

# UNINTERRUPTIBLE POWER SUPPLY

## GENERAL SPECIFICATION

### *Power RAID 3000*

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***CROSS T***<sub>TECHNOLOGY</sub> ***E***<sub>ENGINEERING</sub> ***C***<sub>CO., LTD.</sub>

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## ***MAIN CHARACTERISTICS***

1. Employed the latest technological semiconductor, IGBT (Insulated Gate Bipolar Transistor) .
2. Scalable & strong RAID Redundancy power protection
3. Flexible range of power capacity
4. Redundancy & scalability of RAID and server clustering and mirroring to increase overall systems availability
5. Reduces the risk of systems downtime. by using an N+1 redundant Power RAID, customers ensure maximum uptime and near continuous systems availability.
6. Scalable runtime allows more extended back-up time through the addition of Battery Modules.
7. Modular and hot-swappable components enable maintenance to be simple.
8. Multiple servers, and reboot individual locked computers up
9. Conditioned sine wave power supply with instantaneously high frequency Controlled Pulse Width Modulation.
10. Eliminating the audible noise (raising the switching frequency Inverter over 20 kHz.
11. Compact & lightweight construction.
12. Eliminating noise and cross current by facilitating the semiconductor component for static bypass transfer switch.
13. Improved power input factor with the switching charger.
14. Best suitable for Banking terminals and Computer systems.
15. Built in EMI filter for power input & output.
16. Obtained the Quality Assurance mark "Q".
17. The Quality Assurance ISO 9001 / KS A 9001 approved.

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### 1. Introduction

This specification sheets apply to design, manufacturing, testing, and delivery of the U.P.S / C.V.C.F system, that continuously supplies the refined conditioned power to the Independent Load from the commercial power condition. Advanced in enterprise computing and storage is the power protection technology. Today's computer rooms have the mission of critical application programs and databases running on Wintel and Unix based machines, web servers, and hundreds of consolidated files and print servers . The reliability and the availability of these computers depends on more advanced UPS technology such as Power RAID Redundancy, server mirroring, server clustering, and fail-over recovery. The UPS utilizes the 'true online' topology with a microprocessor based Pulse Width Modulation (PWM) Inverter. The UPS also provide high quality AC power for stable load of electronic equipment, and offers the following features:

- High power quality (Redundancy): Power RAID technology combines manageability and serviceability. It reduces the risk of system downtime. Using an N+1 redundant (Hot stand by) Power RAID enables customers to maximize uptime and near-continuous system availability.

- Full noise cancellation: Power RAID 3000 unit is designed to eliminate all noises through double-shielded transformers on input/output load lines, and to provide excellent efficiency even at the non-linear load of computers.
- Full compatibility with all types of loads: IGBT shows excellent performance at any type of loads. Also expected are perfect protections as well as economical costs at the non-linear load from On-Line UPS and at the additional expansion.
- Power blackout protection: Your computers and important equipment can be joined into the 365-day 24-hour safe backup line against sudden electric power off. And any type of batteries can be accepted by six-phase control rectifier built-in on the UPS, and longer battery life time is also guaranteed.
- Full battery care: The cyclic or scheduled rectifying function of Equalizing and floating supports you to use batteries longer. And easy replacement of PowerCell XR only is helpful for your easy maintenance.
- SNMP Server protection: Triangle combination of Microprocessor running, MultyView control and Operating System will enable you to manage the perfect control and the scheduling works of your server and computer equipment for SNMP management. They are one hundred percent compatible with any type of Operating Systems throughout the world.

#### 1.1 Model Available

1.2 Power RAID 3000 series; three-phase input/output models as specification in the following table

## 2. APPLICATION STANDARDS

- Korea Industrial Standard ( KS )
- National Electrical Manufacturer's Association ( NEMA )
- American National Standard Institute ( ANSI )
- International Electromechanical Committee ( IEC )
- Manufacturer's standard ( ISO 9001 )

### 3. ENVIRONMENTAL CONDITIONS

The Power RAID meets the specified performance under the following conditions:

- \* Ambient temperature: 12 C to 30 C Recommended operation  
2 C to -40 C Extreme excursion
- \* Relative humidity: 0 to 90% at non-condensing
- \* Altitude: Below 1000m above sea level
- \* Cooling method: Forced air-cooling

### 4. SYSTEM COMPOSITION & DESCRIPTION

#### 4.1 COMPONENTS

The UPS consists of the following major equipment:

- Rectifier
- Charger
- Inverter
- Output Transformer
- Electronic Static Switch and reserve supply
- Power Supply Controller
- Digital Display Panel

#### 4.2 SYSTEM DESCRIPTION

##### 4.2.1. Rectifier

The solid state rectifier is phase-controlled with constant voltage/constant current electronic control circuitry. It is capable of accepting the AC input voltage as specified herein and delivering DC power to the inverter under specified capacity limits.

