

Performance Specifications

Product:	Off-Grid Inverter/Charger
Model:	Inverter III+ HIC - 1000
Document No.:	

Revision History

Rev.	Date	Description	Prepared By	Approved By

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1.0 Product Scope

This document defines the functional requirements, HIC series of products ranging in power levels 1000W. The Inverter/Charger product is an AC line powered uninterruptible power supply that provides AC power with battery backup outlets. The Inverter is an auto frequency ranging, Standby, Power System. This document collectively defines the electrical, mechanical, environmental, and reliability specifications, as well as safety and EMC/EMI requirements. The Inverter automatically maintains continuity of electrical power within tolerances and time frames specified in this product performance specification

2.0 Product Highlights

Model	DC Voltage	Watt Rating	Operating Voltage	Input Connection	Output Connections
HIC-1000)	24Vdc	1000Watts	230Vac	IEC C-14	universal socket

3.0 Electrical Requirements

3.1 AC Input

Item	HIC- 1000
Acceptable Input Voltage Range	170 - 264 Vac for 230V
Cold Start (0 to 100% load)	Yes
Frequency	50/60Hz Auto select 56 to 64Hz @ 60Hz 46 to 54Hz @ 50Hz
Low Loss / Recovery	56/57 Hz \pm 1Hz @ 60Hz 46/47 Hz \pm 1Hz @ 50Hz
High Loss / Recovery	64/63 Hz \pm 1Hz @ 60Hz 54/53 Hz \pm 1Hz @ 50Hz
Protection type	Re-settable Circuit Breaker
Charger Circuit Breaker	7A
Output circuit breaker	7A
DC breaker	50A 2pole
Surge Energy Rating	>220 joules
Let Through	5%, 6 KV Ring wave ANSI C62.41-1991 Cat 3
Response Time	0 ns normal mode, < 5 ns common mode
AC Leakage Current	<5mA

3.2 AC Output, Normal Mode

Model	HIC - 1000
Power (Watts)	1000W
Output Current (continuous) RMS	5A
Load Power Factor	1.0
Output Voltage - Waveform - Line Mode Voltage - Line Mode Voltage Regulation - Efficiency with fully charged	Same as input Factory Preset Value 170 – 264Vac (±3%) Normal mode>95%
Transfer and Reset Points:	Brownout Transfer Point – 170V(+/-3%) Brownout Reset point – 180V(+/-3%) Overvoltage Transfer point -264V (+/-3%) Overvoltage Reset point – 254V(+/-3%)
Transfer Time	16 ms max.
Output Frequency -Nominal output frequency	Same as Input
Short-Circuit Protection Line Mode	Re-settable Circuit Breaker and Electronically Limited
Surge Power Capability	Same as circuit breaker

3.3 AC Output, Battery Mode

Item	1000
Power (Watts)	1000W
Load Power Factor	1.0
Output Voltage - Waveform - Output Voltage Regulation - Peak Voltage	Sine wave Nominal 230V +/- 5% until LBW, +- 10% Max. 360V peak
Output Frequency & Regulation	50/60Hz +/- 0.5Hz Cold start frequency : 230V @ 50Hz
Total harmonic distortion (THD) - Typical (No Load) - Maximum(linear load)	< 5% (before LBW) < 10% (before LBW)
Battery Runtime	Depend on batteries and load capacities
Efficiency (Peak)	>80%
Short Circuit Protection	Active Electronic (Current Limit)
Overload Capability - 1 second Surge current - 10 seconds Surge power (real watts) - 1 minute Surge power (real watts)	7.5A 130~149% 110~129%
Search mode(Power Saving)	Load > 100W return to normal output Load < 50W into Saver mode

3.4 Battery (Discharge / Charge)

Model	1000
Nominal DC Voltage	24V
Input Voltage Rating	20 ~ 32Vdc
DC Input Max. Current (Discharge)	60A
Battery Protection	Fuse not user replaceable
- Battery-low alarm	22.6V start alarm
- Discharge prevention	Depend on battery detector board
DC leakage current	<30uA +/-10uA
Charging Voltage @ 25°C	See 6.4 figure
Charging Current	25Adc(+/-4A)
Battery Charge Temperature compensation for CV1&CV2 charging mode	The default value is -4mV/°C/cell. RJ-11 port to connect the temperature sensor. (PS:This length is 1M for RJ-11 temperature sensor cable)

Note : *

3.5 FAN Operation

Fan Operation	<p>Variable speed fan operation is required in invert and charge mode. This is to be implemented in such a way as to ensure high reliability and safe unit and component operating temperatures in an operating ambient temperature up to 50°C.</p> <ul style="list-style-type: none"> • Speed to be controlled in a smooth manner as a function of internal temperature and/or current. • Fan should not start/stop suddenly. • Fan should run at minimum speed needed to cool unit. • Fan noise level target < 65dBA @ 1 meter. • Each speed continue 3 minutes. <p>The fan logic as below:</p>			
	Condition	Enter condition	Leave condition	Speed
	Heat Sink Temp.	$T \leq 50^{\circ}\text{C}$	$T > 65^{\circ}\text{C}$	OFF
		$65^{\circ}\text{C} \leq T < 85^{\circ}\text{C}$	$T \leq 60^{\circ}\text{C}$ or $T \geq 85^{\circ}\text{C}$	50%
		$T > 85^{\circ}\text{C}$	$T \leq 70^{\circ}\text{C}$	100%
	Charge Current	Standby	Charge	OFF
		$25 < I < 50\% \text{Max}$	Standby or $I \geq 50\% \text{Max.}$	50%
		$I > 50\% \text{Max.}$	$I \leq 40\% \text{Max.}$	100%
	Load % (Invert Mode)	Load < 30%	Load \geq 30%	OFF
		$30\% \leq \text{Load} < 50\%$	Load \leq 20% or Load \geq 50%	50%
Load \geq 50%		Load \leq 40%	100%	

