

# DUAL CONVERSION ON-LINE UPS

## Industrial/Commercial

### “NX” Series Three $\emptyset$ In / Single or Three $\emptyset$ Out NX31 and NX33

#### TRUE SINE WAVE ON-LINE UPS

Due to the increasing requirements placed by today's users and technological advances in present day electronics, the demand for an industrial UPS system with commercial capabilities is required. Always “On”™ designed NX Series UPS systems to provide clean, isolated, reliable and consistent power to all critical loads.

The NX Series UPS's are dual conversion, on-line, three phase, intelligent systems for centralized power protection and distribution. The “dual conversion” means AC utility is converted into DC power which, in turn, charges the batteries and supplies the inverter, which inverts the DC power back into highly regulated and isolated AC power. This continuous three phase on-line UPS is available in models from 10kVA up to 320kVA.

For high power redundant applications, the NX Series UPS's can be installed with up to eight units in parallel, achieving N+1 redundancy. Isolated Parallel Redundant Operation (IPRO) is an optional feature of the NX Series, whereby the systems are controlled in a true peer-to-peer configuration with redundancy in all critical elements and functions. This advanced technology provides the greater system reliability and expansibility required for mission critical applications.

The NX Series UPS's are also energy efficient. The models up to 40kVA are equipped with GES (Green Energy System) to maximize savings on operating costs without compromising security. GES for IPRO configuration is a special firmware package which allows significant reductions in energy consumption and operating cost during low load conditions. Controls within the CPU monitor and distribute the load to maintain the maximum efficiency and reduce energy consumption. The GES mode for IPRO is programmed to take care of load changes during the day or the degree of redundancy required.

The NX Series UPS's provide reliable and robust protection for mission critical installations from IT to telecommunications and infrastructure applications such as airports, hospitals and financial companies.

#### Features and Benefits

**Full Galvanic Isolation:** Full Galvanic Isolation provides a completely isolated and referenced output. This isolation protection provides a proven solution to problems created by induced voltages affecting the critical loads. Since the output circuit to the load is completely isolated and no noise induced on the neutral can permeate to the loads, systems operate in a more reliable fashion. Also, this type of protection increases the life span of equipment by eliminating noise, which breaks down components.

**Modular Design:** Each major component (inverter, rectifier and static switch) on the NX Series are installed on slide-out modules. This allows for quick repair (mean time to repair of >30 minutes) and easy field upgradeability.

**High efficiency:** Thanks to IGBT technology, the NX Series UPS's provide high efficiency (up to 94.5%). This, combined with IPRO, results in the most cost-efficient and reliable UPS solution in the industry.

**Fully digital:** DSP (Digital Signal Processor), flash memory and SVM strategy are the technology corner stones of the new age of power quality and reliability.

**Extremely flexible:** The NX Series UPS offers tailor-made power protection to comply with your individual installation requirements. Options include passive filter, a 6-pulse rectifier (instead of the standard 12-pulse rectifier) for units under 80kVA and a Smart Panel (SP). In addition, a comprehensive software suite can be added for mission control and data protection.



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TRUE SINE WAVE ON-LINE UPS

10kVA - 320kVA

GENERAL DATA														
Topology		True On-Line, Dual Conversion												
Nominal output at PF=0.8		kVA	10	15	20	30	40	50	60	80	100	160	250	320
Overall efficiency	100% load, 0.9 PF	%	91	91	91	91	91.5	92	92	92.5	92.5	93	93	93
	50% load, 0.9 PF	%	89	89	89	89	89	91	91	91	91	92	92	92
True galvanic isolation from input to output		Yes												
Heat rejection at 100% load, 0.9PF and charged battery		BTU/hr (kW)	3,070 (0.9)	3,510 (1.0)	4,440 (1.3)	6,480 (1.9)	8,870 (2.6)	10,200 (3.0)	11,900 (3.5)	15,700 (4.6)	18,400 (5.4)	29,700 (8.7)	44,360 (13)	61416 (18)
Audible noise level (at 1 m)		dB (A)	< 65 at 1m maximum						< 67 at 1m maximum					
Operating temperature range	UPS	0°C to 40°C (32°F to 104°F)												
	Battery	Optimum 20°C to 25°C (68°F to 77°F) Higher temperatures reduce battery life expectancy												
Storage temperature range	UPS	-15°C to +50°C (5°F to 122°F)												
	Battery	0°C to 40°C (32°F to 104°F)												
	(VRLA)	Storage time is 6 months at 25°C (77°F) Higher temperatures reduce battery storage time												
Relative Humidity		0% to 90%, non-condensing												
Maximum Altitude		Without Derating	<1,500m (5,000ft.) No derating											
Enclosure	Type	Indoor (NEMA 1) [Optional drip shield available] [other configurations available]												
	Safety	Internal dead front construction												
	Cooling	Forced air (bottom to top)												
	Colour	Manufacturer colour (ivory)												
Installation	Rigging	Suitable for handling by forklift												
	Mounting	Casters and Floor mounting brackets												
Installation and maintenance access		Front access required for normal maintenance												
Conduit access		Bottom entry standard [Optional top entry]												
Standards		UL 1778, IEC 62040, FCC Class A, EN50091-1, -2												
Electrostatic discharge immunity		4kV contact / 8kV air discharge												
Configuration	Standard	Stand-alone												
	Optional	IPRO - up to 8 units may be paralleled for redundancy or capacity												

