

Working in Power



MUST 1500

3 Phase Modular UPS
Hot swappable, scalable
40 to 3200 KW

- LOCAL AREA NETWORKS (LAN)
- SERVERS
- DATA CENTERS

- INTERNET CENTERS (ISP/ASP/POP)
- INDUSTRIAL PLCS
- EMERGENCY DEVICES (LIGHT, ALARM)

- ELECTROMEDICAL DEVICES
- TELECOMMUNICATION DEVICES
- INDUSTRIAL APPLICATION

MUST 1500

The power demand increases and business continuity is vital, GTEC is proud to introduce our latest Modular, Scalable high-power UPS designed for mission-critical applications requiring scalability, reliability and efficiency. The next generation UPS system ensures uninterrupted power with advanced modular architecture, making it an ideal choice for data centres, industrial & manufacturing facilities; healthcare facility; telecommunication networks with innovative power solutions can benefit your organisation.

The **MUST 1500 series** is a true online double conversion transformerless uninterruptible power supply (UPS), three phase input/output with its single module capacity of 40KVA (40PM), 50KVA (50PM) and 100kVA rated at unity power (PFI). The modular UPS systems are designed to cover a wide range of power ratings from 40KVA to 3.2MVA and many other applications where operations are critical in nature. The MUST 1500 series modular UPS combines the latest three-level IGBT technology with DSP control arithmetic. Along with high input power factor, low THDi and high efficiency, this product can achieve very high load adaptability.

The modular UPS ensures reliable and trouble free operation for the critical load. The MUST 1500 series is scalable. It can be easily expanded by adding power modules to the system to reach 800kVA/ kW in a single frame. It is possible to connect four frames in parallel to increase the capacity to a maximum of 3.2MVA/ MW power for N+1 and N+X redundant architecture.

EACH 40PM, 50PM & 100PM MODULE CONSISTS:

- **IGBT Rectifier**

Advance technology achieving input THDi is <3% and input p.f is 0.99, thanks to the IGBT Rectifier with PFC control.

- **Battery Charger**

Distributed battery charger in each module, it is capable of delivering up to 20% of the rated power per UPS module for battery charging. Thus a wide range of battery capacity can be connected to UPS for longer battery autonomy. An intelligent battery temperature compensation kit option is available. Adjustable battery end voltage control as standard to prolong battery life.

- **IGBT Inverter**

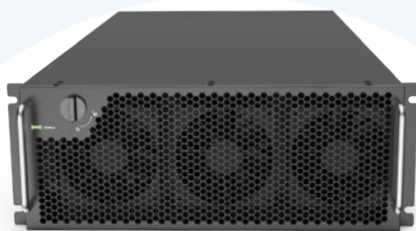
New generation 3 level IGBT power bridge digital control utilising high frequency PWM modulation switching. High performance DSP control achieves system stability, reliability and efficiency. High efficiency > 96% & unity output power factor (PFI)

- **Static Switch Inverter**

It connects the load to Inverter while in normal operation.

- **Local LCD Panel**

Each power module is designed with a local LCD panel for 40PM & 50PM which allows a quick glance of module status and measurements



100PM



50PM

Input 3 phase voltage



Input 3 phase current



Output 3 phase voltage



Output 3 phase load rate



Output 3 phase current



DC bus and battery voltages (positive and negative) & current



Module Status and alarm



STATIC BYPASS MODULE for 40PM & 50PM SYSTEMS

A fully rated static bypass for the UPS system ensures no interruption transfer from Inverter to the Bypass source if the Inverter overload limits are reached or if the Inverter becomes unavailable for any reason. Re-transfer from Bypass source to Inverter source with no power interruption. High quality SCR is designed for the bypass line with precision control.

