



INSTALLATION & OPERATING MANUAL

SCIMITAR SERIES RACK-MOUNT INVERTERS

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★ Please read the instructions in this manual before installing and using your Inverter.

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1. Features:

- ※ Pure sine wave output (THD < 3%) R load
- ※ Auto bypass function 4-6ms
- ※ Output voltage / frequency selectable
- ※ RS-232C interface / remote control port / wire connection to PC
- ※ Compact design, low profile
- ※ Temperature and load controlled cooling fan
- ※ Advanced microprocessor
- ※ Low ripple: VAC, VDC, AMP, Watts, Temp, Frequency
- ※ Protection: Input low voltage, Input over voltage, Short circuit, Overload, Over temperature

1-1 Applications:

- ※ Power tools — circular saws, drills, grinders, sanders, buffers, landscaping tools, air compressors.
- ※ Office equipment — computers, printers, monitors, facsimile machines, scanner.
- ※ Central office — data centers.
- ※ Factory automation — backup control systems.
- ※ Household items — vacuum cleaners, fans, fluorescent and incandescent lights, shavers, sewing machines.
- ※ Kitchen appliances — microwave ovens, refrigerators and freezers, coffee makers, blenders, ice makers, toasters.
- ※ Industrial equipment — metal halide lamp, high pressure sodium lamp.
- ※ Home entertainment/electronics — television, VCRs, video games, stereos, musical instruments, satellite equipment.

1-2 Specification:

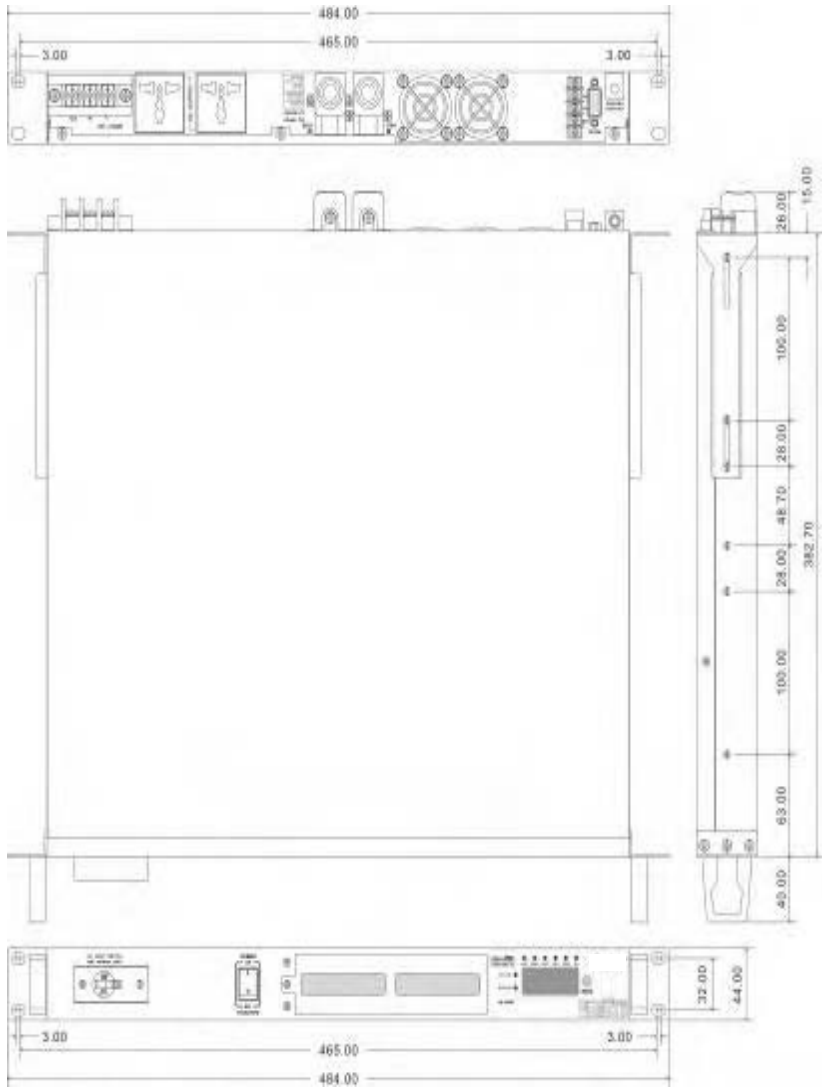
1-2-1 Specifications for model: 1U-1KVA series

