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POWER LINE DISTURBANCES

Dip (Sag): is a short term decrease in line voltage. Usually it results from a short circuit in the power line or a sudden increase in electrical load on the line (start up of large loads), utility switching or equipment failure.

Surge: is the exact opposite of a dip. It is a temporary increase in line voltage that lasts at least one cycle (approx. 16mS). It can be triggered off by rapid reduction in power loads or by utility switching.

Spike (transient): is similar to a surge except that it lasts less than a full cycle (often only a few milliseconds). It can be 100% or more above nominal voltage.

Electrical Noise: probably the most common type of disturbance, which is a random high voltage, or high frequency interference on the power line caused mostly by non-linear loads. There are two types of noise, usually referred to as common mode (noise between power connection and ground) and transverse mode (noise between power connections).

Brownout: is a deliberate reduction in AC line voltage by the utility company during periods of unusual high demand or insufficient load capacity. The power line supply does not have the full capacity to supply the load which results in load sharing.

Blackout: this is the ultimate power disturbance. It is a complete cut in the power line supply (power failure). Typically described as "zero-volt" condition lasting longer than half a cycle. Can be caused by utility equipment failure, lightning etc . . . the list is long.

Businesses are becoming more and more reliant on a utility power supply that is pushed beyond its capacity. Despite advances in the capabilities of modern personal computers, a momentary power outage is still all it takes to lose your data.

More dangerous is the loss of previously written files, or even an entire hard disk, which can occur should a power problem strike while your computer is saving a file. Network file-servers constantly writing to disk are particularly susceptible.

Some African countries, including South Africa, have resorted to power rationing as a way to meet increasing demand. In these cases, the question of whether or not to use power conditioning, is no longer a choice.

HOW POWER PROBLEMS CAN BE AVOIDED

Below is a table of power problems and how to solve them.

Equipment Available	Automatic Voltage Regulator (AVR)	Line Conditioner	Offline UPS	Line Interactive UPS	True Online UPS	Frequency Converter
Surges	Limited Protection (MOV)	Full Protection	None or Limited Protection (MOV)	Limited Protection	Good Protection	Good Protection
Spikes	Limited Protection	Full Protection	None or Limited Protection (MOV)	Limited Protection	Good Protection	Good Protection
Sags	Good Protection	Full Protection	None or Limited Protection	Limited Protection	Full Protection	Full Protection
Noise	Limited Protection	Good Protection	None or Limited Protection	Limited Protection	Good Protection	Full Protection
Blackout (Power Failure)	No Protection	No Protection	Good Protection 4ms-8ms Changeover	Good Protection	Full Protection (no break)	No Protection
Frequency Variation	No Protection	Good Protection	No Protection	Limited Protection	Full Protection	Full Protection
Waveform Distortion	No Protection	Good Protection	No Protection	Limited Protection	Full Protection	Full Protection

CABLE SELECTION CHART

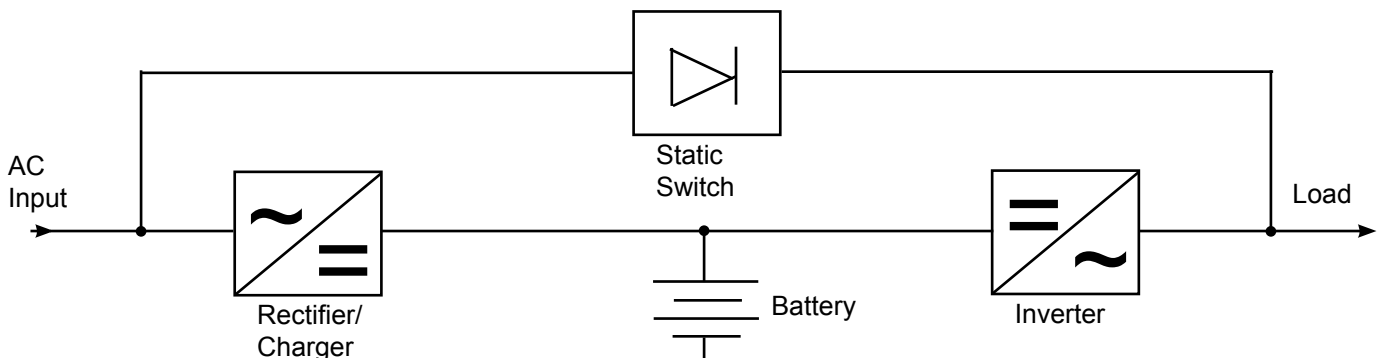
Cable Size	Armoured Cable Free Air Wired	Unarmoured Cable Free Air Wired
2.5mm2	27 Amps	24 Amps
4.0mm2	35 Amps	32 Amps
6.0mm2	43 Amps	41 Amps
10mm2	60 Amps	55 Amps
16mm2	70 Amps	72 Amps
25mm2	100 Amps	94 Amps
35mm2	125 Amps	115 Amps

Cable Size	Armoured Cable Free Air Wired	Unarmoured Cable Free Air Wired
50mm2	150 Amps	140 Amps
70mm2	180 Amps	175 Amps
95mm2	225 Amps	215 Amps
120mm2	260 Amps	250 Amps
150mm2	290 Amps	280 Amps
185mm2	340 Amps	330 Amps
240mm2	400 Amps	385 Amps

POWER CONDITIONING & UPS

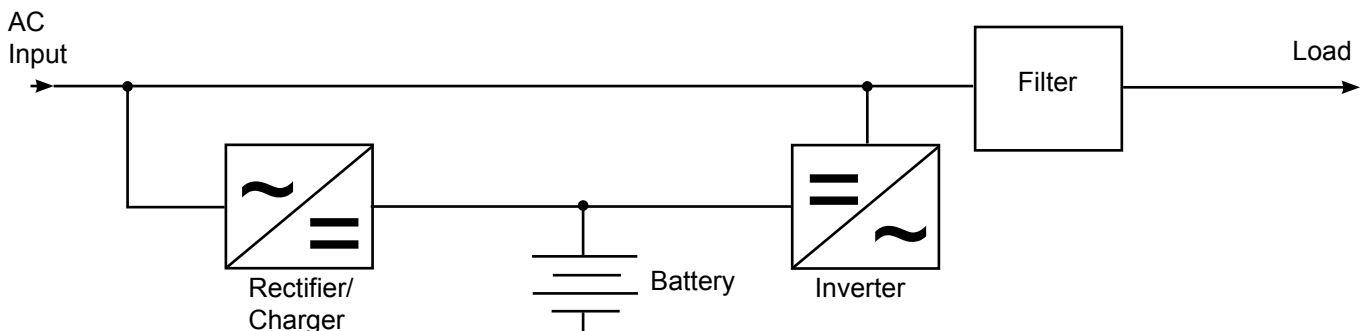
OVERVIEW OF DIFFERENT UPS TYPES

Most of the critical applications in data processing and other industries are now protected by Uninterruptible Power Supplies (UPS). It is essential that the different types and performance levels are covered by international standards (IEC). UPS systems are intended to improve the quality of AC power and provide a redundant (back-up) power source. Power quality defects which may be improved by a UPS include surges, noise or sags.



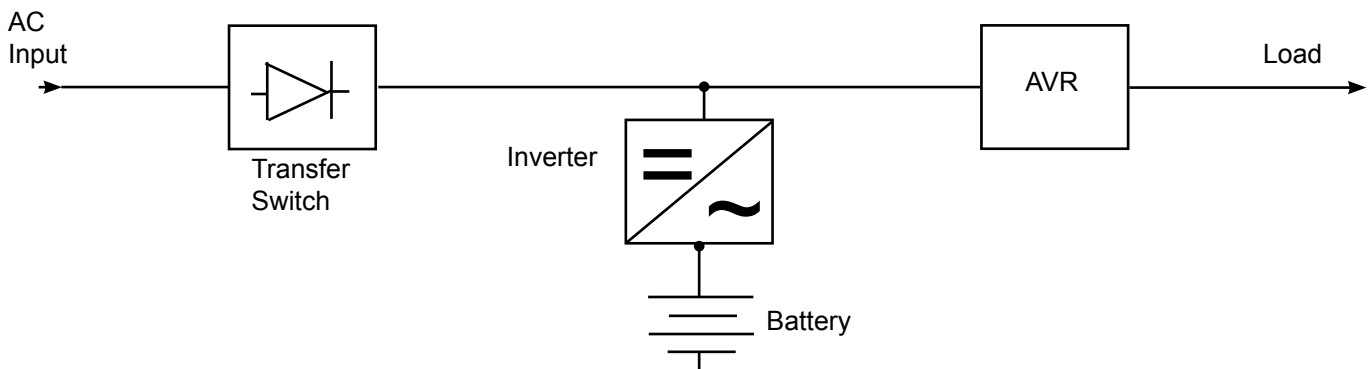
In this type of UPS the load is isolated from the mains, hence all the power to the load flows through the inverter, offering continuous protection and full isolation against surges, noise and sags. It offers true on line protection.

Simplified Diagram of an "Offline" UPS



This type of UPS is not suitable for all applications because it does not use a static switch bypass and the switching times are longer. There is no isolation between the load and the mains. There is also no output frequency control.

Simplified Diagram of an "Line-Interactive" UPS



This type of UPS does not provide isolation between the mains and the load. There is poor protection against spikes and poor efficiency. There is no output frequency control but it has voltage regulation on the output.

UPS - ACCESSORIES

SNMP CARDS

- Internal units to be used with UPS's equipped with an intelligen slot
- External units to be used with UPS's already equipped with RS232 communications
- Web server interface
- Linux, MAC and Windows compatible
- Remotely control UPS's
- Battery management features for UPS's being monitored
- SMS and Email capable for several UPS alarms and statuses
- Shut down multiple PC's and/or servers during a power outage.



GSM INTERFACE CARD

- Easy setup with any terminal
- Emulator software
- Flexible messages
- Dedicated standalone operation
- 10 SMS alarm recipients
- No need to use a PC.



REMOTE ALARMS PANEL FOR UPS

- LED Indications for Mains Present, Mains Fail, Low Battery and UPS on Bypass
- To be used with UPS's equipped with potential free alarm contacts
- Audible alarm
- Alarm can be cancelled with a push button.



BATTERY CABINETS

- Used for all battery types
- In 7 different sizes, selection matrix below for battery size and cabinet sizing requirements.



No. of Batteries	7.2Ah	8Ah	9Ah	12Ah	17Ah	20Ah	24Ah	28Ah	33Ah	45Ah	75Ah	100Ah
A1	6	6	6	4	4	4	2	3	2	2	1	1
A2	12	12	12	8	8	8	4	6	4	4	2	2
A4	24	24	24	16	20	20	8	12	12	8	4	4
A8	60	60	60	40	40	40	16	24	24	16	12	8
A12	90	90	90	60	60	60	24	36	36	24	18	12
A20	150	150	150	100	100	100	40	60	60	40	30	20
A35	270	270	270	180	180	180	80	110	105	70	50	35

UPS - LINE INTERACTIVE MODIFIED SINEWAVE



T1X SERIES (650VA-2kVA)

- Compact size
- Excellent microprocessor control guarantees high reliability
- Boost and buck AVR for voltage stabilisation
- Auto restart with AC recovery
- Simulated sinewave inverter output
- Off-mode charging
- Cold start function
- USB comm. standard with RJ11 telephone protection.



Model	ST1006X	ST1010X	ST1015X	ST1020X
Capacity	650VA/360W	1000VA/600W	1500VA/900W	2000VA/1200W
Input				
Voltage	110/120VAC or 220/230/240VAC			
Voltage Range	81-145VAC or 162-290VAC			
Frequency Range	50Hz or 60Hz (auto-sensing)			
Output				
Ac Voltage Regulation (Batt. Mode)	± 10%			
Frequency Range (Batt. Mode)	50Hz or 60Hz ± 1Hz			
Transfer Time	Typical 1-6ms, 10ms Max			
Battery				
Battery Type & Number	12V/7Ah x 1	12V/7Ah x 2	12V/9Ah x 2	
Backup Time (1 PC @ 120W load)	10 min.	30 min.	40 min.	42 min.
Typical Recharge Time	4-6 hours recovery to 90%			
Indicators				
AC Mode	Green LED on		The right green LED is on and LED's 2-5 indicate load level	
Battery Mode	Green LED Flashes	Yellow LED Flashes	The right green LED flashes and LED's 2-5 indicate battery capacity	
Fault	Red LED Flashes			
Protection				
Full Protection	Overload, discharge and overcharge protection			
Alarm				
Battery Mode	Sounds every 10 seconds			
Low Battery	Sounds every second			
Overload	Sounds every 0.5 seconds			
Battery Replacement Alarm	Sounds every 2 seconds			
Fault	Continuously sounds			
Physical				
Dimension, D x W x H (mm)	287 x 100 x 142	350 x 146 x 160	230 x 500 x 280	
Net Weight (kg)	4.25	8.0	11.1	11.5
Operating Environment				
Humidity	0-90% RH @ 0-40°C (non-condensing)			
Noise	Less than 40dB			

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UPS - LINE INTERACTIVE MODIFIED SINEWAVE



T1 SERIES (500VA-1kVA)

- Compact and stylish, ideal for office or home
- Excellent performance and reliability, designed for maximum equipment protection
- Advanced MCU control technology, enhancing UPS performance
- 500VA, 700VA and 1kVA, powerful enough for desktop PC's
- Conforms to all necessary safety and CE specifications
- No noise, place it on your desktop
- Simple, easy to read LCD display
- Fast, low voltage protection buck and boost
- Predicting mains failure
- Automatic voltage regulation saving battery power
- Low battery protection preventing deep discharge
- Advanced battery management
- Modem, phone line and peripheral equipment protection
- Hot battery swap, no need to switch off UPS (except for 1kVA).



Model	ST1005	ST1007	ST1010
Capacity	500VA/300W	700VA/420W	1000VA/600W
Input			
Input Voltage Range	220/230/240VAC (+25% / -30%)		
Input Frequency	44Hz ~ 56Hz		
Output			
Output Voltage	220/230/240VAC \pm 10% (On Battery Mode)		
Output Voltage Regulation	\pm 10%		
Output Frequency (Battery Mode)	50 \pm 0.1Hz		
Overload Capability	Delayed protection when the output is > 150% overload		
Battery			
Number of Batteries	1 cell	1 cell	2 cells
Recharge Time to 90%	< 10 hours		
Transfer time			
AC to DC	< typical 6 ms		
Indication			
LCD	AC Mode, Battery Mode, Output Status, Battery Capacity, Overload, UPS Fault		
Audible Alarm			
Battery Mode	Long beeping		
Low Battery	Continuous beeping		
Overload	Short beeping		
Dimensions			
W x H x D (mm)	90 x 165 x 325	90 x 165 x 325	120 x 210 x 380
Weight			
Net Weight w/ Battery (kgs)	6.3	6.6	15
Environmental			
Operating Temperature	-5 ~ +40°C		
Relative Humidity	< 90% (Non-Condensing)		
Audible Noise	<45dBA @ 1 Meter	<50dBA @ 1 Meter	<55dBA @ 1 Meter

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UPS - LINE INTERACTIVE PURE SINEWAVE



T2 SERIES (1kVA-3kVA)

Launched in 2005 and superseding the highly regarded PHD IP Series UPS, the T2 Series benefits from the latest microprocessor Control Unit (MCU) technology, and now offers even greater value for money. The T2 is aimed at users that require protection from line voltage fluctuations and require a reliable and constant power source. The T2 is a sophisticated unit utilizing full digital control technology. Available with power rating of 1kVA, 2kVA and 3kVA each with LCD display and audible alarm keeping you quickly updated on mains and battery status. The T2 is also fitted with an intelligent test button enabling a self-test routine which also prevents the UPS from being inadvertently switched off.



FEATURES:

- Extensive log files
- Scheduled battery and inverter testing
- Scheduled system shutdown/restart
- User-Customisable commands and messages
- Multiple UPS control from a single computer
- Remote Console Command module for remote multiple server shutdown
- Internal SNMP sub-agent for integration into existing NMS (e.g. HP OpenView, CA).

Model	ST2010	ST2020	ST2030
Capacity			
Maximum Capacity	1000VA/700W	2000VA/1400W	3000VA/2100W
Input			
Input Voltage Range	220/230/240VAC ± 25% Singe Phase w/Ground		
Input Frequency	44Hz ~ 56Hz		
Output			
Output Voltage	220/230/240VAC ± 2%		
Output THD	< 3%		
Efficiency (Battery Mode)	82%		
Output Frequency (Battery Mode)	50 ± 0.1Hz		
Overload Capability (Normal Mode)	Sustaining 5 min @ 100 – 200%; 3 sec @ > 200%		
Overload Capability (Battery Mode)	Sustaining 30 sec @ > 100%; 1 sec @ 150%		
Battery			
Number of Batteries	2 cells	4 cells	6 cells
Recharge Time to 90%	< 8 hours (adjustable)		
Charge Current of Long Standby Model *	5A		
Indication			
LCD	AC Mode, Battery Mode, Output Status, Battery Capacity, Overload, UPS Fault		
Audible Alarm			
Battery Mode, Low Battery, Overload	Long beeping, Continuous beeping, Short beeping		
Physical			
W x H x D (mm), Weight	150 x 220 x 460, 19kg	220 x 330 x 487, 32kg	220 x 330 x 487, 42kg
Environmental			
Operating Temperature	-5 ~ 40° C		
Relative Humidity	< 95% (Non-Condensing)		
Audible Noise	<45dBA @ 1 meter		
Communication Port	Standard RS232: USB or SNMP/HTTP (optional)		

* All T2 models have a long standby option with no built in batteries, this is the charge current of the long standby models. For long standby models, add "-L" to the part number.

