

# Cutting-edge Performance and Reliability



Highest Power Density



Most Power in 3U Space



Leading Energy Efficiency



Battery Health Prediction

The power behind competitiveness

## Delta UPS - Modulon Family DPH Series, 50-300/500/600kVA

The highest power density with uncompromised power performance and reliability

# About Delta Group

## Leading expert in power management and thermal management solutions

Delta Group is the world's leading provider of power management and thermal management solutions, as well as a major source for components, visual displays, industrial automation, networking products, and renewable energy solutions. Delta Group is focused on three main businesses: power electronics, energy management, and smart green life. Delta Group has sales offices worldwide and manufacturing plants in Taiwan, China, Thailand, Japan, Mexico, India, Brazil and Europe.

As a global leader in power electronics, Delta's mission is, "To provide innovative, clean and energy-efficient solutions for a better tomorrow." Delta is committed to environmental protection and has implemented green, lead-free production and recycling and waste management programs for many years.

**World no. 1** in Switching Power Supplies, DC Brushless Fans and Telecom Power Systems

**153** sales offices and **39** manufacturing facilities worldwide

**5-6%** of annual sales revenues invested in R&D with over **7,000** engineers

in **64** R&D centers worldwide

Awarded **7,100+** patents and received **47** internationally recognized design awards including iF, Reddot, and the Taiwan Excellence awards.

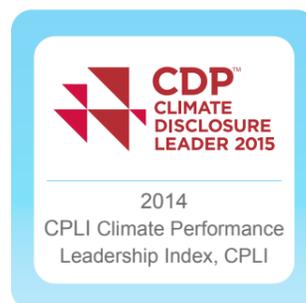
## Worldwide No. 1 supplier of merchant power supplies

According to the IHS report, Delta Electronics remained the largest supplier of merchant power supplies with an estimated market share of 15.5% in 2016 of a global market value that was estimated to be \$21,869 million.

### The Total Merchant Power Supply Market 2016 \$M Revenue

| Ranking | Company Name       | Market Share |
|---------|--------------------|--------------|
| 1       | Delta Electronics  | 15.5%        |
| 2       | Artesyn            | 7.5%         |
| 3       | Lite-on Technology | 4.5%         |

Source: AC-DC & DC-DC Merchant Power Supplies, IHS, 2017



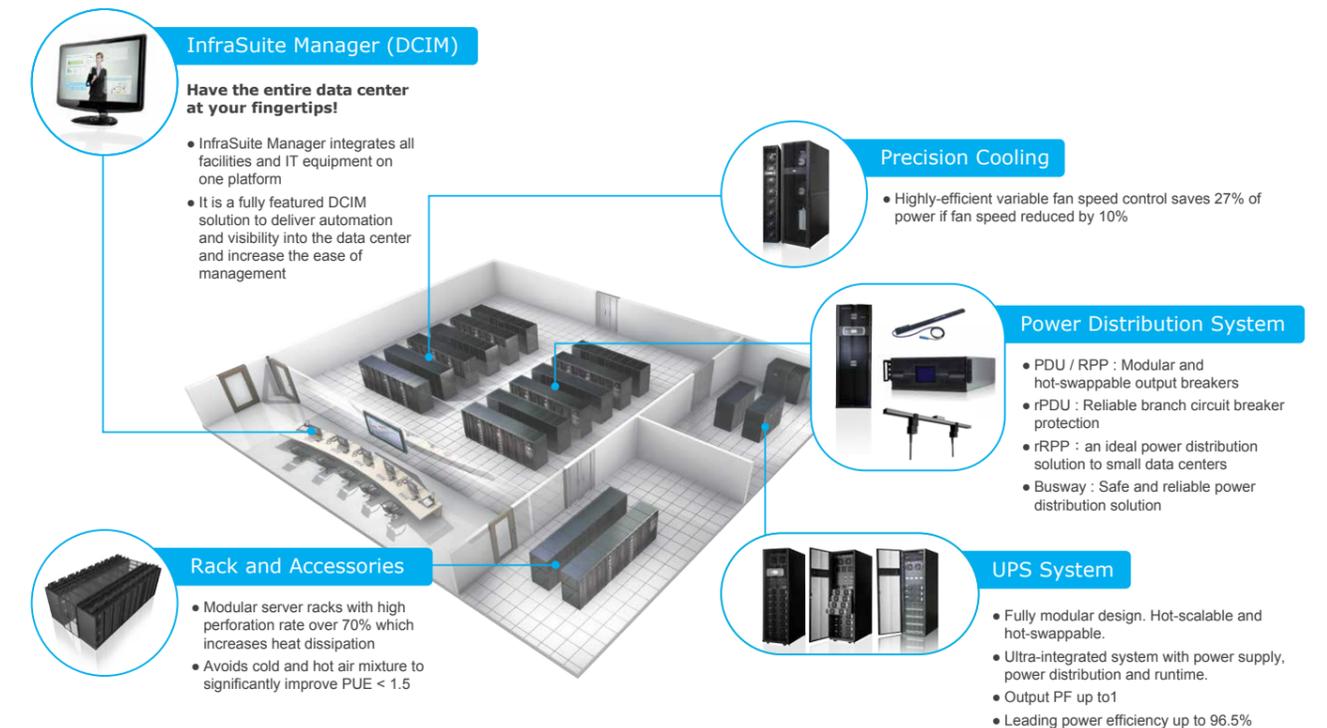
More information about Delta Group can be found at <http://www.deltaww.com/>