Model		1U – 1KVA					
Input (DC)	Voltage	12V	24V	48V	12V	24V	48V
	Voltage Range	10-16V	20-32V	42-62V	10-16V	20-32V	42-62V
Output Continuous Power		850W (1KVA)					
Surge Rating		900W/1min., 950W/3sec., 1000W/1sec.					
Efficiency (full load)		86%	88%	89%	87%	90%	92%
P.F.		0.85					
Output Voltage Regulation		100/110/115/120V RMS \pm 3%			200/220/230/240V RMS \pm 3%		
Frequency (Switch Selectable)		50/60Hz \pm 0.05%					
Output Peak Current		15A			9A		
No Load Current		0.75A	0.4A	0.3A	0.7A	0.35A	0.25A
Output Waveform		Pure Sine Wave <3% THD (R Load)					
Protection		Overload, Short Circuit, Reverse Polarity (Fuse), Over/Under Input Voltage, Over Temperature.					
Digital Display		OVP、UVP、OTP、OLP、VAC、 AMP、WATT、VDC、TEMP、Hz					
Interface Control Port		RS-232C With Baud Rate 2400,4800, 9600, 19200 (Switch Selectable)					
Remote Control Unit		Optional					
AC Input		110V (90~130V)			220V (180~260V)		
AC Frequency		50Hz ~ 60Hz					
Bypass		4~6ms					
Temperature	Operating	-30°C to +60°C (-22°F to +140°F)					
	Storage	-30°C to +70°C (-22°F to +158°F)					
Safety		CE, FCC approved, cUL60950 pending					
Dimensions		408.7(L) ×484.0(W) ×44.0(H) mm					
Weight		6.5kgs					

1-2-2 Specifications for model: 1U-2KVA series

Model		1U – 2KVA					
Input (DC)	Voltage	12V	24V	48V	12V	24V	48V
	Voltage Range	10-16V	20-32V	42-62V	10-16V	20-32V	42-62V
Output Continuous Power		1700W					
Surge Rating	1min.	1870W					
	20sec.	2040W					
Efficiency (full load)		86%	88%	90%	87%	90%	92%
P.F.		0.85					
Output Voltage Regulation		100/110/115/120V RMS ± 3%			200/220/230/240V RMS ± 3%		
Frequency (Switch Selectable)		50/60Hz ± 0.05%					
Output Peak Current		25A			11A		
No Load Current		1.45A	0.7A	0.45A	1.47A	0.8A	0.47A
Output Waveform		Pure Sine Wave <3% THD (R Load)					
Protection		Overload, Short Circuit, Reverse Polarity (Fuse), Over/Under Input Voltage, Over Temperature.					
Digital Display		OVP、UVP、OTP、OLP、VAC、AMP、WATT、VDC、TEMP、Hz					
Interface Control Port		RS-232C With Baud Rate 2400,4800, 9600, 19200 (Switch Selectable)					
Remote Control Unit		Optional					
AC Input		110V AC (90~130V)			220V AC (180~260V)		
AC Frequency		50Hz ~ 60Hz					
Bypass		4~6ms					
Temperature	Operating	-30°C to +60°C (-22°F to +140°F)					
	Storage	-30°C to +70°C (-22°F to +158°F)					
Safety		CE, FCC approved, cUL60950 pending					
Dimensions		408.7(L) ×484.0(W) ×44.0(H) mm					
Weight		7.5kgs					

1-3 Mechanical Drawings



2. Introduction:

The series inverter is DC to AC 1U 19" rack mount pure sine wave inverter. For optimum performance, the instruction manual should be read to ensure proper installation and use of the model.

2-1 Front Panel Operation:



2-1-1 ON / OFF Switch:





Please keep the Power ON/OFF switch in the OFF position during installation.