RECTIFIER													
Configuration		Standard 12 pulse with filter [Optional 6 pulse]						Standard 12 pulse with filter					
Input	Voltage	Standard 208VAC, 3 phase, 4 wire + ground (-20% to +15% without battery discharge) [Optional transformers to change voltage to 480 or 600VAC systems and 3 wire systems]											
	Frequency	45 to 65 Hz											
	Power Factor	< 1 (typical)											
	Inrush current	Limited by soft-start circuit											
	Power walk-in	0 to 100% within 20 seconds											
Output	Output Voltage tolerance	+/- 1%											
	DC ripple voltage	+/- 0.5%											
	DC ripple current	Max. 5% of battery capacity expressed in amps											
Full load input current (A) (Based on 208VAC)		22	33	44	67	89	111	133	178	222	355	555	710
Maximum input current (A) (Based on 208VAC)		33	50	67	100	133	167	200	267	333	533	833	1,065
Output current limit (A) (Based on 208VAC)		18	27	36	53	71	89	107	142	178	284	444	568
Maximum Current THD		12 Pulse with filter: 9%; Optional 6 Pulse: 30%											

Specifications are subject to change without notice to reflect upgrades and improvement in technology.



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10kVA - 320kVA

BATTERY													
Nominal output at PF=0.8	kVA	10	15	20	30	40	50	60	80	100	160	250	320
Battery compatibility	Maintenance Free Sealed lead-acid [Optional NiCD or flooded]												
Number of cells	174 Cells												
Voltage range	295 - 410VDC												
Float voltage at 20°C (68°F)	396VDC												
Low voltage level	320VDC												
Minimum discharge voltage	295VDC												
Boost charge voltage	410VDC												
Maximum Charge Current (ADC)	10	10	10	15	20	25	30	40	50	80	120	160	
Recharge time for 30 minute battery to 95% capacity	10 times the discharge time (15 times for 40kVA)												
Internal Batteries	Available						Not Available						
Battery ground fault detection	Standard												
Automatic and manual battery test	Standard Self Test and Conditioning												

INVERTER													
Nominal output at PF=0.8	kVA	10	15	20	30	40	50	60	80	100	160	250	320
DC voltage input range	285 - 415VDC												
Nominal output voltage	208/120VAC, 3 phase, 4 wire + ground [480/277 and 600/347VAC configurations are available]												
Maximum output wattage (kW)	8	12	16	24	32	40	48	64	80	128	200	256	
Full load output current (A) - Single Phase Output	26	40	54	80	107								
Full load output current (A) - Three Phase Output	18	26	35	53	71	89	106	142	178	284	444	568	
Maximum output peak current (A) (Based on Single Phase 120 / 240V)	79	121	162	241	323								
Maximum output peak current (A) (Based on Three Phase 208 / 120V)	53	80	106	159	214	267	320	428	533	852	1332	1704	
Inverter bridge	IGBT technology via Pulse Width Modulating												
Output isolation transformer	Standard												
Output power factor	0.8												
Frequency lock range	45 - 55Hz / 55 - 65Hz												
Output waveform	True Sine Wave												
Output voltage tolerance	Static	+/- 1%											
	Load step 0% - 100% - 0%	+/- 3%, recovering to within +/- 1% in 1 cycle											
	Load step 0% - 50% - 0%	+/- 2%, recovering to within +/- 1% in 1 cycle											
	100% unbalanced load (Ph-N)	+/- 3%											
Output voltage distortion	100% linear load	< 2% THD maximum											
	100% non-linear load	< 3% THD maximum											
Crest factor capability	3:1												
Phase displacement	100% balanced load	120° +/- 1%											
	100% unbalanced load	120° +/- 0.5°											
Output frequency	Free running	50 / 60Hz, +/-0.1% Synchronized with utility											
Overload capability (on inverter)	< 110%	Continuous											
	110 - 125%	15 minutes											
	125 - 150%	5 minutes											
	> 150%	30 seconds											
Efficiency (100% Load)		92.5%	93.0%	93.0%	93.0%	93.5%	93.5%	94.0%	94.5%	94.5%	95.0%	95.0%	95.0%