#### 4.2.2 Charger

This unit is designed to automatically recharge the battery after full discharge. Upon restoration of the commercial AC Power Source, even if the batteries are completely discharged, the rectifier/charger is automatically restarted. 'Walk in' and gradually assume both the inverter and battery recharge loads. As these are made by full automatic function, it will cause no interruption to the critical load.

#### 4.2.3. Inverter

The Inverter consists of IGBT (Insulated Gate Bipolar Transistor) module, heat dissipation board, and other relevant components. The high frequency switching and the sine wave Pulse Width Modulation are available in this unit. The inverter converts the DC power from the rectifier to PWM AC output. And then the AC filter will make it very similar with the balanced sine wave AC power to supply the critical load.

#### 4.2.4. Output transformer

A dry isolated power transformer is used at the output of the inverter for isolation. The dry type isolation transformer comes with class H type insulation and will be located in the equipment to insure that the hottest spot will not exceed the rated insulation temperature and to insure a low center of gravity.

#### 4.2.5. Static Switch

The unit is mounted at both the commercial electric power line and the inverter in order to transfer the power source from the inverter to the commercial power line without any interruption even if the inverter problem or the overload is caused. Also, in order to avoid the cross current arises from the phase difference, it consists of semi-conductor components, Semi-conductor components and the mechanical contractors. The electronic static switch should be naturally committed, fully rated, High Speed, solid-state transfer device and rated for continuous duty operation. Each AC phase of the input is individually fused by fast-acting fuses to prevent cascading failure. The following transfer and retransfer operations are provided

with the electronic static switch: Un-interrupted AC power transformer reserving power is automatically initiated by the followings:

- Output overload
- Dc voltage output of limited
- Inverter failure
- Over temperature

The static switch control transfers the load to reserve in a 16ms Delay time. When the inverter and the reserve sources are not synchronized to avoid damage from the load due to phase reversal. Uninterrupted manual transfer/retransfer to/from reserve supply shall be initiated from the control panel. Uninterrupted automatic retransfer from reserved supply is initiated whenever the inverter is capable of assuming the load, and is inhibited under the following conditions:

- Manual transfer to by pass via the maintenance switch
- Failure of the inverter static switch
- UPS output overload (until overload removed)

All 'no break' transfer and retransfer shall be inhibited by the following Conditions:

- Voltage of inverter or reserve supply out of limits
- Frequency synchronization out of limits

Overload (the electronic static switch is capable of supporting the Following overloads)

- 125% for 10 minutes
- 150% for 1 minute
- 700% for 600 milliseconds
- 1000% for 100 milliseconds

Bypass switching shall allow the critical load to be fed from the reserve supply While providing isolation of the N+1 Power RAID UPS and static switch to ensure operating safety during maintenance. Provisions for testing the UPS operation without affecting or disconnecting the critical load shall be provided.

#### 4.2.6. Power Supply (Control)

The power supply control unit employs DC/DC converter system of high performance switching with the power from the main battery in order to avoid the abnormal operation of the equipment when starting and ending of operation. It shall maintain its optimum operation though the internal voltage transient and power outage.

#### 4.2.7. SingleView(LCD Digital Display)

Showing up to 42 characters by 12 lines, the large screen LCD panel of the remote controller is provided for the operating parameters of the UPS. The LCD pop-up menu is accessed by the push button switches on the control panel. All operating status on UPS are displayed on the LCD of the remote controller panel. This facility permits the system operators to see analysis results in 100milisecond steps for 10 seconds prior to and one second after inverter failure. This features provides all Information features so that user may know the failure cause to be determined.

#### 4.2.8. QuickCROSS (RS232C/485) : REMOTE ALARMS AND CONTROLS Software

This is a UPS remote controlling program. Through QuickCROSS, user can easily monitor and control all equipment status and information on both Windows 95 and SingleView. The QuickCROSS provides user with convenient and clarity control of all UPS devices any time in advance or after matters particularly when managing to simultaneously operate many UPS devices.

Therefore, user can directly check and remotely control the UPS devices even at far distance through dial-up modem, thanks to QuickCROSS program.

#### 4.2.9. MultiView (Wireless Remote LCD Digital Display)

This unit is placed at the upper side of the front panel, and the LCD type wireless remote controller is used for the UPS control and reading operating status. The MultiView of remote controller shows all power and UPS information, and is controlled by system administrator's finger in a menu-based format. The wireless monitoring and control parameters include input voltage, level of Redundancy, Rectifier Status, Inverter Status, By-pass Status, System Status and digital output Status. Through the MultiView program, user can make the best of Power RAID Redundancy. And monitoring station up to 45 feet away is available. Thanks to the remote controller, user came to control full operation of the UPS at anywhere user has a desk or want to place.