2-1-2 Function Key

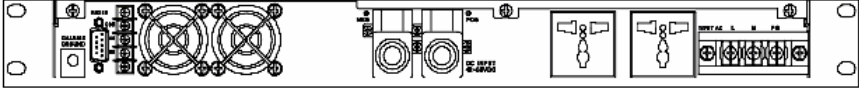
When sequentially pushing the "Function Key", the screen will display various status items such as output voltage, output current, output power, etc.

When a malfunction occurs, the corresponding error will be displayed on the screen.

2-1-3 AC outlet (Outlet sockets available)

1. Universal	2. PC connector
	
3. North America	4. North America(GFCI)
	

2-2 Rear Panel Operation:



2-2-1 Ventilation openings:

Do not obstruct, allow at least 3 inches for airflow.

2-2-2 Battery terminals:

Connect to a 12VDC/24VDC/48VDC battery or other 12VDC/24VDC/48VDC power source.

Red [+] is positive; Black [-] is negative. Reverse polarity connection will blow the internal fuse and may damage inverter permanently.



WARNING:

Do not connect the 12VDC model to a 24VDC battery. The unit will be destroyed immediately!

2-2-3 RS-232C:

Connect to remote control unit (optional accessory) or connect to computer for remote control working status.

2-2-4 Connect chassis ground terminal to earth or to vehicle chassis using #8AWG wire.



WARNING:

Operation of the inverter without a proper ground connection may result in an electrical safety hazard.



WARNING:

Shock Hazard! Before proceeding, carefully check the inverter is NOT connected to any batteries and is disconnected from any electrical source. Do not connect the output terminals of the inverter to an incoming source at this time.

2-3 Installation:

Where to install:

The power inverter should be installed in a location that meets the following requirements:

- ※ Dry: Do not allow water to drip or splash on the inverter.
- ※ Cool: Ambient air temperature should be between 0°C and 40°C.
- ※ Safe: Do not install in a battery compartment or other areas where flammable fumes may exist, such as fuel storage areas or engine compartments.
- ※ Ventilated: Allow at least three inches of clearance around the inverter for air flow, ensuring that the ventilation openings on the rear and bottom of the unit are not obstructed.
- ※ Dust Free: Do not install the inverter in a dusty environment where dust, wood particles or other filings/shavings are present that may be pulled into the unit when the cooling fan is operating.
- ※ Close to Batteries: Avoid excessive cable lengths but do not install the inverter in the same compartment as batteries.

Use the recommended wire lengths and sizes (see section 2-6).

Avoid mounting the inverter where it may be exposed to the gases produced by the battery. Prolonged exposure to these corrosive gases will damage the inverter.

2-4 Quick Hook Up and Testing:

- ※ Unpack and inspect the power inverter, verifying that the power switch in the OFF position.
- ※ Connect the cables to the power input terminals on the rear panel of the power inverter.
Red【 + 】is positive; Black【 - 】is negative. Insert the cables into the terminals and tighten the nut to securely clamp the wires.

**WARNING:**

You may observe a spark when you make this connection as current may flow to charge the capacitors in the inverter.

Do not make this connection in the presence of flammable fumes. Explosion or fire may result!

- ※ Before proceeding, confirm that your cable is connected from the negative terminal of inverter to the negative output of your power source.
- ※ Connect the cable from the positive terminal of the inverter to the positive terminal of the power source. Make a secure connection.

**WARNING:**

Reverse polarity connection will blow a fuse in the inverter and may cause damage. Damage caused by reverse polarity connection is not covered by our warranty

**WARNING:**

Make sure that all DC connections are tight (torque to 9-10 foot pounds). Loose connections will overheat and could result in a potential hazard

- ※ Set the power switch to the ON position; you will hear a beeping sound, while the display shows the word “ASIAN” twice. After that, you will hear a continuous tone from the internal alarm. Finally, the AC voltage shows on the display, signaling that the inverter has completed the start up operation.
- ※ Set the power switch to the OFF position; the device will shut down completely.
- ※ Please use a power meter to accurately measure the true output R.M.S. voltage of inverter.

