

## MX SERIES POWER INVERTERS

**EXELTECH** introduces the world's first truly **redundant, modular** inverter system. This is the most reliable inverter system available. No single malfunction will cause the inverter system to fail. For **ease of maintenance, modules are "hot" insertable**. Power levels are **expandable**, and inverter modules can be upgraded or replaced while the system is on line **without interruption in power** to your critical loads.

The system can be configured for **power levels from 1000 Watts to 5KW with 120 Vac** output. Larger systems are available with up to 20KW at 120 Vac output and 40KW at 240 Vac bi-phase or 60KW at 208 Vac 3 phase, upon special order.

Eliminating control and alarm cards can create systems lower in cost, but are not redundant. One 1000 Watt module and any number of additional 1000 Watt power modules (up to 4), combine to make a standard inverter. This type of system can be expanded as power requirements increase.

The system is **extremely compact and lightweight**. The power modules only weigh 7 lbs. each.

The output voltage is precisely regulated, such that no measurable voltage change occurs on the output when the input voltage changes over its wide voltage range. Similarly, less than 0.5 volt change in output voltage will occur when the output load varies from 0 to 100% of rated power. With distortion of 2% maximum, this inverter offers **the cleanest sine wave power available**.

Models are available which cover all standard battery systems. Custom models can be designed to meet your specific input voltage requirements.

- **N+ 1 REDUNDANT**
- **EXPANDABLE**
- **REMOTE SWITCHING**
- **TRUE SINE WAVE**
- **"HOT" INSERTABLE**
- **1000 WATT MODULES**
- **REMOTE METERING**
- **ADJUSTABLE POWER**



## Module Description

The **Exeltech MX** Series of inverters is a highly modular system of products which can be assembled in many combinations to afford the user infinite flexibility. All **MX** systems feature manual power adjustment allowing power modules not in use to be turned off, reducing "no load" current drain. Optional remote metering and switch is also available.

The building blocks of the system are as follows:

- 1.) **Power Module** - this is a 1000 Watt slave power inverter. It requires drive signals from a Master Module or Control Card as described below. This module is the backbone of the inverter system and will be the majority of the modules in most systems.
- 2.) **Master Module** - This is a 1000 Watt power inverter which contains all the electronics necessary to operate. It requires an enclosure to provide connections to the battery and AC output. This module can also operate up to 19 slave Power Modules as listed above. If this module is used to operate the slave modules the system cannot be fully redundant.  
**All MX systems require either a master module or at least one control card.**
- 3.) **Control Card** - This card will generate all the signals necessary to operate up to 20 Power Modules. The card itself will not generate any AC output power nor does any power flow through it. This card can be paralleled with another Control Card to generate a redundant set of control signals to form the basis of completely redundant inverter system.  
**All MX systems require either a master module or at least one control card.**
- 4.) **Alarm Card** - This card can be used in conjunction with a redundant or non redundant inverter to provide various alarm output signals to the user via LED's and alarm contact closures. It must be included in redundant system to detect failure of control card.
- 5.) **Transfer Switch** - Provides all the same functions as the alarm card, plus provides a relay to transfer AC power to the load from either the inverter or the utility input. Use only with systems 7KW or less.

The above modules can be placed in the following enclosures. Installations can either be free standing or in standard relay racks.

- 1.) **19" cage assembly** - This enclosure is compatible with a 19" relay rack. This is the smallest cage which can contain a redundant system. It is available in the following configurations:
  - A - This is the basic configuration for a redundant system. It can hold up to 4 Power Modules, 2 Control Cards and either a Transfer Switch or an Alarm Card.
  - B - This is used as an expansion rack or may be used as an expandable, non redundant inverter, up to 5 KW. **This configuration will not accept X-fer switch, alarm card or control cards.**
- 2.) **23" cage assembly** - This enclosure is compatible with a 23" relay rack.
  - A - This is the basic configuration for a redundant system. It can hold up to 5 Power Modules, 2 Control Cards and either a Transfer Switch or an Alarm Card.
  - B - This is used as an expansion rack or may be used as an expandable, non redundant inverter, up to 6 KW. **This configuration will not accept X-fer switch, alarm card or control cards.**
- 3.) **7" cage assembly** - for 1 or 2KW systems when redundancy is not required.
  - A - This configuration consists of 1 Transfer Switch and 1 Master Module.
  - B - This configuration is expandable up to 2KW. 1 Master Module and 1 Power Module.  
**This configuration will not accept Xfer switch, alarm card or control cards.**
- 4.) **9" cage assembly**- for 1-3KW systems when redundancy is not required.
  - A - This configuration consists of Transfer Switch and 1 or 2 Master Module.
  - B - This configuration is expandable up to 3KW. 1 Master Module and 2 Power Modules.  
**This configuration will not accept Xfer switch, alarm card or control cards.**