# Delta InfraSuite Data Center Infrastructure Solutions

Enterprise growth and IT equipment have become so closely linked that planning and building a high performance data room is one of the critical issues for IT managers today.

With 45 years of leadership in the core technologies of power electronics, the expert teams at Delta Electronics have developed a new generation of data center infrastructure solutions: InfraSuite.

Delta InfraSuite includes power system, rack and accessories, precision cooling, and environment management system.



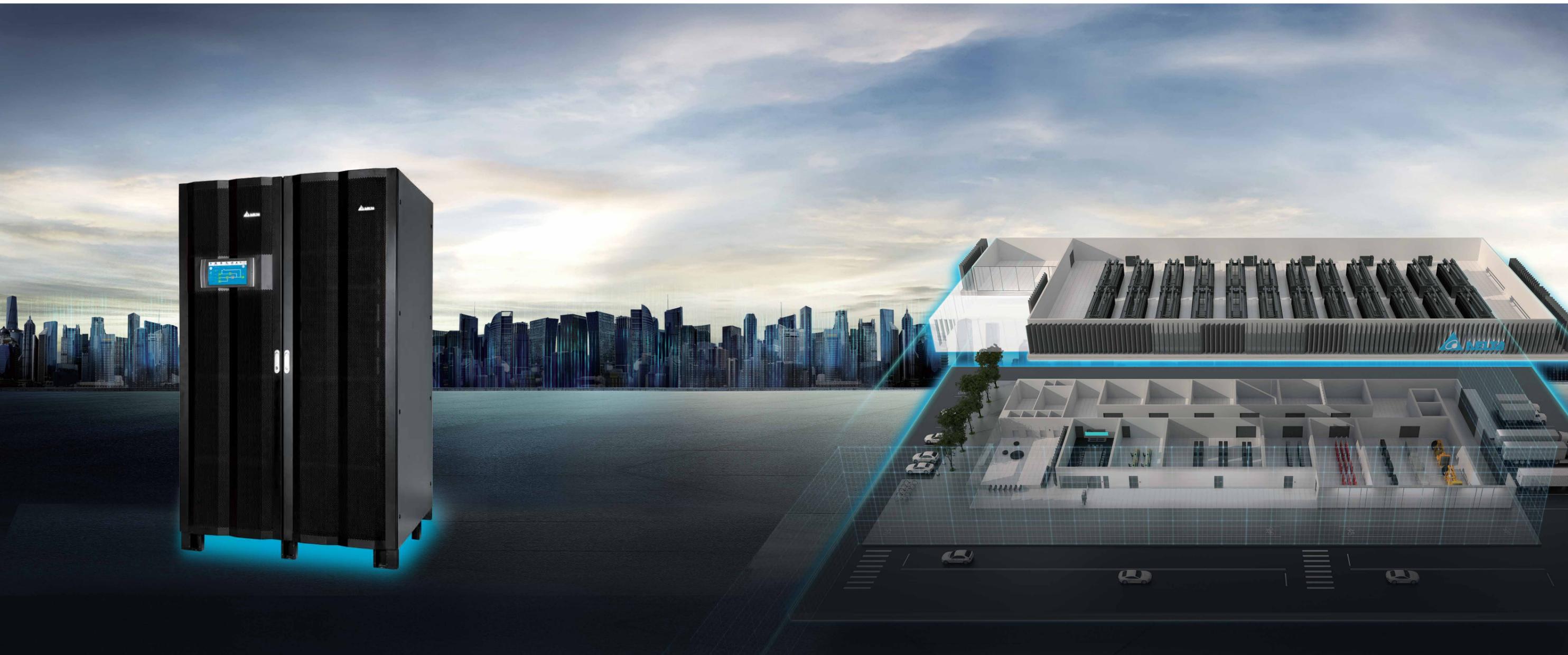
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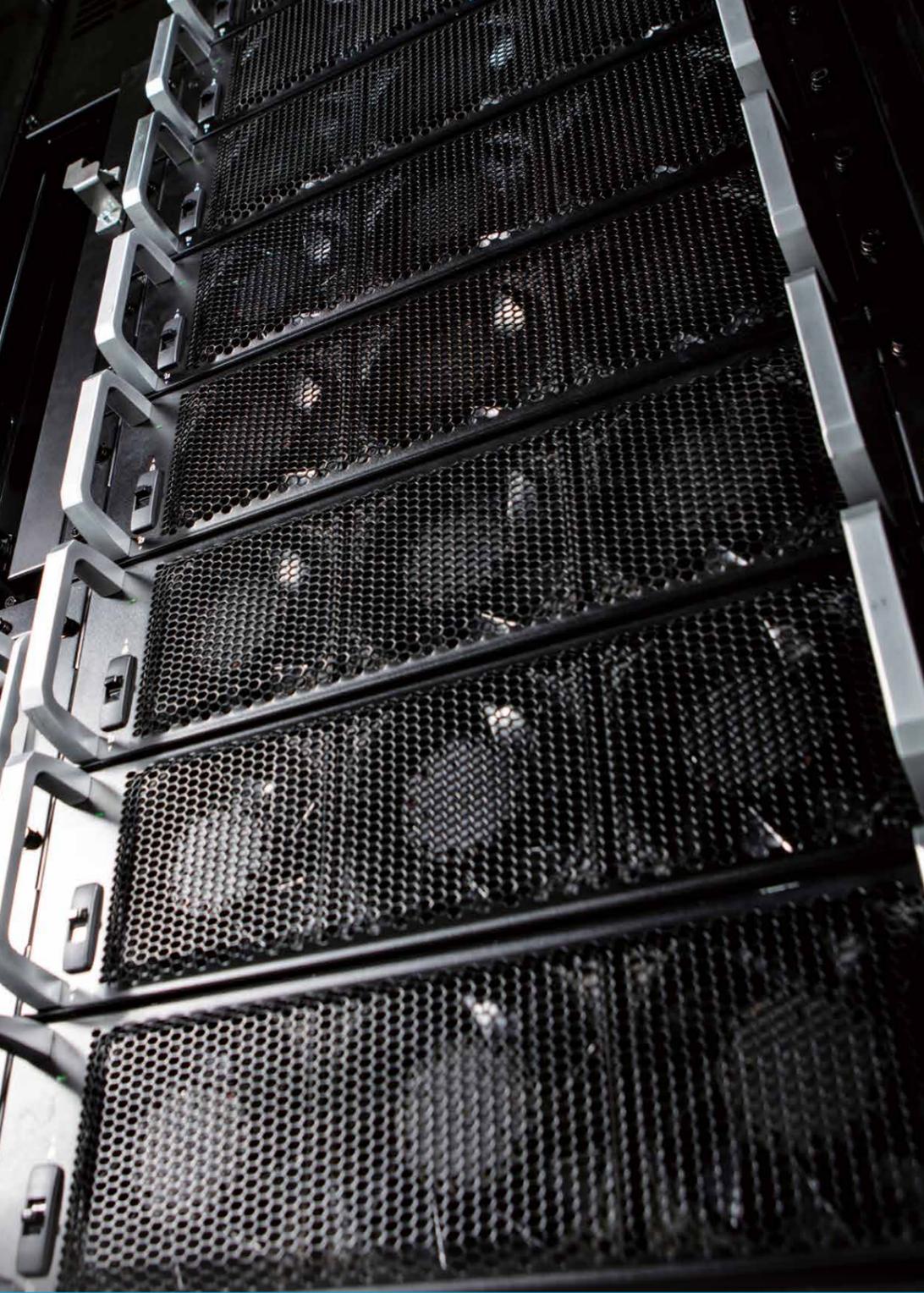