2-5 AC Safety Grounding:

During the AC wiring installation. AC input and output ground wires are connected to the inverter. The AC input ground wire must connect to the incoming ground from your AC utility source. The AC output ground wire should go to the grounding point for your loads (for example, a distribution panel of bus chassis).

2-5-1 Neutral Grounding (GFCI's):

※ 110VAC Series:

The neutral conductor of the AC output circuit of the inverter is automatically connected to the safety ground during inverter operation. This conforms to national electrical code requirements stating that separately derived AC sources (such as inverters and generators) have their neutral conductors tied to ground in the same way that the neutral conductor from the utility is tied to ground at the GFCI breaker panel. For models configured with a transfer relay, while AC utility power is present and the inverter is in bypass mode, this connection (neutral of the inverter's AC output to input safety ground) is not present so that the utility neutral is only connected to ground at your breaker panel, as required.

※ 220VAC Series:

There is no connection made inside the inverter from either the line or neutral conductor to the safety ground.



WARNING:

Do not operate the power inverter without connecting it to ground. Electrical shock hazard may result.

2-6 Making DC Wiring Connections:

Follow this procedure to connect the battery cables to the DC input terminals on the inverter. Your cables should be as short as possible (ideally, less than 10 feet / 3 meters) and large enough to handle the required current in accordance with the electrical codes or regulations applicable to your installation.

Cables that are not an adequate gauge (too narrow) or are too long will cause decreased inverter performance such as poor surge capability and frequent low input voltage warnings and shutdowns.

These low input voltage warnings are due to DC voltage drip across the cables from the inverter to the batteries. The longer and narrower these cables, the greater the voltage drop.



WARNING:

The installation of a fuse must be on positive cable. Failure to place a fuse on “+” cables running between the inverter and battery may cause damage to the inverter and will void warranty.

Increasing your DC cable size will help improve the situation. We recommend the following cables for optimum inverter performance (apply both 110V and 220V series).

Use only high quality copper wiring and keep cable length short (from 3-6 feet).

Model No.	DC Voltage	Wire AWG	Inline Fuse
1KVA	DC 12V	#2	150A
	DC 24V	#4	80A
	DC 48V	#6	40A
2KVA	DC 12V	#2/0	250A
	DC 24V	#1/0	125A
	DC 48V	#2	70A

2-7 Inverter Operation:

To operate the power inverter, turn it on using the ON/OFF switch on the front panel. The power inverter is now ready to deliver AC power to your loads.

If you are operating several loads from the power inverter, turn them on separately after the inverter has been turned on. This will ensure that the power inverter does not have to deliver the starting currents for all the loads at once.

※ Controls and indicators:

The ON/OFF switch turns the control circuit in the power inverter on and off. The inverter operates from an input voltage ranging from:

DC Voltage	DC input voltage range
12V DC	10.5V to 15.0V
24V DC	21.0V to 30.0V
48V DC	42.0V to 60.0V

※ The inverter will indicate high and low DC voltage conditions as follows:

DC Voltage	DC input over voltage		DC input under voltage	
	Shut-down	Alarm	Alarm	Shut-down
12V	16.0V	15.5.0V	10.5V	10.0V
24V	32.0V	31.0V	21.0V	20.0V
48V	62.0V	61.0V	43.0V	42.0V

※ Output Voltage Indicator:

VAC LED illuminated. Display indicates output voltage value.

※ Output Current Indicator:

AMP LED illuminated. Display indicates output current value.