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UPS - LINE INTERACTIVE PURE SINEWAVE



T2R SERIES (2kVA-10kVA)

FEATURES:

- True Bi-Lateral Converter Line-interactive UPS
- Pure Sinewave and suitable for linear and non-linear loads
- Rack and Tower Convertible
- Standard and long backup time models available
- Multi-Interface slot for RS232, SNMP, USB, RS485, Modbus, Dry Contact and customised interfaces
- Various communication options selectable and all can be available at the same time
- Complete protection for overload, overheat, surges, spikes, short circuit and over charge
- Detachable two-way dialogue interactive dot-matrix LCD control panel
- Real time remaining backup time calculations
- User friendly, swappable battery replacement design
- Built-in powerful charger with power factor correction
- Emergency Power Off (EPO) available
- Intelligent fan speed control
- Cold start (DC start) function
- Compatible with generators.



UPS - LINE INTERACTIVE PURE SINEWAVE



Model	ST2R20	ST2R30	ST2R50	ST2R75	ST2R100
Capacity	2kVA/1250W	3kVA/1875W	5kVA/3125W	7.5kVA/4688W	10kVA/6250W
Input					
Voltage	220/230/240VAC				
Voltage Range	170VAC~300VAC				
Frequency Range	45Hz~70Hz Auto-Sensing				
Output					
Voltage	220/230/240VAC ± 3% settable on the LCD				
Frequency Range	50Hz or 60Hz ± 0.1Hz				
Wave Form	Pure Sinewave				
Efficiency (Line Mode / Battery Mode)	98% / 80%				
Overload (Line Mode)	> 110% Buzzer alarms and Amber LED blinks continuously				
Overload (Batt. Mode)	110%-150% for 30sec, > 150% for 200ms, then UPS shuts down				
Battery					
Battery Voltage	36Vdc		48Vdc		
Battery Quantity	3 x 9Ah	6 x 7.2Ah	8 x 9Ah	16 x 7.2Ah *	16 x 9Ah *
Charge Current of Long Standby Models **	> 10A				N/A
Other					
Transfer Time	< 4ms				
Communication Interface	USB standard, RS232, RS485, SNMP, Dry Contact and AS400 available				
Physical and Environmental					
Operating Temperature	0°C-40°C				
Relative Humidity	0-95% non-condensing				
Audible Noise	< 55dBA (@ 1m)				
Dimensions (W x H x D, mm)	440 x 88 x 465	440 x 132 x 465	440 x 132 x 620	440 x 132 x 465 (UPS), 440 x 132 x 465 (Battery Box)	
Weight (kg)	24.5	36.9	49.8	34.6 (UPS only)	36.6 (UPS Only)
IEC Outputs	6	10	10 + 1 Terminal Block	5 + 1 Terminal Block	
Safety Standards					
Safety	EN62040-1-1				
EMC	EN62040-2				
Marks	CE, UL, cUL				

* Batteries on these models are external to the UPS cabinet

** Models from 2kVA - 7.5kVA have long standby models available, add "-L" to the model no. Charge currents on these of up to 30A available on request.

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UPS - LINE INTERACTIVE PURE SINEWAVE (LONG STANDBY)



T2X SERIES (800W-8kW)

The Star T2X UPS is an All-In-One user friendly UPS, easy to handle, suitable and compatible for almost all Home/Office applications (Linear and non-linear loads including Air Conditioners!).

Being a line interactive UPS, it can produce clean and perfect **PURE SINEWAVES**, by providing the best power quality for all your electric equipment.

The traditional UPS supplies power only for a limited few minutes, the T2X can function as an efficient **GENERATOR**! With an Auto Transfer Switch, it can easily handle any critical power failure situations.

Also, the T2X Series has a powerful charger that can supply a capacity over 500 Ah, it can adapt itself and charge without any damage to any type of battery. Its Solar Power Server allows the UPS to work with solar panels to supplement the built in battery charger of the UPS.

The Star T2X Series: an ecologic solution for homes and offices!



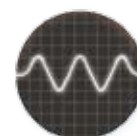
Features:	
✓	Multiple microprocessor design base
✓	Compatible with linear and non-linear load
✓	Stronger charger to support batteries 500AH and up
✓	24 hours operation on the inverter
✓	Parameter presentable
✓	DC start and automatic self-diagnostic function
✓	THD less than 3%
✓	High efficiency design to save electricity
✓	Low heat dissipation in long time operation
✓	Designed to operate under harsh environment
✓	LCD Panel Control
✓	Controllable & Removable panel with LCD
✓	Wall Mounted Design or 19" Rack



Powerful charger



Auto transfer switch



Pure sinewave



Sinewave inverter

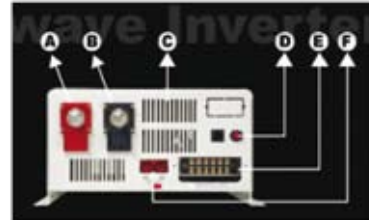
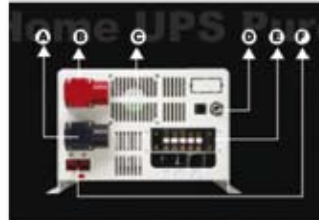


Solar power server

UPS - LINE INTERACTIVE PURE SINEWAVE (LONG STANDBY)



- A Positive DC connector
- B Negative DC connector
- C Cooling Fan
- D AC Output Fuse
- E AC Output Terminal Block
- F Solar Panel Input.



Model		ST2008X	ST2010X	ST2020X	ST2040X	ST2060X	ST2080X	
Capacity	Watt/Amps		800W/3.6A	1600W/7.2A	2400W/10.9A	4000W/18.1A	6000W/27.2A	8000W/36.3A
Input	Normal Voltage		220Vac / 110Vac					220Vac
		Acceptable Voltage	120-275Vac / 60-135Vac					120Vac-275Vac
		Frequency	50Hz / 60Hz (45Hz- 70Hz)					
	Voltage Range	Line Low Transfer	120Vac +-2% /60VAC +- 2%					120Vac+-2%
		Line Low Return	130Vac +-2% /65Vac +-2%					130Vac+-2%
		Line High Transfer	275Vac +-2% / 135Vac +-2%					275Vac+-2%
		Line High Return	260Vac+-2% / 130Vac +-2%					260Vac+-2%
Output	Voltage	220Vac (230V or 240 Vac re-settable via LCD panel); 110Vac (115V or 120Vac re-settable via LCD panel)					230Vac (220V or 240Vac re-settable via LCD panel)	
	Voltage Regulation (Batt Mode)	<3% RMS for entire battery voltage range						
	Frequency	50Hz or 60 Hz						
	Frequency Regulation (Batt Mode)	+-0.1 Hz						
	Power Factor	0.67			0.6		0.62	
	Waveform	Pure Sinewave						
Transfer Time	Typical	< 8ms						
Battery	Battery Voltage	12Vdc	24Vdc			48Vdc		
	Backup Time (at full load)	Long time available						
	Max Charging Current (3 steps selectable)	>40A	>50A		>60A			
Solar Power	Solar Power Server 50A (Option)	Optional*			Standard			
Display LCD	LCD Extended LCD Remote Control (optional)	UPS status,I/P &O/P Voltage Frequency, Load%, Battery Voltage & %, Temperature, Model						
	LED	Normal (Green), Warning (Yellow), Fault (Red)						
Audible Alarm	Battery Mode	Beeping every 4 seconds						
	Low Battery	Beeping every second						
	UPS Fault	Beeping Continuously						
	Overload	Beeping twice per second. UPS will shutdown automatically in 30 seconds if overload is over 105~ 150% and up to 150 % will shutdown immediately.						
	Operation Temperature	0-40 degree C; 32-104 degree F						
Environ-ment	Relative Humidity	0-95% non-condensing						
	Audible Noise	Less than 55dBA (at 1M)						
Physical	Net Weight (Kgs)	14	21	23	49.2	51.4	53.6	
	Dimension (WxHxD)mm Rack Mount	440*132*290	440*132*360	440*132*360	N/A	N/A	N/A	
	Wall Mounted(W*H*D)mm	298*400*150	298*450*190	298*450*190	415*600*260	415*600*260	415*600*260	

* Add "S" to the part number for the solar server option

Different specifications required are available
All specifications mentioned above are subject to change without prior notice.

UPS - ONLINE (TRANSFORMERLESS)

1 PHASE INPUT, 1 PHASE OUTPUT



T3 SERIES (1kVA-10kVA)

The T3 is a physically small On-Line double conversion UPS but retains all the features normally associated with On-Line technology, but what is On-Line double conversion technology and why does it matter? Simply put "double conversion" is where the mains supply is rectified to a clean DC voltage and rebuilt into a very clean and regulated AC voltage, at all times your critical load runs from this clean no break supply.

Line-Interactive and Off-Line UPS's are single conversion, put in its crudest form your computer runs on semi regulated mains and will always suffer a small break in supply whilst the UPS moves from mains mode to battery mode in a mains fail situation.

PARALLEL

A big advantage offered by the T3 6kVA to 10kVA is that by means of a simple cable the machines can be linked together to form a parallel N+1 system. This offers the client the opportunity to be either a fail safe system or the option to expand the power as the network grows. Up to three machines can be connected in this way making the T3 a flexible and versatile solution.

UPS MANAGEMENT SOFTWARE

The UPS management software is installed on a server or workstation connected to each UPS via the serial or USB port. Power failure, power restored, battery failure or eight events will be detected and the user informed. A shutdown will be initiated when the batteries are exhausted or a technical problem occurs with the UPS. The UPS management software disconnects, logs out users and closes open applications(subject to application/operating system support) before shutting down the operating system itself.

SIMPLE NETWORK MANAGEMENT PROTOCOL (SNMP)

The T3 SNMP external agent can be located up to 5 metres away from the UPS. Initial configuration is carried out by serial comms using any suitable terminal application (e.g. Hyperterminal for Windows).

The embedded HTTP server presents an HTML interface to the network, which can be accessed from any web browser. All system parameters can be configured from here including scheduled shutdown. A sophisticated JAVA applet provides full monitoring in real time, along with comprehensive events and history logs.

- TRUE ON-LINE DOUBLE TECHNOLOGY FOR HIGH LEVEL OF PROTECTION
- DSP TECHNOLOGY (FOR 6-10kVA MODELS)
- PARALLEL REDUNDANCY CAPABILITY (FOR 6-10kVA MODELS AS STANDARD)
- INTEGRATED SMARTCARD SLOT PROVIDING A CHOICE OF COMMUNICATIONS INTERFACES
- OPTIONAL SPECIALISED UPS MANAGEMENT SOFTWARE
- USER FRIENDLY LCD DISPLAY
- FAILSAFE INTERNAL BYPASS
- SWITCH WITH MANUAL CONTROL
- LONG RUNTIME AVAILABILITY.



UPS - ONLINE (TRANSFORMERLESS)

1 PHASE INPUT, 1 PHASE OUTPUT



Model	ST3010	ST3020	ST3030	ST3060	ST3100
Topology	True On-Line, Double Conversion				
On-battery Waveform	Pure Sine Wave				
Input					
Maximum Capacity (VA/W)	1000VA/800W	2000VA/1600W	3000VA/2400W	6000VA/4800W	10000VA/8000W
Nominal Input	230VAC				
Input Voltage Regulation	160~300 VAC Single Phase w/ Ground			170~285 VAC Single Phase w/Ground	
Nominal Input Frequency	50/60 ± 4Hz				
Input PFC	≥0.95			≥0.98	
Input Short Protection	Circuit Breaker				
Output					
Nominal Output	220/230/240 VAC nominal				
Output Regulation	± 2%			± 1%	
Output T.H.D	≤3% (Linear Load) ≤6% (Non-Linear Load)	≤4% THD (Linear Load) ≤7% THD (Non-Linear Load)		≤2% THD (Linear Load) ≤6% THD (Non-Linear Load)	
High Efficiency Mode (AC to DC)	85%	85%	88%	> 88%	
High Efficiency Mode (DC to AC)	83%	83%	83%	> 88%	
Crest Factor	3:1				
Start on Battery	Yes				
Output Frequency	50 Hz ± 0.2 Hz			50 Hz ± 0.5 Hz	
Battery					
Typical Backup Time (at full load)	9 minutes	12 minutes	8 minutes	10 minutes	8 minutes
Battery Type	Sealed Lead-Acid maintenance-free 12VDC/7Ah per cell				12VDC/9Ah per cell
Number of Batteries	3 cells	8 cells		20 cells	
Recharge Time to 90%	5 hours			7 hours	8 hours
Charge Current of Long Standby Model *	8A			4.2A **	
Advanced Warning Diagnostics					
Front Panel Indication – LCD	UPS Status, I/P Voltage & Frequency, O/P Voltage & Frequency, Battery Voltage, Battery Capacity, Loading %, Temperature, History Alarm.				
Front Panel Indication – LED	Normal (Green), Warning (Yellow), Fault (Red)				
Audible Alarms	Battery Mode, Low Battery, Overload, Fault				
Communication Interface					
Communication Port	RS232 (Standard), DB9 or USB or AS400 or SNMP / HTTP (Optional)				
Environmental					
Audible Noise	< 45dBA @1 meter	< 50dBA @1 meter		< 55dBA @1 meter	
Mechanical					
Dimensions (W x H x D mm)	160 x 220 x 400	200 x 352 x 450		260 x 717 x 570	
Weight (Net Weight with Battery) (kgs)	15	34	35	90	93

* All T3 models have a long standby option with no built in batteries, this is the charge current of the long standby models. For long standby models, add “-L” to the part number.

** 6 and 10kVA models can have up to 25A charging capabilities when connected in parallel with the ST-CHARGER external super charger.

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UPS - ONLINE (TRANSFORMER)

1 PHASE INPUT, 1 PHASE OUTPUT



T3T SERIES (10kVA - 15kVA)

The T3T is a transformer isolated On-Line double conversion UPS but what is On-Line double conversion technology and why does it matter? Simply put "double conversion" is where the mains supply is rectified to a clean DC voltage and rebuilt into a very clean and regulated AC voltage, at all times your critical load runs from this clean no break supply and is isolated from the input.

Line-Interactive and Off-Line UPS's are single conversion, put in its crudest form your computer runs on semi regulated mains and will always suffer a small break in supply whilst the UPS moves from mains mode to battery mode in a mains fail situation.

PARALLEL

A big advantage offered by the T3T is that by means of a simple cable the machines can be linked together to form a parallel N+1 system (only for 10kVA and 15kVA models). This offers the client the opportunity to be either a fail safe system or the option to expand the power as the network grows. Up to three machines can be connected in this way making the T3T a flexible and versatile solution.

UPS MANAGEMENT SOFTWARE

The UPS management software is installed on a server or workstation connected to each UPS via the serial or USB port. Power failure, power restored, battery failure or eight events will be detected and the user informed. A shutdown will be initiated when the batteries are exhausted or a technical problem occurs with the UPS. The UPS management software disconnects, logs out users and closes open applications(subject to application/operating system support) before shutting down the operating system itself.

SIMPLE NETWORK MANAGEMENT PROTOCOL (SNMP)

The T3T SNMP external agent can be located up to 5 metres away from the UPS. Initial configuration is carried out by serial comms using any suitable terminal application (e.g. Hyperterminal for Windows).

The embedded HTTP server presents an HTML interface to the network, which can be accessed from any web browser. All system parameters can be configured from here including scheduled shutdown. A sophisticated JAVA applet provides full monitoring in real time, along with comprehensive events and history logs.



- TRUE ON-LINE DOUBLE CONVERSION TECHNOLOGY FOR HIGH LEVEL OF PROTECTION
- DSP TECHNOLOGY
- PARALLEL REDUNDANCY CAPABILITY (OPTIONAL)
- INTEGRATED SMARTCARD SLOT PROVIDING A CHOICE OF COMMUNICATIONS INTERFACES
- OPTIONAL SPECIALISED UPS MANAGEMENT SOFTWARE
- USER FRIENDLY LCD DISPLAY
- FAILSAFE INTERNAL BYPASS
- SWITCH WITH MANUAL CONTROL
- LONG RUNTIME AVAILABILITY.

UPS - ONLINE (TRANSFORMER)

1 PHASE INPUT, 1 PHASE OUTPUT



Model*	ST3020T	ST3030T	ST3050T	ST3060T	ST3100T	ST3150T
Topology	True Online Double Conversion, Isolated Transformer Output					
Input						
Maximum Capacity (kVA/kW)	2/1.4	3/2.1	5/3.5	6/4.2	10/7	15/10.5
Input Voltage Regulation	220VAC ±25%					
Nominal Input Frequency	50Hz ± 5%					
Battery Voltage	48VDC	96VDC	192VDC			
Output						
Output Regulation	220VAC ± 2%					
Waveform	Sinewave, ≤3% THD					
Switch Time	0ms					
Overload Capacity	125% for 60 seconds, 150% for 0.5 seconds					
Crest Factor	3:1					
Start on Battery	Yes					
Output Frequency	Automatic synchronous tracing when power supply normal, at 50Hz ± 0.5% when power supply abnormal					
Battery						
Back up time**	15 mins	25 mins	10 mins	10 mins	Any backup time	
Battery efficiency	>80%	>87%			>89%	
Charging***	Intellectual MMBM battery control technique, unique multi-charging mode improving the reliability and lengthening the life of the batteries					
Other Features						
Panel Display	Input voltage, Output voltage, Load capacity, Battery voltage LED indicating lights show the working status					
Alarm	Mains supply abnormal, Low battery, Overload					
Protection Function	Protection for low battery, overload, over temperature, short circuit, output over voltage, output low voltage					
Parallel function*	N/A				Random extending or N+1 redundancy parallel connection	
Communication Interface						
Communication Function	RS232 communication port supports UPSilon 2000 software (standard). Supports SNMP adapter for network management (optional).					
Remote Control (Optional)	Independent digital remote control at the distance of 1000 meters supported by RS485, which supports remote monitoring					
Dry connection	The port allows a 2A current, convenient and safe					
Environmental						
Audible Noise	< 55dBA @1 meter				< 60dBA @1 meter	
Work Temperature, Relative Humidity	0~40°C, 0~95%(no condensation)					
Altitude	Meet GB/T 7260.3-2003 standard					
Mechanical						
Dimensions (W x L x H mm)	230 x 620 x 470	230 x 635 x 690			400 x 800 x 1180	
Weight (with & without batteries) (kgs)	65/52	82/58	90/57	108/61	210/92	250/140

* T3T10kVA and 15kVA models have a parallel redundant option, add "-P" to the part number.

