NH Plus UPS

Online Three Phase UPS

(20-480kVA)

Green Building, Tainan Plant, Taiwan

"Environmental protection and energy conservation has been a long-standing mission at Delta. As a responsible corporate citizen, Delta must do our part to slow global warming. We have dedicated ourselves to improving the efficiency of our products, to developing alternative energy sources, and to educating our employees on putting the principles of green design into practice" said **Bruce C. H. Cheng,** Chairman of Delta Electronics & Chief Environmental Officer.

Our Mission

To provide innovative, clean and efficient energy solution for a better tomorrow

- Delta is a global leader in range of products and has received Forbes Asia "Fabulous 50" Award for several consecutive years
- CNBC European Business magazine recently listed Delta Electronics as a "Global Top 100 Low-Carbon Pioneer"
- Delta Electronics received the first Asia Pacific 2009 Frost and Sullivan Green Excellence Award for Corporate Leadership
- Received the CSR award from Global Views magazine for the 2nd successive year and were named by Commonwealth Magazine as one of the best corporate citizens
- Delta Electronics continues to be world's number one in power supply sales since 2002.

Delta Electronics (India)

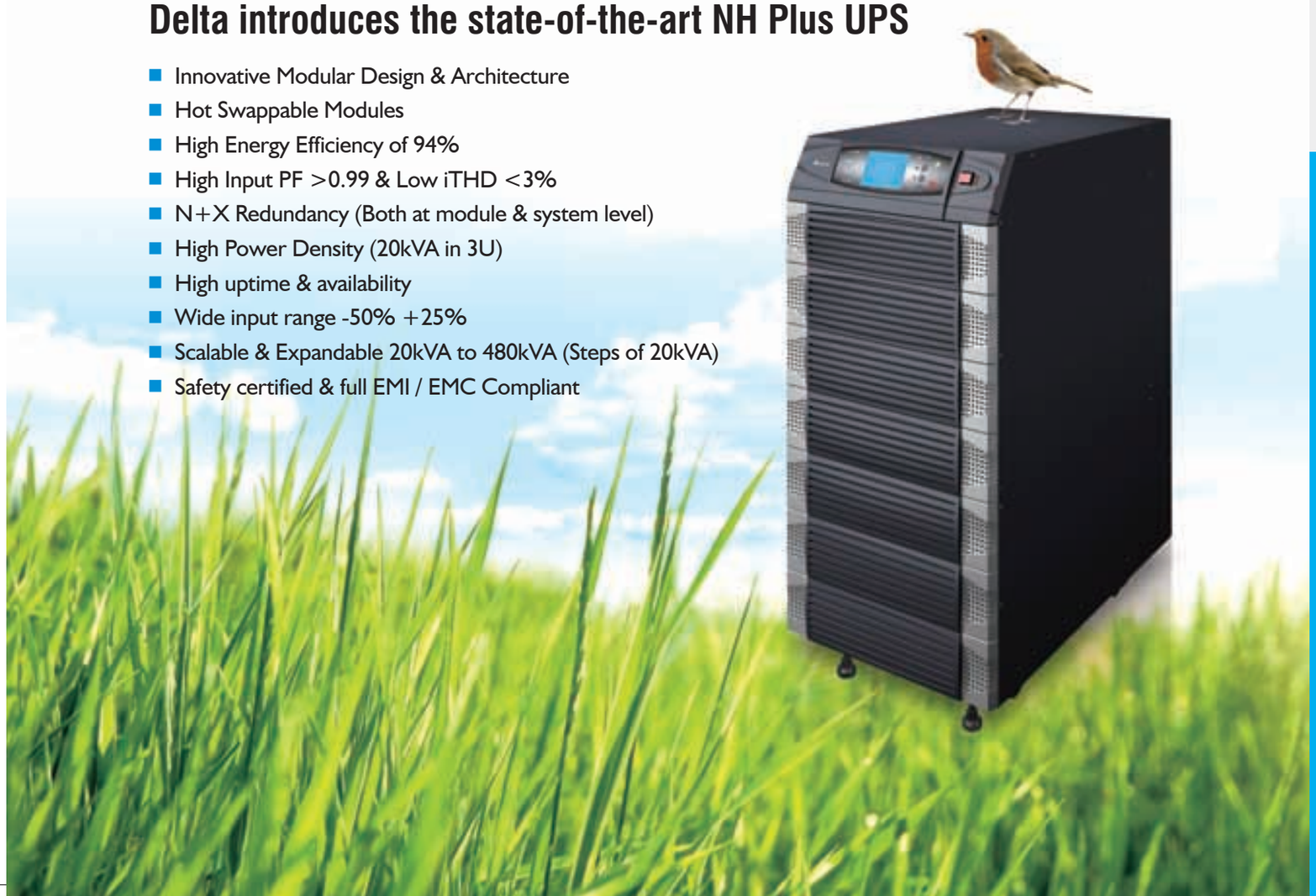
Delta Electronics (India), is part of the Delta Group, a leading multinational with headquarters in Taiwan with 5.34 billion USD revenue for 2008. Delta Electronics (India) is a world-class provider of ***power management solutions in the areas of telecom power supplies, uninterrupted power supply, industrial automation, components, Renewable Energy, consumer lifestyle power and visual displays.***