STATIC BYPASS MODULE for 100PM SYSTEMS

An integrated Static Bypass Module is designed with the 100PM cabinet families, it ensures seamless transition to bypass mode in case of modular UPS failure or overload conditions maintaining power to the load. Additionally, it supports dry contact and communication interfaces for enhanced system monitoring & integration, these includes:

Temperature sensor options for battery and environment • Emergency power off

• Four (4) input signal contacts • Five (5) output dry contacts • CAN/ RS485/ USB ports (optional) • SNMP/ AS400/ Expandable RS485 for BMS (optional)

LARGE LCD SCREEN

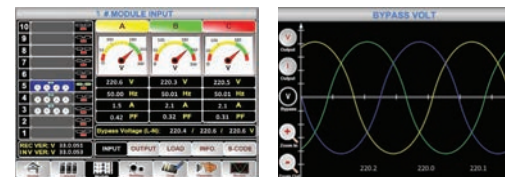
Large 10.4 inch color touch screen with comprehensive user friendly interface. Easy to operate and with wide range of information. Password control at different levels to allow configuration, parameter settings and graphical display of UPS directly from the touch screen.



MUST 500i/50 Removable Modular Static Bypass Switch



MUST 100PM Removable Modular Static Bypass Switch



SYSTEM ADVANTAGES

1. Highest reliability (MTBF of the power availability is much more than the stand alone UPS) & much lower Mean Time To Repair (MTTR). Average time to replace the module is less than 3 mins
2. With its swappable design, there is no supply interruption when replacing the faulty module
3. Precision control with double DSP controller per power module for Rectifier, Inverter, Charger & Super Charger
4. Compact foot print of 1.1m² in 600kVA single modular UPS chassis, makes it one of the smallest foot print among the competitors. Power expansion simply by adding similar capacity module without any downtime and extra footprint
5. Very low maintenance costs
6. Each power input module is designed with intelligent battery charger, with adjustable charging current limit up 20% of output power.
7. User friendly large touch screen LCD provides comprehensive UPS detail, command buttons and single line with superimposed LED's and EPO function.



UPS FRONT PANEL

50PM Systems LCD



100PM Systems LCD

LED

- REC - Rectifier ON/OFF Status
- BAT - Battery Charge/Discharge/ Failure/Abnormal Status
- INV - Inverter ON/OFF Status
- BYP - Bypass On Load Status
- OUT - Load On-Line/Abnormal Status
- STATUS- UPS General Status
- 🔊 - Buzz
- EPO - Emergency Power OFF Button

Push Buttons

- BYP - Command transfer to bypass source
- INV - Command transfer to bypass inverter
- MUTE - Buzzer mute on or off

The MUST system

THE HIGHEST CLASS PERFORMANCES TO SUPPLY THE MOST CRITICAL LOADS

- LOCAL AREA NETWORKS (LAN)
 - SERVERS
 - INTERNET CENTERS (ISP/ASP/POP)
 - DATA CENTERS
- HOSPITAL
 - BANKS
 - EMERGENCY DEVICES
 - TELECOMMUNICATIONS DEVICES
- INDUSTRIAL PLC
 - ALARM SYSTEM
 - TRANSPORTATION

MUST 1500 series UPS Cabinet Configuration

Must 1500 is designed with 6 different chassis types for matching with different 40PM and 50PM power modules
These are:

MUST 80i/40	For 40PM (40kVA/ 40kW)power module, PF1	In-built with manual bypass isolator
MUST 400i/40		In-built with input, bypass,output & manual bypass MCCB
MUST 100i/50	For 50PM (50kVA/ 50kW) power module, PF1	In-built with manual bypass isolator
MUST 200i/50		
MUST 300i/50		In-built with input, bypass,output & manual bypass MCCB
MUST 400i/50		
MUST 500i/50		

High degree ingress protection (IP42) for MUST 300i/50 & above rating is available upon request

MUST 600iS/100	For 100PM (100kVA/ 100kW) Power Module, PF1	In-built Input, Bypass, Output, Manual Bypass isolators
MUST 800iS/100		
MUST 1000iS/100		In-built with Manual Bypass isolators
MUST 800i/100		
MUST 1000i/100		



MUST 600i/100



MUST 500i/50

40PM & 50PM

The 3 phase power module can be paralleled up to 30 modules to achieve maximum power availability, scalability and redundancy. It is designed with local LCD, redundancy fans, high power density & channelled air-flow design separating power and control compartment for excellent reliability. Hence, excellent maintainability and reliability are achieved.



