SANUPS
E11A302A002US
3 kVA

Uninterruptible Power Systems

Technical Specifications

September '07

SANYO DENKI *AMERICA, INC.*

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1. The System

1.1. This specification describes a single-phase, Hybrid *, solid state Uninterruptible Power System herein after referred to as the UPS. The UPS shall operate in conjunction with the existing building electrical system to provide power conditioning and back-up power protection. The system shall consist of a solid-state inverter, rectifier, battery charger, and a 100 % rated, automatic, continuous duty static switch.

* SANYO DENKI combines both line interactive and double conversion UPS technologies in the SANUPS E11A Hybrid UPS, delivering 3 modes of operation for high efficiency and reliability.

2. UPS Requirements and Performance Characteristics

2.1. Rating

2.1.1. The UPS is available in:

	US model
Apparent power	3 kVA
Active power @ 0~40 °C (32~104 °F)	2.1 kW

2.2. Input Features

2.2.1. Voltages: 208 V, 1 phase, 2 wire + ground

2.2.2. ON LINE AC input Range:

166.4 to 239.2 V (+15 / -20 %)

2.2.3. Input Frequency: 50 / 60 Hz Auto-select. 60 Hz (Default)

2.2.4. Input Frequency Range:

+/- 1, 3, 5 %(User selectable) +/- 3 % (Default)
Change mode Economy or Active filter to Double conversion

+/-8 %
Change mode Double conversion to Battery operation

2.2.5. Current Values

	Sn (kVA)	Normal AC source (A)	Load (A)
Double Conversion: Min i/p voltage (166 V) and 208 V o/p	3	11.8 (14.8)	14.4
On Economy and 191.4 V i/p voltage	3	16.5	14.4

2.2.6. Recommended AC input MCCB: 20A

2.2.7. Inrush Current: 41A for 1 ms

2.2.8. Input Current Total Harmonic Distortion:

< 10 % (Double Conversion Mode)

2.2.9. Power factor: > 0.7

2.3. Output Characteristics

2.3.1. Voltages: 208 V Single phase

2.3.2. Voltage Regulation:

+/- 8 %: Economy Mode

+/- 5 %: Active Filter Mode

+/- 2 %: Double Conversion Mode

2.3.3. Frequency: 60Hz (Auto-select 50 / 60 Hz)

2.3.4. Frequency Regulation:

+/- 1, 3, 5 % (User selectable)

+/- 3 % (Default): Economy or Active Filter Mode

+/- 1 %: Double Conversion Mode

+/- 0.5 %: Battery Operation

2.3.5. Frequency converter mode: Can be used as a frequency converter

2.3.6. Slew Rate: < 1 Hz / second

2.3.7. Frequency Stability:

When UPS is synchronized on Normal AC source, the max phase shift is 31 µs, and inverter phase leads Normal AC phase.

2.3.8. Overload detection: Current limited

Overload occurs when output VA or Watts are beyond 105 % of nominal load.The 3 kVA meets overload detection as soon as measured output VA are beyond 3.15 kVA or as soon as measured output Watts are beyond 2.21 kW.

The UPS may stay Double Conversion Mode in overload conditions:

<200 ms 105 %

If bypass inside voltage (< 249.6V):

After the delay (200 ms), UPS switches to bypass without output break.

Customer can select a mode of action when overload disappears.

Auto return to Double Conversion Mode without a break (Default) or Continue running in bypass

If bypass outside voltage:

After the delay (200 ms), Output is shutdown

2.3.9. Short circuit: 800 % of nominal load during 2 cycles

2.3.10. Restart after short circuit:

Customer must push BYPASS-OC switch after turning off a MAIN MCCB*. (*MCCB: Moulded Case Circuit Breaker)

2.3.11. Crest factor: 2.5:1

2.4. Battery Characteristics

2.4.1. Cold Start: The units can be started on battery.
(50/60Hz selectable. 60Hz by default.)

2.4.2. The backup time of the standard version can be increased by adding battery extension modules (EXB's).
Up to three.

2.4.3. Battery Replacement: Hot Swappable

2.4.4. Battery Type: 12 V / 34W (15min-rate), 9Ah (20hr-rate)

2.4.5. Nominal Battery voltage: 72 V

2.4.6. Number of Batteries per Module: 6, in series.

2.4.7. Battery test: manual start, every 180 days (by default).
Can be adjusted to; every 30 days, 90 days, 180 days, or no test.

2.4.8. Leakage Current:
100 µA after end of backup time and full shutdown if DC circuit is on.

2.4.9. Battery Current Protection: Battery fuse 100 A

2.4.10. Battery protection against overvoltage :
Yes, if charger voltage exceeds 99 V (2.75 V / Cell).

2.4.11. Pre-alarm level: By default, set to 1.8 V / Cell.

2.4.12. Battery to replace warning:
The UPS has inner timer. The warning alarm sounds two times when the battery has reached its services life and before half a year.