The group has operated in India since 1992. Delta Electronics (India) is responsible for developing business in the SAARC region and is also recognized as the "Centre for Technical Excellence" for South Asia. Delta Electronics (India) has an impressive installation base with regional support centers all over India and the SAARC region. Delta Electronics (India) has been awarded ISO 9001:2000 and ISO 14001:2004 certifications by Underwriters' Laboratories, USA, for Quality, Procedures, Environment management and OHSAS 18001:1999.

Business Critical Power (Delta UPS) is trusted for powering critical equipment, machines, processes and ensures clean & continuous power for mission critical vital operations, enabling businesses to perform with certainty. Delta UPS offers end-to-end solutions for Unitary Use, SOHO / SME Segment, Mid-size to Large IT and Data Centers, Industrial & Outdoor applications. Delta UPS system offer - Innovative technology, High energy efficiency, High power density, High uptime and availability and Easy capacity enhancement capability.

Delta introduces the state-of-the-art NH Plus UPS

- Innovative Modular Design & Architecture
- Hot Swappable Modules
- High Energy Efficiency of 94%
- High Input PF >0.99 & Low iTHD <3%
- N+X Redundancy (Both at module & system level)
- High Power Density (20kVA in 3U)
- High uptime & availability
- Wide input range -50% +25%
- Scalable & Expandable 20kVA to 480kVA (Steps of 20kVA)
- Safety certified & full EMI / EMC Compliant



Design Concept for NH Plus UPS

Present day mission critical applications and demanding business processes not only need the UPS for clean and continuous power but also should offer low TCO (Total Cost of Ownership),High system availability in terms of process uptime, extreme flexibility in terms of growth and local / remote manageability.

Feature in NH Plus UPS	Advantage	Benefit to Customer
Modular Design & Construction	Low TCO (Total Cost of Ownership)	Reduced CAPEX Grow as business grows
High Efficiency of 94% even at 25% load		Reduced OPEX & savings in Electricity bills
High Input PF>0.99 & Low Harmonics iTHD <3%		Savings in installation cost – Genset Size
Wide input voltage range -50% +25%		Extended battery life & reduced OPEX
Hot swappable modules	High Availability & Uptime	Minimized MTTR (Mean Time to Repair)
N+X Redundant Configuration		Availability can be pushed to 0.9999997
Inbuilt Static & Maintenance Bypass		Maintenance without downtime of equipment
Paralleling up to 4 cabinets (4x120kVA=480kVA)	Expandability	Accommodate future growth
Multi Language LCD Display	Flexibility & Manageability	User friendly, Ease of use, Customization
2 x Smart Slot & Programmable Input / Outputs		Easy interfacing with any NMS / BMS / DCS

