NERV CENTR®

SOLOPACK™ BATTERY

USER GUIDE

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GENERAL INFORMATION

The Nerv Centr SoloPack™ Battery is a lightweight high-energy density battery pack designed for soldier applications.

SoloPack uses a 6-pin connector that is compatible with the NettWarrior standard prescribed by U.S. Forces for soldier applications.

SoloPack is compliant with SMBus v1.1 (System Management Bus) and is therefore capable of interfacing with smart chargers.

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TECHNICAL SPECIFICATIONS

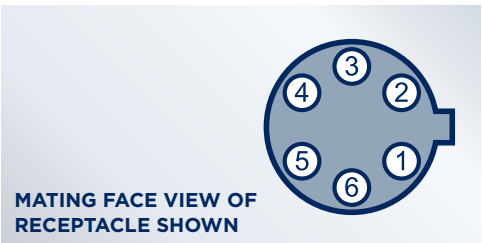
NOMINAL CAPACITY	6.8 Ah	C/5 @ 23°C (73.4°F)
OUTPUT VOLTAGE RANGE	11-16.8 V	15.0 VDC Nominal
MAXIMUM DISCHARGE	5.0 A Continuous	
PEAK DISCHARGE	15.0A < 3ms	
CHARGE CURRENT	5.0 A Maximum	
DIMENSIONS	181 x 77 x 30 (mm)	L x W x H
WEIGHT	550 g (1.2 lbs)	
ENERGY DENSITY	178 Wh/kg	
CYCLE LIFE	Greater Than 500 Cycles	100% DOD, 20% Capacity Loss
SHORT CIRCUIT PROTECTION	15 A	@ 3 ms
OVER CHARGE PROTECTION	4.25 V per cell 4.35 V per cell	Recoverable permanent failure
UNDER VOLTAGE PROTECTION	2.25 V	per cell
HIGH TEMPERATURE PROTECTION	70°C (158°F) Recovers at 50°C (122°F)	Internal battery temperature
OVER TEMPERATURE PROTECTION	Permanent fuse at 91°C (195.8°F)	Internal battery temperature
CELL BALANCING	Passive	

CONNECTORS

SoloPack is fitted with a single 6-pin NettWarrior compatible connector which carries all power and signals coming in and out of SoloPack as illustrated below.

The connector and pinout are compatible with the NettWarrior spec, but is not standard as Pin 3 is bi-directional.

CONNECTOR



PIN	NAME	
1	BAT +	Battery Pack Positive
2	BAT -	Battery Pack Negative
3	BAT +	Battery Pack Positive
4	DATA	SMBus Data
5	CLOCK	SMBus Clock
6	SMBID	SMBus ID


TALK

OPERATION

SoloPack has 2 operating modes: Normal and Shipping.

NORMAL

The normal operating mode is the standard operating mode of the battery.

SHIPPING

Shipping mode is only entered at the date of manufacture and is a low power state to increase the shelf life of the battery. Batteries are manufactured and shipped at approximately 30% state of charge.

The battery must be connected to a charger to exit shipping mode and enter normal operation.

USAGE GUIDELINES

- The battery pack should be fully recharged before the first use.
- The SoloPack operational temperature range is:
  CHARGE: -20°C to 55°C (-4°F to 131°F).
  DISCHARGE: -32°C to 70°C (-26°F to 158°F).
- The battery pack should be recharged after each use to prolong life.

NOTE: A Smart Charger is required when charging below 0°C (32°F) or above 45°C (113°F).

CHARGE

The battery pack should be charged to 100% prior to use. A desktop charger with NettWarrior connector can be used under normal operating temperatures. Compatible chargers are as follows:

Desktop Evaluation Charger	6130-01-542-5108
Soldier Charger	6130-01-545-1983
BTC-70801	6130-01-495-2839
BTC-70819	6130-01-555-7817
BTC-70844	6130-14-533-1900
BTC-70836	6130-01-527-2726
BTC-70870 VMC Lite	6130-01-606-5296
BTC-70777 Combo Charger	6130-01-605-5858
Galvion Nerv Centr Charger	014-458

NOTE: Charge rate & experience will vary based on charger used. Use of Battery Eliminator cables with chargers should be avoided; instead, use NettWarrior charging cable provided by charger manufacturer.

The SoloPack has an array of LED lights which indicate the capacity remaining in the battery by pressing the button. Each LED represents 20% remaining capacity meaning that five active LEDs indicate full charge. For example, two active LEDs indicate that the remaining capacity is greater than 20% but less than 40%, and so on. One exception to this rule applies when the remaining capacity is less than 10%: the bottom LED (next to the button) will blink upon pressing the button.

PHYSICAL & ELECTRO-MAGNETIC ENVIRONMENTS

SoloPack was designed to operate under extreme conditions encountered by ground troops. Verification testing was conducted in accordance with applicable military standards as indicated in the following chart.