BYPASS													
Input configuration	Common to rectifier (standard) or dual input (optional)												
Primary components	Full load rated static switch, back-feed protection and internal maintenance by-pass												
Voltage range	+/- 20% of input voltage (line to neutral)												
Frequency range	45 - 55Hz / 55 - 65Hz												
Efficiency	99.50%												
Transfer time	Inverter to bypass	0 ms											
	Bypass to inverter	0 ms											
Overload capability	200% of UPS rating	30 seconds											
	400% of UPS rating	1 second											

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## “NX” Series Three $\emptyset$ In / Single or Three $\emptyset$ Out

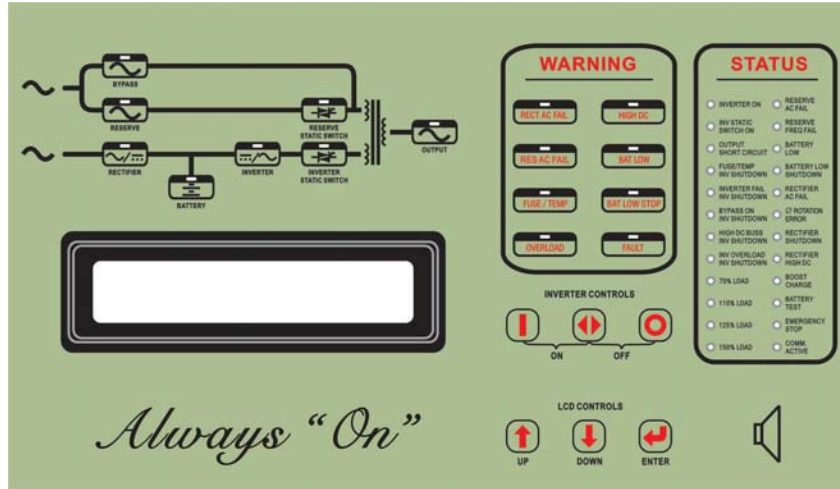
TRUE SINE WAVE ON-LINE UPS

10KVA - 320KVA

### EXTERNAL INTERFACE

Alarm contacts	Standard	8 pre-defined contacts (consult user manual)
Serial communication		RS-232
Ethernet communications		SNMP standard
Input signals		Emergency Power Off contacts provided (optional switch) Status displayed on LCD Panel

### FRONT PANEL CONTROLS, SIGNALS & ALARMS

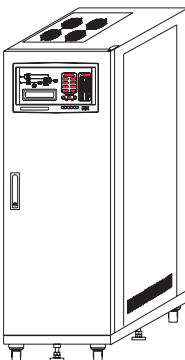


Active mimic Diagram	Represents the operational status of the UPS, with integrated LED's and power flow indicators.
LED display	Displays operational and fault conditions
Audible alarm	audible signal active when any alarm condition is present.
LCD Display	Display of UPS metering functions and event history (multi-language)
Push-Buttons	Inverter On, Inverter Off, Inverter Control, Up key, Down key, Enter key

### OPTIONAL FEATURES

IPRO	Isolated Parallel Redundant Operation
5th Harmonic Input Filter	Available
Remote status Panel	Active mimic diagram w/ Stop Operation and Summary Alarms.
Fire suppress protection	Drip shield
Dust protection	Air filters
Battery Cabinets	Additional matching battery cabinets to extend runtime