Availability

Most mission critical and vital operations today are pushing the uptime and availability of any power management systems as it forms the weak link between the power sources and loads. Data centers particularly need to achieve unprecedented levels of uptime to keep pace with modern business demands. To achieve these uptime goals, data center managers are paying increased attention to facility infrastructure issues, including UPS & power management solutions deployed. Tier IV data centers used within financial institutions, web hosting organizations, healthcare and others with the greatest need for critical uptime, have availability rates of 99.995%.

This requires the data center be designed to experience only 0.4 hours of downtime annually. Availability is dependent upon MTBF (Mean Time Between Failures) & MTTR (Mean Time To Repair). The focus today has shifted from enhancing MTBF because the reliability of designs have been pushed to the limit and today are constrained by technology, quality of components & manufacturing processes. So to further improve availability, efforts are on to reduce the MTTR. It is with this key design concept NH Plus UPS has been designed to be modular in construction & allowing Hot Swappability of the modules – primarily to minimize the MTTR to near zero.

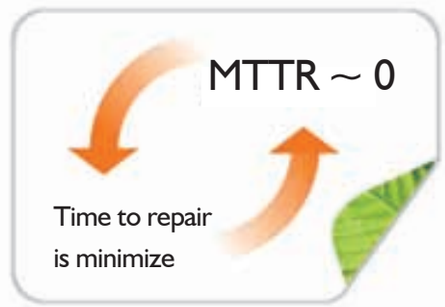
1. MTTR minimized to near zero

However high is the reliability of a UPS system, in the field the UPS solution engaged for the Data Center continues to be the weak link between the multiple sources of supply (utility supply through multiple feeders, Diesel generator set supply) and distribution of power to multiple loads – server racks, networking racks, workstations, storage equipments, etc. The mortality rate of UPS can never be reduced to zero because the very function of UPS is to absorb all the wide anomalies in the power source while continuing to feed clean power to the loads in terms of voltage, frequency and wave form, kept in close tolerances. In traditional UPS without redundancy, failure of even the smallest component connects the load to the raw power through the static by pass to maintain the continuity of power – thereby making the IT equipments vulnerable to power problems.

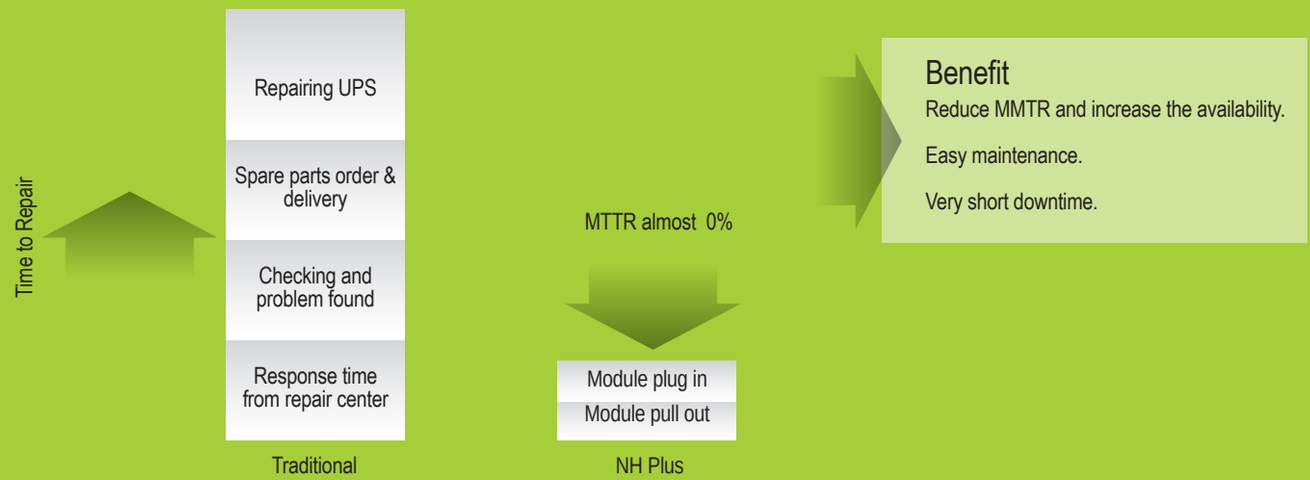
Another challenge emanates from the fact that once UPS goes faulty, there will always be some decent time elapsed before the UPS can be repaired. First of all UPS failure needs to be reported to the vendor, vendor tries to support on telephone, if unable to repair deputes a service engineer with spares, engineers travel time to site. There is uncertainty and delay at each step – it could be a holiday or the failure takes place at night beyond normal working hours, the vendor helpline is down, spares may need time to be arranged, worst the service engineer needs to travel through heavy traffic on the roads and lastly the problem may be beyond the skill & competence of the service engineer!!!