50PM

100PM

The 100kVA/ 100kW 3 phase module is highly efficient modular UPS. Scalable from 100kVA/ kW to 3.2MVA/ MW capacity for N+1 & N+X configuration. An ideal solution for organisations that require efficiency, redundancy & seamless scalability to meet the growing demands.



100PM

Optional Items

Various optional hardware are available for different applications, these are:

- SNMP
- Battery compensation kit
- Dust proof kit
- Parallel kit
- LBS (Load Bus Synchronization)

BENEFITS TO USERS: ENERGY EFFICIENT UPS

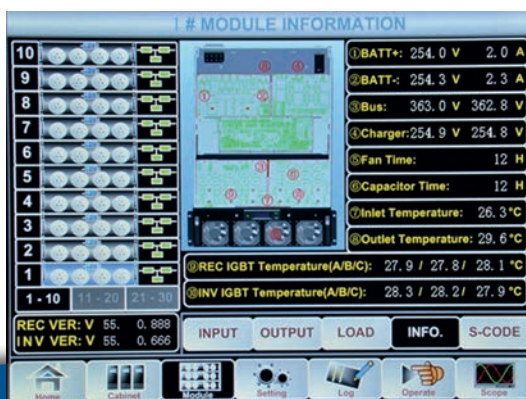
Energy saving function, some modules will be in idling mode when at low load consumption, so as to maximize overall system efficiency and pro-long life span of modules.

It is designed with three level IGBT power bridge introduced for Inverter, with high efficiency >96%, making MUST 1500 as one of the lowest cost of ownership as compared to conventional UPS.

Real time monitoring from LCD of major components in UPS for optimum performance of the UPS system.

These include:

- ventilation fan operating hours
- capacitor operating hours
- Inlet air temperature
- Outlet air temperature
- 3 level rectifier IGBT
- 3 level inverter IGBT



50PM LCD



100PM LCD

Advance Communication Solutions

Standard in-built feature for remote communication

- Standard RS232 , USB & RS485 port with ModBus Interface Protocol
- External input signal to interface with UPS for battery & environment temperature
- REPO (Remote Emergency Power Off) for power down UPS from external signal
- Interface with generator for operating status, as well as driving signal for holding coil for battery circuit breaker
- Interface with Battery Circuit Breaker (BCB) for ON/OFF status
- Standard four alarm contacts for remote alarm reporting. These are: Battery Low, General Alarm, Mains Failure and Mains Normal