### MECHANICAL DATA



UPS Rating (kVA)	Dimensions			Weight	
	W (Width)	D (Depth)	H (Height)	UPS	Floor Loading
10	550 mm (21.75")	812 mm (32.0")	1,600 mm (63.0")	380kg (838lbs)	864 kg/sq.m (177 lbs/sq.ft.)
15	550 mm (21.75")	812 mm (32.0")	1,600 mm (63.0")	415kg (915lbs)	943 kg/sq.m (193 lbs/sq.ft.)
20	550 mm (21.75")	812 mm (32.0")	1,600 mm (63.0")	450kg (992lbs)	1,023 kg/sq.m (210 lbs/sq.ft.)
30	550 mm (21.75")	812 mm (32.0")	1,600 mm (63.0")	580kg (1,279lbs)	1,318 kg/sq.m (270 lbs/sq.ft.)
40	550 mm (21.75")	812 mm (32.0")	1,600 mm (63.0")	650kg (1,433lbs)	1,477 kg/sq.m (303 lbs/sq.ft.)
50	550 mm (21.75")	812 mm (32.0")	1,600 mm (63.0")	710kg (1,565lbs)	1,614 kg/sq.m (330 lbs/sq.ft.)
60	1100 mm (43.25")	812 mm (32.0")	1,600 mm (63.0")	920kg (2,024lbs)	1,672 kg/sq.m (207 lbs/sq.ft.)
80	1100 mm (43.25")	812 mm (32.0")	1,600 mm (63.0")	920kg (2,024lbs)	1,672 kg/sq.m (207 lbs/sq.ft.)
100	1100 mm (43.25")	812 mm (32.0")	1,600 mm (63.0")	1,050kg (2,310lbs)	1,909 kg/sq.m (236 lbs/sq.ft.)
120	1100 mm (43.25")	812 mm (32.0")	1,600 mm (63.0")	1,300kg (2,860lbs)	2,363 kg/sq.m (293 lbs/sq.ft.)
160	1100 mm (43.25")	812 mm (32.0")	1,600 mm (63.0")	1,600kg (3,520lbs)	2,909 kg/sq.m (360 lbs/sq.ft.)
250	2,200 mm (86.5")	812 mm (32.0")	1,600 mm (63.0")	1,950kg (4,299lbs)	1,108 kg/sq.m (227 lbs/sq.ft.)
320	2,200 mm (86.5")	812 mm (32.0")	1,600 mm (63.0")	2,450kg (5,401lbs)	1,392 kg/sq.m (285 lbs/sq.ft.)

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NX-Series UPS

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### Back-up Times (Battery Banks)

10kVA - 320kVA

Full load runtime calculations for NX Series UPS systems from 8kW (10kVA) to 160kW (200kVA).

Load	4000W	8,000W	12,000W	16,000W	24,000W	32,000W
	5000VA	10,000VA	15,000VA	20,000VA	30,000VA	40,000VA
Model						
BBU-NX33D	25 mins	9 mins	4 mins			
BBU-NX33E	90 mins	40 mins	20 mins	15 mins	7 mins	
BBU-NX33KF		36 mins	23 mins	18 mins	10 mins	5 mins
BBU-NX33KG		80 mins	36 mins	32 mins	17 mins	10 mins
BBU-NX33KH		108 mins	76 mins	46 mins	28 mins	19 mins
BBU-NX33KI			105 mins	81 mins	40 mins	24 mins
BBU-NX33KJ				108 mins	72 mins	38 mins

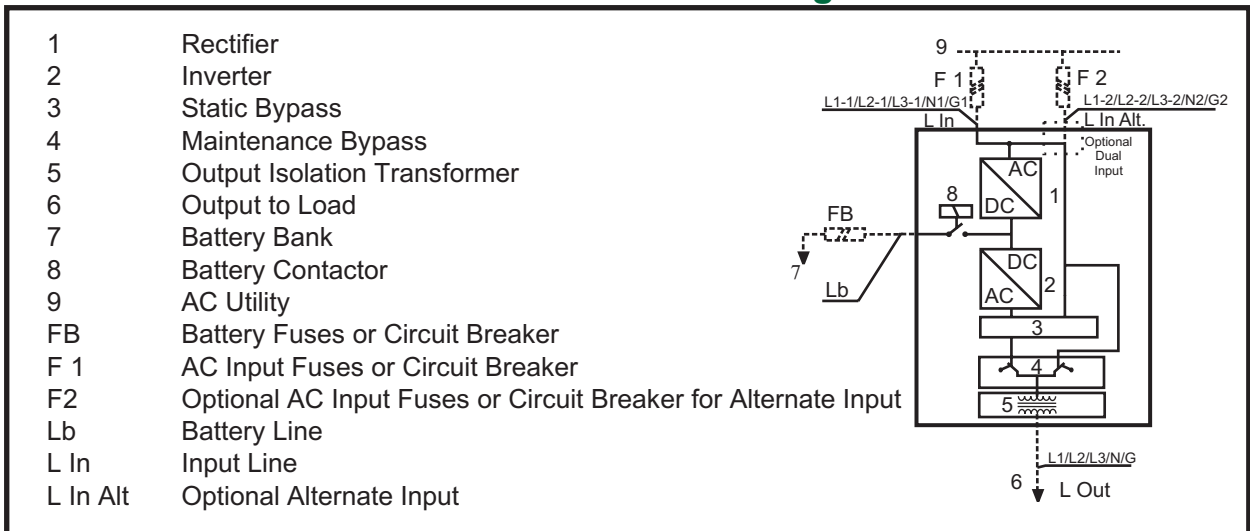
Load	40,000W	48,000W	64,000W	80,000W	96,000W	128,000W	160,000W
	50,000VA	60,000VA	80,000VA	100,000VA	120,000VA	160,000VA	200,000VA
Model							
BBU-NX33KG	6 mins						
BBU-NX33KH	12 mins	10 mins					
BBU-NX33KI	21 mins	18 mins	12 mins	8 mins	5 mins		
BBU-NX33KJ	33 mins	23 mins	18 mins	13 mins	10 mins		
2 X BBU-NX33KI	66 mins	40 mins	24 mins	21 mins	18 mins	12 mins	8 mins
2 X BBU-NX33KJ	92 mins	72 mins	38 mins	33 mins	23 mins	18 mins	13 mins