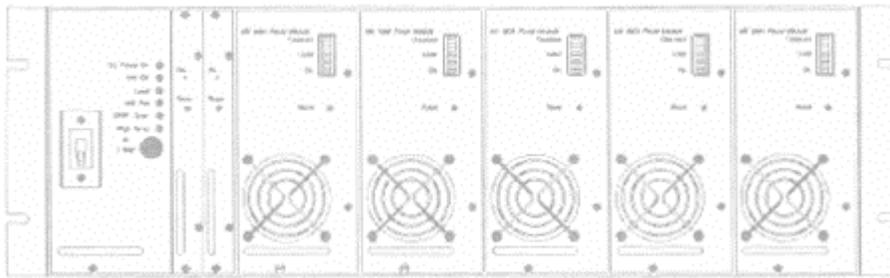


# System Description

The **Exeltech MX** Series of inverters is available in three basic architectures, redundant, upgradable and expandable. Different options and sizes are available in either to fit varying applications. As a benefit of the MX series modular design, power levels are expandable in any system, as power requirements increase.

**1.) N+1 Redundant-Expandable Inverter System:** For applications where reliability and maintainability are paramount, the N+1 redundant system offers the most cost-effective method of achieving redundancy and the ability to maintain the system while loads remain on line. All cards(except 12 Vdc)are "hot" insertable to allow maintenance without interrupting power to critical loads. Designing the power level with N+1 number of power modules, allows for redundancy without necessitating the purchase of an entire duplicate system.

**A redundant system consists of:**



1 ea. Alarm Card  
part # H (100 Vac)  
A (120 Vac)  
A (240 Vac)<sup>2</sup>  
F (230 Vac)

2 ea. Control Cards  
part # LL (100 Vac)  
CC (120 Vac)  
CC (240 Vac)<sup>2</sup>  
EE (230 Vac)

At least 3 Power Modules  
part # P (100 Vac)  
P (120 Vac)<sup>2</sup>  
P (240 Vac)  
R (230 Vac)

1 ea. Cage assembly  
part # 1A (19" cage)  
2A (23" cage)

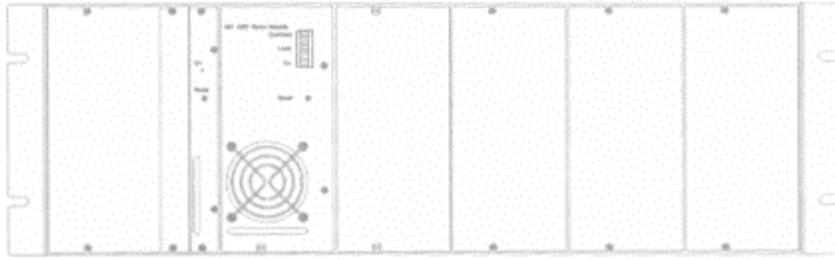
Options: 1 ea. X-fer switch  
part # G (100 Vac)  
X (120 Vac)  
X (240 Vac)<sup>2</sup>  
Z (230 Vac)  
X-fer switch includes alarms and replaces the alarm card.

expansion rack  
part # 1B (19" cage)  
2B (23" cage)  
...integrates with rack A for accommodating additional power modules, up to total rating of 20KW. Additional control cards and a larger X-fer switch may be required. Please call the factory for assistance.

**2.) Upgradable Inverter System:** The **Upgradable system** offers the flexibility to add a X-fer switch or alarm card and Full Redundancy for future requirements. A minimum system with as little as one control card and one power module can be upgraded in the future to include additional power modules, X-fer switch or alarm card and an additional control card for full redundancy(see figure II). By using one master module a system may be upgraded to include a X-fer switch and additional power modules, but will not be redundant(see figure III). 1 KW inverters with a X-fer switch use the 7"or 9"(part # 7A, 9A) cage.

<sup>2</sup> Requires 2 cages

Figure II.



1 ea. Cage assembly  
part # 1A (19" cage)  
2A (23" cage)  
7C (7" cage)  
9C (9" cage)

1 ea. Control Card  
part # L\*(100 Vac)  
C\*(120 Vac)  
C\*(240 Vac)<sup>2</sup>  
E\*(230 Vac)

1 ea. Power Module  
part # P (100 Vac)  
P (120 Vac)  
P (240 Vac)<sup>2</sup>  
R (230 Vac)

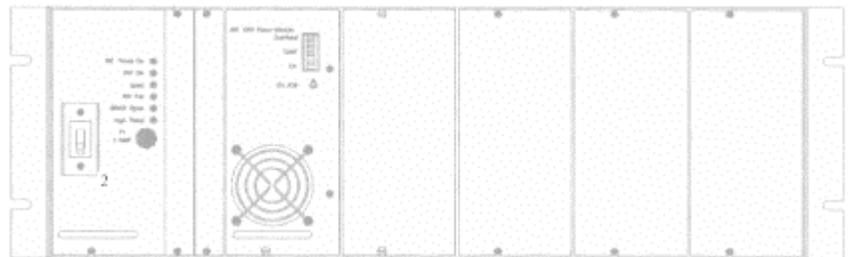
**Options:**

1 ea. X-fer Switch  
part # G (100 Vac)  
X (120 Vac)  
X(240 Vac)<sup>2</sup>  
Z (230 Vac)

1 ea. Alarm Card  
part # H (100 Vac)  
A (120 Vac)  
B (240 Vac)<sup>2</sup>  
C (230 Vac)

expansion rack  
part # 1B (19" cage)  
2B (23" cage)

Figure III.