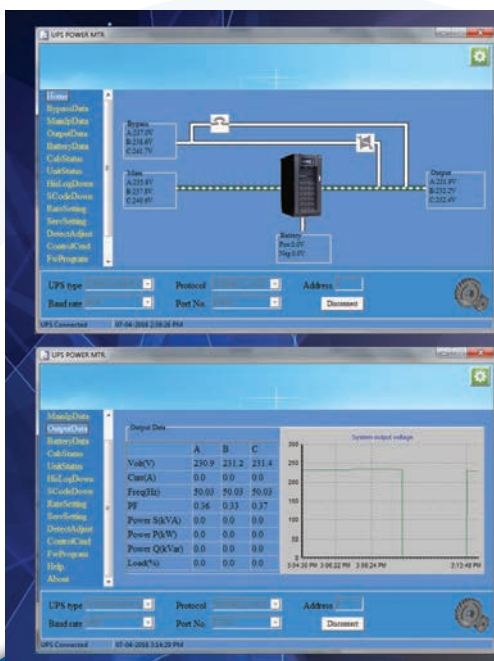
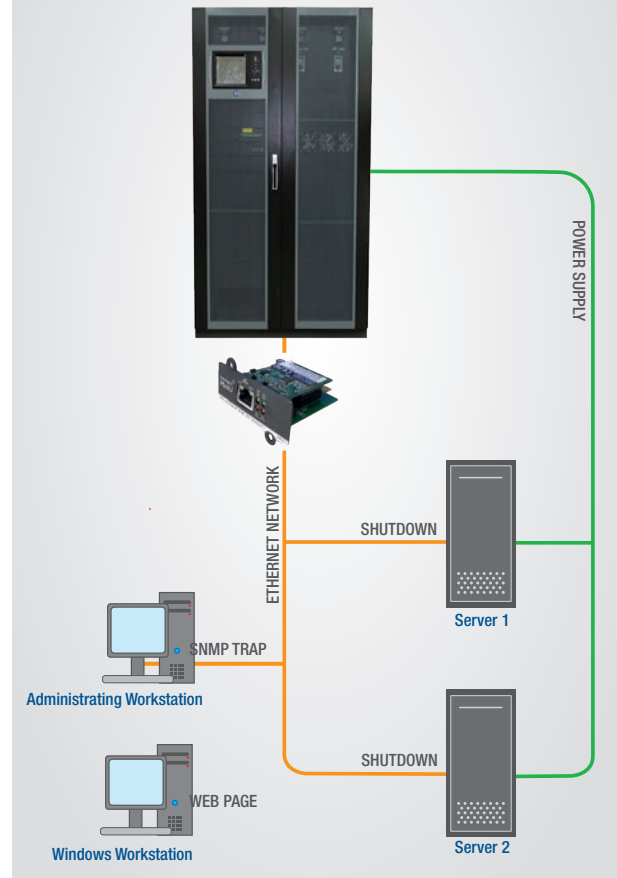
Other optional remote monitoring and control feature:

- SNMP card allows UPS management across a LAN using any network communication protocol such as TCP/IP, HTTP, SMTP, DHCP, Telnet , BOOTP, DNS, DDNS, PPPoE, Wap, PDA Browser, SNMP RFC 1628 MIB, PPC MIB and Ethernet Up
- External Load Bus Synchronizer (LBS) port to interact with external Static Transfer Switch (STS) for highest system reliability

UPS Power Monitoring Software

Propriety UPS Power Monitoring Software provide comprehensive information of the UPS. Real time tracking can assist fast system recovery in the event of an emergency

Direct Connection with Ethernet Network



TECHNICAL **ASSISTANCE** SERVICE

UPService, our technical assistance facility uses highly trained engineers to provide a reliable and competent technical support and after-sales service.

UPService can provide customers with:

- A dedicated CALL CENTRE for connection to the UPService organisation. UPService personnel are always available and ready to provide advice and assistance regarding UPS installation, maintenance, fault finding and repair.
- **FAST & READY** A fast repair on site is guaranteed through the use of state-of-the-art UPS technology and the professionalism of the UPService personnel and Authorised Assistance Centres. UPService guarantees that failed parts are replaced with original ones, tested and updated in order to maintain the safety, reliability and operating characteristics of the UPS.
- **COMMISSIONING AND START-UP** UPService can provide assistance during commissioning and startup of the UPS equipment on-site with additional training during handover to site personnel. UPService engineers can also verify site suitability, analyse and advise on potential problems, and disconnect and relocate equipment. UPService recommend that all hardwired installations are commissioned by UPService engineers.
- **MAINTENANCE CONTRACTS** can be provided by UPService to minimise response times and repair costs. Contracts range from periodic inspections to comprehensive cover including labour and materials.
- UPService organises regular **TECHNICAL TRAINING COURSES** for UPS operators and installers.