# Big Density for Big Data

Increasing digitization expands the global need for compute and storage. IT managers must respond to growing IP data traffic with only limited data center space. Content-heavy applications such as bandwidth-intensive video streaming, the Internet of Things (IoT), VR/AR and big data are generating considerable additional traffic, resulting in demand for greater data center capacity. That has made scalability and flexibility driving forces in infrastructure innovation.

Delta's innovative modular UPS technologies give customers the high power density, power performance, and availability they need to succeed in the face of these challenges. This high density makes oversizing – one of the major drivers of excess data center cost – avoidable right from design phase.





# Modulon DPH series UPS 50-300/500/600 kVA

The world's highest power density UPS providing ultimate MW power protection with leading power performance and superior reliability

Delta's state-of-the-art online double conversion UPS is available in capacities of up to 600kVA with record-setting high density power modules of 50kW. Data center operators can save more power room space with cabinets that are only half the width of most competing models. Besides high power performance and efficiency, the new Modulon DPH series UPS also offers advanced failure detection and event analysis capabilities to ensure outstanding reliability for large scale data centers.

Modulon DPH UPSs give customers greater flexibility to meet their backup power requirements, such as for CORD (central office re-architected as a data center) or edge data centers in the telecommunication segment. Delta offers a broad range of modular UPSs for diverse mission critical applications.

- 1 Standard 19" rack dimension
- 2 10" color touch screen
- 3 Control module
- 4 Static transfer switch module
- 5 High density power module 50kW in 3U space
- 6 Input, output, bypass and maintenance bypass breakers
- 7 Bypass switch
- 8 Input, output and maintenance bypass switches
- 9 Input, output, bypass and maintenance bypass switches



300/500kVA



600kVA



300kVA



500kVA

Switch Cabinet (Optional)



600kVA



Performance



Availability



Manageability

# Pay-as-you-go Architecture with Ultra Compact Design

The industry-leading power density of 55.6kVA/50kW per 3U module achieved by Delta's new Modulon DPH UPS gives data center operators the flexibility to adapt to rapidly changing requirements. Delta's Modulon DPH series UPS offers both the highest power density per module and the smallest footprint available, achieving 500kVA in a single rack and 600 kVA in two racks to make the most out of the available space.

This high power density means less space is consumed by power infrastructure. That helps avoid oversizing—one of the major drivers of excess data center cost. What's more, adding capacity later is simple and economical, unlike with conventional monoblock UPS solutions, which require enough capacity for the maximum data center load to be installed from the start. The flexibility and density of Delta's new Modulon DPH line translates to more room for revenue-generating IT racks and longer data center life cycles.