With NH Plus UPS, all of the above problems are put to rest. Modular & Hot Swappability allows the faulty module to be removed without disrupting or disconnecting the critical loads and replaced with a healthy module available as spare. Besides on site repair may repeat the problem because site conditions are rarely conducive for board level repairs. Whereas with NH Plus UPS, modules can be taken back to repair center where repairs can be undertaken in a controlled environment with requisite test and repair tools. The modules then can be subjected to full quality test as undertaken during manufacturing of new UPS.

NH Plus UPS allows reducing MTTR to zero practically and thereby giving the highest uptime and availability to the business process.



NH Plus UPS Repair Time



(Wujiang Plant China)

2. Scalability & Expandability

Because of growing business needs, UPS systems deployed today need to adapt to the growth. UPS should be scalable & expandable to keep the initial investment low. Traditional UPS were sized based on forecasts made (which on a mid to long term basis can go horribly wrong!) and had to be procured for the highest power requirement foreseen may years hence. E.g. the current need of any business could be only 20kVA but the capacity of 60kVA is expected few years down the line. IT managers to play it safe would consider procuring an 80kVA or even100kVA.

Other challenge could be the need for a quick and fast deployment as some times business opportunities come up unannounced or it could be a step by step growth over a period of time. IT managers cannot plan for the opportunity but with NH Plus UPS they can certainly plan for the expansion of UPS requirement. NH Plus allows UPS to grow from 20kVA to 480kVA in steps of 20kVA. Even the layout space can be conserved as 40kVA, 80kVA & 120kVA cabinet share the same footprint. Business managers can keep not only their initial investments for UPS low but also save on the cost of rentals, facility requirements for air-conditioning, batteries under control

3. N+X Redundancy

Level of redundancy in a system defines the fault tolerance of a system. In a system engaging N+X modules, all modules run in paralleling sharing and powering the IT equipment as loads. In such a scenario, failure of up to X modules is tolerated by the system without disrupting or discontinuity of power to the loads. System develops an extremely high "immunity to faults" caused either due to internal or external conditions.

For improving reliability of the power solution, traditional UPS use a 1+1 parallel configuration of UPS in master-slave architecture. Under normal condition each UPS will be loaded to maximum **50% capacity.** Where as in N+1 redundancy the loading on each module can be improved. E.g. in case the load is 100kVA, a traditional system will deploy **1+1** configuration with load shared by **2 UPS of 100kVA** with 50kVA on each UPS, under normal condition. Whereas in NH Plus we can engage **5+1** configuration where the 100kVA load will be shared by **6 modules of 20kVA** with 16.6kVA load on each module thereby utilizing **83.3% capacity** of each module. Systems have higher efficiency at higher part load. Besides traditional UPS will call for *"offline maintenance"* whereas with NH Plus UPS hot swappable modules, we can undertake *"online maintenance"*.