TECHNICAL
ASSISTANCE SERVICE



MUST 1500

Technical Specification					
Models/Capacity	100PM& 100PM-N (*), (100kVA/ 100kW)				
INPUT					
Rated voltage (V)	380V/ 400V/ 415V, 3 phase + N				
Voltage tolerance (V)	323V ~ 478V _{LL} at full load / 138V ~ 478V _{LL} load decrease to 30%				
Frequency & Range	50Hz/ 60Hz auto sensing, 40Hz to 70Hz				
Input power factor & THDi	≥0.99 & ≤3%				
BATTERY					
Type	VRLA battery; Vented lead acid battery, NiCad battery& Lithium-Ion battery				
Charging method	Two level & Cyclic charging according to EN 50272-2				
Battery configuration	VRLA battery from 30 to 48 x 12V block (**)				
Charger power	15% x output power				
INVERTER OUTPUT					
Module output PF	1				
Output voltage & stability	±1% from 0% to 100% linear load				
Frequency & Stability (Hz)	50/60 Hz ± 0.1% (free running mode)				
Dynamic Stability (V)	<5% for step load according to IEC62040-3				
Overload	110% for 60mins; 125% for 10mins; 150% for 1min; >150% for 200ms				
Output voltage THDv	<1% at linear load, <5% at non-linear load to IEC/ EN 62040-3				
BYPASS					
Rated voltage (V)	380V/ 400V/ 415V, 3 phase + N				
Voltage tolerance (V)	Default -20% / +15%. Upper threshold: 418V ~ 475V settable, lower threshold: 228V ~ 342V settable				
Frequency & Range	50/60Hz, selectable ±1Hz, ±3Hz, ±5Hz				
Overload	110% for continuous; 125% for 10mins; 150% for 1min; >150% for 200ms				
ENVIRONMENTAL DATA					
Operating Temperature	0°C to 40°C (***)				
Relative Humidity	<95% non-condensing				
Colour	RAL 7012 front panel / RAL7021 for side panel				
Efficiency	>96% at On-line				
Compliance Standard	General & Safety: IEC EN62040-1-1; EMC: IEC EN62040-2 (C3); Performance & Test: IEC EN62040-3				
Noise level @ 1m (dBA)	75dBA at 100% load, 70dBA at 45% load				
MODULE PHYSICAL DATA					
Size (LxDxH) mm & weight	440 x 795 x 174, 53.5kg				
CHASSIS PHYSICAL DATA					
Chassis model	MUST 600iS/100	MUST 800iS/100	MUST 1000iS/100	MUST 800i/100	MUST 1000i/100
Display panel	User friendly 10" touch screen colour LCD display + LED				
Size (LxDxH) mm & weight	1000 x 1100 x 2000, 400kg	1800 x 1100 x 2000		1200 x 1100 x 2000	
		890kg	940kg	590kg	620kg
In-built isolator	Input, Bypass, Output, Manual Bypass			Manual Bypass	
Cable entry	Top & bottom				
Compliance standards	EN50091-1-1/IEC62040-1-1 for General & safety requirements for UPS used in operator access areas EN50091-2/ IEC62040-2 (C3) for EMC for UPS EN50091-3/ IEC62040-3 for Method of specifying performance and test requirements of UPS				
Cabinet protection rating	IP20				
Interface	Standard: Dry contacts, CAN, RS485, USB, 2x Intelligent slots, dry contact extension slot				

(*) 100PM is designed with 3 battery wires with neutral; 100PM-N is designed for 2 battery wires without neutrals

(**) please consult GTEC for battery configuration.

(***) Recommended operating temp for battery is ≤25°C, please consult respective battery manufacturers for recommended temp.