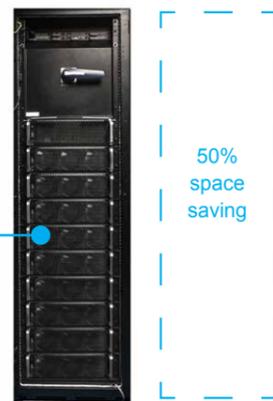
How were we able to achieve these specifications? In UPS design, high efficiency and high density are two sides of the same coin. Delta R&D experts first chose advanced high-speed IGBT semiconductor technology and low-loss magnetic components for the Modulon DPH family. They then optimized the layout and airflow management to reduce power loss and increase heat dissipation. The resulting design requires smaller heat sinks and fewer components. In the end, our engineers were able to fit 55.6kVA per power module in a mere 3U space - a testament to Delta's engineering capabilities.

Delta's engineering excellence is the secret behind the compact, high-power 3U module

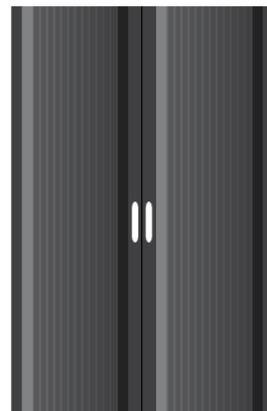
**55.6 kVA**  
in 3U space



Modulon DPH 500kVA UPS



Competitor



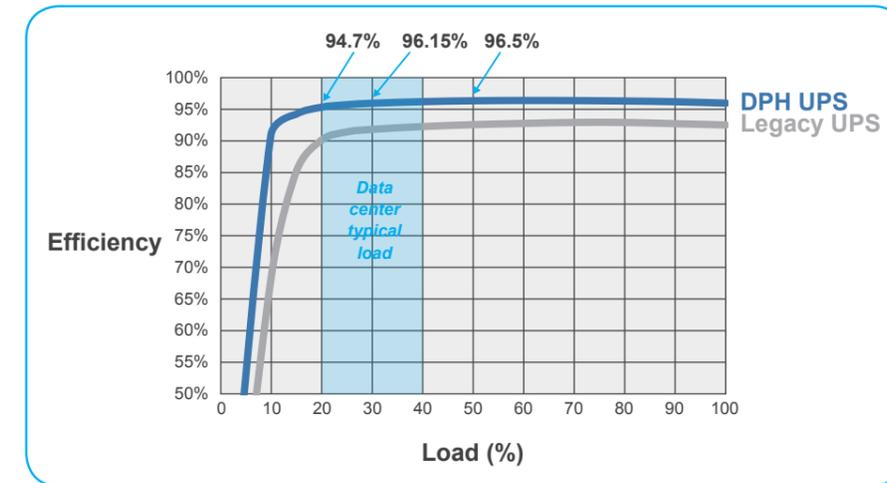
Delta's new DPH series UPS offers the highest power density available at 55.6 kVA/ 50kW in a three unit space. State-of-the-art technologies were used to design the device including optimized printed circuit board (PCB) layout placement, PFC interleaving technology, solid thermal simulation, and more.

Delta's ongoing pursuit of engineering excellence and leading position in the market reflects a deep commitment to serving our customers the world over.

# Excellent Power Performance and Efficiency

## Leading AC-AC efficiency in Online Mode

Delta is firmly committed to making data centers as green as possible. The Modulon DPH series UPS is the ecological choice with its AC-AC conversion efficiency of up to 96.5% in normal operation and 99% in ECO mode. This high energy efficiency results in considerable energy savings for large data centers.