** T3T 2kVA-15kVA models have a long standby option with no built in batteries, add "L" to the part number for these models.

***5-15kVA models can have up to 15A charging capabilities when connected in parallel with the ST-CHARGER external super charger.

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UPS - ONLINE (TRANSFORMERLESS)

1 PHASE INPUT, 1 PHASE OUTPUT



T3R SERIES (1kVA-10kVA)

With ever greater demands being made on valuable floor space, many IT managers are moving towards computer rack solutions rather than conventional floor standing options offered in the past. The same philosophy has affected the UPS industry with many UPS now being located with the computer inside the rack cabinet. On-Line UPS have historically been handicapped in this particular market sector, essentially for two reasons, size and price. Most IT managers have dealt with this problem by moving to Line-Interactive and Off-Line topologies. As these technologies have fewer fail safe features and for the most part only work when a problem occurs. With the introduction of the T3R series these past limitations are no longer valid.

The T3R is a physically small On-Line double conversion UPS but retains all the features normally associated with On-Line technology, but what is On-Line double conversion technology and why does it matter? Simply put, "double conversion" is where the mains supply is rectified to a clean DC voltage and rebuilt into a very clean and regulated AC voltage, at all times your critical load runs from this clean no break supply. Line-Interactive and Off-Line UPS are single conversion, put in its crudest form, your computer runs on semi regulated mains and will always suffer a small break in supply whilst the UPS moves from mains mode to battery mode in a mains fail situation. The T3R offers a competitive price, even against the more basic technologies, but unlike these technologies you will get as standard an LCD screen, RS232, USB port options, battery extension options, battery monitoring, no-break supply, static switch, wide voltage input without using batteries, optional software, comms slot for SNMP, Relays or Optocoupler.

SIMPLE NETWORK MANAGEMENT PROTOCOL (SNMP)

The T3R SNMP external agent can be located up to 5 metres away from the UPS. Initial configuration is carried out by serial comms using any suitable terminal application (e.g. Hyperterminal for Windows). The embedded HTTP server presents an HTML interface to the network, which can be accessed from any web browser. All system parameters can be configured from here including scheduled shutdown. A sophisticated JAVA applet provides full monitoring in real time, along with comprehensive events and history logs.

UPS MANAGEMENT SOFTWARE

The UPS management software is installed on a server or workstation connected to each UPS via the serial or USB port. Power failure, power restored, battery failure or eight events will be detected and the user informed. A shutdown will be initiated when the batteries are exhausted or a technical problem occurs with the UPS. The UPS management software disconnects, logs out users and closes open applications (subject to app/os support) before shutting down the operating system itself.

- EXTENSIVE LOG FILES
- SCHEDULED BATTERY AND INVERTER TESTING
- SCHEDULED SYSTEM SHUTDOWN/RESTART
- USER-CUSTOMISABLE COMMANDS AND MESSAGES
- MULTIPLE UPS CONTROL FROM A SINGLE COMPUTER
- REMOTE CONSOLE COMMAND MODULE FOR REMOTE MULTIPLE SERVER SHUTDOWN
- INTERNAL SNMP SUB-AGENT FOR INTEGRATION INTO EXISTING NMS (E.G. HP OPENVIEW, CA UNICENTER).



UPS - ONLINE (TRANSFORMERLESS)

1 PHASE INPUT, 1 PHASE OUTPUT



Model	ST3R10	ST3R20	ST3R30	ST3R60	ST3R100
Topology	True On-Line, Double Conversion				
Output Waveform	Pure Sine Wave				
Input					
Maximum Capacity (VA/W)**	1000VA/800W	2000VA/1600W	3000VA/2400W	6000VA/4800W	10000VA/8kW
Nominal Input Voltage	230 VAC				
Input Regulation Voltage	160~300 VAC Single Phase w/ Ground			160~300 VAC Single Phase w/ Ground	
Nominal Input Frequency	50/60 ± 4Hz				
Input PFC	≥0.95			≥0.98	
Input Short Protection	Circuit Breaker				
Output					
Nominal Output Voltage	220/230/240 VAC nominal				
Output Voltage Regulation	± 2%				
Output T.H.D	≤3% (Linear Load) ≤6% (Non-Linear Load)	≤4% THD (Linear Load) ≤7% THD (Non-Linear Load)		≤2% THD (Linear Load) ≤6% THD (Non-Linear Load)	
High Efficiency Mode (AC to DC)	85%	85%	88%	> 88%	
High Efficiency Mode (DC to AC)	83%	83%	83%	> 88%	
Crest Factor	3:1				
Start on Battery	Yes				
Output Frequency	50 Hz ± 0.2 Hz			50 Hz ± 0.5 Hz	
Battery					
Typical Backup Time	9 minutes	12 minutes	8 minutes	10 mins	8 minutes
Battery Type	Sealed Lead-Acid maintenance-free 12VDC/7Ah per cell				12VDC/9Ah per cell
Number of Batteries	3 cells	8 cells		20 cells	
Recharge Time to 90%	5 hours			7 hours	8 hours
Charge Current of Long Standby Model *	8A			4.2A **	
Advanced Diagnostics					
Front Panel Indication – LCD	UPS Status, I/P Voltage & Frequency, O/P Voltage & Frequency, Battery Voltage, Battery Capacity, Loading %, Temperature, History Alarm.				
Front Panel Indication – LED	Normal (Green), Warning (Yellow), Fault (Red)				
Audible Alarms	Battery Mode, Low Battery, Overload, Fault				
Communication Interface					
Communication Port	RS232 (Standard), DB9 or USB or AS400 or SNMP / HTTP (Optional)				
Environmental					
Operation Temperature	0-40°C				
Storage Temperature	-15°C to 50°C				
Relative Humidity	20% to 90% non-condensing				
Audible Noise	< 45 dBA @ 1 meter	< 50 dBA @ 1 meter		< 55 dBA @ 1 meter	
Mechanical					
Dimensions (W x H x D mm)	440 x 88 x 465 (with internal batteries)	440 x 88 x 465 (UPS only) 440 x 88 x 465 (External Battery)		440 x 132 x 640 (UPS Only) 440 x 132 x 640 (External Battery)	
Weight (Net Weight with Batteries) (kgs)	15.5	35	36	85	88

* All T3R models have a long standby option with no built in batteries, this is the charge current of the long standby models.
For long standby models, add "-L" to the part number.

** 6 and 10kVA models can have up to 25A charging capabilities when connected in parallel with the ST-CHARGER external super charger.
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UPS - ONLINE (TRANSFORMERLESS)

1 PHASE INPUT, 1 PHASE OUTPUT



T3RT SERIES (1kVA-10kVA)

The T3RT is a rack tower online double conversion UPS. It is a physically small On-Line double conversion UPS but retains all the features normally associated with On-Line technology, but what is On-Line double conversion technology and why does it matter? Simply put "double conversion" is where the mains supply is rectified to a clean DC voltage and rebuilt into a very clean and regulated AC voltage, at all times your critical load runs from this clean no break supply.

Line-Interactive and Off-Line UPS's are single conversion, put in its crudest form your computer runs on semi regulated mains and will always suffer a small break in supply whilst the UPS moves from mains mode to battery mode in a mains fail situation.

PARALLEL (OPTIONAL)

A big advantage offered by the T3RT 6kVA to 10kVA is that by means of a simple cable the machines can be linked together to form a parallel N+1 system. This offers the client the opportunity to be either a fail safe system or the option to expand the power as the network grows. Up to three machines can be connected in this way making the T3RT a flexible and versatile solution.

UPS MANAGEMENT SOFTWARE

The UPS management software is installed on a server or workstation connected to each UPS via the serial or USB port. Power failure, power restored, battery failure or eight events will be detected and the user informed. A shutdown will be initiated when the batteries are exhausted or a technical problem occurs with the UPS. The UPS management software disconnects, logs out users and closes open applications(subject to application/operating system support) before shutting down the operating system itself.

- TRUE ON-LINE DOUBLE CONVERSION TECHNOLOGY FOR HIGH LEVEL OF PROTECTION
- CONTINUOUS BATTERY CHARGER AND INVERTER FOR PRIMARY POWER PATH
- CONSTANT BATTERY CONNECTION TO INVERTER AND LOAD
- GUARANTEES FULL POWER OPERATION DURING POWER FAILURE
- NO VOLTAGE DROP AND ZERO TRANSFER TIME
- LIGHT WEIGHT UNIT
- ROTATABLE LCD DISPLAY FOR TOWER OR 19" RACK CONCEPT



UPS - ONLINE (TRANSFORMERLESS)

1 PHASE INPUT, 1 PHASE OUTPUT



Model *	ST3010RT	ST3020RT	ST3030RT	ST3060RT	ST3100RT
Topology	True On-Line, Double Conversion				
On-battery Waveform	Pure Sine Wave				
Input					
Maximum Capacity (VA/W)	1000VA/800W	2000VA/1600W	3000VA/2400W	6000VA/4800W	10000VA/8000W
Nominal Input	230VAC				
Input Voltage Regulation	160~276 VAC				
Output					
Nominal Output	230VAC				
Output Regulation	± 1%				
Output T.H.D	≤2% (Linear Load)				
Crest Factor	3:1				
Start on Battery	Yes				
Output Frequency	50Hz				
Battery					
Battery Type	Sealed Lead-Acid maintenance-free 12VDC/7Ah per cell				12VDC/9Ah per cell
Number of Batteries	3 cells	8 cells	8 cells	16 cells	
Recharge Time to 90%	8 hours				
LCD Display					
Front Panel Indication – LCD	Inpiut Voltage and Current. Output Voltage, Frequency and Current. Battery Voltage				
Communication Interface					
Communication Port	RS232 (Standard), DB9 or USB or AS400 or SNMP / HTTP (Optional)				
Environmental					
Audible Noise	< 45dBA @1 meter	< 50dBA @1 meter		< 55dBA @1 meter	
Mechanical					
Dimensions (W x D x H mm)	430 x 480 x 88 (2U)	430 x 480 x 176 (4U)		430 x 680 x 176 (4U)	
Weight (Net Weight with Battery) (kgs)	13	31	32	85	87

* All T3RT models have a long standby option with no built in batteries, add "-L" to the part number. Available on request

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UPS - Online (Transformerless)

3 PHASE INPUT, 1 PHASE OUTPUT



T4 SERIES (10kVA-20kVA)

The T4 is a physically small On-Line UPS but retains all the features normally associated with double conversion technology. Simply put "double-conversion" is where the mains supply is rectified to a DC voltage and rebuilt into a very clean and regulated AC voltage, at all times your critical load runs from this clean no break supply.

PARALLEL

A big advantage offered by the T4 10kVA to 20kVA is that by means of a simple cable the machines can be linked together to form a parallel N+1 system. This offers the client the opportunity to either have a fail safe system or the option to expand the power as the network grows. Up to three machines can be connected in this way making the T4 a flexible and versatile solution.

ULTRA COMPACT

With a very small footprint you will find a ready home for the T4 in even the most hard-pressed data center. Installing such a compact free-standing UPS avoids taking up valuable rack space without significantly reducing the available floor area.

DISPLAY PANEL

LCD display and audible alarms actively let you know if the unit is on battery, the battery charge is low, or there is an overload condition. Loading and battery information via the LCD prevent you from exceeding the UPS capacity and allow you to assess the remaining runtime before battery reserves are depleted.

ADVANCED BATTERY MANAGEMENT

A variable boost charger ensures quick battery recharge. This means that the T4 UPS is fully prepared for duty with a minimum recovery time in the event of a power failure. Active battery management intelligently monitors the battery set with automatic battery and circuitry self-tests, this feature increases both battery life and system reliability.

UPS MANAGEMENT

One standard management tool can be used to monitor and control all your UPS's from one central location. This means power management can now be integrated into your existing network or building management strategy. Alarms ('traps') can be configured to ensure automatic notification of events such as low battery, mains failure or overload. Two such tools can be used with the T4: Simple Network Management Protocol (SNMP) and UPS Management Software via RS232.

- TRUE ON-LINE DOUBLE CONVERSION TECHNOLOGY FOR ULTIMATE POWER PROTECTION
- DSP TECHNOLOGY
- PARALLEL REDUNDANCY CAPABILITY AS STANDARD
- IGBT INVERTER TECHNOLOGY
- SNMP/HTTP OPTION FOR REMOTE MANAGEMENT & INTEGRATION INTO NMS
- SMART RS232 AS STANDARD
- INTEGRATED SMARTCARD SLOT PROVIDING A CHOICE OF COMMUNICATIONS INTERFACES
- OPTIONAL SPECIALISED UPS MANAGEMENT SOFTWARE
- USER FRIENDLY LCD DISPLAY
- FAILSAFE INTERNAL BYPASS SWITCH WITH MANUAL CONTROL
- LONG RUNTIME AVAILABILITY.



UPS - ONLINE (TRANSFORMERLESS)

3 PHASE INPUT, 1 PHASE OUTPUT



Model	ST4100	ST4150	ST4200
Topology	True On-Line, Double Conversion		
On-battery Waveform	Pure Sine Wave		
Input			
Maximum Capacity (kVA/kW)	10kVA/8kW	15kVA/12kW	20kVA/16kW
Nominal Input Voltage	380VAC Three Phase (3 Φ 4W + G)		
Input Voltage Regulation	304 ~ 478 VAC		
Nominal Input Frequency	50/60 ± 4Hz		
Input PFC	≥0.95 @ full load		
Input Short Protection	50A Circuit Breaker	100A Circuit Breaker	
Output			
Nominal Output Voltage	220/230/240 VAC Single Phase (1 Φ 2W + G)		
Output Voltage Regulation	± 1%		
Output T.H.D	≤2% THD (Linear Load), ≤6% THD(Non-Linear Load)		
Efficiency – Normal Mode	88%		
Efficiency – Battery Mode	88%		
Crest Factor	3:1		
Start on Battery	Yes		
Overload Capability (Normal Mode)	Sustaining 10 min @ 105% ~ 130% load; 1sec @ > 130% load		
Overload Capability (Battery Mode)	Shut down UPS after 10 sec @ > 150% load		
Output Frequency	50/60 Hz ± 0.05 Hz (Battery Mode)		
Battery			
Battery Type	Sealed Lead-Acid maintenance-free 12VDC/7Ah per cell		
Number of Batteries	40 cells	40 cells	40 cells
Typical Backup Time at Full Load	12 mins	8 mins	6 mins
Recharge Time to 90%	< 8 hours		
Charger Current (Max)	4.2A *		
Advanced Diagnostics			
Front Panel Indication – LCD	UPS Status, I/P Voltage & Frequency, O/P Voltage & Frequency, Battery Voltage, Battery Capacity, Loading %, Temperature, History Alarm.		
Front Panel Indication – LED	Normal (Green), Warning (Yellow), Fault (Red)		
Audible Alarms	Battery Mode, Low Battery, Overload, Fault		
Communication Interface			
Communication Port	RS232 (Standard), DB9 or USB or AS400 or SNMP / HTTP (Optional)		
Environmental			
Audible Noise	< 55dBA @ 1 meter		
Mechanical			
UPS Dimensions (W x H x D mm)	260 x 717 x 570		
Battery Cabinet Dimensions (W x H x D mm)	260 x 717 x 570		
UPS Weight (kgs)	39	55	55
Battery Cabinet (w/battery) (kgs)	143	143	143
Total Weight (kgs)	182	198	198

* All T4 models can have up to 25A charging capabilities when connected in parallel with the ST-CHARGER external super charger.
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UPS - ONLINE (TRANSFORMER)

3 PHASE INPUT, 1 PHASE OUTPUT



T4T SERIES (10kVA-50kVA)

The T4T Series UPS is an online sine wave UPS mainly designed for major equipment used in large-scaled data centers (such as measurement equipment, industrial automation equipment, etc.) with high performance. Its high reliability provides necessary protection on load for the users in finance, communication, traffic, tax, forces, security, power source, education, government and enterprise etc. The T4T Series UPS is true double conversion on-line UPS. With IGBT power units, SPWM inverter, intellectual multi modes battery management technique, advanced tech and power management software.

TRUE ONLINE DOUBLE CONVERSION UPS

Output is fully isolated by a transformer, with IGBT power units used to solve problems on the electric system such as lightning strikes, power blackouts, etc.

EMC COMPLIANT

All products are EMC compliant. Testing points include conducting disturbance, radiant disturbance, conducting ant-disturbance, radiant ant-disturbance, power fault, mass pules, ESD etc. Excellent EMC features make the T-UK Series capable of high frequency communication and video & audio broadcasting.

COLD START FUNCTION

Because of special current limiting circuits on the UPS, the user can start the UPS directly on its battery bank without mains being available. The UPS has a more powerful cold starting capability and is able to run on full load.

PERFECT PROTECTION MEASURES

Protection for over output voltage and current, low battery, quick current limit and short-circuit to avoid stoppages caused by the user's incorrect operation.

INTELLIGENT BATTERY MANAGEMENT TECHNOLOGY

Equipped with patented intellectual battery management technique. With proffessional management design on battery charging or discharging, the user can get high battery reliability and running life. At the same time the intellectual charging module can select the right charging power according to different battery configurations making sure that there is rapid power compensation on the battery bank.

FLEXIBLE NETWORK SUPERVISION

Flexible network supervising ability to realise intellectual monitoring of the UPS. Including close point-to-point communication supervising, middle range communication supervising, and remote network management. Based on these, there are many UPS functions such as real time supervising over running status and features, automatic call, sending e-mail, cell phone text messaging, voice function, remote on/off for the UPS etc.

