

# Invertronic Modular 3 Phase Inverter System

Benning has applied over 70 years of accumulated knowledge and experience in high reliability power electronics to come up with another world class solution.

Introducing – **Invertronic Modular**, the world's highest power density, modular true three phase inverter system for telecom, datacenter, and other critical AC power applications.

The first model, with -48VDC input and 120/208VAC, 60Hz. output is targeted for the North American telecom industry. Recognizing that most telecom AC loads run off 120VAC line-to-neutral or 208-240VAC line-to-line, why introduce a three phase inverter?

First, it allows for efficient load balancing between phases, particularly as this applies to a typical building commercial AC supply. Costs associated with distribution transformers, protective devices, and cabling can be minimized.

Second, many applications involve replacement of an existing UPS. Critical AC loads are now fed inverted power continuously from a -48VDC plant with typically 8-12 hours hold-up time. This configuration protects the loads from AC mains power disturbances. The cost of yearly UPS service contracts and associated separate UPS battery maintenance can also be eliminated. Cutover from a three phase UPS to the Invertronic is quick and easy because the inverter system output can be run up and connected directly into the existing three phase AC distribution. There is no need to incur the cost and downtime associated with disturbing the existing distribution panels and cabling.

To further enhance system availability, a new topology has been introduced whereby each inverter module has its own Static Bypass Switch (SBS), eliminating the one large transfer switch of past generations which can be a source of system failure. Secure data bus communications between modules provides for a coordinated transfer to back-up AC in the unlikely event of system failure or overload. Redundancy is determined dynamically, based on measurement of actual present load. A transfer to back-up will take place when the system determines that its capacity has been exceeded either due to a non-redundant module failure or due to excess load being added on the output.

## Key Features

- Static Switch Allows Programming For AC Mains Priority or DC Inverter Priority
- Hot swap 10kVA modules each with built-in SBS for the ultimate in scalability (10-60kVA systems in single cabinet; 60-120kVA systems in dual cabinet)
- Employs 4th Generation DSP Technology for outstanding dynamic step load response and maintenance of high quality, low distortion sine wave output into non-linear loads
- Front Door-mounted Graphical Display of Operating Mode & System Parameters
- Remote Monitoring via Network (HTML) (SNMP)

# BENNING

120 kVA of Secure AC Power  
in 2 Cabinets - AC Mains Or  
Inverter Priority



Main Cabinet      Secondary Cabinet



## Technical Specifications

<i>Invertronic Modular 3 Phase Inverter</i>		
<i>AC OUT</i>	Inverter Module Rating	10kVA / 8kW at 0.8 power factor inductive
	Maximum System Capacity	120kVA / 96kW at 0.8 power factor inductive
	Maximum Modules Per Cabinet	6
	Maximum Cabinets	2
	AC Output Volts	120 / 208 VAC 3 phase, 4 wire, Y connected
	AC Output Amps	27.8A per phase at full load
	AC Output Frequency	60Hz +/- .01% on internal crystal; tolerance is programmable when synchronized to commercial AC bypass
	Maximum Allowable Phase Imbalance	100%, up to full load per phase current rating
	Load Power Factor Range	0.7 lagging (inductive) to 0.8 leading (capacitive), standard UPS de-rating
	Output Regulation	Static: +/- 1%; Dynamic: +/-5% max with 100% step load change, settling time: <10 msec
	Efficiency	86.4% @ full load; 88.7% @ 50% load
	Crest Factor Accommodated	3.0 / 1
	Distortion	<2% THD into a linear load; pure sine wave output
Overload Capability	125% for 10 minutes; 200% for 4 seconds	
<i>DC IN</i>	Input Voltage	Nominal: 48VDC, Operating Range 42-60VDC
	Input Current	Maximum: 228A at 42VDC at full load, Nominal: 138A at 54VDC at 80% load
	Inrush Current	Soft-start circuit limits inrush to <25% of full load current
	Reflected Noise on DC Input	<2mV psophometric
<i>SYSTEM</i>	Static Bypass Switch (SBS)	208VAC, 3 Phase SCR bridge built into each module
	SBS Priority	Inverter Priority Or AC Mains Priority
	Transfer Time	SBS is make-before-break; 2ms typical, 6ms maximum
	SBS Overload Capability	1000% for 8ms
	SBS Transfer Criteria	Overload, modules over temperature, short circuit on output, low DC voltage, manual initiation, output AC volts out of range
	External Alarming	10 Outputs include: Major, Minor, Mains Fail, DC Fail, Inverter Fail
	Indicators	13 Programmable LEDs on front door display panel
<i>MECHANICAL</i>	Module Weight & Dimensions	99lbs. (45kg); 19.9" x 17.7" x 8.75" (5RU) (505 x 450 x 222 mm)
	Cabinet Weight & Dimensions (each)	528lbs. (240kg); 24" W x 31.5" D x 84" H (600 x 800 x 2134 mm)
	Module Mounting	Hot-plug into pre-wired mounting shelf
	Heat Output	<4,300 BTUs / hour / module, full load @ 54VDC input
	Operating Temperature Range	0-40°C
	Operating Humidity Range	0-95% relative humidity, non-condensing
	Elevation	Fully rated to 1000M, de-rated thereafter
<i>DESIGN</i>	Safety	EN 60950, UL 1778, cUL 60950
	Design	NEBS Level 3 Certified, Zone 4 cabinets available
	EMI Emissions	EN 62040-2 classification C3, FCC Class A
	EMI Immunity	EN 61000-4-4, EN 61000-4-5
	Electrostatic Discharge Immunity	EN 61000-4-2, (level: 4kV contact, 8kV air discharge)

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