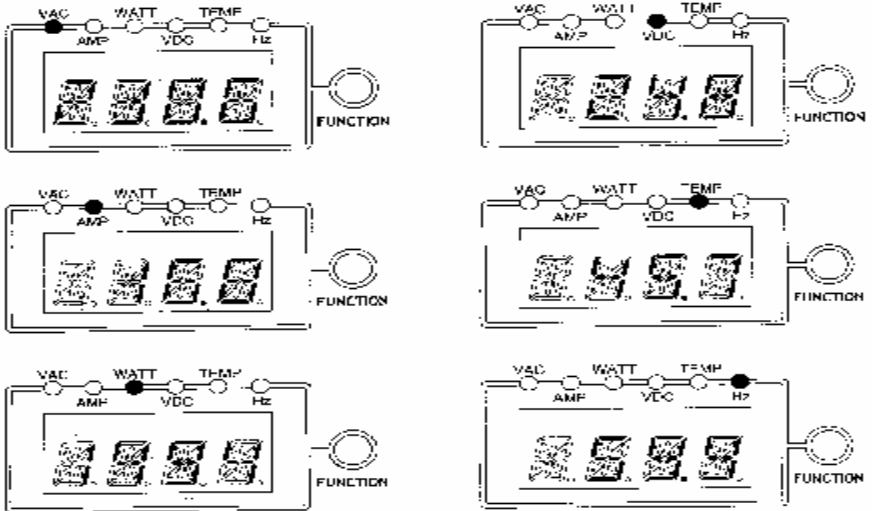
※ Output Watts Indicator:

Watts LED illuminated. Display indicates watts value.

※ Input DC Voltage Indicator:

VDC LED illuminated. Display indicates input DC voltage value.

- ※ Temperature Indicator:
TEMP LED illuminated. Display indicates internal operating temperature value.
- ※ Output Frequency DC Indicator:
Hz LED illuminated. Display indicates output frequency value.



- ※ The accuracy of the six display functions is below:

Function	AC			AMP	WATT	
Range	100-120V	200-240V		0-20A	0-2KW	
Accuracy	± 1%			± 1%	± 3%	
Function	DC			TEMP.	Frequency	
Range	10-16V	20-32V	42-62V	0-120°C	50Hz	60Hz
Accuracy	± 2%	± 2%	± 2%	± 1%	± 0.01	

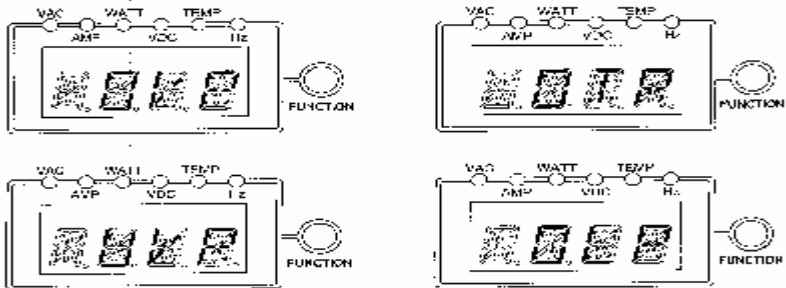
- ※ Over Voltage Protection Indicator: (OVP)
The over voltage indicator indicates that the power inverter has shut itself down because its input voltage exceeded the limits of the inverter (Ref. point 2-7)
- ※ Under Voltage Protection Indicator: (UVP)
The under voltage indicator indicates that the power inverter has shut itself down because its input voltage fell below the limits of the inverter (Ref. point 2-7).

※ Over Temperature Protection Indicator: (OTP)

The over temperature indicator indicates that the power inverter has shut itself down because the inverter has overheated. The power inverter may overheat because it has been operated at power levels above its rating or because it has been installed in a location which does not allow it to dissipate heat properly. The power inverter will automatically restart, once the temperature has decreased.

※ Over Load Protection Indicator: (OLP)

The overload indicator indicates that the power inverter has shut itself down due to the output being overloaded. The inverter must be manually restarted. Turn off the inverter, correct the fault condition, then, turn the inverter back on.



2-8 Output Power:

The inverter will operate most AC powered devices within its power rating:

When deeming whether a microwave oven can be operated by the inverter, remember that the power commonly advertised for microwave ovens is the cooking power, not the power actually consumed by the microwave oven. The microwave oven will consume 40% to 100% more than its advertised cooking power. Check the rating sticker on the back of the oven to determine its actual power requirements. The inverter will operate small microwave oven (0.2 to 0.3 cubic foot capacity) that draws about 900W for 1KVA and 1700W for 2KVA. It will provide 3 minutes of cooking time.