CURRENT EQUALISATION CONTROL TECHNIQUE

Current equalisation control technique, for N units parallel redundancy or N+1 redundant parallel connection, digitized current equalisation control, reliability and redundancy of the system is higher than traditional parallel systems and field installation and debugging is simple. UPS unit can be switched on or be on line on standby mode, to enable hot maintenance on line of parallel system.



UPS - ONLINE (TRANSFORMER)

3 PHASE INPUT, 1 PHASE OUTPUT



Model	ST4100T	ST4150T	ST4200T	ST4300T	ST4400T	ST4500T
Input						
Voltage Range	400VAC (-25%~+25%)					
Frequency Range	50Hz / 60Hz ± 5%					
Phase	Three phases, five wires					
Battery Voltage	16 x 12Vdc = 192Vdc		29 × 12Vdc = 348Vdc			
Output						
Rated Power - kVA/kW	10/7	15/10.5	20/16	30/24	40/32	50/40
Voltage Range	230VAC ± 2%					
Frequency	50Hz ± 1%(battery mode)					
Waveform	THD ≤ 3%(linear load)					
Battery Efficiency	≥ 90% (100% linear load)					
Overload Capacity	10min at 105%, 1min at 125%, 0.5s at 150%					
Crest Factor	3:1					
Parallel Equal Current	≤ 5%(only applicable to the parallel models)					
Other						
Parallel Function	Random extending or N+1 redundancy parallel connection (only applicable to the parallel models)					
LCD Display	Input voltage, Output voltage, Load capacity, Battery voltage		Input voltage, Frequency, Output voltage, Battery voltage, Load, DC current etc.			
LED Display	Operation status					
Alarm Function	Mains supply abnormal, Low battery, Overload		Overload, AC input abnormal, Low battery, Failure, Over-temperature			
Communication Function	RS232/RS485, dry connection communication signal					
Protection Function	Low battery, Overload, Overheat, Output short circuit, Output over voltage					
Audible Noise	< 60dBA @ 1m					
Working Temperature, Relative Humidity	0°C-40°C, 0-95% (no condensation)					
Dimension (W x D x H) (mm)	740 x 300 x 100	800 x 400 x 1180				
Weight (kg)	135	160	205	225	280	305

10-15kVA models can have up to 15A charging capabilities when connected in parallel with the ST-CHARGER external super charger.

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UPS - ONLINE (TRANSFORMER)

3 PHASE INPUT, 3 PHASE OUTPUT



T5 SERIES (10kVA-400kVA)

ST5 (10kVA-400kVA) features true on line double conversion and zero sec. transfer time. Intellectual blocking design, adopts advanced power apparatus IGBT, predominantly a SPWM inverter. It also features MMBM intellectual multi-modes battery management and intellectual monitoring and management software. The parallel capacity can extend the on line parallel redundancy or N+1 for upgradeability.

TRUE ONLINE DOUBLE CONVERSION

Output is isolated by a transformer, with IGBT power units used, making sure a safe working environment for all equipment. Isolation between N and G, and anti-impact from all kinds of surges and disturbances in power.

3 output phases can be adjusted independently, thus allowing 3 phase 100% unbalanced load, flexible load capacity and high system reliability. Especially fit for computer rooms, communication etc.

RELIABLE EMC FEATURES

All products have passed the EMC tests. Testing includes conducting disturbance, radiant disturbance, conducting anti-disturbance, radiant anti-disturbance, power fault, mass pulse, surge, ESD etc. Excellent EMC features allow the ST5 series to be capable of high frequency communication and video & audio broadcasting.

COLD START FUNCTION

Due to a special current limiting circuit on the UPS, the user can start the UPS directly from the battery bank connected for emergency situations in a no mains situation. The UPS can run on cold start on full load.

FULL FUNCTION LCD DISPLAY

All ST5 series products above 20KVA are equipped with large LCD Displays. They also feature real time surveillance on UPS running parameters and status, FE and daily maintenance.

The ST5 features an Intelligent battery management system while batteries are being charged and discharged for longer operational life and higher reliability of the batteries.

FLEXIBLE NET PROJECT MONITORING (OPTIONAL)

Independent digital remote control, supported by RS485, with a range of 1000 meters or SNMP network adapter

ADVANCED NON-MASTER-SLAVE SELF-ADAPTIVE CONTROL TECHNOLOGY (PARALLEL TYPE)

ST5 series parallel UPS features a powerful parallel capacity. There is no need to set the parallel units. The User can extend the parallel capacity as needed for N+1 parallel redundancy. This increases the reliability of the power system.



UPS - ONLINE (TRANSFORMER)

3 PHASE INPUT, 3 PHASE OUTPUT



Model	ST5 010	ST5 020	ST5 030	ST5 040	ST5 050	ST5 060	ST5 080	ST5 100	ST5 120	ST5 160	ST5 200	ST5 300	ST5 400
Input													
Voltage *	380/400VAC ± 25%												
Rectifier Frequency Range	40Hz~65Hz												
SYNC Frequency Tracking Range	50Hz ± 5% (± 10% option)												
Phase	3φ4W+PE												
Battery	12Vdc × 29 = 348Vdc / 12vDC x 30 = 360Vdc												
Charge Current (Max)	5~40A (adjustable)										5~80A (adjustable)		
Charge DC Voltage Regulation	395V ± 5Vdc												
DC Ripple Voltage	<1%												
Output													
Capacity (kVA)	10	20	30	40	50	60	80	100	120	160	200	300	400
Power Factor	0.8												
Phase	3φ4W+PE												
Voltage *	L-N: 220VAC ±1%, L-L: 380VAC ± 1%												
Frequency	Utility normal, follow in phase automatically, Utility fault, output frequency at 50Hz ± 0.2%												
Parallel mode (optional)	None-principle-subordinate Adaptive Control Technique, User can extend parallel capacity as needed for N+1 parallel redundancy												
3 phase 100% load unbalance voltage stability	≤2%, allows 100% unbalance												
Waveform	Sinewave THD ≤ 3% (linear load)												
Crest Factor	3:1												
Efficiency	90%												
Static Bypass Transfer Time	0ms												
Overload Capacity	110% load for 30 min,125% load for 10 min,150% load for 1min												
Regulation no load to full load steady state	±2%												
Other													
Panel Display	LCD Display indicates 3 phase input voltage, input frequency, 3 phase output voltage, load, battery voltage, battery charging and discharging etc. LED indicates running status												
Battery Self-Testing	Automatically sounds an alarm and estimates battery status in battery abnormal status												
Lightning Protection	Complies with IEC 1312												
Operating Temp., Humidity	0°C-40°C, 95% (non-condensing)												
Dimension (W x D x H) (mm)	500 x 800 x 1180			800 x 800 x 1600			1000 x 800 x 1800				1800 x 1000 x 2000	2200 x 1000 x 2000	
Weight (kg)	185	205	235	430	450	470	680	705	745	805	1400	2350	2380

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UPS - ONLINE (TRANSFORMER)

3 PHASE INPUT, 3 PHASE OUTPUT



T6 SERIES 10kVA-1MVA

The AEC Star T6 series UPS is an on-line double conversion three phase UPS with a fully digitised intelligent galvanic isolation design. Single unit ratings of up to 1MVA are available and parallel capability is also available. The UPS can also be customised for various input voltages allowing them to be used in various applications (e.g. mining).

FEATURES AND ADVANTAGES:

Advanced Technology DSP, IGBT and Switching Components

To increase reliability and efficiency.

True Galvanic Isolation Design

An isolation transformer is used on the output. This can solve numerous problems such as poor input grounding, different grounds between input and output and ground leakage currents. The user also has the benefit of attenuation of common mode noise from the output isolation transformer.

Multi-CPU design and Software/Hardware Cooperate Control

Several CPU's are employed in the control circuitry, critical functions are designed to employ parallel redundancy to improve reliability.

Redundant Power Supply

An extra power supply is connected redundantly to supply power to the static switch, so that, there will be AC output no matter what happens to the UPS.

Plug and Play Modular Design

The power circuit is separated into several modules plugged into slots in the UPS, which is easy to remove, allowing for quick maintenance and easier trouble-shooting.

Each Phase with Individual Inverter Support

Allowing for 100% unbalanced load.

Protection Against Detached or Floating Neutral of the Input

MOV's are used at the input and provide sufficient protection to both the UPS and the load from any lightning or surges caused by neighbouring large loads.

Large Charging Power (Selectable)

The charge power is selectable according to the Ah of the battery bank. Ah ratings to allow for 8 hours backup time can be supported with no additional external chargers needed.

Various Interface Options

Remote control panel, 3 phase software for PC monitoring, auto dialling module, battery monitoring module, 3 Phase SNMP card, emergency stop switch.

12-Pulse Fully Controlled Rectifier (Optional)

In order to further improve the power factor and reduce harmonic current drawn by the rectifier, the UPS from 120kVA uses a 12-pulse fully controlled rectifier. The total harmonic current can be reduced to around 10% and the power factor improved to over 0.8. A phase shift transformer is added to achieve the performance. The input inductor is retained to obtain the best result. This is a more rugged topology.

Parallel Operation (Optional)

To increase the capacity and reliability of the UPS. The load is equally shared between the paralleled units. When there is a fault with one of the units, the other units continue running without output interruption.

FEATURES:

- Wide input range, robust design for harsh environments
- DC start function, can be started without AC
- Intelligent, safe and unique battery management system
- Variety of accessories
- Parallel operation available
- Specifications can be customised
- Frequency converter option available.



UPS - ONLINE (TRANSFORMER)

3 PHASE INPUT, 3 PHASE OUTPUT



Model	ST6 010	ST6 015	ST6 020	ST6 030	ST6 040	ST6 050	ST6 060	ST6 080	ST6 100	ST6 120	ST6 160	ST6 240	ST6 320	ST6 400
kVA	10	15	20	30	40	50	60	80	100	120	160	240	320	400
Input (Rectifier)														
Input Voltage	190V / 208V / 380V / 400V / 415V / 440V / 480V / 600V, 3P4W or 3P3W													
Input Range	± 20% (> 20% available on request)													
Input Frequency	50Hz / 60Hz ± 5Hz													
Power Walk In	0% - 100% : 20sec													
Battery														
DC Voltage	29 x 12Vdc = 348Vdc													
Maximum Charge Current	5	8	10	15	20	25	30	40	50	60	80	120	160	200
Inverter														
Output Voltage Regulation	190V / 208V / 380V / 400V / 415V / 440V / 480V / 600V, 3P4W or 3P3W ± 1%													
Output Power Factor	0.8													
Output Frequency	50Hz / 60Hz ± 3Hz (lock range), 50Hz / 60Hz ± 0.1Hz (free running)													
Phase Shift	< 0.50 at 100% unbalanced load													
THD (Linear Load)	< 2%													
Overload	< 110% Continuous, 110%-125% 15mins, 125%-150% 10mins, > 150% 30sec													
Efficiency at 100% Load	93%			93.5%			94%	94.5%		95%				
Overall Characteristics														
Overall Efficiency	91			91.5		92		92.5		93				
Maximum Heat Dissipation (kW)	1.1		1.3	1.9	2.6	3	3.5	4.6	5.4	6.5	8.7	13	17.4	21.7
Dimensions (L x W x H) (mm)	550 x 800 x 1600							1100 x 800 x 1600				2200 x 800 x 1600		3300 x 800 x 1600
Weight (kg)	270	300	350	400	480	550	680	820	950	1180	1450	1950	2450	3100
Audible Noise	< 65dBA (at 1m)							< 67dBA (at 1m)						
Temperature / Humidity	0°C-40°C, 32°F-104°F / 0-90% (Non-condensing)													
Altitude	< 1500m above sea level													
12 Pulse Rectifier	Optional									Standard				
FCC Class A, EN50091-1, -2	Yes													
Short Circuit Protection	Rectifier, Reserve and Bypass													
Lightning / EMC Filter	MOV / Input & Output													
Galvanic Isolation	Output true Galvanic Isoation (input available on request)													
Indicator & Alarm	LCD, LED, Mimic Display, Buzzer													
Remote Control / Communication Interface	Monitoring 1-99 UPS simultaneously / Dry Contact, RS232, RS485													

Bigger sizes up to 1000kVA available

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UPS - ONLINE (TRANSFORMERLESS)

3 PHASE INPUT, 3 PHASE OUTPUT



T6I SERIES (10kVA-120kVA)

ST6I (10kVA-400kVA) features true on line double conversion and zero sec. transfer time. The features include full digital control with DSP's for IGBT rectifier, inverter and battery charger.

COLD START FUNCTION

Due to a special current limiting circuit on the UPS, the user can start the UPS directly from the battery bank connected for emergency situations in a no mains situation. The UPS can run on cold start on full load.

FULL FUNCTION LCD DISPLAY

All ST6I series products above 40KVA are equipped with a large touch screen LCD display. Units 40kVA and below have an LCD display with keyboard input. They also feature real time surveillance on UPS running parameters and status, FE and daily maintenance.

The ST6I features an Intelligent battery management system while batteries are being charged and discharged for longer operational life and higher reliability of the batteries.

FLEXIBLE NET PROJECT MONITORING

Independent digital remote control, supported by RS485, with a range of 1000 meters or SNMP network adapter.

ADVANCED NON-MASTER-SLAVE SELF ADAPTIVE CONTROL TECHNOLOGY (PARALLEL TYPE)

ST6I series parallel UPS features a powerful parallel capacity. There is no need to set the parallel units. The user can extend the parallel capacity as needed for N+1 parallel redundancy. This increases the reliability of the power system.



UPS - ONLINE (TRANSFORMERLESS)

3 PHASE INPUT, 3 PHASE OUTPUT



Model	ST6010I	ST6015I	ST6020I	ST6030I	ST6040I	ST6060I	ST6090I	ST6120I
Input								
Voltage	380/400/415VAC (Line to Line), 50/60Hz							
Input Connection	3Ph+N+PE							
Power Factor	>0.99							
Input Voltage Window	+25% ~ -20%							
	-20% ~ -40%, power derating between 100% to 70%							
Frequency Window	40-70Hz							
Battery								
Battery Voltage	±240Vdc							
Charge Power	20%*Power							
Max. Internal Batteries	40 x 12Ah					External Only		
Output	10kVA	15kVA	20kVA	30kVA	40kVA	60kVA	90kVA	120kVA
Voltage Precision	1% (balanced load), 1.5% (unbalanced load)							
Output Voltage Transient	5% (0-100% load step)							
Voltage THD	THD < 1% (linear load), THD < 5% (non-linear load)							
Power Factor	0.9							
Frequency Tracking Range	50/60Hz ± 3Hz, adjustable							
Frequency Precision	±0.02%							
Crest Factor	3:1							
Overload Capability	102% continuous, 110% for 1 hour, 125% for 10mins, 150% for 1 min, > 150% for 200ms							
Bypass Overload	125% continuous, 130% for 1 hour, 150% for 6 mins, > 1000% for 100ms							
System								
Efficiency	Normal Mode: 95%, ECO Mode: 99%							
Battery Configuration	12V, 40 PCS (36-44PCS acceptable)							
Display	LCD, LED + Keyboard					LCD, LED, Touch Screen and Keyboard		
EMI	IEC62040-2							
EMS	IEC61000-4-2 (ESD), IEC61000-4-3 (RS), IEC61000-4-4 (EFT), IEC61000-4-5 (Surge)							
IP Class	IP 20							
Communication	RS232, RS485, Dry Contacts, SNMP, EPO, Generator Interface							
Operating Temperature	0-40°C							
Relative Humidity	0-90% (non-condensing)							
Noise	<55dB							
Weight (w/o battery)	51.5		89		61	170	231	266
Dimensions (W x D x H, mm)	250 x 840 x 715		350 x 738 x 1335		250 x 836 x 770	600 x 980 x 950	600 x 980 x 1400	

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UPS - ONLINE (TRANSFORMERLESS) 3 PHASE INPUT, 3 PHASE OUTPUT



T7 MODULAR SERIES - 10-300KVA

FEATURES:

- Hot swappable for each module, easy maintenance
- Redundant and High Reliability
- Strong load adaptability for linear and nonlinear load
- Intelligent module and system protection design
- Double DSP controller for individual power module
- IGBT modules rather than discrete components are applied in the power module.
- Friendly generator interface
- SNMP communication card
- Battery temperature compensation module
- Alarm and message module for mobile phone.