2.4.13. Battery Supplier: CSB Battery
Part Number: = HRL1234WF2FR

2.4.14. Backup time

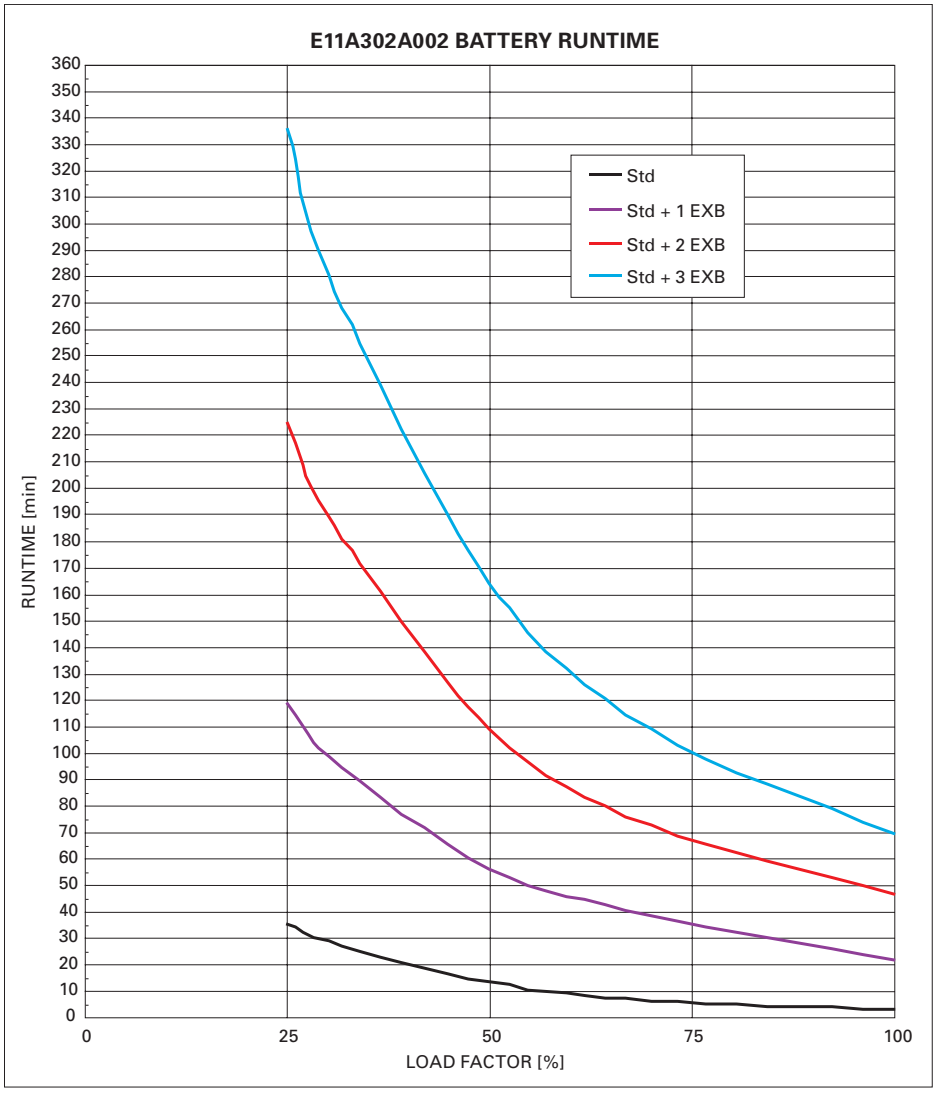
Typical backup times tables:

Backup times (in minutes) with 0.7 output power factor:

Batteries fully charged (at least 12 hours on floating conditions) @ 25 °C.
The battery aging is not taken into account in backup time prediction.
The batteries supplier is not taken into account.

3kVA with battery modules: (min)

	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Std	87	48	31	20	15.5	11	8.5	8	6	5
Std + 1 EXB	300	160	100	79	58	49	40.5	34.5	29	24
Std + 2 EXB	540	290	190	140	110	90	74	62	55	49
Std + 3 EXB	750	420	280	215	165	130	110	96	82	71



2.5. Charger Characteristics

2.5.1. Configuration: There is only one charger.

2.5.2. The charger is powered by the total DC bus.

2.5.3. Float: The floating value is set to 81.9V @ 25 °C.

2.5.4. Nominal charging current: 1.4 A

2.5.5. Floating value table vs ambient room temperature:

T (°C)	0	10	20	25	30	40
Voltage / cell	2.317	2.30	2.28	2.275	2.267	2.25
Total voltage	83.4	82.8	82.1	81.9	81.6	81

2.5.6. With EXB:

When an EXB battery module is connected, the total charging current is 1.4 A.