Model	Cabinet Style	Dimensions	Weight
BBU-NX33D	D Cabinet	235 (9.25") W x 546 (21.5") D x 552 (21.75") H	117 kg (258 lbs)
BBU-NX33E	E Cabinet	400 (15.75") W x 682 (26.75") D x 1,008 (39.75") H	511 kg (1,126 lbs)
BBU-NX33KF	KF Cabinet	1,314 (51.5") W x 850 (33.5") D x 1,945 (76.5") H	814 kg (1,791 lbs)
BBU-NX33KG	KG Cabinet	1,314 (51.5") W x 850 (33.5") D x 1,945 (76.5") H	1,024 kg (2,258 lbs)
BBU-NX33KH	KH Cabinet	1,314 (51.5") W x 850 (33.5") D x 1,945 (76.5") H	1,204 kg (2,649 lbs)
BBU-NX33KI	KI Cabinet	1,314 (51.5") W x 850 (33.5") D x 1,945 (76.5") H	1,398 kg (3,076 lbs)
BBU-NX33KJ	KJ Cabinet	1,314 (51.5") W x 850 (33.5") D x 1,945 (76.5") H	1,764 kg (3,881 lbs)

Specifications are subject to change without notice to reflect upgrades and improvement in technology.

For 250kVA and 320kVA UPS systems, contact factory for models.

### NX-Series UPS Block Diagram



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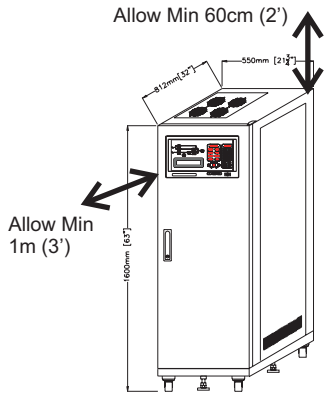
TRUE SINE WAVE ON-LINE UPS

10kVA - 320kVA

### System Configurations

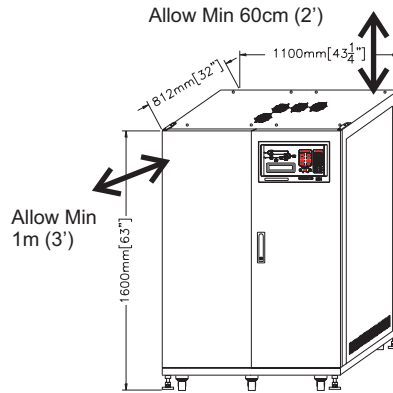
The standard configurations presented are intended only to illustrate the minimum number of enclosures required for each system and our recommended installation arrangement. These enclosures are shipped as separate components.

#### 10 to 50kVA UPS system



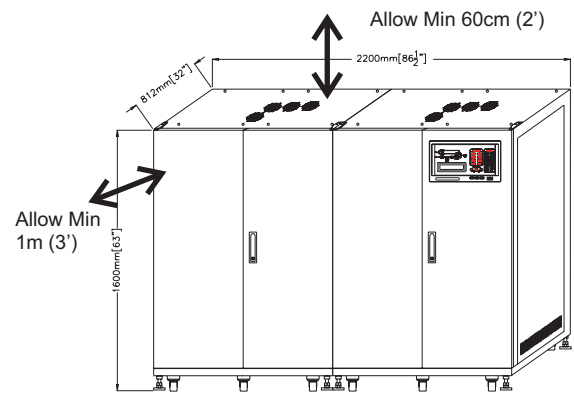
Dimensions:  
550 mm (21.75") W  
812 mm (32") D  
1,600 mm (63") H