UPS - ONLINE (TRANSFORMERLESS)

1 PHASE INPUT, 1 PHASE OUTPUT



Specifications		
Capacity	10-200KVA	300KVA
Main Input		
Input voltage	380V/400V/415V, -40%~+25%	380V/400V/415V,-20%~+25%
Input frequency	50/60Hz, 40-70HZ	50/60Hz, 40-70HZ
Power factor	>0.99	>0.99
Battery		
Battery voltage	±240VDC	±240VDC
Charger power	20%*Power	20%*Power
Charger voltage precision	1%	1%
Bypass		
Bypass voltage	380V/400V/415V, three phase	380V/400V/415V, three phase
Bypass voltage window	-20%~+15%, full load	-20%~+15%, full load, settable
Bypass overload capabiltiy	125%< load <130%, last for more than 1 hour	< 115%, long time operation
	130%<load<150%,last for more than 6 minutes	115%< load <120%, last for more than 1 hour
	>1000%, last for more than 100ms	120%<load<125%,last for more than 10 minutes
Output		
Output voltage	380V/400V/415V, three phase	380V/400V/415V, three phase
Voltage precision	1% (balance load),1.5% (unbalance load)	0.5% (balance load),±1% (unbalance load)
Voltage THD	THD<1.5%(linear load),THD<5%(nonlinear load)	THD<1%(linear load),THD<5%(nonlinear load)
Power factor	0.8	0.8
Phase tolerance	120°±0.5° (balance and unalance load)	120°±0.5° (balance and unalance load)
Crest factor	3:1	3:1
Overload capabiltiy	105%,long time operation	110%, transfer to bypass after 10 minutes
	110%, transfer to bypass after 1hour	
	125%, transfer to bypass after 10 minutes	125%, transfer to bypass 150%, transfer to bypass after 1 minute after 1 minute
	150%, transfer to bypass after 1 minute	
	>150%, transfer to bypass after 200ms	
System		
System efficiency	Normal mode: 96%, ECO mode: 99%, Bat. Mode: 96%	Normal mode: 96%, ECO mode: 99%, Bat. Mode: 96%
Display	LCD+LED, Touch screen and keyboard	LCD+LED, Touch screen and keyboard
Interface (Communication Ports)	RS232,RS485,Dry contacts,SNMP card,EPO,Generator interface	RS232,RS485,Dry contacts,SNMP card,EPO,Generator interface
Operation temperature	0-40°C	0-40°C
Storage temperature	-25°C ~70°C	-25°C ~70°C
Relative humidity	0-95% (non-condensing)	0-95% (non-condensing)
Noise(dB)	<55dB	<55dB
Weight(kg)	6-module cabinet / 150kg	10-module cabinet / 180kg
	10-module cabinet / 180kg	
	10KVA: 20kg	
	15KVA: 21kg	
	20KVA: 22kg	30KVA: 22kg
Dimension(W x D x H)(mm)	6-module cabinet / 600 x 900 x 1600	10-module cabinet / 600*900*2000
	10-module cabinet / 600 x 900 x 2000	
	Module / 440*600*134 (10KVA/15KVA/20KVA)	Module / 400 x 600 x 133 (30KVA)

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INVERTER/CHARGERS

MODIFIED SINEWAVE



IG SERIES - INVERTER/CHARGER (600VA-2kVA)

- Simulated sinewave inverter
- Selectable input voltage range for home appliances and personal computers
- Auto restart with AC recovery
- Overload, and short circuit protection
- Cold start function
- Generator and Computer-related products compatible
- Reverse polarity protection.



Model	IG600	IG1000	IG2000
Capacity	600VA/300W	850VA/600W	2000VA/1200W
Input			
Voltage	220/230/240VAC		
Selectable Voltage Range	140-300VAC	90-280VAC (wide range), 170-280VAC (narrow range)	
Frequency Range	50Hz/60Hz (auto-sensing)		
Output			
AC Voltage Regulation (Batt. Mode)	±10% (battery mode)		
Frequency Range (Batt. Mode)	50Hz/60Hz ±1Hz		
Transfer Time	10ms Typical		
Battery			
Battery Voltage	12Vdc		24Vdc
Floating Charge Voltage	13.7Vdc ±2%		26.8Vdc ±2%
Low Battery Alarm Voltage	10.2Vdc ±2%		21.6Vdc ±2%
Shutdown Voltage	9.9Vdc ±2%		20.0Vdc ±2%
Overcharge Protection	15Vdc ±2%		30Vdc ±2%
Maximum Charge Current	13A	10A or 20A optional	
Alarm			
Low Battery	Sounding every second		
Overload	Sounding evry 0.5 seconds		
Fault	Continuously sounding		
Physical			
Dimensions, L x W x H (mm)	358.5 x 96.8 x 146.5	232 x 293 x 82.5	
Net Weight (kg)	5.8	2.35	2.55
Operating Environment			
Humidity	0-90% Relative Humidity (Non-Condensing)		
Operating Temperature	0°C-50°C		
Storage Temperature	-15°C-70°C		

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INVERTER/CHARGERS

MODIFIED SINEWAVE



SKX-M SERIES - MODIFIED SINEWAVE INVERTER (150W-3kW)

- Modified sinewave output
- With or Without Battery Charger
- High Surge Rating
- Hot Swappable Fuse
- Reverse Polarity Protection (Fuse).



Model	SKX-150-M-XX	SKX-300-M-XX	SKX-500-M-XX	SKX-600-M-XX	SKX-1000-M-XX	SKX-1500-M-XX	SKX-2000-M-XX	SKX-2500-M-XX	SKX-3000-M-XX
Capacity (Watts)	150	300	500	600	1000	1500	2000	2500	3000
Output Waveform	Modified Sinewave								
Continuous Power (Watts)	150	300	500	600	1000	1500	2000	2500	3000
Surge Power (Watts)	300	600	1000	1200	2000	3000	4000	5000	6000
DC Input Voltage	10-15Vdc (12V Version) / 20-30Vdc (24V Version) / 40-60Vdc (48V Version)								
AC Output Voltage	220-240VAC ± 10%								
Output Frequency	50/60Hz ± 1Hz								
Efficiency	> 85%								
No Load Current Draw	< 0.25A	< 0.3A			< 0.8A		< 0.9A		< 0.95A
Protection									
Low Voltage Alarm	10Vdc ± 0.2V / 20Vdc ±0.3V / 40Vdc ± 0.4V								
Low Voltage Shutdown	9.5Vdc ± 0.2V / 19Vdc ± 0.3V / 38Vdc ± 0.4V								
Over Voltage Shutdown	15.5V / 30.5V / 61.2V								
Overload	Shut Off Output								
Over Temperature	Shut Off Output								
Environment									
Operating Temperature	-10°C - 50°C								
Operating Relative Humidity	20% - 90% RH non-condensing								
Storage Temperature	-30°C - 70°C								
Automatic Cooling Fan	Turns on above 45°C								
Dimensions (mm)	140 x 105 x 55	150 x 105 x 55	180 x 105 x 55		210 x 150 x 70	310 x 150 x 70		340 x 150 x 152	
Net Weight (kg)	0.5	0.6	0.8	0.8	1.7	2.4	2.6	5.9	6.1
Battery Charger Specs - Model	SKX-150-MC-XX	SKX-300-MC-XX	SKX-500-MC-XX	SKX-600-MC-XX	SKX-1000-MC-XX	SKX-1500-MC-XX	SKX-2000-MC-XX	SKX-2500-MC-XX	SKX-3000-MC-XX
Charging Current	3A	5A	10A	10A	10A	15A	20A	20A	30A
Automatic Transfer Time	< 40ms								

XX Denotes the DC Voltage - 12Vdc, 24Vdc and 48Vdc available

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INVERTER/CHARGERS

PURE SINEWAVE



SOLAR INVERTERS- PURE SINEWAVE (150W-3kW)

- True sinewave output
- Power ON-OFF remote control
- Advanced microprocessor
- Input polarity / under voltage / over voltage protection
- Output short circuit / overload / over temperature protection
- Capable of driving highly reactive and capacitive loads
- Three color LED indicators.



Model*	S150-X	S300-X	S600-X	SK1000-X	SK1500-X	SK2000-X	SK3000-X
Rated Power/Surge Power	150W/200W	300W/400W	600W/800W	1kW/2kW	1.5kW/3kW	2kW/4kW	3kW/6kW
Output							
AC Voltage	220/230/240VAC						
Waveform	True Sinewave (THD < 6%)		True Sinewave (THD < 3%)				
Frequency	50Hz / 60Hz		50Hz / 60Hz selectable by DIP switch				
AC Regulation	± 5%		± 3%				
Power Factor Allowed	cosΘ(-900) - cosΘ(+900)						
LED Indicator	Input voltage level, output load level and fault status						
Input							
DC Voltage	12/24		12/24/48				
No Load Current Draw	0.22/0.16	0.26/0.28	0.83/0.43/0.22	1.2/0.6/0.28	1.4/0.7/0.4	2.64/1.32/0.65	2.8/1.5/0.7
Voltage Range	10.5-15/21-30		10.5-15/21-30/42-60				
Efficiency (typ. %)	87/88	89/89	90/93/94	91/93/94	90/93/94	91/94/95	90/93/94
Protection							
Bat. Low Alarm	N/A		11V / 22V / 44V				
Bat. Low Shutdown	10 ± 0.5V / 20 ± 1V		10.5V / 21V / 42V				
Overload	Shut off output voltage, re-power on to recover						
Over Voltage	15V-16V / 30V-32V		15.3V / 30.6V / 61.2V				
Over Temperature	Shut off output voltage, recovers automatically after temperature goes down						
Output Short	Shut off output voltage, re-power on to recover						
Bat. Polarity Reverse	Fuses will become open						
Environment							
Working Temp.	0-40°C						
Working Humidity	20% - 90% RH non-condensing						
Storage Temp. & Humidity	-30°C-70°C / -22°F-158°F / 10%-95%						
Safety & EMC							
Isolation Resistance	I/P - O/P: 100M Ohms / 500VDC						
EMI Conduction and Radiation	Compliance EN55022 class B		Compliance EN55022 class A				
EMS Immunity	Compliance EN61000-3 -2, 3						
LVD	Compliance EN60950-1						
e-Mark	Compliance to e-13 * 72/245/EEC, 95/54/EC						
Other							
Dimensions, L x W x H (mm)	200 x 132 x 72	237 x 155 x 72	295 x 180 x 72	383 x 182 x 88	415 x 191 x 88	422 x 208 x 166	452 x 208 x 166

* X denotes the DC Voltage

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INVERTER/CHARGERS

PURE SINEWAVE



SKX-S SERIES - PURE SINEWAVE INVERTER (300W-5kW)

- Pure sinewave output
- With or Without Battery Charger
- High Surge Rating
- Hot Swappable Fuse
- Reverse Polarity Protection (Fuse)
- Remote Control Option: Control at a distance.



Model	SKX-300-S-XX	SKX-500-S-XX	SKX-600-S-XX	SKX-1000-S-XX	SKX-1500-S-XX	SKX-2000-S-XX	SKX-2500-S-XX	SKX-3000-S-XX	SKX-5000-S-XX	
Capacity (Watts)	300	500	600	1000	1500	2000	2500	3000	5000	
Output Waveform	Pure Sinewave (THD < 4%)									
Continuous Power (Watts)	300	500	600	1000	1500	2000	2500	3000	5000	
Max Constant Power Start (Watts)	360	600	720	1200	1800	2400	3000	3600	6000	
Surge Power (Watts)	600	1000	1200	2000	3000	4000	5000	6000	10000	
DC Input Voltage	10-15Vdc (12V Version) / 20-30Vdc (24V Version) / 40-60Vdc (48V Version)									
AC Output Voltage	220-240VAC ± 10%									
Output Frequency	50/60Hz ± 1Hz									
Efficiency	> 90%									
No Load Current Draw	< 0.6A		< 0.8A			< 0.9A		< 0.95A	< 1.5A	
Protection										
Low Voltage Alarm	10Vdc ± 0.2V / 20Vdc ±0.3V / 40Vdc ± 0.4V									
Low Voltage Shutdown	9.5Vdc ± 0.2V / 19Vdc ± 0.3V / 38Vdc ± 0.4V									
Over Voltage Shutdown	15.5V / 30.5V / 61.2V									
Overload	Shut Off Output									
Over Temperature	Shut Off Output									
Environment										
Operating Temperature	-10°C - 50°C									
Operating Relative Humidity	20% - 90% RH non-condensing									
Storage Temperature	-30°C - 70°C									
Automatic Cooling Fan	Turns on above 450C									
Dimensions (mm)	135 x 150 x 53	220 x 150 x 70		280 x 150 x 70	290 x 220 x 88	320 x 220 x 88	410 x 150 x 70		480 x 220 x 146	
Net Weight (kg)	0.85	1.4	1.5	2.5	2.8	3	5.9	6.1	14	
Battery Charger Specs - Model	SKX-300-SC-XX	SKX-500-SC-XX	SKX-600-SC-XX	SKX-1000-SC-XX	SKX-1500-SC-XX	SKX-2000-SC-XX	SKX-2500-SC-XX	SKX-3000-SC-XX		
Charging Current	5A	10A	10A	10A	15A	20A	20A	30A	N/A	
Automatic Transfer Time	< 40ms									N/A

XX Denotes the DC Voltage - 12Vdc, 24Vdc and 48Vdc available

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SWITCH MODE RECTIFIERS

1 PHASE & 3 PHASE



ES1948 SERIES - SWITCHING MODE RECTIFIER

The PHD ES1948-48V/39.6A is a switched mode rectifier (SMR) module designed to provide up to 39.6A of output current into a 48V nominal system. This rectifier has been designed especially to be used in conjunction with a battery to provide an uninterruptible DC power system. The low noise and high reliability make it ideally suited to telecommunications applications. The rectifiers are designed to slide and plug into a single magazine-SR1948-9, designed for a 19" rack, which can accommodate up to 9 rectifiers and up to 32 rectifiers can be configured as a system using one control and supervisory unit (MCSU2048).

The ES1948 Switching Mode Rectifiers are highly compact, highly efficient, fully featured switch mode rectifiers which can operate in a modular rack environment with overall control from the control and supervisory unit MCSU2048. With overall control, such features as active current sharing, accurate battery voltage regulation, battery recharging current limit control, automatic battery equalization and battery temperature compensation are achieved.

The ES1948 rectifier modules incorporate a microcontroller-based control card which incorporates the control and supervisory facilities of the SMR. The microcontroller enables digital communications to the MCSU2048 as well as to the outside world (via the MCSU2048), so that it is possible to examine the operating parameters and, if necessary change them to suit a particular situation, from a remote location, even a distant one if a modem is used. This method of monitoring and control opens up entirely new methods of routine and emergency maintenance procedures.

INTERFACE BOARD AND OPTIONAL ACCESSORIES

MUIB: PHD's MUIB board combined with MCSU, external transducers and digital or analog I/O contacts to control and monitor a 24V or 48V or 110V DC power system. It provides a basic interface between the MCSU and the system environment.

MMIB (optional): PHD's MMIB board is an add-on module for the MCSU. It is used to monitor external AC power sources in either single phase or three phase configurations during operation.

BCM (optional): PHD's BCM board is an add-on module for the MCSU. It is used to monitor individual cells of a batteries during either float, equalize operation, or discharge. Each BCM board is capable of monitoring up to 24 cells(BCM) or 96 cells(BCM2).

SMM (optional): PHD's SMM board is an expansion of the MCSU. It allows the user to monitor the status of equipment that is external to PHD's DC power system. It can also be used to monitor a 3rd party DC power system. Using the same communication link and winCSU2000 software, the SMM can supervise numerous off-site systems from a central monitoring station.

WinCSU2000: PHD's WinCSU2000 software is an intuitive program designed for the Windows 95,98 and NT environments. Working through MCSU and interface boards, you can monitor and control PHD's DC power system either locally or remotely through a modem.

MCSU NetAgent II: PHD has integrated various communication protocols over networking to enable the equipment's real-time remote monitoring and management via MCSU NetAgent II. It is equipped with a UTP RJ45 plug for 10Base-T or 100M fast Ethernet connecting through TCP/IP, UDP, HTTP, Telnet, SNMP, PPP or SMTP protocol to LAN and WAN. It also has a RS232 port to connect with an external modem to dial in via the PPP protocol to access an internet connection.

FEATURES:

- Innovative single phase and three phase input stage with wide input range (90-275VAC, 310-480VAC)
- Power factor > 0.99
- High efficiency
- Microprocessor based
- Active or passive load sharing
- Rear "push in to plug in" connection for AC, DC and communications link
- Weight less than 1.9kg
- Exceptional power density (>18W/in3).

APPLICATIONS:

- Telephone Exchanges
- Cellular Phone/ Radio Base Stations
- Satellite Base Stations
- Microwave Links Remote Multiplexes
- Rural Telecommunications
- PABX's
- Railway Switching Controls
- Transmission and ISDN
- Equipment
- Power Plants
- Airport, Hospital, Banks.



SWITCH MODE RECTIFIERS

1 PHASE & 3 PHASE



Model	ES1948
Input	
Voltage	Wide Input Range: 90-275Vac or 310-480Vac
Frequency	44~66 Hz
Input Protection	13A HRC fuses at input of SMR(line and neutral); power circuit is turned off if the AC voltage exceeds 275Vac or falls to less than 90Vac
Current	<12A rms
Power Factor	>0.99 at full load; sinusoidal wave shape
THD	<5% at full load; satisfies requirements of EN61000-3-2
Efficiency	>91% at nominal mains voltage
Output	
Voltage	Float: -Adjustable 48~59V; Equalise: -Adjustable 50~61V
Current Limit	Adjustable 5~40A
Power (Max)	1900W at 48~60Vdc(input>185Vac); 900W at 48~60Vdc(input 90~185Vac)
Load Sharing	Better than $\pm 5\%$ of full scale with active current sharing from MCSU2048
Protection	Overvoltage - only faulty unit shuts down Overcurrent - can sustain short circuit at output terminals indefinitely Over-temperature - gradual reduction of current limit if heat-sink temperature exceeds pre-set limit
Static Regulation	Line- +0.1%; Load- +1.0%
Dynamic Regulation	+3% for 10~90% or 90~10% load variation; +1% for +25% step change in AC input voltage
Output Noise	< 2mVrms Psophometric weighting; < 10mVrms 10kHz - 100MHz; < 100mV peak to peak 0~30MHz bandwidth
Other	
Surge Protection	EN 61000-4-5
EMC	Emission: EN 61000-6-3, Immunity: EN61000-6-1
Inrush Current	<12 Arms peak at nominal mains voltage
Voltage Withstand Test	3.0 kVac – input and output (4.25 kVdc primary-secondary); 1.5 kVac – input earth (2.12 kVdc primary-ground); 0.75 kVdc – output earth
Environmental	
Audible Noise @ 1m	< 65dBA
Operating Temperature	Operating range -40°C ~ 70°C; derated power at 50°C ~ 70°C
Cooling	Two fan cooled, speed controlled and alarmed
Humidity	0~95% non-condensing
Mechanical	
Dimension (W x H x D)	41mm x 144mm x 287mm
Weight	<1.9kgs(4.19lbs)
Alarms	
Alarm & Status LED indication on SMR	On (Green) - SMR functioning normally Alarm (Yellow) - Blinking when any SMR alarm is present. Shutdown (Red) - Stays on when SMR has turned off due to a signal from the MCSU2048 or an internal fault
Rectifier Alarms	Low/High output voltage alarm; Over voltage shutdown alarm; Current limit alarm; Fan Alarm; Temperature alarm; Rectifier failure alarm

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BATTERY CHARGER

FOR 192VDC & 240VDC SYSTEMS



EXTERNAL BATTERY SUPER CHARGER

DESCRIPTION:

The PHD external battery charger is suitable for any 192Vdc and 240Vdc system (16 and 20 batteries in series). It is designed for 192Vdc and 240Vdc UPS systems to enable longer standby times for them. The 240Vdc version can be used with PHD's T3 Series (6-10kVA models) and T4 Series (10-20kVA models) and the 192Vdc version can be used with PHD's T3T Series (5-15kVA) and T4T Series (10-15kVA). It is easy to install as it is connected in parallel to the UPS's existing battery charger.