Some induction motors used in refrigerators, freezers, pumps and other motor operated equipment require every high surge currents to start. The inverter may not be able to start some of these motors even through their rated current requirement is within the power inverter. If the motor will not start, observe the battery voltage indicator while trying to start the motor. If the battery voltage indicator drops below 11 volts while inverter is attempting to start the motor, this may be the cause. Ensure that the battery connections are good and the battery is fully charged. If the connections are good and the battery is fully charged, but the voltage still drops below 11 volts, you may need to use a larger battery.

2-9 Cooling Fan Operation:

The inverter cooling fan operates by detecting output power and over temperature conditions of the inverter.

Upon starting the inverter, with the output power is 300W, the cooling fan remains off, complying with energy savings specifications. After the output power exceeds 300W, the cooling fan will turn on to decrease the internal temperature.

If the ventilation opening is obstructed, the inverter will enter over temperature protection mode (OTP). The cooling fan will continue working to drop the inner temperature. When the internal temperature decreases sufficiently, the inverter will turn on automatically.

3. Maintenance:

Very little maintenance is required to keep your inverter operating properly.

You should clean the exterior of the unit periodically with a dry cloth to prevent accumulation of dust and dirt. At the same time, tighten the screws on the DC input terminals.

4. Troubleshooting Guide:

Problem & Symptoms	Possible Cause	Solution
Low output voltage (110V: 95-105VAC 220V: 190-210VAC)	Using average reading voltmeter	Use true RMS reading meter and cable. (Ref. point 2-4)
Load Display OLP flash.	Over load	Reduce load.
No output voltage Fault input voltage.	Low/High input voltage	Recharge battery, check connections and cable. (Ref. point 2-6)
No output voltage Over Temp indicator Load less than 500W	Thermal shut down	Improve ventilation , Make sure ventilation openings in inverter are not obstructed, Reduce ambient temperature.
No output voltage, Over load indicator	Short circuit or wiring error very high power load	Check AC wiring for short circuit or improper polarity (hot and neutral reversed) Remove load.

A common problem with inverter operation is television interference. Operation of the power inverter can interfere with television reception on some channels. In this situation, the following steps may help to alleviate the problem:

- ※ Make sure that the chassis ground lug on the back of the power inverter is solidly connected to the ground system of your vehicle, boat or home.
- ※ Do not operate high power loads with the power inverter while watching television.
- ※ Make sure that the antenna feeding your television provides an adequate (“snow free”) signal and that you are using good quality cable between the antenna and the television.

- ※ Move the television as far away from the power inverter as possible.
- ※ Keep the cables between the battery and the power inverter as short as possible and twist them together about 2 to 3 twists per foot. This minimizes radiated interference from the cables.



WARNING:

Do not open or disassemble the inverter, attempting to service the unit yourself may result in a risk of electrical shock or fire.

5. **Warranty:**

We warranty this product against defects in materials and workmanship for a period of 24 months from the date of purchase and will repair or replace any defective power inverter when directly returned (shipping prepaid) to us.

This warranty will be considered void if the unit has suffered any obvious damage by natural and man-made factors or has been internally or externally altered. The warranty does not cover damage arising from improper use such as plugging the unit into an unsuitable power source, attempts to operate products with excessive power consumption requirements or use in unsuitable environments.

This is the only warranty that the company makes. No other warranties are expressed or implied including warranties of merchantability and fitness for a particular purpose.

Repair or replacement are the sole remedies and the company shall not be liable for damages, whether direct, incidental, special or consequential, caused by negligence or other fault.

6. Important Safety Instructions:



WARNING:

Before installing and using your inverter, be sure to read and save these safety instructions.

6-1 General Safety Precautions:

- ※ Do not expose the inverter to rain, snow, spray, bilge or dust. To reduce risk of hazard, do not cover or obstruct the ventilation opening. Do not install the inverter in a zero-clearance compartment. Overheating may result.
- ※ To avoid the risk of fire and electronic shock, make sure that existing wiring is in good electrical condition and that wire size is not undersized. Do not operate the inverter with damaged or substandard wiring.