With NH Plus UPS, we can extend the fault tolerability of the system with N+1, N+2…..up to N+X redundancy. For the same power requirement NH Plus UPS can offer more redundancy & the same level of redundancy NH Plus UPS can offer more cost-effectiveness.

UPS Configuration	Reliability	
	75% Load	50% Load
Standalone UPS	0.99	0.99
1+1 Configuration	0.9999	0.9999
4+1 Configuration	0.999995	0.99999997

UPS are typically loaded to 70% load & hence N+X redundancy can offer higher reliability

UPS Configuration	Reliability	Availability
4+1 Configuration	0.999	0.999999992
3+2 Configuration	0.999995	1.0
2+3 configuration	0.99999997	1.0

Higher level of redundancy leads to higher availability

4. UPS Manageability

With in-built 2 smart slots and 6 programmable Input / Output, NH Plus UPS can be easily interfaced with industry standard NMS (Network Management Software), BMS (Building management Software) or DCS (Distributed control system) for remote monitoring & control. Complete software suites available for different OS and networking protocols.

NH Plus UPS

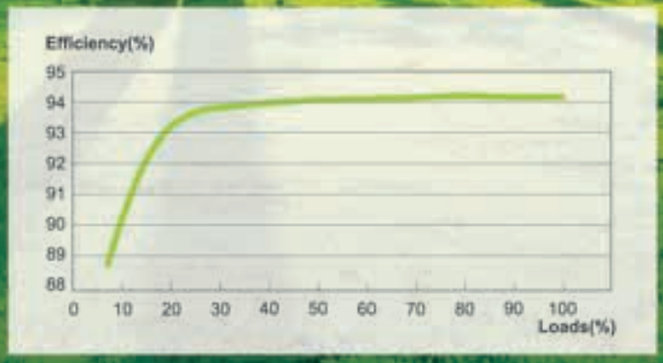
SNMP Connectivity + Software

Monitoring the Data Center

- Temperature
- Humidity
- Failure Alarm
- Smoke Detection
- Water Leakage
- Security Breach

5. High Efficiency

Going 'Green' is not only a social responsibility but it should also mean some tangible benefits to business and IT managers. NH Plus UPS has been designed with overall efficiency of 94% which means lower power losses and savings in electricity bills. More importantly, NH plus UPS achieves a very flat efficiency curve offering high efficiencies even at part loads – NH Plus UPS achieves 90% efficiency at 15% loads which further improves to more than 94% at 27% load. Even small improvement in efficiency can lead to big savings in electricity bills as UPS are used 365 x 24 x 7.



Features of NH Plus UPS

- Available in rating from 20kVA – 480kVA in steps of 20kVA
- Modular & Hot Swappable architecture
- IGBT rectifier (Delta patented PFC technology with IPF > 0.99 and iTHD < 3%)
- Remote monitoring and control (2 smart slots and 6 programmable I/O)
- Paralleling of 4 cabinets (4 x 120kVA = 480kVA)
- Build in bus synchronization for eliminating singal point of failure
- Wide input voltage range from 208 ~ 477V AC
- Full DSP based control using high frequency PWM Technology
- User friendly LC display and LED indicators
- Fan speed control (Fan failure warning)
- High Power Density (20kVA in 3U height)
- Inbuilt manual and static bypass
- High over load withstand capability (125% for 10 minutes)
- Advance Battery Management with scheduled battery test
- Built in SRAM to record 500 real time event logs
- Inbuilt local and Remote Emergency Power Off (REPO)
- Battery charger current control
- Dual feed input for configuring UPS in Hot-Standby
- Automatic self test and diagnostics
- Cold start feature
- Battery disconnector and battery cabinet temperature monitoring