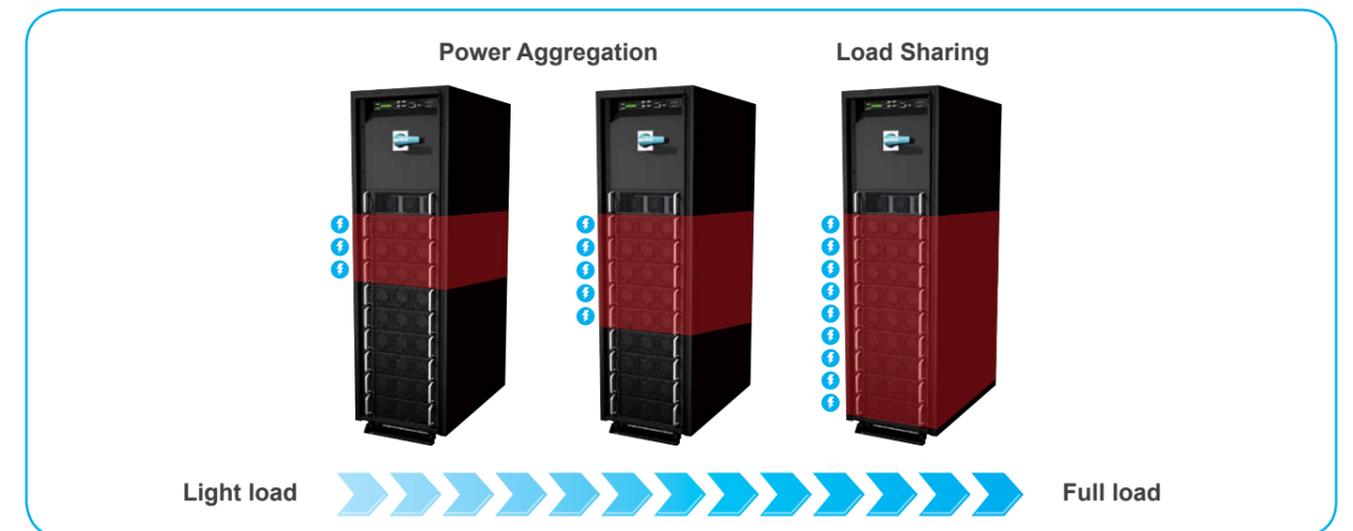


- AC-AC peak efficiency 96.5%
- AC-AC efficiency is around 95%, 20% under light loads
- Efficiency 99% in ECO mode

## Green Mode

All UPS vendors do their best to maximize AC-AC efficiency under full load. However, with N+X and 2N power architectures, a typical data center will operate under light loads of 30% to 40% or even less. That's why efficiency under light loads can sometimes be more important.

Delta's intelligent Green Mode enables UPS power aggregation across all power modules to boost AC-AC efficiency and reduce energy loss. The system will automatically detect the total load capacity percentage to decide which specific power modules should be fully powered on or idle in order to achieve higher efficiency of the UPS. When the load percentage is less than 40%, one power module will switch from online to standby mode every 30 seconds. And when load percentage is higher than 60% or load increases dramatically, the idle modules will be awakened in less than 5ms to ensure the continuous power supply to the load. What's more, the power modules will take turns switching over to standby mode for a long operating life.



# Ultimate availability for mission critical operations

DPH series features the adaptable modular design that critical components are hot swappable. Furthermore, the state-of-the-art microprocessor technology in the DPH series self-detects key components and parameters and supports waveform recording. These advanced features enable accurate event analysis and diagnosis, making the DPH series suitable for high-availability applications.

## Pay as you go

Thanks to its modular design, Modulon DPH UPS systems enable advanced power module redundancy control and the ability to add capacity and pay as you grow.

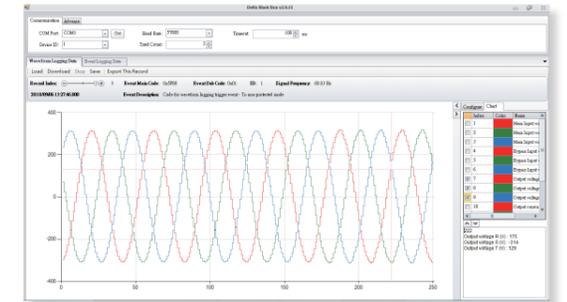
Compared to traditional UPS systems, fully modular designs with hot-swappable key modules - including STS module, communication interfaces and power modules - can also cut the mean time to repair (MTTR) down to practically nothing and expand system capacity flexibly.