#### 60 to 160kVA UPS system



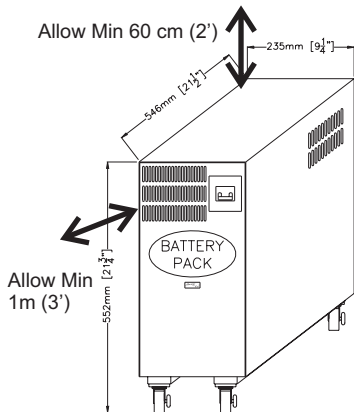
Dimensions:  
1,100 mm (43.25") W  
812 mm (32") D  
1,600 mm (63") H

#### 250 to 320kVA UPS system



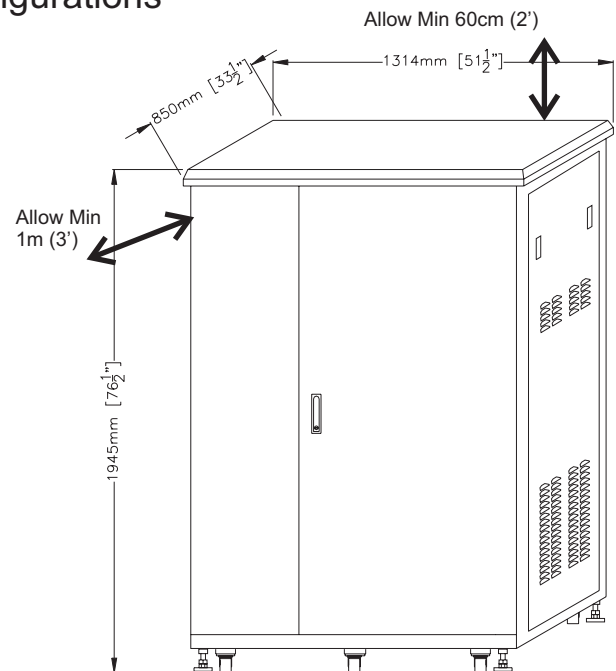
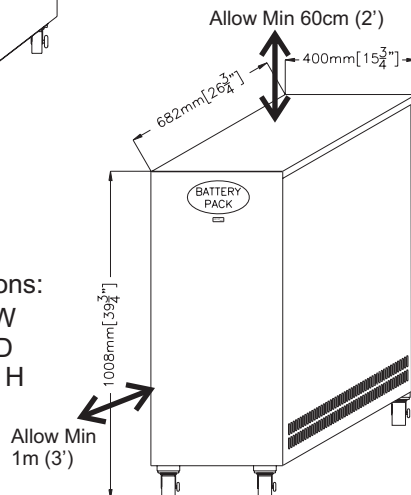
Dimensions:  
2,200 mm (86.5") W  
812 mm (32") D  
1,600 mm (63") H

### Battery Cabinet Configurations



D Cabinet Dimensions:  
235 mm (9.25") W  
546 mm (21.5") D  
552 mm (21.75") H

E Cabinet Dimensions:  
400 mm (15.75") W  
682 mm (26.75") D  
1,008 mm (39.75") H



K Series Cabinet Dimensions:  
1,314 mm (51.5") W  
850 mm (33.5") D  
1,945 mm (76.5") H

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NX31 and NX33

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10kVA - 320kVA

## Features

### Extension of battery life

Batteries are a critical part of every UPS solution, acting as the power supply in the event of an AC power failure. Batteries are sensitive products that need to be handled and monitored continuously and carefully in order to increase their lifetime and predictability. Always “On”™ includes superior battery management within the entire NX Series family and is a comprehensive management and monitoring system that prevents batteries from overcharging and deep discharging. Load dependent runtime indication and re-calibration procedures are standard features to optimize life cycle cost and system reliability.

### Features and Benefits:

The NX Series features a "no surprises" automatic battery test, a deep calibration test, which provides battery performance tracking, boost charging, which enables fast recharging of batteries and a temperature compensated battery charger, which prevents overcharging. The load dependent end of the discharge voltage gives deep discharge protection and the "no-load" shutdown maintains your battery's operational life under no-load conditions.

### UPS Monitoring and Management via SNMP

#### Data Protection & Monitoring:

The primary function of Always “On”™'s protection software is the safeguarding of data and the Operating Systems. Using our software reduces the risk of system crashes and/or data loss. Always “On”™'s software provides event handling and computer shutdown for all major operating systems to enhance security of critical data. Multi-vendor and multi-platform environments, as well as client-server structures, are managed.

Direct access of remote UPS and active management of single modules in multi-unit configurations are the keys to efficient and predictable power quality management. The SNMP Client/Agent structure, direct link, or remote connection enables a network manager or facility engineer to permanently monitor and control local or remote Always “On”™ UPS systems and the equipment and processes they protect. Snap-in modules allow easy integration into the leading Network Management Systems.