FEATURES:

- Compact and light
- Easy to install
- Battery overcharge protection
- Input surge protection.



Model	ST-CHARGER-10A	ST-CHARGER-12A
Input		
Voltage	(176 -276)VAC @ Full Load	
Frequency	(46 - 75)Hz for 50Hz system	
Power Factor	≥0.96@ full load	
THD	<20%@ full load	
Output		
Current	10A Nom. / 10A Max.	12A Nom. / 21A Max.
Voltage	160V Minimum, 218V Nominal, 224V Maximum	200V Minimum, 273V Nominal, 280V Maximum
Voltage Ripple	1%@ full load	
Current Ripple	10% of Ah CAP @ full load	
Efficiency	90%	
Fault Protection		
Output Reverse Polarity Protection	Fuse will open when reversing	
Short-circuit Protection	Yes	
Input Protection	276Vac(+/- 2%) Over Voltage, 176 Vac(+/- 2%) Under Voltage, 110%,1s Open Circuit	
Fault Protection		
Working and Storage Temperature	0°C - 40°C	
Humidity	<95% (No condensing)	
Altitude	< 1000m	
Fault Protection		
ESD	IEC 61000-4-2 Level 4	
RS	IEC 61000-4-3 Level 3	
EFT	IEC 61000-4-4 Level 4	
Surge	IEC 61000-4-5 Level 4	
Conduction	IEC/EN 62040-2 Category C3	
Radiation	IEC 61000-3-2	
Safety	IEC 60950-1/EN 60950-1	
Drop, Variation	ISTA Procedure 2A	
Mechanical Characteristics		
Inlet, Outlet	Terminal Block	
Dimensions (W x D x H) (mm)	200 x 352 x 450	340 x 250 x 110
Net Weight (kg)	15	6

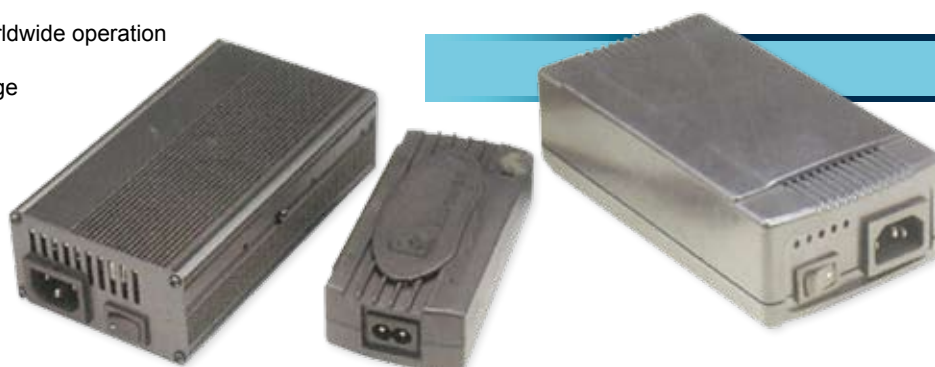
BATTERY CHARGERS

MISCELLANEOUS

AC-DC BATTERY CHARGERS

FEATURES:

- Multi step charger setup and auto shutdown (tri step)
- Fast charge, normal charge and average charge
- Voltage with auto sensor battery
- Full charge with auto shutdown
- Output short circuit protection
- Universal input voltage suitable for worldwide operation
- Anti-reverse voltage protect device
- Fast charge transferred into slow charge
- Overload protection
- LED status display
- Suitable for lead acid battery.



Model	Input Voltage	Input Frequency	Output Current	Output Equaliser DC Voltage	Output Floating DC Voltage	Dimensions (L x W x H) mm	Net Weight
AC0212A	100-240VAC	50/60Hz	2A	14.6Vdc	13.7Vdc	120 x 61.6 x 37.4	0.5kg
AC0224A	100-240VAC	50/60Hz	2A	29.2Vdc	27.4Vdc	120 x 61.6 x 37.4	0.5kg
AC0312A	110/220Vdc ±10% AUTO SW	50/60Hz	3A	14.6Vdc	13.7Vdc	186 x 88 x 47.5	0.8Kg
AC0324A	110/220Vdc ±10% AUTO SW	50/60Hz	3A	29.2Vdc	27.4Vdc	186 x 88 x 47.5	0.8Kg
AC0412A	110/220Vdc ±10% AUTO SW	50/60Hz	4A	14.6Vdc	13.7Vdc	186 x 88 x 47.5	0.8Kg
AC0424A	110/220Vdc ±10% AUTO SW	50/60Hz	4A	29.2Vdc	27.4Vdc	186 x 88 x 47.5	0.8Kg
AC0512A	110/220Vdc ±10% AUTO SW	50/60Hz	5A	14.6Vdc	13.7Vdc	186 x 88 x 47.5	0.8Kg
AC0524A	110/220Vdc ±10% AUTO SW	50/60Hz	5A	29.2Vdc	27.4Vdc	186 x 88 x 47.5	0.8Kg
AC0612A	110/220Vdc ±10% AUTO SW	50/60Hz	6A	14.6Vdc	13.7Vdc	186 x 88 x 47.5	0.8Kg
AC0624A	110/220Vdc ±10% AUTO SW	50/60Hz	6A	29.2Vdc	27.4Vdc	186 x 88 x 47.5	0.8Kg
AC0712A	110/220Vdc ±10% AUTO SW	50/60Hz	7A	14.6Vdc	13.7Vdc	186 x 88 x 47.5	0.8Kg
AC0724A	110/220Vdc ±10% AUTO SW	50/60Hz	7A	29.2Vdc	27.4Vdc	186 x 88 x 47.5	0.8Kg
AC0812A	110/220Vdc ±10% AUTO SW	50/60Hz	8A	14.6Vdc	13.7Vdc	186 x 88 x 47.5	0.8Kg
AC1012A	110/220Vdc ±10% AUTO SW	50/60Hz	10A	14.6Vdc	13.7Vdc	186 x 88 x 47.5	0.8Kg
AC1212A	110/220Vdc ±10% AUTO SW	50/60Hz	12A	14.6Vdc	13.7Vdc	186 x 88 x 47.5	0.8Kg
AM0236A	100-240VAC	50/60Hz	2A	44.5Vdc	41.3Vdc	164 x 90 x 50	0.5kg
AM0424A	100-240VAC	50/60Hz	4A	29.6Vdc	27.4Vdc	164 x 90 x 50	0.5kg
AM0612A	100-240VAC	50/60Hz	6A	14.8Vdc	13.6Vdc	164 x 90 x 50	0.5kg
Other currents and voltages available on request							

GENERATORS

1 PHASE & 3 PHASE

STANDBY DIESEL GENERATOR SETS (10kVA-2000kVA)

FEATURES:

All units complete with exhaust systems, 12 hour fuel tanks (larger tanks available), batteries, **automatic mains failure control panels and prime power base load control panels.** The panels include standard metering switchgear, control gear and engine protection. Both single and three phase versions available.

APPLICATIONS:

- Agriculture
- Cold Rooms
- Banking
- Airports
- Building Services
- Hospitals
- Hotels and Entertainment
- Engineering.

SPECIFICATIONS:

Engine Types: Caterpillar, Cummins, Daimler Chrysler MTU, Detroit Diesel VM Sun, Deutz, Hatz, John Deere, Kirloskar, Lister, Lombardini, Perkins, Scania, Volvo and Yanmar

Alternator Types: Leroy Somer, Marelli and Mecc Alte

Sizes: Petrol powered up to 10KVA Single Phase; Diesel Powered from 10KVA to 2000KVA Three Phase

Voltage Ranges: 110V-525V

Frequencies: 50/60Hz

Engine Speeds: 3000 or 1500 RPM

Generator Sets: Available with Base Load and Automatic Mains Failure Control Panels mounted on open steel frame. Weatherproof Silent Canopy. Mobile Trailer mounted.

All engines and alternators used in the manufacture of Power Generation Equipment conform to the following specifications:

ENGINES: B.S. 5514 1982; ISO 30461; 1DIN6271.

ALTERNATORS: B.S. 5000; VDE 30; IEC 23; UTE 5100; NEC 51-111; NEMA – IEEE CSA.

Where applicable alternators specified for Marine Applications will conform to: **BUREAU VERITAS; LLOYDS REGISTER; AMERICAN BUREAU OF SHIPPING; DNV; RINA; GERMANISHER LLOYDS; KOREAN REGISTER OF SHIPPING; NKK.**



300KVA Automatic mains failure



100KVA, 25KVA, 13KVA remote start/stop and AMF



1000KVA Automatic mains failure Generator Set. MTU 16V 2000 G62 / Leroy Somer (Installed at the Capital Alliance Building, Johannesburg)



30KVA Automatic mains failure soundproof Generator Set. Standard soundproof canopy with sound levels of 65dB(A) at 7 metres in an open field.

CONSTANT VOLTAGE TRANSFORMERS

1 PHASE

CONSTANT VOLTAGE TRANSFORMERS (150VA-20kVA)

FEATURES:

- **Input Voltage:** Single Phase, 230V (184-276).
Other voltage on request
- **Supply Frequency:** 50Hz
- **Output Voltage:** 230V. Other voltages on request
- **Output Accuracy:** Better than 3% (1% option available)
- **Harmonic Distortion:** Typically less than 2%
- **Effect of Frequency Change:** 1% change in frequency produces approximately 2.5% change in output voltage
- **Response:** Typically 1-2 cycles (20-40ms)
- **Overload:** Short circuit limited
- **Efficiency:** Approximately 85% at full load.



Model*	Input/Output	Rating	Current	Dimensions (W x H x D) mm	Mass
SC150S	230V/230V	120W	0.52A	290 x 231 x 400	17kg
SC250S	230V/230V	200W	0.87A	290 x 231 x 400	18kg
SC500S	230V/230V	400W	1.74A	290 x 231 x 400	21kg
SC750S	230V/230V	600W	2.61A	290 x 231 x 400	24kg
SC1000S	230V/230V	800W	3.48A	290 x 231 x 400	26kg
SC1500S	230V/230V	1200W	5.22A	290 x 231 x 400	36kg
SC2000S	230V/230V	1600W	7.27A	400 x 263 x 550	55kg
SC2500S	230V/230V	2000W	9.09A	400 x 263 x 555	59kg
SC3000S	230V/230V	2400W	10.91A	400 x 263 x 565	65kg
SC4000S	230V/230V	3200W	14.55A	400 x 263 x 600	83kg
SC5000S	230V/230V	4000W	18.18A	400 x 263 x 600	90kg
SC6000S	230V/230V	4800W	21.82A	540 x 365 x 908	154kg
SC7500S	230V/230V	6000W	27.27A	540 x 365 x 925	172kg
SC10000S	230V/230V	8000W	36.36A	540 x 365 x 970	212kg
SC12000S	230V/230V	9600W	43.64A	450 x 890 x 1100	290kg
SC15000S	230V/230V	12000W	54.55A	450 x 890 x 1100	340kg
SC18000S	230V/230V	14400W	65.45A	450 x 890 x 1100	435kg
SC20000S	230V/230V	16000W	72.73A	450 x 890 x 1100	450kg

SERVO TYPE

1 PHASE

SERVO TYPE FULLY AUTOMATIC VOLTAGE STABILISER (SINGLE PHASE)

DESCRIPTION:

The SVC fully automatic voltage regulator consists of a contact voltage regulator, sampling control circuit and service motor as well. It features small waveform distortion, high efficiency and high power factor. It is also not affected by input frequency variations. It can be widely used in most situations where voltage stabilisation is required.

Model	500VA	1kVA	1.5kVA	2kVA	3kVA	5kVA	7.5kVA	10kVA	15kVA	20kVA	30kVA
Input Voltage	150V-250V					160V-250V			150V-250V		
Output Voltage	220V ± 3%										
Frequency	50Hz/60Hz										
Response Time	< 1s (against 10% input voltage deviation)										
Efficiency	> 90%										
Ambient Temperature	-10°C ~ +40°C										
Relative Humidity	< 90%										
Power Factor	0.8										
Insulation Resistance	> 5MΩ										
Length (cm)	18.5	21	21	27.5	29	45	47	47	42	42	42
Width (cm)	15	18	18	23.5	23	24	26	26	38	38	38
Height (cm)	12.5	14.5	14.5	18.5	22	18.5	22	22	73	73	83
Weight (kg)	4.6	6.5	7	10.5	13.6	22.4	40	43	75.5	80	87
Append "SVC-" to the model above for the full part number											



SERVO/ELECTRONIC TYPE

3 PHASE

SERVO/ELECTRONIC TYPE FULLY AUTOMATIC VOLTAGE STABILISER (THREE PHASE)

DESCRIPTION:

- Microprocessor DSP control
- Automatic Voltage Regulation
- Protection against Brownouts and Overvoltages
- Short Circuit & Overload Protection
- Digital meter indicates line voltage and regulated voltage
- LED indicators to show status of working input and output
- Selectable Delay Time
- Built-in transformer, Square transformer or Servo motor
- Surge, Spike & Lightning Protection.



Model*	10kVA	15kVA	20kVA	30kVA	50kVA	80kVA	100kVA	150kVA	200kVA
Input Voltage	260-430VAC				260-450VAC				
Input Frequency	50/60Hz								
Output Voltage	380/400/415VAC								
Output Precision	± 3%								
Technology	Servo, Independent Phase Control				Silicon Controlled, Non-Contact, Independent Phase Control				
Efficiency	98%								
Response Time	1s/step				4ms/step				
LED Display	Input Voltage / Output Voltage								
LED Input Status	Blue; indicating phase voltage normal/abnormal								
LED Power Status	Red; indicating Power ON/OFF								
LED Delay Status	Yellow; during delay the LED flashes								
LED Output Status	Blue; indicating output voltage ON/OFF								
Protection	High Voltage, Low Voltage, Overload, High Temp.								
Safety Standards	CE, EN60950, EN55024								
Operating/Storage Temp.	0°C-40°C / -15°C-45°C								
Operating Humidity	10% RH - 102% RH, non-condensing								
Dimensions, L x W x H (mm)	443 x 483 x 858		503 x 553 x 888	503 x 553 x 938	1000 x 640 x 1250	1000 x 640 x 1380		1285 x 750 x 1600	
Weight (kg)	57.8	62.3	88.4	108.4	238	300	318	450	506
* Append "PDR-" to the model above for the full part number									
Bigger ratings available on request									

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ELECTRONIC WITH ISOLATION

1 PHASE & 3 PHASE

VOLTAGE STABILISER - ELECTRONIC (15kVA-30kVA)

FEATURES:

- Wideband voltage regulation range ($\pm 25\%$)
- True RMS voltage sensing ensures accurate regulation even with distorted mains (eg diesel generator)
- Regulates individual phases to within 5% with input variations of up to $\pm 25\%$
- High capability to temporary overloads (eg aircon units, power supplies etc)
- Over/Under voltage cut-out protects sensitive loads
- TVSS Surge protection
- Volt meter (optional)
- High efficiency - approximately 98% at full load
- Rugged and reliable.

APPLICATIONS:

- Transmissions and telecommunications
- Radar systems in naval or air navigation
- Process controls
- Computer data processing & numerical control machines
- Photography controls and processes
- Laboratory equipment
- Test equipment
- Electric furnaces
- Illumination
- Medical equipment
- Any electrical or electronic sensitive to voltage variations.