NH Plus UPS: Physical Specification

Part No.	Rating	Dimenson (WxDxH)	Wieght
GES203NHP	20KVA	520x910x1695mm	170kg
GES403NHP	40KVA	520x910x1695mm	200kg
GES603NHP	60KVA	520x910x1695mm	230kg
GES803NHP	80KVA	520x910x1695mm	260kg
GES104NHP	100KVA	520x975x1695mm	320kg
GES124NHP	120KVA	520x975x1695mm	350kg
GES144NHP	140KVA	1040x975x1695mm	550kg
GES164NHP	160KVA	1040x975x1695mm	580kg
GES184NHP	180KVA	1040x975x1695mm	610kg
GES204NHP	200KVA	1040x975x1695mm	640kg
GES224NHP	220KVA	1040x975x1695mm	670kg
GES244NHP	240KVA	1040x975x1695mm	700kg
GES264NHP	260KVA	1560x975x1695mm	900kg
GES284NHP	280KVA	1560x975x1695mm	930kg
GES304NHP	300KVA	1560x975x1695mm	960kg
GES324NHP	320KVA	1560x975x1695mm	990kg
GES344NHP	340KVA	1560x975x1695mm	1020kg
GES364NHP	360KVA	1560x975x1695mm	1050kg
GES384NHP	380KVA	2080x975x1695mm	1250kg
GES404NHP	400KVA	2080x975x1695mm	1280kg
GES424NHP	420KVA	2080x975x1695mm	1310kg
GES444NHP	440KVA	2080x975x1695mm	1340kg
GES464NHP	460KVA	2080x975x1695mm	1370kg
GES484NHP	480KVA	2080x975x1695mm	1400kg

NH Plus UPS: Technical Specification

Model			NHP20	NHP40	NHP60	NHP80	NHP100	NHP120***
Power Rating – kVA			20	40	60	80	100	120
Power Rating - kW			16	32	48	64	80	96
Input	Rating Voltage	V	380/220 , 400/230 , 415/240 (3 phase, 4-wire plus ground)					
	Voltage Range	V	208~477(line-line) / 120~276 (line-neutral) *					
	Input Current Harmonic	%	< 3 (full load)					
	Power Factor		> 0.99					
	Frequency	Hz	50 or 60 ± 5					
Output	Voltage	V	380/220 , 400/230 , 415/240 (3 phase, 4 wire plus ground)					
	Voltage Harmonic	%	< 3 (linear load)					
	Voltage Regulation	%	± 1 (static)					
	Frequency	Hz	50 or 60					
	Frequency Regulation	Hz	± 0.05 (interior oscillator) ± 5 (synchronized, adjustable in steps of 0.1Hz)					
	Overload		≤125% : 10minutes ; ≤150% : 1minute					
Display	LED		UPS status : Normal, Bypass, Backup, Fault					
	LCD		Input/Output, Bypass, Inverter, Frequency, Loading and battery voltage, Current, UPS abnormal message and intelligent self diagnosis					
Interface	Standard		RS232 x 1, Smart Slot x 2, Dry contact output x 6, Contact input x 2, Parallel port x 1, Battery cabinet temperature x 4					
	Optional Accessories		SNMP card, Modbus card, Relay I/O control card, EnviroProbe, SNMP+ 5 ports hub, Battery cabinet temperature sensor, Battery cabinet temperature kit (For Delta battery cabinet), Battery cabinet status cable					
Confor-mance	Safety & EMC		CE, EN62040-1-1, EN62040-2(Class A)					
Others	Parallel Redundancy And Expansion		Module and system redundancy; Maximum 4 cabinets in parallel up to 480kVA					
	Emergency Power Off		Local and remote					
	SRAM Event Log		500 Records					
	Battery-Start & AC-start		Yes					
Overall	Efficiency Normal	%	94					
	Efficiency ECO	%	97					
	Temperature	℃	0 ~ 40					
	Relative Humidity	%	90 (non-condensing)					
	Noise (at one meter)	dBA	65	68	70	70	72	73

* Lower range 208~300 / 120~173Vac is acceptable under 70~100% loading conditions.
** EBC: External battery cabinet.
*** Higher Rating available by parelleaing
All specifications are subject to change without prior notice.

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