4.0 Mechanical

Model	HIC-1000
Enclosure	Powder coated steel
Unit Case Dimension W x D x H (the rack is not be included)	434X425X529mm
Unit Weight	TBD

4.1 Packing

Individual unit packaging box will be carton packaging. The shipping container shall be a commercial grade, brown carton. Packaging shall provide protection for the inverter against damage, breakage or loss during shipment and shall be of a type not destroyed by opening. The packing shall also be capable of withstanding multiple shipments without breaking.

4.1.1 Accessories Matrix

Accessory
User's Manual
Quick Install Guide

4.2 Color

TBD

5.0 Safety & Environmental

Safety Standard : TBD

EMI/RFI: TBD

5.1 Temperature

Operating Range : 0°C to +45°C: 0 to 1500 meters above sea level.

0°C to +35°C: 1501 to 3000 meters above sea level.

Transit and storage : -25°C to +70 °C.

5.2 Relative Humidity

0 - 95% non-condensing

5.3 Acoustic

Maximum noise generated under normal operation on utility operation shall be less than 55 dB, "A" weighted (when fan turn off). Maximum noise generated on battery operation shall be less than 70 dB. All measurements shall be taken 1 meter from the nearest surface of the Inverter. The audible alarm shall produce a constant frequency and amplitude tone of 60 to 80 db.

6.0 Controls and Status Indicators



6.1 Controls

The inverter shall contain a user-operated On/Off Standby switch and two piano switches. Activating the Standby side of the switch turns on or off power to the output receptacles. Pressing the piano switch to change the charger voltage/current setting.

6.1.1 Auto-Restart

After battery low cut off, if AC recover. Inverter can auto restart working normal, But if AC does not recover for a long time, or CPU detected battery voltage continues 10s lower than $10.5V \pm 0.3V$, then CPU will turn off the system power. If AC recover ,Inverter can not start to output.

6.2 Automatic Self Diagnostic Tests

The inverter shall perform automatic self-diagnostic tests at turn on: Flashing all LEDs during self-diagnostic.

6.2.1 Automatic Self Diagnostic Test: Power ON

Whether the utility power has been qualified or not, moving the inverter “on/standby”. Pushing the switch to the “on” position shall initiate the inverter to perform start-up tests. These tests, consisting of an electronics test and a battery test shall occur prior to enabling output power.

6.3 Status & Audio Indicators

The inverter shall provide the operator with both visual and audible status indicators. Visual indicators shall consist eight LED's provides complete information.

LED and Alarm Indicator for 24V system

	LED 1	LED 2	LED 3	LED 4	LED 5	LED 6	LED 7	LED 8	Alarm
AC Normal	Off	On/Blink See Note 3	Off	Off	Off	Off	Off	Off	Off
DC Model	On	Off	Off	Off	21 ~ 24.0v	24.0 ~ 24.6v	24.6 ~ 25.0V	> 25.0V	Off
Battery Low (DC Mode)	On	Off	Off	On	21 ~ 24.0v	24.0 ~ 24.6v	24.6 ~ 25.0V	> 25.0V	1 beeps @ 5 sec, last for 3Min.
Low Battery Cut Off (LBCO)	Off	Off	Off	On	Off	Off	Off	Off	1 beep @ shutdown
Battery High (DC Mode)	On	Off	Off	blink	21 ~ 24.0v	24.0 ~ 24.6v	24.6 ~ 25.0V	> 25.0V	1 beep @ 0.5sec
Overload (DC Mode)110%	On	Off	On	Off	21 ~ 24.0v	24.0 ~ 24.6v	24.6 ~ 25.0V	> 25.0V	1beeps @ 0.5 sec
Overload (DC Mode)130%	On	Off	On	Off	21 ~ 24.0v	24.0 ~ 24.6v	24.6 ~ 25.0V	> 25.0V	Constant on
Overload (DC Mode)150%	On	Off	On	Off	21 ~ 24.0v	24.0 ~ 24.6v	24.6 ~ 25.0V	> 25.0V	Constant on
Bypass Output (Power Off)	Off	Off	Off	Off	Off	Off	Off	Off	Off

Note: 1. When the inverter switch to DC mode from AC mode or switch to AC mode from DC mode, the alarm will sound 1 beep .

2. When the battery voltage reach LBCO voltage, the alarm will sound 1 beep and the inverter will shut down. The red LED will continue lighting ,

3. In CC1 charging mode : Green LED2 flash every 2 seconds

In CV1 charging mode : Green LED2 flash every 5 seconds

In CV2 charging mode : Green LED2 always light