The floating DC value is set to 81.9 V.

2.5.7. Recharge time table vs number of extensions:

(after 100% RCD load discharge then recharge to recover 90% of nominal backup time)

Version	Std	Std + 1 pack	Std + 2 packs	Std + 3 packs
Recharge time	12 hours	36 hours	60 hours	84hours

3. Front Panel Information

3.1. MIMIC panel

13 LEDs on the top

ALARM (red)
INV.ON STAND BY (green)
BATT. LOW (red)
LOAD LEVEL / 25 %, 50 %, 75 %, 100 % (green) / O.L. (red)
BATT. TEST (green)
INPUT (green)
OUTPUT (green)
ECONOMY (green)
DOUBLE CONVERSION (green)

3 buttons (INV.ON STAND BY / BATT.TEST / CLEAR)

3.2. INV.ON / STAND BY button.

3.2.1. ON switch

Push time > 1 second: start the inverter, needs user confirmation if Commercial power supply is out of tolerances due to 10ms output break during transfer from bypass to inverter.

Push time > 5 seconds: UPS cold start (if batteries connected and without Normal AC source)

3.2.2. OFF switch

Push time > 1 seconds (Default)*: stop the inverter, needs user confirmation if Commercial power supply is out of tolerances due to 10 ms output break during transfer from inverter to bypass.

*Customer can select the time to turn off: 1second (Default) or 3 seconds.

3.3. Battery Test button

The UPS starts a battery test when this button has been pushed.
If the button is pushed again during battery test, the UPS stops a battery test.

3.4. Clear button

Clear the result of battery test.
And if the button is pushed during alarm beeping, the UPS stops alarm beeping.

4. Communication links specification

4.1. RS232 communication (on DB9 connector)

4.2. Optional Card slots:

1 slot is available. Below is a list of optional cards.

4.2.1. LAN interface Card (PRE11A01-US) features a web interface, Simple Network Management Protocol (SNMP), Simple Mail Transfer Protocol (SMTP) email notification and keeps log files about UPS operation.

5. LEDs and buzzer

5.1. BUZZER DEFINITION

Definition:

- Beep two times in 2 seconds: ** ** ** ** ...
  As soon as the UPS is on battery it must beep slow.
- One beep: *
  An inverter is on or off. Key clicked at a setup menu.
- Continuous beeps: ********** ...
  On battery, when the UPS reaches the pre-alarm threshold it must beep quick.
- Continuous tone: *----------
  The buzzer must beep continuously when:
  The UPS has a mechanical failure.
  The battery is exhausted.
- Beep four times in 3 seconds: **** **** **** ...
  The load devices connected to the output exceed the rated capacity.
- Beep seven times in 2 seconds: ******* ******* ...
  The battery check result was an error.
- Beep five times in 2 seconds: ***** ***** ***** ...
  The battery has reached before half year of its service life.
  The battery has reached its service life (The red BATT.LOW indicator blinks).

Customer can change the buzzer parameters:

a. All beep.
b. Only beep when the UPS has mechanical failure.
c. Key clicks at a setup menu only.
d. Both b and c.

Note that:
In any case, it is possible to stop the buzzer at any time, until the next buzzer, by pressing CLEAR button.

6. Standards

6.1. Safety:

The UPS meet UL1778 -4Th stds. It is UL listed. EN62040-1-1 for CE marking

6.2. EMI <Emission>:

UPS are class A according to FCC Part 15 Subpart B.
And EN50091-2, EN55022 Class-A

6.3. EMS <Immunity>:

Standard:EN50091-2 and EN55024
Testing standard is the following.

EN 61000-4-2 (IEC801-2) (ESD): level 3.
EN 61000-4-3 (IEC801-3) (RF): level 2.
EN 61000-4-4 ((IEC801-4) (FT/B): level 2.
EN 61000-4-5 (Surge): level 3.
EN 61000-4-6 (CS): level 2.
EN 61000-4-11 (V-Dips): PASS.
IEC1000-4-1 (Harmonics):PASS.

6.4. Transportation:

JIS Z 0200 (drop and vibration tests): Yes.

6.5. Environment temperature and humidity

6.5.1. Ambient operating temperature: 0 to 40 °C (32 to 104 °F)
6.5.2. Ambient storage temperature: -20 to 40 °C (5 to 122 °F)
6.5.3. Humidity: 30 to 90 %.
6.5.4. Altitude: up to 2000 meters (6000 ft.) without derating.

6.6. Audible noise (The noise changes depending on the load level.)

6.6.1. Typical 45 dBA online (buzzer not included)

6.7. MTBF

136,000 hours (est.)

Power Systems Division

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