A real-time graphical display of critical UPS parameters and environment information of multiple decentralized UPS's, as well as statistical data and event log files, are available on every local computer display and network management system or on the Internet. Additionally, UPS status information changes can be sent to such varied information carriers as SMS, network management systems, e-mail or fax.

## Options

### Isolated Parallel Redundant Operation (IPRO)

#### Highest standard for reliability:

Power reliability is business reliability. Mission critical applications require the highest availability of power. Always “On”™'s unique IPRO technology sets the highest standard for power reliability, and IPRO compatible NX Series UPS's are field upgradable. Additional units can be added to increase the total power output of a system or to create a redundant system with no single point of failure. Decentralized bypass, redundant control electronics and redundant batteries offer perfect load-sharing and fault-tolerant operations.

#### Protection:

Short circuit, over-temperature and over-voltage protection is built in to protect the NX Series UPS against any form of misuse. Back-feed protection, complete protection circuits and excellent overload behaviour provide outstanding user protection and application security, all in conjunction with full galvanic isolation on the output of every UPS system used in the parallel operation.

#### Features and Benefits:

Up to eight NX Series units can be connected in a redundant-parallel system (N+1 redundant). It also features a decentralized bypass, redundant control electronics, active-active system management and fault tolerant operation, as well as a transparent fail over procedure in case of UPS failure or for maintenance and no single point of failure.

### Drip Shield

The addition of a drip shield ensures that liquids and other debris do not enter your NX Series UPS through the top cooling vents.

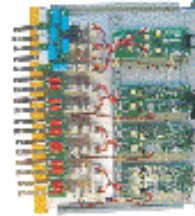
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10kVA - 320kVA