SOLOPACK ENVIRONMENTAL AND EMI/C TESTS	
OPERATIONAL TEMPERATURE: -32 TO +55°C (-26°F TO +131°F)	MIL-STD-810 Method 501-2.5 Procedure II
STORAGE TEMPERATURE: -32 TO +60°C (-25.6°F TO +140°F)	MIL-STD-810 Method 501-2.5 Procedure I
THERMAL SHOCK	MIL-STD-810 Method 503.5 Procedure I-D
CONTAMINATION BYXFLUIDS	MIL-STD-810 Method 504.1 Procedure II
FUNGUS	MIL-STD-810 Method 508.6
SAND AND DUST	MIL-STD-810 Method 510.5 Procedures I & II
IMMERSION: 1 METER FOR 30 MINS (IP67)	MIL-STD-810 Method 512.5 Procedure I
VIBRATION, TRANSPORT	MIL-STD-810 Method 514.6 Procedure I

SOLOPACK ENVIRONMENTAL AND EMI/C TESTS	
SHOCK, FUNCTIONAL	MIL-STD-810 Method 516.6 Procedure I
SHOCK, TRANSIT DROP – 48 INCHES	MIL-STD-810 Method 516.6 Procedures IV
RAIN	MIL-STD-810 Method 506.5 Procedure I
HUMIDITY	MIL-STD-810 Method 507.5 Procedure I
CONDUCTED EMISSION	MIL-STD-461 CE101 and CE102
RADIATED EMISSION	MIL-STD-461 RE101 and RE102
CONDUCTED SUSCEPTIBILITY	MIL-STD-461 CS114, CS115 and CS116
RADIATED SUSCEPTIBILITY	MIL-STD-461 RS102 and RS103 plus five centimeters from a 5-W UHF/VHF source and one meter from a 25-W source
ELECTRO-STATIC DISCHARGE	MIL-STD-464 15 kV pulse

SAFETY INFORMATION

OVER-CURRENT AND OVER-VOLTAGE

The battery pack contains both over-current and over-voltage protection. In the event that the charge current exceeds 5.25 A or discharge current exceeds 5.25 A (continuous) the battery will disconnect its output terminals from the load.

Applying excessive voltages for extended periods may damage the battery and void the warranty. **DO NOT PLUG A SOLAR CHARGER DIRECTLY INTO A SOLOPACK BATTERY.**

VOLTAGE PROTECTION LEVELS (ALL MODES)	
CELL VOLTAGE (ANY CELL)	**ACTION**
2.25 V	Discharge Disabled, Enter Shutdown Mode
4.25 V	Charge Disabled, COV Flag Set
4.35 V	Permanent Failure
PACK VOLTAGE	**ACTION**
10.5 V	Discharge Disabled, Enter Shutdown Mode

If the voltage of any cell in the cell stack exceeds 4.35 V for a period greater than 2 seconds, the battery pack will permanently disable charge and discharge operation.

NOTE: It is important that the power requirements for the equipment being powered are within the output voltage range on page 4. Otherwise, there is a possibility that the equipment could be damaged and rendered unusable.

OVER-TEMPERATURE

The battery pack will disable charging & discharging through the battery cell stack when the internal temperature reaches 70°C ± 5°C (158°F ± 9°F). It will resume normal operation when the internal temperature reaches 50°C ± 5°C (122°F ± 9°F).

Charging and discharging through the battery cell stack will be permanently disabled should the internal temperature exceed 91°C (195.8°F).

SHIPPING & SAFETY REQUIREMENTS

The SoloPack has been certified to UN/DOT 38.3 and IEC 62133-2. The SoloPack is classified as Class 9 Dangerous Goods and shipping has to abide by specific rules.

Safety certification of SoloPack is per IEC 62133-2. Individual lithium cells used for SoloPack fabrication have received IEC 62133-2 safety certification.

NOTE: The SoloPack will need to be charged before use.

LABELLING

Each SoloPack is serialized and bears a label containing all information required by applicable safety standards as well as MIL-PRF-32383.

STORAGE REQUIREMENTS

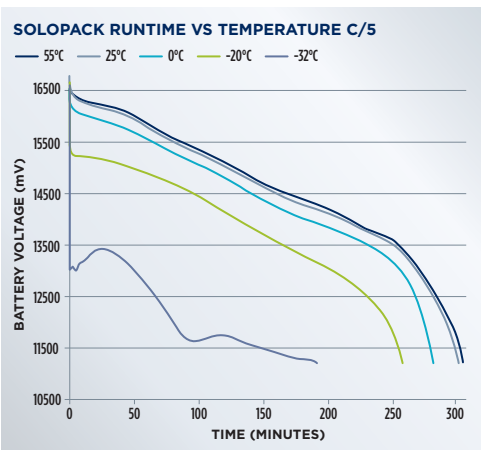
For long term storage, the battery pack should be charged to 50% SOC and stored at an ambient temperature of 25°C (77°F) with no equipment or cables connected.

Please note that the SoloPack in storage will need occasional recharging back up to 50% at an interval that does not exceed 3 months.

DISCHARGE CURVES

As for all batteries, SoloPack capacity depends on ambient temperature. This chart illustrates that relationship for SoloPack:

SOLOPACK TYPICAL DISCHARGE CURVES



DEFINITIONS AND ACRONYMS

DEFINITIONS	
C-RATE	A measure of the rate at which the battery pack is charged or discharged relative to its capacity.
CYCLE LIFE	The number of discharge-charge cycles the battery pack experiences before it fails to meet specific performance criteria.
DEPTH OF DISCHARGE	The percentage of battery capacity that has been discharged relative to rated capacity.

ACRONYMS	
A	Ampere
Ah	Ampere Hour
C	C-Rate
CC	Constant Current
CV	Constant Voltage
DC	Direct Current
DOD	Depth of Discharge
DOT	Department of Transportation
S	Second
SOC	State of Charge
UN	United Nations
V	Volt
W	Watt

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