## Advanced event analysis

Modulon DPH UPS systems offer key parameters and waveform records supporting advanced event analysis and diagnosis.

- **Event triggers:** Mode switch, system shutdown and no output (drop load)
- **Waveform recording time frame:** Pre-event 70ms and post-event 30ms
- **Recorded parameters:** Output voltage, current wave display, battery voltage, DC bus voltage, input voltage wave display



Software: Delta Black Box

## Proactive detection of key components

Modulon DPH series UPS owns the state-of-the-art microprocessor technology which performs proactive self-detection of key components including batteries, STS fans and AC/DC capacitors. The system can also provides complete and detailed operating status of the UPS. Alarm occurs proactively when abnormal situation is detected.

The battery set is critically important in the event of a power outage. Battery health is essential if operation is to continue uninterrupted. Modulon DPH UPS systems can carry out proactive battery testing, perform capacity detection, and even forecast how fast batteries are aging by collecting and analyzing data.



# Redundant design for high availability

The Modulon DPH series UPS is a highly redundant system that is used to achieve outstanding availability. By ensuring the design includes no single points of failure, Delta was able to build an extremely reliable solution. The resulting six-nines availability reflects best practice for optimizing the total cost of operating your data center.



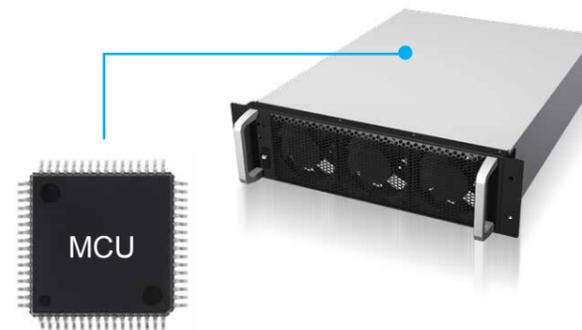
## Controller & Signal Transmission

Expanded relay I/O card and lithium ion battery communication card (optional)

Dual controllers ensure reliable communication and enable parallel system redundancy and synchronization. The dual controller design provides a CAN bus redundancy, either inside the UPS system or between parallel systems as a daisy chain or ring connection.

Dual auxiliary power ports ensure continuous power supply.

## Power Module



The fully fault-tolerant design provides self-redundancy to the control mechanism in power modules. Full control logic in each power module allows the system to self-synchronize in the event of control module failure and automatically switch to the backup for assured continuous operation.

## System



Parallel expansion and N+X redundancy can be implemented to meet the power requirements of MW-level data centers. Modular DPH series UPS systems grow with your business via parallel expansion with up to 8 units for 4.8 MW of total capacity.

# High manageability



Delta's DPH series Modulon UPS offers the ability to view up to 10,000 event logs on the touch panel. The unit's 10" LCD screen can optionally display information on security, cooling, fire protection, and temperature in addition to battery status. The availability of all this information on the touchscreen of the UPS allows for easy local management.

## Battery Management System

If the UPS is equipped with an external battery management system, the battery information (including battery charge/discharge current, voltage, resistance and environment temperature) can be integrated into the UPS and monitored via the LCD of the UPS. It is also compatible with other vendors' BMS hardware through open protocol interface and firmware customization.



## Environment Management System

Up to 16 pieces of EnviroProbe can be connected to UPS via Ethernet for data collection such as security, water, fire and temperature.



## Power Consumption Management

For better facility management, facility managers can monitor the power consumption and get detailed energy usage analysis to understand the electricity tariff history by day / week / month / year.



Delta InfraSuite Manager DCIM solution is also available for option for more comprehensive data center infrastructure management.

