upon temperature, as temperature increases the charging voltage is decreased at a negative coefficient of 3mV/°C/Cell.

Charge fail & alarms - High & Low only on SNLUL & ESNLUL Ranges

A self diagnostic 'charge fail' circuit and relay output is provided along with under and over voltage warnings. The volt free relay de-energise in the event of a charging fault or high/low battery state.

Electrical connection of the AC and DC supply and alarms are via screw-type terminals.

Product Specification

Power Supply:

nominal operating voltages	85-130V (120V Units) 180-250V (240V Units)
nominal operating frequency	50/60Hz

DC Charge Output:

maximum current ADC	5	10
nominal voltage VDC	24	12

float / boost voltages
These are factory preset for specified batteries, typical settings are as follows: -

	Float Voltage	
	12V	*24V*
Vented Lead Acid	13.7V	27.4V
	12V 10 Cell	*24V 20 Cell*
NiCad	14.1V	28.2V

	Boost Voltage	
	12V	*24V*
Vented Lead Acid	14.1V	28.2V
	12V 10 Cell	*24V 20 Cell*
NiCad	14.6V	29.2V

Charge Fail Output:

relay type	SPDT contacts relay de-energised on fault
contact rating	1A @ 30VDC (resistive load)

General:

operating temperature	-20 to +60°C

OPEN FRAME MODELS

SNSUL70 and SNSUL140

dimensions	105mm/4.1"(W) x 70mm/2.75"(D) x 130mm/5.1"(H)
weight	0.55Kg / 1.2lb

SNLUL70 and SNLUL140

dimensions	105mm/4.1"(W) x 70mm/2.75"(D) x 150mm/5.9"(H)
weight	0.6Kg / 1.3lb

WALL MOUNTED ENCLOSURE MODELS

All Models

dimensions	278mm/10.9"(W) x 120mm/4.7"(D) x 280mm/11"(H)
weight	1.6Kg / 3.5lbs

EMC emission / immunity	EN58801-2 / EN50082-2

GENERAL INFORMATION (ctd)

Current Limiting

The Sentinel Battery Charger is current limited and will only output the rated current of the charger *(see chart below)*

SENTINEL CURRENT RATINGS

MODEL	RATING
SNxUL70 & ESNxUL70	5A
SNxUL140 & ESNxUL140 12V	10A
SNxUL140 & ESNxUL140 24V	5A

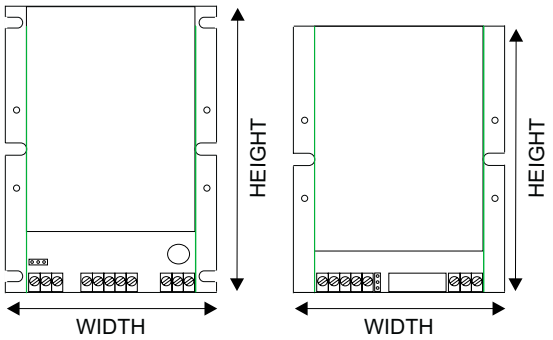
Battery Charged Condition

When charged the battery will only accept a charge to replace the losses within the battery (approx. 1mA per AH of battery). If there is a standing load (i.e. the panel controller etc) the charger will output the standing load plus the losses to the battery i.e. if a standing load of 1A is present with 50AH Vented Lead Acid batteries then charger will supply 1.05 amps.

A charged battery with open circuit terminals (i.e. no load connected) will always be higher than nominal battery voltage (i.e. 12.6 on a 12V lead acid battery)

Dimensions

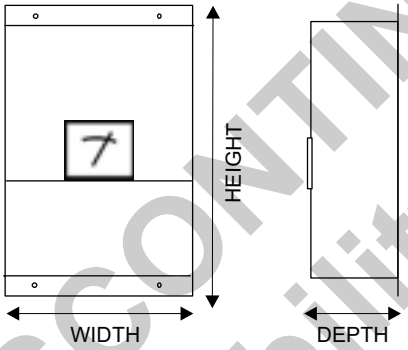
figure 1a - Open frame models



SNLUL Range **SNSUL Range**

	W	D	H	Weight
SNLUL	105mm 4.1"	70mm 2.75"	150mm 5.9"	0.6Kg 1.3lbs
SNSUL	105mm 4.1"	70mm 2.75"	130mm 5.1"	0.55Kg 1.2lbs

figure 1b - Wall mounted enclosed models



	D	W	H	Weight
ESNLUL	115mm 4.5"	140mm 5.5"	281mm 11.1"	1.6Kg 3.5lbs
ESNSUL	115mm 4.5"	140mm 5.5"	281mm 11.1"	1.6Kg 3.5lbs