- The measurement of AC input voltage
- The measurement of AC output voltage, current, and frequency
- Battery voltage
- Input power condition
- Bypass operating condition
- Inverter operating condition
- Fault: internal failure
- Alarm
- Power history
- Event history
- Block diagram of By-pass or normal battery status
- System ON/OFF
  - Win NT & Others O/S SNMP Management
  - 10 BASE-T Network interface

SNMP Protocol interfaces  
QuickCROSS (RS232C/485)

#### **4.3 DNM (Digital Net-work Management) SNMP**

**Windows NT (Digital Net-work Management) & other O/S SNMP Management**

**Cross UPS provides you with enterprise power management, automatic power failure notification, UPS testing and Status, and the power alarms (traps) sent to your network management Console. SmartMon is advanced user-customizable power monitoring, power management and shutdown program, and designed to display the information of the power conditions of a UPS.**

#### **4.4 Computer Relay Interface (SmartMon FEATURES & BENEFITS)**

- *On screen power history graph showing the number of AC power outages, the longest and the shortest outages, average length of the outages and number of shutdowns caused by timer expiration or manual shutdown. The graph displays power conditions for over 31-day, 24-hour.*
- *Automatic unattended shutdown of server*
- *Network broadcast messages inform logged in users that power has failed*
- *Shutdown workstations across the network from a server using Soft MultiMon Software technology*
- *User-defined actions for the specified list of power events*
- *Smart messages can be user-defined to include specific information such as server name, the type of event, the time it occurred and load ratio.*
- *Color-coded data logging allows each power event to be uniquely filtered*
- *User-customizable scheduling of regular system shutdowns, restarts and self-tests on a daily, weekly or monthly basis*
- *Complies with UPS standard protocol*
- *Built-in graphing routines allow customized graphs to be created on-line*
- *Ability to translate screens into a variety of languages including French, English, Spanish, and German*
- *Battery conservation mode*
- *User-customizable*
- *User-customizable power thresholds*
- *Automatic reboot*
- *Scheduling of UPS diagnostic testing*
- *Built-in on-line help*

## 5. OPERATION MODE

### 5.1. NORMAL

The rectifier and the charger will get the AC commercial power and convert it to DC, and then, send it to inverter for the reverse to AC and to battery for recharging. The filtered AC power from inverter will be supplied to the load without interruption.

### 5.2. POWER FAILURE

When commercial power fails, the battery begins to let out the reserved DC power to inverter, and it continues to feed the load during the power outage for the defined time.

### 5.3 POWER RECOVERY

When the commercial power is recovered, the battery stops to feed and starts to recharge. At the same time, the commercial power passes through the normal outline.

### 5.4. INTERNAL FAILURE & OVER-LOAD

The output voltage and the frequency of inverter are synchronized with the commercial power supply at all times. Thus, in case of internal power failure or over-load, the static switch transfers power to bypass feed and the synchronized power is constantly fed to the load.

## 6. BATTERY MODULE

Choose additional Battery modules and Extended Run Battery Frames for longer backup times if needed. Use the Runtime chart for your order.

- Low cost shipping and installation
- Isolated Battery Module

By physically isolating the Battery Modules from the heat-producing Power Modules, the Battery is maximized in both battery runtime and life

- Parallel Battery Modules
- Provide the runtime you need.
- Power modules and Battery modules are hot-swappable and user Replaceable
- Long battery life.

By keeping the batteries separate from the UPS, and enhanced through PowerCell XR intelligent battery management with high precision Float & equalizing charging and automatic true load battery tests.

- Simple maintenance.

The modular Power-Cell XR lets the user easily replace batteries even when the protected equipment remains up and running

. Power RAID 3000 ELECTRICAL CHARACTERISTICS

CATEGORY	Power RAID 3000		
CAPACITY	KVA		
GENERAL	COOLING METHOD		FORCED AIR COOLING
	OPERATION MOTH		100% CONTINUOUS
	RECTIFIER & CHARGER	CONTROL	3PHASE CONTROLLING
		SEMI- CONDUCTOR	SCR-SCR MODUCLE
	INVERTER CONTROL		INSTANTANOUS WAVE FORM SINE WAVE PWM WITH 20 kHz
	ST/SW TRANSFER		SYNCHRONIZED POWER TRANFER BY SEMI-CONDUCTOR
	TRANSFORMER		HIGH EFFICIENCY H CLASS
INPUT	NO. OF PHASE		3 PH 4W
	RATED VOLTAGE		380 Vac
	VOLTAGE VARIATION		WITCHIN -20% +10%
	RATED FREQUENCY		50Hz 6%
	POWER FACTOR		OVER 0.85 LAG
OUTPUT	NO, OF PHASE		3 PH 4W
	RATED VOLTAGE		380/220 Vac
	VOLTAGE STABILITY		1 %
	RATED FREQUENCY		50 Hz 0.5Hz
	VOLTAGE REGULATION		5%
	RESPONSE TIME		LESS THAN 16mS
	VOLTAGE ADJUSTMENT		5%
	WAVEFORM DISTORTION		LESS THAN THD 3% (100% LINER LOAD)
	OVER-LOAD CAPACITY		120%, 10 MINUTES
	POWER FACTOR		0.85 LAG