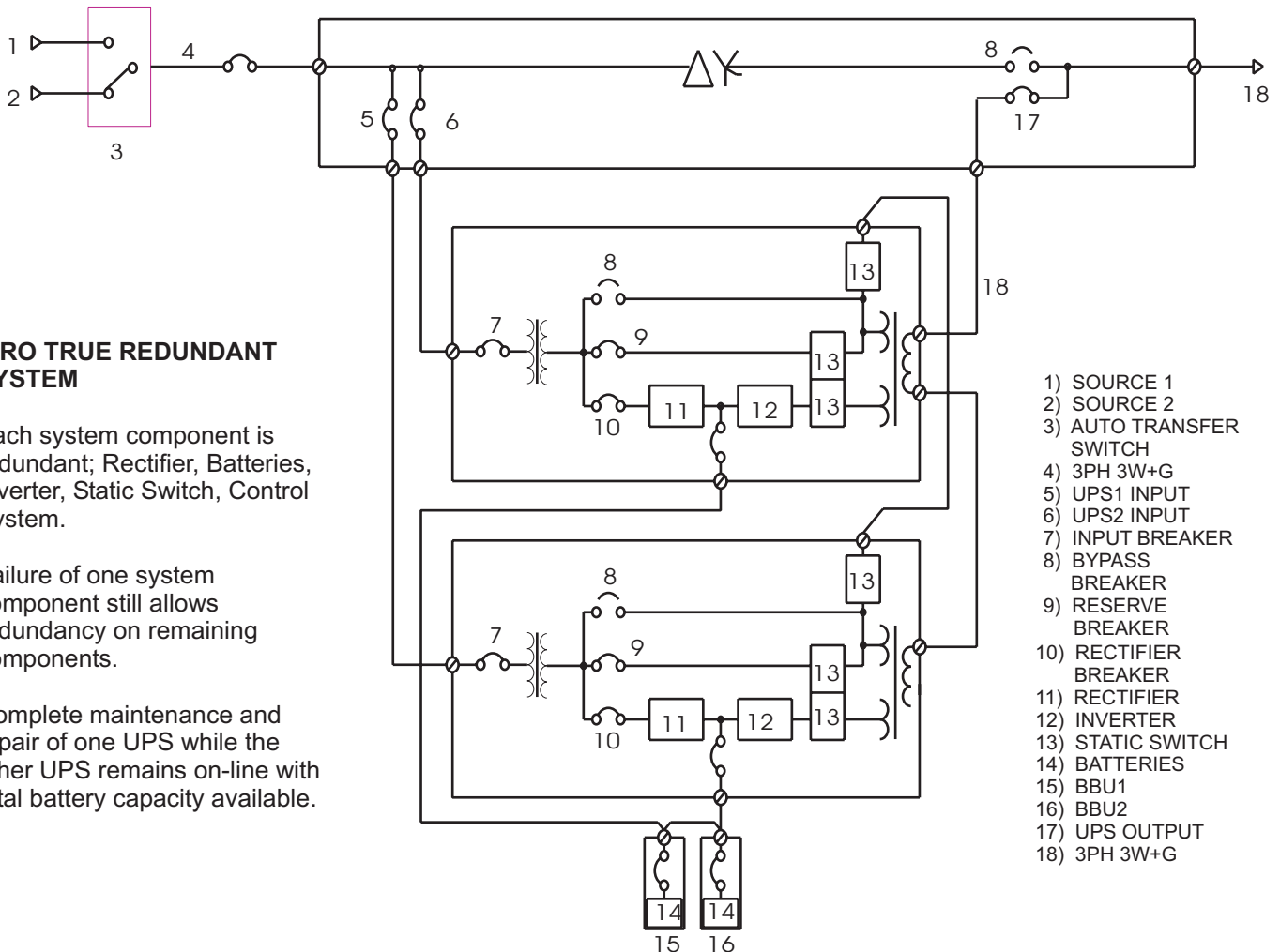
## Module Interior Layout



Rectifier Module



Inverter Module



### IPRO TRUE REDUNDANT SYSTEM

Each system component is redundant; Rectifier, Batteries, Inverter, Static Switch, Control System.

Failure of one system component still allows redundancy on remaining components.

Complete maintenance and repair of one UPS while the other UPS remains on-line with total battery capacity available.

- 1) SOURCE 1
- 2) SOURCE 2
- 3) AUTO TRANSFER SWITCH
- 4) 3PH 3W+G
- 5) UPS1 INPUT
- 6) UPS2 INPUT
- 7) INPUT BREAKER
- 8) BYPASS BREAKER
- 9) RESERVE BREAKER
- 10) RECTIFIER BREAKER
- 11) RECTIFIER
- 12) INVERTER
- 13) STATIC SWITCH
- 14) BATTERIES
- 15) BBU1
- 16) BBU2
- 17) UPS OUTPUT
- 18) 3PH 3W+G

# DUAL CONVERSION ON-LINE UPS

## “NX” Series Three $\emptyset$ In / Single or Three $\emptyset$ Out External Bypass Systems

TRUE SINE WAVE ON-LINE UPS

10kVA - 320kVA

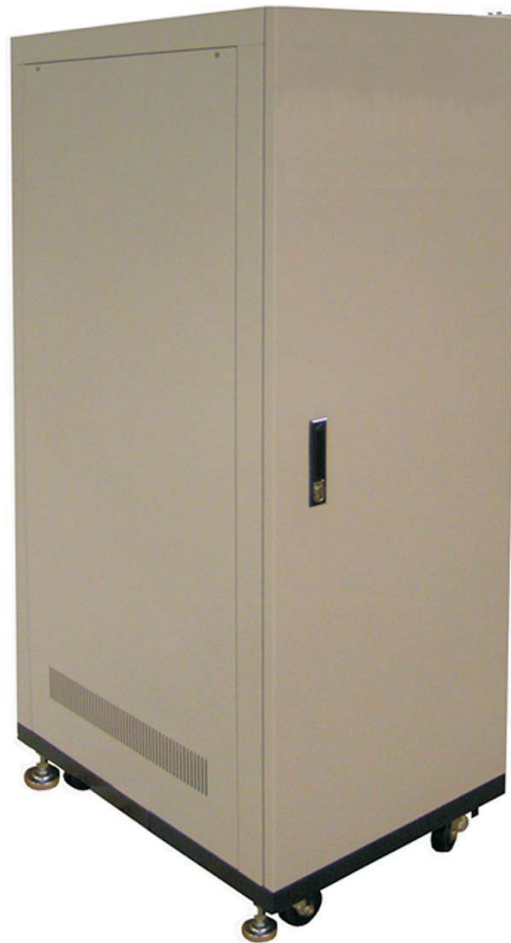
A separate cabinet to allow for complete removal of the UPS system from the load, while still supplying the load with conditioned power. Always “On”™ offers various systems which include isolation transformers for different voltage configurations, distribution panels, electro-mechanical interlock protection to ensure proper operation, rotary switch operation and transient voltage surge suppression.

Systems are supplied in a matching cabinet or wallmounted cabinet. These systems are recommended for maintenance purposes to prevent accidental removal of power from the loads and to allow for complete power removal from the UPS system for safety considerations.

Bypass with optional TVSS filter



Standard Bypass system



Rotary Bypass system