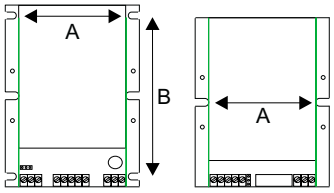
IMPORTANT ASSEMBLY INSTRUCTIONS - SAVE THESE INSTRUCTIONS

OPEN FRAME MODELS -
SNSUL70, SNSUL140, SNLUL70 & SNLUL140

- The charger must be mounted as shown in Figure 2a, with heatsink fins in vertical position.
- 2 or 4 screws should be used to mount charger to panel. Ensure screws are tightened firmly as as not to become loose during normal use on engine.
- Adequate consideration should be given to ventilation for proper heat dissipation.

WALL MOUNTED ENCLOSURE MODELS -
ESNSUL70, ESNSUL140, ESNLUL70 & ESNLUL140

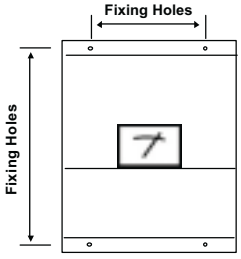
- The charger must be mounted as shown in Figure 2b.
- By unscrewing the fixing screws the faces can be opened on their hinges, to allow access to the internal connections.
- Cable entry is via knock-outs on either side of the unit, these must be carefully removed from the enclosure sides.
- A suitable cable-gland (20mm/0.8" DIA) should be used to prevent damage to cables and stop unwanted entry into inner part of charger. See "Electrical Connection" for details of terminal connections.
- The lower face should be firmly screwed to the charger before use.
- Four screws should be used to mount charger to panel. Ensure screws are tightened firmly as as not to become loose during normal use on engine.
- Adequate consideration should be given to ventilation for proper heat dissipation.



SNLUL Range **SNSUL Range**

	SNSUL All models (mm)	SNLUL All models (mm)
A	95	95
B		130

Figure 2a - open frame models



Fixing hole dimensions:
Width *(between holes)* - 66mm / 2.6"
Height *(Between holes)* -274mm / 10.75"
Fixing holes Ø=6mm (0.2")

Figure 2b - wall mounted enclosure models

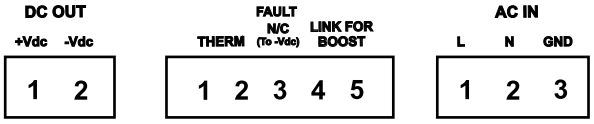
CAUTION: When handling chargers, care should be taken not to place excessive strain on either the heatsink, PCB, transformer or connecting wires. Unit should be handled by main heatsink/case (open frame models) or steel enclosure (enclosed models).

IMPORTANT OPERATING INSTRUCTIONS - SAVE THESE INSTRUCTIONS

Before operating the battery charger, ensure that the charger is assembled and installed as per the section listed in these instructions.

Terminal Connection Information

SNLUL70, SNLUL140, ESNLUL70, ESNLUL140



Output: DC Out (1 + 2) to battery
CAUTION: *Observe correct polarity*

Input: AC supply
CAUTION: *Observe correct voltage as stated on unit*

ALARM INDICATION - Over Voltage, Under Voltage and Charge Fail
3 - Change over contact for common alarm signal
(See notes on connection of alarms - see right)

Boost: 4 + 5 - Boost Initiate - Link these 2 connections to force the charger from into a single boost cycle of operation. *(Once the charger has completed a single boost cycle as outlined on page 3 of these instructions the charger returns to it's normal mode of operation)*

THERM: 1 + 2 - Connect correct stated value of thermistor for monitoring remote battery temperature.