SPECIFICATIONS:

Nominal Input Voltage:	400/230vac 50/60 Hz $\pm 25\%$ (3 Wire)
Nominal Output Voltage:	400/230vac 50/60 Hz $\pm 5\%$ (4 Wire)
Over Voltage Cut-off at:	290V input voltage under normal operation (L-N) (U out 230V) 250V input voltage under bypass operation (L-N) (U out 230V)
Under Voltage Cut-off at:	160V input voltage under normal operation (L-N) (U out 230V) 200V input voltage under bypass operation (L-N) (U out 230V)
Output Voltage Accuracy:	5%
Overload Rating:	120% for 60mins; 200% for 10 sec
Efficiency:	98% at full load
Earthing:	The input earth is bonded to the enclosure
Speed Correction:	± 20 milliseconds
Waveform Distortion:	Negligible
Effect of load Power Factor:	None
Maximum Continuous Voltage:	300V
Nominal Discharge Current:	40kA
Impulse Current Limp (10/350us)kA:	12kA
Voltage Protective Level:	≤ 2.0
Response Time:	$\leq 100\text{ns}$
Environment:	Protection class IP21 (indoor enclosure); IP54 (outdoor enclosure)
Ambient Operating Temperature:	0°C to +45°C
Operating Elevation:	1000m, over 1000m derate by 2.5% for each 500m



Model	Description	Rating	Current	Dimensions (L x W x D mm)	Weight
APS-15kVA-ID	Indoor - 15kVA	15kW	66A (Max)	700 x 385 x 1100	210kg
APS-22.5kVA-ID	Indoor - 22.5kVA	22.5kW	96A (Max)	700 x 385 x 1100	226kg
APS-30kVA-ID	Indoor - 30kVA	30kW	132A (Max)	700 x 385 x 1100	236kg
APS-15kVA-OD	Outdoor - 15kVA	15kW	66A (Max)	775 x 465 x 1210	216kg
APS-22.5kVA-OD	Outdoor - 22.5kVA	22.5kW	96A (Max)	775 x 465 x 1210	232kg
APS-30kVA-OD	Outdoor 30kVA	30kW	132A (Max)	775 x 465 x 1210	242kg

Note: Higher ratings available on request

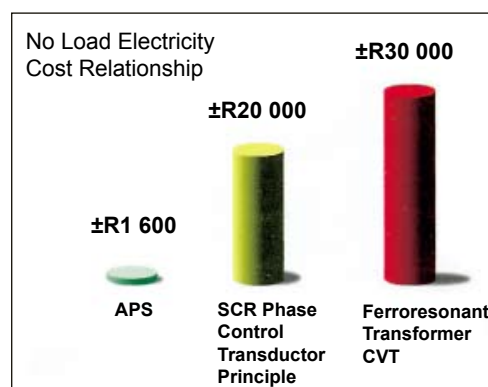
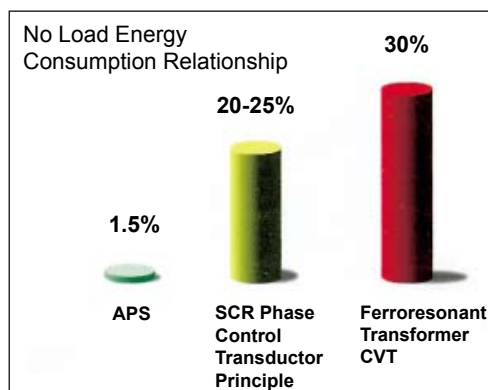
ELECTRONIC

1 PHASE & 3 PHASE

VOLTAGE STABILISER - ELECTRONIC (1kVA-75kVA)

FEATURES:

- High Efficiency
- High Power Factor
- High Reliability
- Low Harmonic Distortion
- Low Environmental Pollution
- Low Electro Magnetic Interference
- APS Range of Products Solve Over 95% of Your Power Problems
- Micro Processor Control
- Micro Size - Quarter the size / weight of traditional AVR
- Modular Design - Circuit designed in PCB modules, easy for maintenance
- High Efficiency - $\eta \geq 98\%$ at Full Load.
- High Input Power Factor - Input Power Factor 0.95 ~ 1
- Extra Low No Load Power Consumption - No Load Power Consumption $\leq 1.5\%$
- Automatic Electronic Bypass - Electronic Bypass, Automatic in Overload / Abnormal conditions
- Low Audible Noise - Audible noise 35 dB at 1 m
- Flexibility for Loads - Suitable for Pure Capacitive / Inductive Load.



Calculation Based on typical South African Electricity Cost, 10 hours per day

APS Single Phase Models

Model	KVA	Output Regulation	Type	Current (A) (1 Phase)	Dimensions (H x W x D) (mm)	Weight (kg)
APS-1KB	1	±3% Typical	B	4.5	120 x 220 x 360	10
APS-2KB	2	±3% Typical	B	9.1	120 x 220 x 360	13
APS-3KB	3	±3% Typical	B	14.0	200 x 380 x 450	21.5
APS-5KB	5	±3% Typical	B	23.0	200 x 380 x 450	26
APS-7KB	7	±3% Typical	B	32.0	200 x 370 x 550	33
APS-10KB	10	±3% Typical	B	45.0	200 x 370 x 550	39
APS-15KB	15	±2% Max	B	68.0	200 x 370 x 550	45
APS-20KB	20	±2% Max	B	91.0	355 x 835 x 650	50
APS-30KB	30	±2% Max	B	137.0	355 x 835 x 650	55

APS Three Phase Models

Model	KVA	Output Regulation	Type	Current (A) (per Phase)	Dimensions (H x W x D) (mm)	Weight (kg)
APS-10KZ	10	±3% Typical	Z	15	355 x 835 x 650	70
APS-15KZ	15	±3% Typical	Z	23	355 x 835 x 650	85
APS-22KZ	22	±3% Typical	Z	33	355 x 835 x 650	100
APS-30KZ	30	±3% Typical	Z	45	355 x 835 x 650	115
APS-45KZ	45	±2% Max	Z	68	355 x 835 x 650	130
APS-60KZ	60	±2% Max	Z	91	450 x 955 x 800	160
APS-75KZ	75	±2% Max	Z	114	450 x 955 x 800	185

Note: Higher ratings available on request

ELECTRONIC INDUSTRIAL INDUCTIVE TYPE

VOLTAGE STABILISERS - INDUCTIVE (100kVA-1500kVA)

FEATURES:

- **Strong, durable and high reliability** - No contact point. Capable of sustaining spikes, surges or impulses from non-linear loads. Long equipment life.
- **Protection** - Redundant circuit control. Event history log for up to 200 events. Phase loss and phase reverse protection. Output over voltage and under voltage protection. Output overload protection.
- **High overload capability** - 100% continuous load. 200% transient current up to 5 minutes. Maximum tolerable transient start current of up to 500%
- **LCD user interface** - Blue backlight, wording in white. RS-485 communication port. Push buttons are lit for convenience in the dark. Remote signal for measurements and control functions to monitor and control your equipment.
- **1500kVA capacity** - The inductive type voltage stabiliser can have a maximum capacity of 1500kVA in one unit.

APPLICATIONS:

- **Communication Systems** - TV stations, ADSL, Coaxial cable TV systems and components, Radio communication equipment and systems, Satellite and communication equipment, Fiber-optics systems, Lan servers.
- **IT** - Home electrical appliances, Information appliances, Office IT equipment, POS systems.
- **Computer and Computer Peripherals** - Electronic data processing (EDP) centres, Server / Data storage systems, Industrial PC's.
- **General Lab** - Program control systems, Electronic test equipment.
- **F / A** - Production lines, IC (integrated circuit) field, CNC machines, SMT equipment, Auto-Insertion equipment, PCB assembly equipment, Semiconductors (BGA, CSP, Flip Chip, LCD), Production process and control equipment, Printing industry.
- **Medical and Military** - Electronic and Medical equipment, Medical monitoring systems, Airport x-ray scanning equipment, Airport facilities, Airport control tower facilities.
- **Other** - Bioscience, Gas stations, Opto-electronic industry.



ELECTRONIC

INDUSTRIAL INDUCTIVE TYPE

Model**	0100	0125	0150	0200	0250	0300	0350	0400	0500	0600	0800	1000	1250	1500
Capacity (kVA)	100	125	150	200	250	300	350	400	500	600	800	1000	1250	1500
Circuit Type	Inductive Voltage Regulator													
Input														
Phase	3P3W / 3P4W													
Voltage Range*	-13% - +17% (option: -22% - +30%)													
Frequency	47Hz - 63Hz													
Output														
Phase	3P3W / 3P4W													
Voltage	200V / 208V / 220V, 380V / 400V / 415V \pm 2% (\pm 1%- \pm 5% adjustable)													
Voltage Modulation	< 4 V/s													
Overload	125%-40min; 150%-20min; 175%-10min; 200%-5min													
Total Harmonic Distortion	< 1% (compared with input)													
VA Efficiency	>97%													
Measurement														
Measurements	Input line voltage and frequency, Output line voltage, Phase voltage, Line current and frequency, VA, W, PF, Load rate, Internal temperature													
Protection														
Protection Functions	Phase loss, phase reverse, output over voltage & under voltage, output overload, over temperature, over current, redundant circuit control. Event history log for 200 events.													
User Interface														
Operation	LCD and Push buttons													
Alarm	Alarm 1. Audio. Alarm 2. Activate													
Communication	RS-485													
Software	Remote control and monitor													
Environment														
Working Temperature	-5°C-40°C													
Storage Temperature	-30°C-50°C													
Humidity	< 95% (non-condensing)													
Altitude	< 1000 meters													
Cooling System														
Type	Fan cooling													
Other														
Noise	< 60dB													
Optional	Auto transformer, full time lightning & surge protection, output on & off electromagnetic contactor													

* Other input ranges on request

** Prefix the model no. with APH-33 for the full part number.

Custom made specifications on request

All information contained in this brochure is purely indicative and can not be used to form any contractual obligations. Specification or design can be changed at anytime without prior notice.

FREQUENCY CONVERTERS

1 PHASE & 3 PHASE

FREQUENCY CONVERTERS (500VA-300kVA)

FEATURES:

- **Wide Application:** Allows users to simulate Worldwide voltage and frequency for commercial applications (47-63Hz) and Military / Avionics / Marine applications at 400Hz.
- **Pure Sinewave Output:** All models generate very clean sine waveforms output. It is not only a superior power source for R&D and Laboratory, but also a standard power source for EMI/EMC/ Safety testing.
- **Superior Stability:** Output Load Voltage regulation $\pm 1\%$, Output Frequency $\leq 0.01\%$.
- **Quick & Convenient 3 Scales of Preset Voltage for High and Low Voltage Simulation:**
 - *High (Surge):* $+10\% \sim +25\%$ of Present voltage,
 - *Medium:* Preset voltage,
 - *Low (Sag):* $-10\% \sim -30\%$ of Preset voltage.
- **Direct Select of Six Scales Output Frequency:** 47~63Hz, 50Hz, 60Hz, 2xF (F = Input Frequency), 4xF (F = Input Frequency), 400Hz.
- **2F or 4F Output Testing Frequency for Layer Short Test of Coils Products.**
- **High Overload Capability:** 100% full load continuously; withstand 3 times of inrush current.
- **Protections:** Input Circuit Breaker, Output Circuit Breaker, Instant Trip Circuits for Overload, Over Voltage, Short Circuit, Over Temperature protection and Alarm system.
- **Suitable for Any Load:** Resistive, Capacitive, Inductive and Non-linear load use.

APPLICATIONS:

Industrial:

- **Home Electrical Appliances, Manufacturers of:** Washing Machines, Refrigerators, Vacuum Cleaners, Microwave Ovens, Air Conditioners, Blenders.
- **Electronic Manufacturers of:** Switching Power Supply Testing, Ballasts (in Bulbs, Fluorescent Lamps), Uninterruptible Power Supplies, Chargers, Relays, Passive components.
- **Electric Machinery Manufacturers of:** Compressors, Transformers, AC Fans, Motors.
- **IT Field:** OA Equipment (Fax Machines, Copy Machines, Shredders, etc), Computer & Monitors, Printers, Scanners & Peripherals.

General Laboratory:

- AC Power Source Testing
- Life & Safety Testing
- EMC Testing
- OQC (FQC) Testing
- Product Testing
- Product Researches & Developments.

400Hz Output Frequency:

- Aerospace
- Airport Grounding Facilities, including Airport Terminals, Control Towers, Aprons
- Avionics Equipment
- Air Force System Diagnostics
- Military System Diagnostics
- Navy System Diagnostics
- Marine Systems
- Satellite Navigation
- Switching Power Supply of Super Computers
- 400Hz Equipment & Instruments.

AFC-SERIES 500VA-60kVA SINGLE PHASE



AFC-SERIES 60kVA-300kVA THREE PHASE

FREQUENCY CONVERTERS

1 PHASE & 3 PHASE

AFC SERIES - SINGLE PHASE SPECIFICATIONS:

Model			AFC-500	AFC-11001	AFC-11003	AFC-11005	AFC-11010	AFC-11015	AFC-31020	AFC-31030	AFC-31045	AFC-31060
Capacity (kVA)			0.5	1	3	5	10	15	20	30	45	60
	Voltage		110V or 220V ±15%, 1 Phase			220V ±15%, 1 Phase			380V ±15%, 3 Phase 3 or 4 wire			
	Frequency		50Hz ± 3Hz, 60Hz ± 3Hz									
Output (AC)	Phase		Single Phase									
	Voltage	Low	0~150V			5V ~ 150V (L-N)						
		High	0~300V			10V ~ 300V (L-N)						
	Frequency		47 ~ 63Hz, 50Hz, 60Hz, 400Hz, 2F (2 x Input Frequency), 4F (4 x Input Frequency)									
			Option: 40 ~ 500Hz									
Maximum Current		Low	4.2A	8.4A	25A	42A	84A	126A	168A	250A	375A	500A
		High	2.1A	4.2A	12.5A	21A	42A	63A	84A	125A	188A	250A
Frequency Stability			≤0.01%									
Load Regulation			±0.2%			±1% (linear load)						
Total Harmonic Distortion			±0.2%			±2% (linear load)						
Transient Response			50us Max.			2ms Max.						
Meter / Res.	4 Dig. Freq. Met.		Res. 0.1Hz									
	4 Dig. Voltmeter		Res. 0.1V									
	Digit Ammeter		0.001A	0.01A	4 Digit Ammeter / Res. 0.1A					5 Digit Ammeter / Res.0.1A		
	4 Dig. Wattmeter		0.1W	1W	Option							
Protection			Input Circuit Breaker, Output Circuit Breaker, Electronic Circuits Instant Trp for Over Voltage, Over Load, Over Temperature, Short Circuit Protection and Alarm System									
Enviornment	Ambient Temp.		0°C ~ 45°C									
	Relative Hum.		0 ~ 90% Non-condensing									
	Altitude		1500 meter									
Dimensions W x H x D (mm)			430x520x200	430x520x720			430x750x990		600x970x1240		800x600x1600	
Net Weight (kg)			44	89	73	89	150	171	280	333	418	571

AFC SERIES - THREE PHASE SPECIFICATIONS:

Model			AFC-33006	AFC-33010	AFC-33020	AFC-33030	AFC-33045	AFC-33060	AFC-33075	AFC-33100	AFC-33150	AFC-33180
Capacity (kVA)			6	10	20	30	45	60	75	100	150	180
	Voltage		380V ±15%, 3 Phase 3 or 4 wire									
	Frequency		50Hz ± 3Hz, 60Hz ± 3Hz									
Output (AC)	Phase		Three Phase									
	Voltage	Low	5V ~ 150V (L-N)									
		High	10V ~ 300V (L-N)									
	Frequency		47 ~ 63Hz, 50Hz, 60Hz, 400Hz, 2F (2 x Input Frequency), 4F (4 x Input Frequency)									
			Option: 40 ~ 500Hz									
Maximum Current		Low	16.7A	27.8A	55.6A	83.3A	125A	167A	208A	278A	417A	500A
		High	8.3A	13.9A	27.8A	41.7A	62.5A	83.3A	104A	139A	208A	250A
Frequency Stability			≤0.01%									
Load Regulation			≤ ±1% (linear load)									
Total Harmonic Distortion			≤ ±2% (linear load)									
Transient Response			2ms Max.									
Meter / Res.	4 Dig. Freq. Met.		Res. 0.1Hz									
	4 Dig. Voltmeter		Res. 0.1V									
	Digit Ammeter		4 Digit Ammeter / Res. 0.1A						5 Digit Ammeter / Res.0.1A			
	4 Dig. Wattmeter		Option									
			Load Balance or No Load: ≤ 1°, 100% Unbalance: ≤ 2° (measured at 50Hz or 60Hz)									
Protection			Input Circuit Breaker, Output Circuit Breaker, Electronic Circuits Instant Trp for Over Voltage, Over Load, Over Temperature, Short Circuit Protection and Alarm System									
Enviornment	Ambient Temp.		0°C ~ 45°C									
	Relative Hum.		0 ~ 90% Non-condensing									
	Altitude		1500 meter									
Dimensions W x H x D (mm)			430x750x990		600x970x1240		800x1090x1600			800x600x1600		
Net Weight (kg)			150	175	345	385	528	635	700	1000	1350	1620

GROUND MILITARY UNITS

1 PHASE & 3 PHASE

GROUND - MILITARY POWER UNITS (500VA-300kVA)

400Hz Frequency Converters & 28VDC Power Supplies

28VDC Power Supply

FEATURES:

- Used as a DC power supply unit or voltage simulating test for GPU / Military Unit
- 28VDC $\pm 10\%$ Standard Output Voltage; 100Amp to 2,000Amp Output Current
- Automatic Input Line Monitoring
- Output Voltage and Output Current Monitoring
- Current Limit Adjustable
- Auto Feedback Control Circuits. Capable to adjust input and output automatically for constant voltage
- Automatic Line Drop Compensation
- Fixed voltage Fixed current. Interchangeable to have control and protection features.
- **Protection:** *Input Line Loop:* Auto detection and trip for Over Current, Over Voltage, Loss Phase, Phase Reversed.
Output Circuit: Electronic-controlled Short Circuit Protection.



400Hz Solid State Frequency Converter

FEATURES:

- Small, Light & Space Saving: Typically, 1/4 size of motor-generator sets of the same power output rating.
- High Efficiency, Optimum Stability, Superior Heat Dissipation.
- Economical Cost of Ownership.
- **Modular design permits quick and easy replacement:**
 - Typical motor-generator sets downtime is four times greater, often resulting in costly delays, maint. and production schedules.
 - High efficiency features reduce operating costs through 25% and upward utility savings compared to motor-generator sets.
 - On-site repairs are easily accomplished.
 - Motor-generator sets quite often must be removed from location for repairs, resulting in costly rigging and transport charges.
- **Low Noise:** Solid State frequency converters have no moving mechanical parts generating a loud noise and eliminates the need for expensive sound insulation.
- **Individual Phase Regulation at Output:** Excellent voltage regulation under 100% unbalanced load.
- **Output Isolation Transformer:** capable of sustaining CEMF (counter-electromotive force).
- **Option:**
 - 36VAC input voltage or acc. to customer's specifications
 - "Add on module" of Solid State frequency converter and 28VDC power supply
- Low Harmonic Distortion at 3% maximum.

APPLICATIONS FOR BOTH:

- Provides DC current for Airlines / Spacecraft starting
- Working current on avionics or simply provide ground support maintenance
- Provides clean DC power that meets MIL-STD-704 standard for aircraft power
- Input Power Supply Simulating Test of air materials
- Aircraft Manufacturers
- Aerospace Equipment Manufacturers
- Hangars
- Air Force Bases
- Passenger Boarding Bridges (PBB)
- Aprons
- Control Towers
- Meter Control Centers
- Air Force System Diagnostics
- Military System Diagnostics
- Navy System Diagnostics
- R&D Dept. of Military, Defense
- Military Equipment
- Power Supply for Warships
- Power Supply for Radars
- Rotary Engineer Manufacturers.