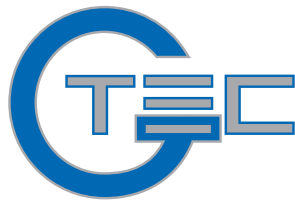
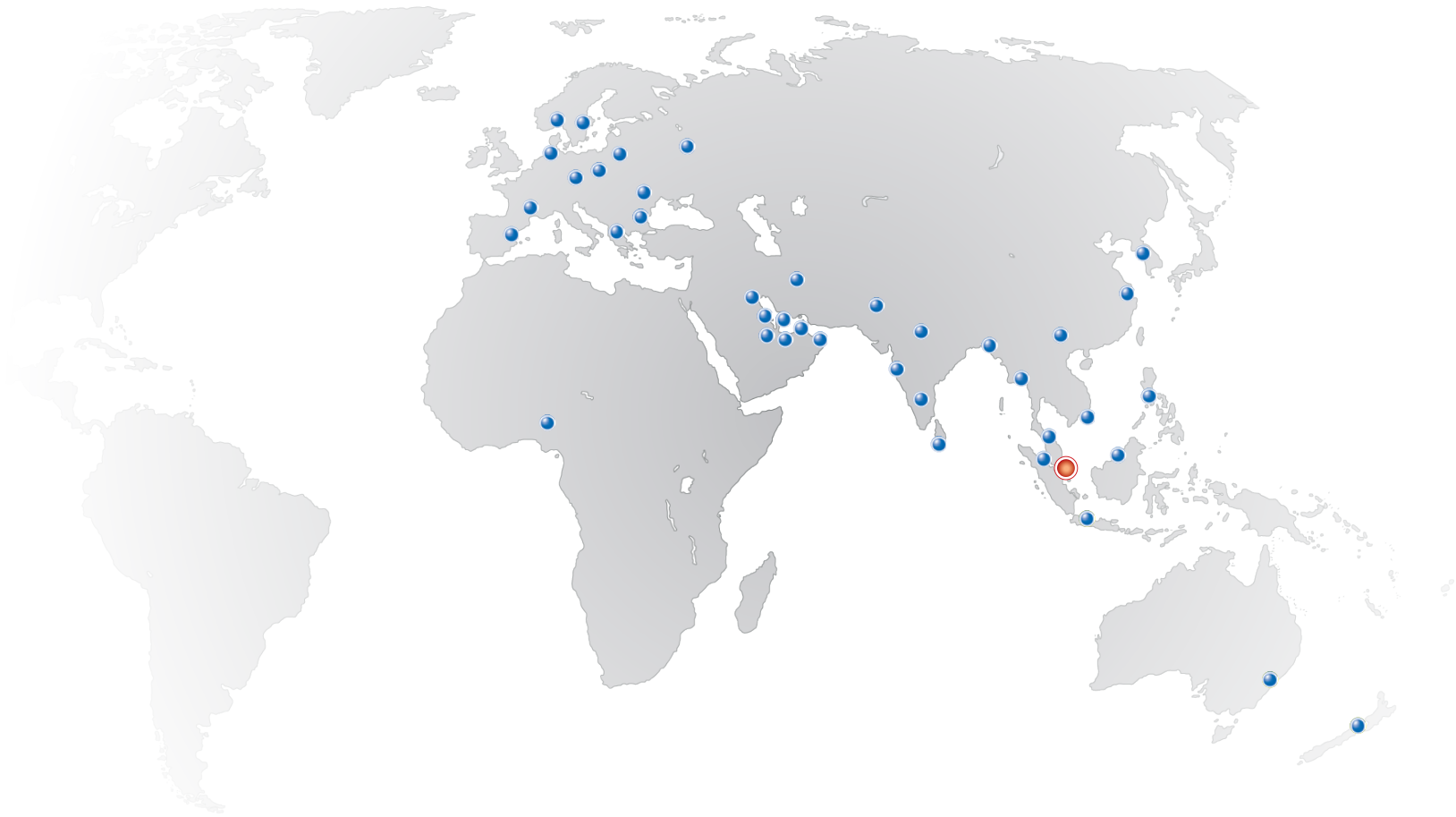
UPS specification and data may subject to change for improvement without prior notice