SNSUL70, SNSUL140, ESNSUL70, ESNSUL140

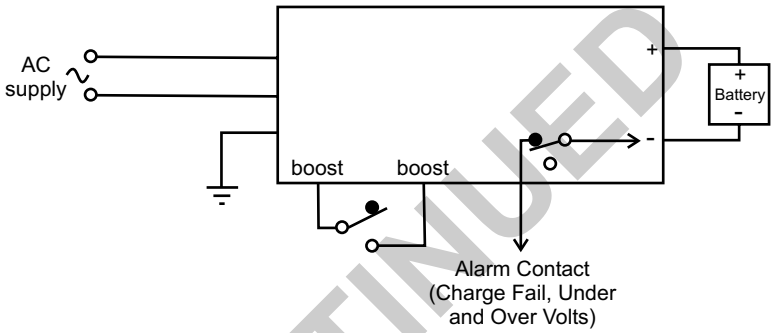
Output: DC Out (1 + 2) to battery
CAUTION: *Observe correct polarity*

Input: AC supply
CAUTION: *Observe correct voltage as stated on unit*

ALARM INDICATION - Over Voltage, Under Voltage and Charge Fail
5 - Change over contact for common alarm signal
(See notes on connection of alarms - see right)

THERM: 3 + 4 - Connect correct stated value of thermistor for monitoring remote battery temperature.

Thermistor Values
12V Models - 10K Thermistor
24V Models - 20K Thermistor



Connection to Mains Supply:
Ensure supply is isolated before connection is made to charging unit
Ensure unit is properly earthed at earth stud (enclosed) on chargers metal chassis
CAUTION: *Ensure correct AC voltage is supplied to unit, applying 240VAC on a 120VAC unit will destroy it and could cause serious personal injury.*

Connection to Batteries:
Ensure mains supply is isolated before connecting charger to batteries
Ensure battery type and voltage are correct before connecting to batteries
WARNING: Charging either different voltage or type of batteries from stated type may result in damage to both the charging unit and/or batteries and could result in serious personal injury.

Disconnection of Batteries:
Ensure mains supply is isolated before disconnecting charger from batteries
WARNING: *Disconnecting the batteries whilst mains supply is connected to the charger could result in a spark at battery terminals, this could ignite the hydrogen given off from the batteries.*

Boost Initiate Connection:
The charger will be in it's normal mode of operation whilst the boost link is broken, upon connecting the two *boost initiate* terminals the charger will perform a single auto-boost cycle, whereby the charger outputs a higher voltage, once battery voltage has reached this point, the charger returns to it's normal float mode of operation.

Over Voltage, Under Voltage and Charge Fail Connection (if fitted):
In a de-energised state the COM - N/C contact is alarmed. The relay energises on power up and changes state. The contact is common to -Vdc and rated at 1A @ 30VDC.

Fuses:
All Sentinel models are fitted with mains input fuses at the required ratings (see markings on chargers). Before replacing any fuses, ensure charger is isolated from mains supply.

The Sentinel Range are fitted with a self-resetting polyfuse on the dc output. If reverse polarity or short circuit faults are made, isolate supply, disconnect the outputs and allow fuse to self-reset. The charger can then be re-connected and switched back on. No replacement of output fuse should be necessary. If fuse fails to reset, the charger should be returned to supplier. Ensure correct rating when replacing input fuses.

AUTOMATIC BATTERY CHARGER
The Sentinel-L (SNL and ESNL) range are automatic battery chargers, if voltage falls below a preset voltage (12.2V on a 12V lead-acid battery) they automatically enter an increased charging voltage state (boost). Once the batteries have reached this point, the charger will switch to it's normal "float" voltage. this prevents over-charge, which in turn prevents the battery from over-gassing and subsequently maximises battery life.

WARNING: The Sentinel range is not USER SERVICEABLE. No attempt should be made to replace or repair the charger, any attempt to do so may invalidate any warranties and could cause serious personal harm or injury as well as damage to both the battery charger and any connected devices. In event of failure the charger should be returned to supplier.

ELECTRICAL CONNECTION

WARNING: DANGER OF INJURY OR DEATH. Before connection, disconnection or handling of SENTINEL battery charger, ensure that all AC power supplies are isolated. Connection to or disconnection from live wiring can also cause damage to internal components.

TROUBLESHOOTING FLOWCHART

START HERE

Are batteries charging?

YES → PROBLEM SOLVED

MEASURING CHARGING VOLTAGE AND CURRENT

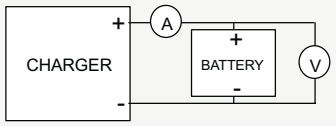


Figure (ii)

To check charger is working, follow these steps then consult expected conditions for relevant battery type below.