## Specification

Option	Power RAID 3000
Power Capacity(KVA)	15 KVA
Battery type	Lead-acid maintenance free & user's optional
Recharge time (normal)	4 hours
Extended Battery Option	yes
Topology	Full True on-line C.V.C.F ( IGBT )
<b>Input Specification</b>	
Nominal input voltage	3 phase 380V
Nominal input frequency	50Hz
Input voltage range	15%
Input frequency range	
<b>Output Specification</b>	
Nominal output volatge	3 phase 380V
Output voltage regulation	1 % 이내
Total voltage harmonic distortion	< 3% at full load
Load crest factor supported	up to 3 : 1
Power factor tolerance	loads with 0.5 to 1.0 power factor
Efficiency inverter at full load	> 93 %
Overload capacity	150 % for 10 seconds,120 % 10 minutes
<b>Feature</b>	
N+1 Redundancy	yes
Power(KVA) Expandability	N+1
Runtime(battery) Expandability	yes
Self Diagnostics	yes
User serviceable	yes
Automatic bypass	Solid state
Manual bypass	yes
<b>Indicators, Interface &amp; control</b>	
LCD Display ( <b>SingleView</b> )	Programmable 42*12 character Bakelite LCD
Wireless remote control( <b>MultiView</b> )	Programmable 42*12 character Bakelite LCD
Intelligent serial interface	yes
SNMP Capability	yes
Multiple server/OS Shutdown	via <b>MultiLink</b>
Modem(out of band) control	<b>QuickCROSS</b> (RS232C/485 via WIN95')
Emergency power off capability	Auto static switch
<b>Others</b>	
DC Characteristics	210-270 v
Bypass isolation transformer	Provides a galvanic isolation while operating on the emergency bypass line
Warrant( <b>PowerPlan</b> )	2 years
On site service	Optional
Cross T.E.C's quality system is certified by ISO 9001 standards	
SingleView, MultiView, QuickCROSS are CROSS T.E.C owners trademarks	

## 7. MATERIAL AND CONSTRUCTION

7.1. The UPS unit is designed for indoor use, and conveniently accessed for service and maintenance. Also, the excellent ventilation is provided.

7.2. All electrical components in the unit have acceptable electrical insulation characteristics.

7.3. The front display panel including the control switches is made as a single unit in accordance with the additional drawing and fixed to the front upper corner of the UPS equipment for easy control and reading.

7.4. The major power circuitry is basically equipped with the protection devices such as circuit breakers, protective fuses, and auto-recharging current regulation circuitry.

7.5. The terminals for input, output and battery lines have enough capacity to accommodate powerful electrical process, and is firmly mounted to the lower side of the equipment for perfect shield and the risk reduction.

7.6. Every cable harnesses, wires used in the main circuitry and control circuitry has sufficient insulation capacity. The pressed lug is also used for the terminal connection.

7.7. The thickness of the cubicle base frame is 2.3mm minimum, and that of the front and the rear doors 1.2mm of the cold rolled sheet metal. The spray enamel coating as well as the oxidation-free base coating is required.

## 8. TESTS

- 8.1. Power Supply Variation Test
- 8.2. Output Voltage Stability Test
- 8.3. Output Voltage Distortion Test
- 8.4. Display and Alarm Operation Inspection
- 8.5. Output Frequency Stability Test
- 8.6. Load Test & Total Efficiency Measurement
- 8.7. Measurement Accuracy Test
- 8.8. Insulation Test
- 8.9. Audible Noise Test
- 8.10 SNMP Test

## 9. ADDITIONAL

9.1. The UPS is warranted against all defects in workmanship and materials under normal use for a period of 2 year from the date of initial operation of our serviceman to the original user. The warranty could not be applied if the product has been subject to physical abuse, improper installation, unauthorized service, or modification. CROSS TECNIACL ENG., Company does not take responsibility of any damage caused by the use or misuse of the product.

9.2 Power RAID Redundancy protects your hardware and extends system life through superior full-time multistage surge suppression and noise filtering. Meeting for network protection without the need for additional external conditioners.

9.3 Power RAID Redundancy will raise your productivity.

Power RAID Redundancy is entirely C.V.C.F True on line

9.4 The nameplate stating the name of manufacturer, production date, serial number, and the power rating, is affixed to the equipment.