MUST1500

Technical Specification					
Models/Capacity	40kVA – 1.5MVA 40PM (40kVA/ 40kW), 50PM (50kVA/ 50kW)				
INPUT					
Rated Voltage (V)	380V/ 400V/ 415V, 3 phase + N				
Voltage tolerance (V)	304V ~ 478V line to line at full load/ 228V ~ 478V load decrease to 75%				
Frequency & Range	50Hz/ 60Hz auto sensing, 40Hz to 70Hz				
Input power factor & THDi	≥0.99 & ≤3%				
BATTERY					
Type	VRLA battery; Vented lead acid battery, NiCad battery and Lithium-ion battery				
Charging Method	Two level & Cyclic charging according to EN 50272-2				
Ripple voltage	Approximately 0%				
INVERTER OUTPUT					
Rated Power (kVA/ kW)	40kVA – 1.5MVA				
Module power factor	1 (40PM) / 1 (50PM)				
Rated Voltage & Stability (V)	380/220V, 400/230V, 415/240V ±1.5% from 0% to 100% linear load				
Frequency & Stability (Hz)	50/60 Hz ± 0.1%				
Dynamic Stability (V)	<5% for step load according to IEC62040-3				
Overload	110% for 60mins; 125% for 10mins; 150% for 1min; >150% for 200ms				
BYPASS					
Rated voltage (V)	380V/ 400V/ 415V, 3 phase + N				
Voltage tolerance (V)	Default -20% / +15%. Upper threshold: 418V ~ 518V selectable, lower threshold: 228V ~ 342V selectable				
Frequency & Range	50/60Hz, selectable ±1Hz, ±3Hz, ±5Hz				
Rated current (A)	121A ~ 758A depending on chassis model				
ENVIRONMENTAL DATA					
Operating Temperature	0°C to 40°C, VRLA battery life is halved for every 10°C increase in temperature from 20°C				
Relative Humidity	<95% non-condensing				
Colour	RAL 7012 front panel / RAL7021 for side panel				
Efficiency	Up to 96% at On-line mode				
Compliance Standard	General & Safety: IEC EN62040-1-1; EMC: IEC EN62040-2 (C3); Performance & Test: IEC EN62040-3				
Noise level @ 1m (dBA)	65dBA at 100% load, 62dBA at 45% load				
MODULE PHYSICAL DATA					
Module Model	40PM	50PM			
Size (LxDxH) mm & weight	510 x 700 x 178, 44kg	510 x 700 x 178, 45kg			
CHASSIS PHYSICAL DATA					
Chassis model	MUST 80i/40, MUST 100i/50	MUST 200i/50	MUST 300i/50	MUST 400/50	MUST 400i/40, MUST 500i/50
Size (LxDxH) mm & weight	600 x 980 x 1150, 120kg	650 x 960 x 1600, 170kg	650 x 1095 x 2000, 220kg	1050 x 1100 x 2000, 350kg	1300 x 1100 x 2000, 450kg
In-built breakers/ isolator	MCCB (Input, Bypass, Output & Manual Bypass)	Load Break Switch	Load Break Switches	Load Break Switches	MCCB (Input, Bypass, Output & Manual Bypass)
Cable entry	Bottom	Top	Top & Bottom	Top & Bottom	Top & Bottom
Compliance standards	EN50091-1-1/IEC62040-1-1 for General & safety requirements for UPS used in operator access areas EN50091-2/ IEC62040-2 (C3) for EMC for UPS EN50091-3/ IEC62040-3/ AS62040-3 for Method of specifying performance and test requirements of UPS				
Cabinet protection rating	IP20 (IP42 is available for MUST 300i/50 & above)				
Interface	Standard: Dry contacts, RS232, RS485, USB / Optional: SNMP				

UPS specification and data may subject to change for improvement without prior notice

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