(1) VOLTAGE - Place voltmeter across battery terminals (V on fig ii)

(2) CURRENT - Break the positive line to the battery and place an ammeter between positive from charger and positive of battery (A on fig ii)

Lead Acid @ 20ºC

CURRENT FLOW FROM CHARGER TO BATTERY
If voltage at terminals is less than nominal battery voltage then the maximum rated charger current should be present.
Note: Once battery is fully charged, output current should be between 0/1% and 0.5% of battery's AH capacity plus any standing loads.
VOLTAGE RISE AT BATTERY TERMINALS
A gradual rise of voltage should be seen slowing as float voltage is reached. - batteries should NOT be boost charged continuously *(see page 3)*
Note: If the battery voltage increases rapidly during charge and no or minimum current is measured then the battery may have become sulphated and will not hold charge and may be unrecoverable

Wet NiCad

CURRENT FLOW FROM CHARGER TO BATTERY
The current should stay constant or near to constant whilst charging.
VOLTAGE RISE AT BATTERY TERMINALS
A gradual rise of voltage should be seen until float voltage is reached, once fully charged a slight drop in battery voltage will be measured - batteries should NOT be boost charged continuously *(see page 3)*

NO

Is a battery charger connected?

NO → Connect battery charger

YES

Is correct mains supply present on terminals?

NO → Check mains supply, fuses and wiring.

YES

Is output voltage correct for batteries?

NO → Replace with correct voltage charger.

		12V	24V			12V (10 Cell)	24V (20 Cell)
Lead Acid	Float:	13.7V	27.4V	Wet NiCad	Float:	14.1V	28.2V
	Boost:	14.1V	28.2V		Boost:	14.6V	29.2V

Typical output with no battery or load connected:
All Sentinel Models - The precalibrated float voltage should be present

YES

Is output voltage correct polarity on terminals?

NO → Check fuses and wiring.

YES

Is battery charger correct size for battery?

NO → Replace with correct size charger.

Lead Acid

Refer to genset manual for sizing of battery chargers to generator set. If installing your own chargers, battery manufacturers recommend the following: -
Minimum charge current should be approximately 5% battery AH capacity
Maximum charge current to be equal to 25% battery AH capacity
NOTE: When batteries are normally charged by a charging alternator, a float battery charger rated at lower than the minimum charge current is sufficient to keep batteries in fully charged state.

Wet NiCad

$$\text{Min Charge Current} = \frac{\text{AH Capacity of batteries}}{10}$$

$$\text{Max Charge Current} = \frac{\text{AH Capacity of batteries}}{5}$$

YES

Is there a standing load present?

NO → Are electrolyte levels correct?

YES → Are batteries at end of life?

YES → Replace batteries

FACTORS CONTRIBUTING TO ELECTROLYTE LOSS

- Physical damage to cells can cause electrolyte to leak or evaporate
- High charging voltages will evaporate electrolyte

Check charging voltage against battery type and voltage

WARNING: If the batteries are being used at above 20 DEGREES CELSIUS the chargers output voltage should be temperature compensated at -3mV/ºC/Cell

Lead Acid

Two possible methods:
(1) Using Hydrometer or (2) Using a digital DC voltmeter

Step 1. Fully charge the batteries
Step 2. Disconnect batteries and leads and leave for 24 hours
Step 3. Measure either specific gravity (hydrometer) or terminal voltage (voltmeter) and compare with table below.

% Charge	Specific Gravity	Voltage (DC) on a 12V battery
100	1.265	12.8
75	1.225	12.5
50	1.19	12.4
25	1.155	12.0
Discharged	1.12	11.5

If the voltage across the terminals shows around 10.5V, this may indicate a shorted cell is present.
Step 4. If time is limited due to on-site testing, remove surface charge by either applying a 20A load for 3 minutes or crank engine for 10 seconds, then disconnect batteries and leads and leave for minimum of 10 mins.
NOTE: On this method, providing batteries have been sized correctly for engine and charged correctly, an open terminal voltage of 12.5V or greater should be present.

YES

Is standing load current greater than charger output current?

REMINDER
The battery charger will need to provide both the standing load and minimum charge current
I.e. if a charging current of 2A is required, and the standing load is 1A then the charger needs to be able to output a total of 3 amps

NO → Top up batteries as per manufacturers recommendations

YES → Replace charger with correct size unit.

NO → Battery Charger may be faulty - Contact manufacturer