6-2 Precautions When Working with Batteries:

- ※ If battery acid contacts skin or clothing, wash immediately with soap and water. If acid enters eye, immediately flush with running cold water for at least 20 minutes and seek medical attention immediately.
- ※ NEVER smoke or allow a spark or flame in the vicinity of battery or engine.
- ※ Do not drop a metal tool on battery. The resulting spark or short-circuit on the battery or other electrical part may cause an explosion.
- ※ Remove personal metal items such as rings, bracelets, necklaces, and watches when working with a lead-acid battery. A lead-acid battery produces short-circuit current high enough to weld a ring other metal to the skin, causing a severe burn.

7. Appendix A

7-1 110VAC DIP Switch Settings (on left side of inverter)

S1	Freq.	S2	S3	Baud Rate	S4	S5	Voltage Output (VAC)
ON	60Hz	OFF	OFF	2400	OFF	OFF	100
OFF	50Hz	OFF	ON	4800	OFF	ON	110
-----	-----	ON	OFF	9600	ON	OFF	115
-----	-----	ON	ON	19200	ON	ON	120

※ S1: Freq (Hz)----50/60Hz

※ S2/S3: Baud Rate----2400/4800/9600/19200

※ S4/S5: Voltage Output – 100/110/115/120 VAC

When you set up S1~S5, please reset the inverter and let update data through CPU.

7-2 220VAC DIP Switch Settings (on left side of inverter)

S1	Freq.	S2	S3	Baud Rate	S4	S5	Voltage Output (VAC)
ON	60Hz	OFF	OFF	2400	OFF	OFF	200
OFF	50Hz	OFF	ON	4800	OFF	ON	220
-----	-----	ON	OFF	9600	ON	OFF	230
-----	-----	ON	ON	19200	ON	ON	240

※ S1: Freq (Hz)----50/60Hz

※ S2/S3: Baud Rate----2400/4800/9600/19200

※ S4/S5: Voltage Output – 200/220/230/240 VAC

When you set up S1~S5, please reset the inverter and let update data through CPU.

7-3 Variable Resistor Adjustment

By turning the variable resistor, the inverter output voltage can be adjusted from 100/110/115/120V AC OR 200/220/230/240V AC, depending upon the model purchased.

A. COMMUNICATION PROTOCOL:

1. Status Inquiry:

Computer: Q1<cr>

INV INV data stream, such as

(MMM.M NNN.N PPP.P QQQ RR.R S.SS TT.T b7b6b5b4b3b2b1b0<cr>

INVERTERdata stream :

There should be a space character between every field is list as followed:

a. Start byte : (

b. I/P voltage : MMM.M------(SPEC)

M is an integer number ranging from 0 to 9.

The unit is Volt.

c. I/P fault voltage : NNN.N------(SPEC)

N is an integer number ranging from 0 to 9.

The unit is Volt.

d. O/P voltage : PPP.P

P is an integer number ranging form 0 to 9.

The unit is Volt.

e. O/P current : QQQ

QQQ is a percent of maximum current, not an absolute value.

f. I/P frequency : RR.R

R is an integer number ranging from 0 to 9.

The unit is HZ.

g. Battery voltage : SS.S or S.SS

S is an integer number ranging from 0 to 9.

For on-line units battery voltage/cell is provided in the form S.SS

For standby units actual battery voltage is provided in the form SS.S

UPS type in UPS status will determine which reading was obtained.

h. Temperature : TT.T

T is an integer number ranging form 0 to 9.
 The unit is degree of centigrade.

- i. INVERTER Status : <U>------(SPEC)
 <U> is one byte of binary information such as <b7b6b5b4b3b2b1b0>.
 Where bn is a ASCII character ‘0’ or ‘1’.

INVERTER status:

Bit	Description
7	1 : Utility Fail (Immediate)
6	1 : Battery Low
5	SPEC
4	SPEC
3	SPEC
2	SPEC
1	SPEC
0	SPEC

- j. Stop Byte : <cr>

Example : Computer : Q1<cr>

INVERTER

(208.4 140.0 208.4 034 59.9 2.05 35.0 00110000<cr>

Means : I/P voltage is 208.4V.------(SPEC)

I/P fault voltage is 140.0V.------(SPEC)

O/P voltage is 208.4V.

O/P current is 34%.

I/P frequency is 59.9 HZ.

Battery voltage is 2.05V.

Temperature is 35.0 degrees of centigrade.