GROUND MILITARY UNITS

1 PHASE & 3 PHASE

AMF SERIES - SINGLE PHASE SPECIFICATIONS:

Model		AMF-500	AMF-11001	AMF-11003	AMF-11005	AMF-11010	AMF-31020	AMF-31030	AMF-31045	AMF-31060	AMF-31100
Capacity (kVA)		0.5	1	3	5	10	20	30	45	60	100
Circuit Type		IGBT / Pulse Width Modulation Type									
Input (AC)	Phase	1 Phase 2W+G					3 Phase 3W+G(Δ) or 3 Phase 3W+N+G(Y)				
	Voltage	110V (B) or 220V (G) ±15%		220V (G) ±15%			220V (G) ±15% or 220V/380V (T) ±15%				
	Frequency	50Hz ±3Hz, 60Hz ±3Hz									
Output (AC)	Phase	1 Phase 2 W+G									
	Voltage	115V (C) or 220V (G), 230V (H) Output Voltage ±10% Adjustable									
	Frequency	2-Step Output Frequency: 1. 400Hz Fixed, 2. 350Hz-450Hz adjustable (*can comply with customer's specs)									
Frequency Stability		≤0.01%									
Load Regulation		≤±1%					≤±1.5%				
Total Harmonic Distortion		≤±2% (linear load)					≤±3% (linear load)				
Meter / Res.	4 Dig. Freq. Met.	Res. 0.1Hz									
	4 Dig. Voltmeter	Res. 0.1V									
	Digit Ammeter	0.001A	0.01A	4 Digit Ammeter / Res. 0.1A				5 Digit Ammeter / Res.0.1A			
Overload Capability		120% / 1hr - 150% / 1min. - 200% / 15sec. (25% duty cycle)									
Protection		Input Circuit Breaker, Output Circuit Breaker, Electronic Circuits for fast detection and trip off protection for Over Current, Over Voltage, Over Load, Over Temperature, Short Circuit and Alarm system									
Isolation Resistance		≥500Vdc 20MΩ									
Withstand Voltage		1800Vac / 5mA / 1min									
Cooling System		Air Forced Fan									
Ambient Temperature		-20°C ~ 45°C									
Relative Humidity		0 ~ 90% Non-condensing									
Dimensions W x H x D (mm)		430x520x200	430x520x720			430x750x990	600x970x1240		800x1090x1600		800x600x1600
Net Weight (kg)		44	60	73	89	150	280	333	418	571	898

AMF SERIES - THREE PHASE SPECIFICATIONS:

Model	AMF-33006	AMF-33010	AMF-33020	AMF-33030	AMF-33045	AMF-33060	AMF-33075	AMF-33100	AMF-33150	AMF-33180
Capacity (kVA)	6	10	20	30	45	60	75	100	150	180
Circuit Type	IGBT / Pulse Width Modulation Type									
Input (AC)	Phase	3 Phase 3W+G (Δ) or 3 Phase 3W+N+G(Y)								
	Voltage	3W+G : 220V (G) or 3W+N+G : 220V/380V (T) ±15%								
	Frequency	50Hz ±3Hz, 60Hz ±3Hz								
Output (AC)	Phase	3 Phase 3 W+N+G (Y)								
	Voltage	200V/115V (P) Output Voltage ±10% Adjustable								
	Frequency	2-Step Output Frequency: 1. 400Hz Fixed, 2. 350Hz-450Hz adjustable (*can comply with customer's specs)								
Frequency Stability	≤0.01%									
Load Regulation	≤±1%					≤±1.5%				
Total Harmonic Distortion	≤±2% (linear load)					≤±3% (linear load)				
Meter / Res.	4 Dig. Freq. Met.	Res. 0.1Hz								
	4 Dig. Voltmeter	Res. 0.1V								
	Digit Ammeter	4 Digit Ammeter / Res. 0.1A					5 Digit Ammeter / Res.0.1A			
Phase Shift	Balanced Load / Empty Load: ±2° : 100% Unbalanced Load: ±4°									
Overload Capability	120% / 1hr - 150% / 1min. - 200% / 15sec. (25% duty cycle)									
Protection	Input Circuit Breaker, Output Circuit Breaker, Electronic Circuits for fast detection and trip off protection for Over Current, Over Voltage, Over Load, Over Temperature, Short Circuit and Alarm system									
Isolation Resistance	≥500Vdc 20MΩ									
Withstand Voltage	1800Vac / 5mA / 1min									
Cooling System	Air Forced Fan									
Ambient Temperature	-20°C ~ 45°C									
Relative Humidity	0 ~ 90% Non-condensing									
Dimensions W x H x D (mm)	430x750x990		600x970x1240		800x1090x1600				800x600x1600 (x3)	
Net Weight (kg)	150	175	345	385	528	635	700	1000	1350	1620

SOLAR PHOTOVOLTAIC PANELS



SOLAR PANELS AND GREEN ENERGY SYSTEMS

Powerhouse Distributions has launched a reliable, high performance and high quality range of:

- Solar panels
- Solar charge controllers (MPPT)
- Pure and modified sinewave inverters
- Solar water pumps
- Wind turbines
- Deep cycle (solar) batteries.

SOLAR IN SOUTHERN AFRICA

In the past few years, the number of solar system installations in Africa has grown at a tremendous rate. We at Powerhouse Distribution strive to always come up with new ideas and be at the forefront of the renewable energy sector. We stock a very comprehensive range of solar products and equipment.

SOLAR PANELS

We have a high grade range of solar panels in the poly and mono-crystalline range designed for high efficiency solar systems. Our panels are available in 12V or 24V from 50W up to and including 200W.

INVERTERS

Powerhouse only distributes the highest quality equipment and our solar inverters are no exception. We offer units from 150W up to and including 3000W in the pure sinewave and modified sinewave range.



SOLAR CHARGE CONTROLLERS

Powerhouse has a comprehensive range of solar charge controllers including the state of the art maximum power point tracking units from AEC. These allow your solar panels to operate at their optimum power output voltage, providing higher efficiency up to 97% with lower power losses.



SOLAR CHARGE CONTROLLERS



SUNMAX-1500W SOLAR MPPT CONTROLLER

The Sunmax-1500W developed by AEC can be used universally for 12, 24, 36 and 48V. Its broad DC input voltage range makes sensible system configuration possible for almost all PV modules. Thanks to the integrated MPP tracking, the charger guarantees an energy yield that is 15-30% higher than that of conventional shunt and serial charge controllers.

Auto-selection four-stage (Bulk/Pulse/Float1/Float2) charge mode to reduce the charge time by a third and maximise the system's performance. What is unique about charge controllers of this power range is the high protection class, and the broad temperature range that makes worldwide use, even in harsh ambient conditions, possible. The easy installation and completely automatic customisation of the controller's settings by the SA series make its commissioning very simple.

Features:

- Parallel capable
- MCU controlled
- LCD display
- High efficiency
- Battery temperature compensated
- Four-stage charging.

Model	Sunmax-1500W
Input	
Rated Voltage	40-120Vdc
Current (Max.)	35A
Max. PV Array Open Circuit Voltage	150Vdc
Output	
Nominal Battery Voltage	12/24/36/48Vdc
Max. Charger / Output Current	60A
Physical Characteristics	
Dimensions (L x H x D, mm)	165 x 85 x 330
Input/Output Connectors	Hardwired (Terminal Block)
Weight (kg)	3.2
Computer Interface	
Type	RS-232



GRID-TIE & SELF CONSUMPTION TOUGH INVERTER

- Pure sinewave output
- Microprocessor controlled to guarantee stable charging system
- Multiple operations: Grid tie, Off grid and grid-tie with backup
- LCD display panel for comprehensive information
- Multiple communications
- Built-in MPPT solar charger.



Model	Tough-5000
Output Data (AC)	
Maximum AC Output	5000W
Maximum AC Output Current	22 a.c.A
Nominal AC Voltage	220-240 a.c.V
Grid AC Frequency	50/60Hz, auto-selection
Total Harmonic Distortion	< 3%
AC connection / Grid forms	TN-C, TN-S, TN-C-S
Input Data (DC)	
Maximum DC Power	5300W
Maximum DC Input Current	2 x 15 d.c.A
Max. number of MPP Trackers	2
Maximum DC Voltage	650 d.c.V
MPP Tracking Voltage Range	150-500 d.c.V
Peak Power Tracking Voltage Range	200-460 d.c.V
Efficiency	
MPPT Efficiency	>99.9%
Maximum Efficiency	96.9%
Consumption: Operating (standby) / Night	<12.5W / <0.2W
General Specification	
Dimensions (W x H x D) in mm	405 x 442 x 165
Weight	25.8kg
Cooling Concept	free convection
Acoustic Noise Level	< 35dB(A)
Operating Temperature Range	-20 to +55°C
Ambient Temperature Range	-25 to +60°C
Humidity	0 to 95%,
Protection Degree	IP65
Features	
DC Connection	MC4, Tyco
AC Connection	AC connectors
Communication Interface	RS232, RS485; Bluetooth (Option)

POWER SUPPLIES

MEANWELL



MEANWELL POWER SUPPLIES

ENCLOSED SINGLE OUTPUT POWER SUPPLIES

Features:

- Universal AC Input/Full range
- Protections: Short Circuit / Overload / Over Voltage
- Cooling by free air convection
- 100% full load burn-in test
- 2 year warranty.

Additional Features of the RS-25

- All using 1050C long life electrolytic capacitors
- Withstand 300VAC surge input for 5 seconds
- High Operating temperature up to 700C
- Withstand 5G vibration test
- No load power consumption < 0.5W
- 3 year warranty.



Model	S-60-12	NES-35-12	NES-35-24	RS-25-24
Output				
DC Voltage	12V		24V	
Current Range	0-5A	0-3A	0-1.5A	0-1.1A
Rated Power	60W	35W		25W
Input				
Voltage Range	85-264VAC, 120-370VDC			88-264VAC, 125-373VDC
Frequency Range	47-63Hz			
Efficiency (Typ.)	76%	81%	85%	86%
AC Current (Typ.)	2A/115VAC, 1A/230VAC	0.75A/115VAC, 0.5A/230VAC		0.7A/115VAC, 0.4A/230VAC
Protection				
Overload	105-150% rated output power	110-150% rated output power		110-180% rated output power
Over Voltage	13.8-16.2V		27.6-32.4	
	Protection type: Hiccup mode, recovers automatically after fault condition is removed			
Environment				
Working Temp.	-10-60°C			-20-70°C
Working Humidity	20-90% RH non-condensing			
Vibration	10-500Hz, 2G 10min./1 cycle, period for 60min. each along X, Y, Z axes			10-500Hz, 5G 10min./1 cycle, period for 60min. each along X, Y, Z axes
Other				
MTBF	316.2K hrs min. MIL-HDBK-217F (250C)	394K hrs min. MIL-HDBK-217F (250C)		309.7K hrs min. MIL-HDBK-217F (250C)
Dimensions	159*97*38mm (L x W x H)	99*97*36mm (L x W x H)		78*51*28mm (L x W x H)
Weight	0.51kg	0.36kg		0.2kg

* All other Meanwell power supply models available, please enquire for further information

POWER SUPPLIES

MEANWELL



MEANWELL POWER SUPPLIES

DIN RAIL SINGLE OUTPUT POWER SUPPLIES

Features: - DR-60

- Universal AC input/Full range
- Protections: Short circuit / Overload / Over voltage
- Cooling by free air conversion
- Can be installed on DIN rail TS-35/7.5 or 15
- UL 508 (industrial control equipment) approved
- Isolation class II
- LED indicator for power on
- 100% full load burn-in test
- 3 year warranty.

Features: - DR-120

- AC input range selectable by switch
- Protections: Short circuit / Overload / Over voltage
- Cooling by free air conversion
- Can be installed on DIN rail TS-35/7.5 or 15
- UL 508 (industrial control equipment) approved
- Fixed switching frequency at 55KHz
- LED indicator for power on
- 100% full load burn-in test
- 3 year warranty.



Model	DR-60-24	DR-120-24
Output		
DC Voltage	24V	
Current Range	0-2.5A	0-5A
Rated Power	60W	120W
Input		
Voltage Range	88-264VAC, 120-370VDC	88-132VAC / 176-164VAC by switch, 248-370VDC
Frequency Range	47-63Hz	
Efficiency (Typ.)	84%	
AC Current (Typ.)	1.2A/115VAC, 0.8A/230VAC	2.6A/115VAC, 1.6A/230VAC
Protection		
Overload	105-160% rated output power	105-150% rated output power
Over Voltage	27.6-32.4V	29-33V
	Protection type: Hiccup mode, recovers automatically after fault condition is removed	
Environment		
Working Temp.	-20-60°C	-10-60°C
Working Humidity	20-90% RH non-condensing	
Vibration	10-500Hz, 2G 10min./1 cycle, period for 60min. each along X, Y, Z axes	
Other		
MTBF	216.2K hrs min. MIL-HDBK-217F (250C)	136.8K hrs min. MIL-HDBK-217F (250C)
Dimensions	78*93*56mm (L x W x H)	65.5*125.2*100mm (L x W x H)
Weight	0.3kg	0.79kg

* All other Meanwell power supply models available, please enquire for further information

ISOLATION TRANSFORMERS

1 PHASE & 3 PHASE

ISOLATION TRANSFORMER (10kVA-40kVA)

DESCRIPTION:

This interface transformer has been specifically designed for use in Africa, where conditions vary from country to country and site to site. The input of the transformer has an easily adjustable tap changer, allowing for voltage variation of 380VAC ~ 415VAC nominal. The output is designed to offer 400VAC as this is the European standard, three phase voltage, of which 95% of equipment manufactured in Europe and Southern Africa require.

The input winding has been designed to withstand high input voltages, often found in African conditions, without experiencing permanent damage. The overall transformer has been designed to tolerate the type of harmonic distortion often associated with non linear loads, like x-ray and telecommunications equipment. The inter-winding screens offer high attenuation of interwinding voltages and good common-mode and differential-mode protection (0V between neutral and earth). Due to the delta primary, phase shifting is eliminated.

The overall, oil-cooled packaging allows for outdoor installation. This feature becomes handy when space and cooling in existing installations are limited. Finally, because of the double wound design and the electro-static screen, you have complete isolation between primary and secondary, providing additional safety between the installation and the utility.

FEATURES:

- Interface Isolation Transformer designed for Harsh African conditions
- Easily adjustable tap changer 380V-415V
- Withstands high input voltages
- For non-linear loads
- High attenuation of inter-winding voltages.
- Outdoor installation
- Complete Isolation between primary and secondary.

SPECIFICATIONS:

- **Input Voltages:** Single Phase 230V;
Three phase 380, 400, 415V Delta
- **Frequency:** 48-63Hz; 0.95%
- **Output Voltage:** Single Phase 230VAC;
Three Phase 400VAC Star
- **Cooling:** Oil Cooled
- **Application:** Outdoor
- **Nominal Power Range:** From 10kVA 1P; From 20kVA to 40kVA 3P
- **Enclosing:** Weatherproof powder-coated mild steel
- **Vector Group:** Dyn 11
- **Temperature Class:** H
- **Environment:**
 - Ambient 0-45°C;
 - Humidity 0-95%;
 - Altitude Max 3000m, no die-rating



Model	Input/Output	Rating	Connection	Dimensions (W x H x D mm)	Weight
10kVA/IS	230/230	10kW	Stud	450 x 535 x 425	120kg
20kVA/IS	400/400	20kW	Stud	515 x 840 x 696	250kg
25kVA/IS	400/400	25kW	Stud	515 x 840 x 696	250kg
30kVA/IS	400/400	30kW	Stud	515 x 840 x 696	250kg
40kVA/IS	400/400	40kW	Stud	515 x 840 x 696	265kg

Note: Other ratings available on request

BATTERIES

SEALED & SEMI-SEALED

BATTERIES - SEALED MAINTENANCE FREE



Model	Design Life	Volts	Capacity at 20Hr Rate (Ah)	Dimensions (L x W x H) mm	Mass (kg)
12V7-5	3-5 years	12V	7.2Ah	151 x 65 x 100	2.0
12V17-5	3-5 years	12V	17Ah	181 x 77 x 167	5.3
12V24-5	3-5 years	12V	24Ah	166 x 175 x 125	7.6
12V33-10	10 years	12V	33Ah	195 x 130 x 168	9.7
12V45-10	10 years	12V	45Ah	197 x 166 x 170	14.6
12V65-10	10 years	12V	65Ah	350 x 167 x 179	22.4
12V100-10	10 years	12V	100Ah	330 x 171 x 222	29.0

BATTERIES - SEMI SEALED MAINTENANCE FREE



Model	Volts	Capacity (Ah)	Dimensions (L x W x H) mm	Mass (kg)
12V36	12V	36Ah	207 x 175 x 175	11.5
12V45	12V	45Ah	207x 175 x 175	12.1
12V55	12V	55Ah	242 x 175 x 190	14.1
12V66	12V	66Ah	277 x 175 x 175	16.4
12V88	12V	88Ah	381 x 175 x 190	19.5
12V102	12V	102Ah	330 x 175 x 240	26

* Other battery capacities available

SURGE PROTECTION

DIN MOUNT CLASS 2 SURGE PROTECTION
1POLE, 2POLE AND 4POLE, 20kA - 40kA



DIN MOUNT CLASS 1 SURGE PROTECTION
1POLE, 2POLE AND 4POLE, 200kA



POWER, TELEPHONE AND ETHERNET
SURGE PROTECTORS



PABX AND TELEPHONE PROTECTION
1 WAY AND 10 WAY



ETHERNET PROTECTION
1 PORT AND 24 PORT



POWER PROTECTION AND FILTERING



NOTES

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