# Technical Specifications

| Model        | DPH 300 System                              | DPH 500 System   | DPH 600 System       |                       |
|--------------|---|--|----------------------|-----------------------|
| Power Rating | kVA   | 100,150,200,250,300  | 300,350,400,450,500* | 500,550,600           |
|              | kW  | 100,150,200,250,300  | 300,350,400,450,450  | 500,550,600           |
|              | Power Module Quantity                       | Up to 6 units  | Up to 9 units        | Up to 12 units        |
| Input        | Nominal Voltage                             | 220/380V, 230/400V, 240/415V (3-phase, 4-wire + G)   |                      |                       |
|              | Voltage Range                               | 176 ~ 276 Vac (full load)  |                      |                       |
|              | Current Harmonic Distortion                 | < 3%**   |                      |                       |
|              | Power Factor                                | > 0.99   |                      |                       |
|              | Frequency Range                             | 40 ~ 70 Hz   |                      |                       |
| Output       | Voltage                                     | 220/380V, 230/400V, 240/415V (3-phase, 4-wire + G)   |                      |                       |
|              | Voltage Harmonic Distortion                 | ≤ 0.5% (linear load)   |                      |                       |
|              | Voltage Regulation                          | ±1% (static)   |                      |                       |
|              | Frequency                                   | 50/60 ± 0.05 Hz  |                      |                       |
|              | Overload Capability                         | ≤ 125% : 10 minute ; ≤ 150% : 1 minute ; >150%: 1 second   |                      |                       |
|              | Display                                     | 10" color touch screen   |                      |                       |
| Interface    | Standard                                    | RS232 x 1, Parallel port x 4, USB type A x 2, USB type B x 1, MODBUS x 1, Smart slot x 1, REPO x 1, EPO x 1, Input dry contact x 4, Output dry contact x 6, External battery temperature dry contact x 4, External switch/breaker status dry contact x 4, BMS (RJ45) x 1, Ethernet x 1 |                      |                       |
|              | Optional                                    | Relay I/O card, Battery cabinet temperature sensor cable   |                      |                       |
| Conformance  | Safety                                      | CE   |                      |                       |
| Efficiency   | AC-AC Mode                                  | Up to 96.5%  |                      |                       |
|              | ECO Mode                                    | 99%  |                      |                       |
| Battery      | Nominal Voltage                             | ±240 Vdc   |                      |                       |
|              | Charge Voltage                              | ±272V (adjustable from 204V to 312V)   |                      |                       |
|              | Protection of Battery Deep Discharge        | Yes  |                      |                       |
| Environment  | Operating Temperature                       | 0 ~ 40°C   |                      |                       |
|              | Relative Humidity                           | 0 ~ 90% (non-condensing)   |                      |                       |
|              | Audible Noise (at one meter)                | < 75 dB  | < 80 dB              | < 85 dB               |
|              | IP Protection                               | IP20   |                      |                       |
| Others       | Parallel Redundancy and Expansion           | Module and system redundancy ; Maximum 8 units   |                      |                       |
|              | Emergency Power Off                         | Remote (default) and local (optional)  |                      |                       |
|              | Battery Start                               | Yes  |                      |                       |
| Physical     | Dimensions (W x D x H)                      | 600 x 1100 x 2000 mm   |                      | 1200 x 1100 x 2000 mm |
|              | Weight : UPS System (without power modules) | 311 kg   | 317 kg               | 605 kg                |
|              | Weight : 50kW Power Module (optional)       | 36 kg  |                      |                       |

\* The power module's power rating is adjustable to either 50kVA or 55.6kVA via touch panel.

\*\* When input vTHD is less than 1%.

All specifications are subject to change without prior notice.



2007~ 2008 Forbes Asia's Fabulous 50



2009 Frost & Sullivan Green Excellence Award for Corporate Leadership



Delta's Manufacturing System Certified by ISO 9001 and ISO 14001 Standards



IECQ Certificate of Hazardous Substance Process Management



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