1 ea. X-fer Switch  
part # G (100 Vac)  
X (120 Vac)  
X (240 Vac)<sup>2</sup>  
Z (230 Vac)

1 ea. Master Module<sup>1</sup>  
part # Q\* (100 Vac)  
M\* (120 Vac)  
M\* (240 Vac)<sup>2</sup>  
O\* (230 Vac)

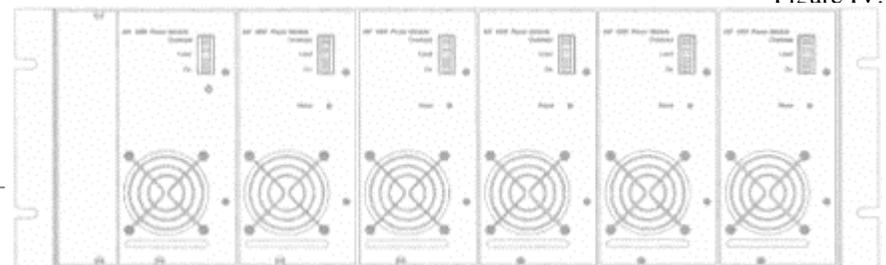
**3.) Expandable inverter system:** This configuration can be used as an independent inverter system (figure IV), or to expand power levels of existing MX systems (figure V). This configuration does not utilize X-fer switch, alarm card or control cards. It will accommodate an additional power module in both the 19" and 23" cages. 1KW, 2KW and 3KW inverters without a X-fer switch use the 7" or 9" (part number 7B, 9B) cage assembly.

Figure IV.

**Options:**

expansion rack  
part # 1B (19" cage)  
2B (23" cage)

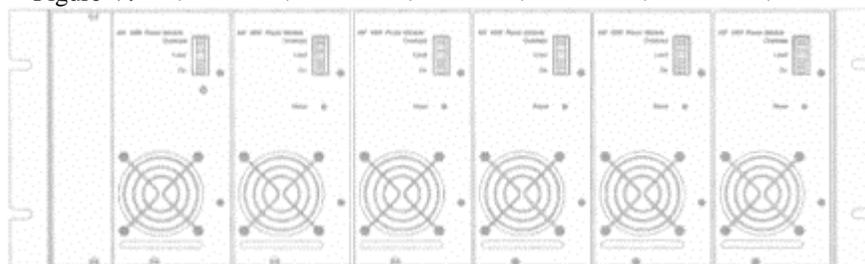
7B (7" cage)  
9B (9" cage)



1 ea. Cage assembly  
part # 1A (19" cage)  
2A (23" cage)

Up to 6  
Power Modules  
part # P (100 Vac)  
P (120 Vac)  
P (240 Vac)  
R (230 Vac)

Figure V.



1 ea. Master Module  
part # L\* (100 Vac)  
M\* (120 Vac)  
M\* (240 Vac)<sup>2</sup>  
O\* (230 Vac)

Up to 5  
Power Modules  
part # P (100 Vac)  
P (120 Vac)  
P (240 Vac)  
R (230 Vac)

<sup>1</sup>Alarm card is not an option on this configuration

<sup>2</sup>Requires 2 cages

Use the chart on page 7 to formulate the 15 digit model number

### EXELTECH MX SERIES MODEL NUMBER

**Step 1:** Enter the two character code for cage assembly size and configuration.

**Step 2:** When a transfer switch or alarm card is used, enter the single character code that card. In applications where neither is used, enter an asterisk(\*). The 2<sup>nd</sup> character designates option level of Alarm Card or X-fer Switch.

**Step 3:** Enter the two character code for control card(s) or a master module, there is not an application where both are used.

**Step 4:** To designate power levels, enter the number for the quantity of power modules required. Redundant systems require continuous load ratings plus one additional power module.

**Step 5:** To designate the type of power module required, enter the single character code.

**Step 6:** To designate the input voltage, enter the single character code from the Vdc INPUT VOLTAGE CHART BELOW.

Vdc INPUT VOLTAGE CHART						
DC Volts	12	24	32	48	66	108
Designation	1	2	B	4	E	I

**Step 7:** The output frequency is designated by using the first number of the frequency (5 for 50Hz, 6 for 60Hz, 4 for 400Hz).

**Step 8:** Any option number if applicable.

**EXAMPLE:** A redundant system with an alarm card, to fit a 23" wide cage, for powering a 4000 watt continuous load, at 115Vac, 60Hz with 48Vdc input would require the following model number... **2AA-CC5P-46**





# Module Part Number

**EXELTECH MX SERIES**      **MX** - - - - - **1** - -  
**MODEL NUMBER**

**Step 1:** Model number always starts with MX.

**Step 2:** To designate a cage assembly enter the two character code from the chart on page 7. When ordering a power module or master module enter a "K". If ordering any other module enter an asterisk(\*).

**Step 3:** To designate the type of module enter the single character code from the chart on page 7. To designate cage assembly output voltage enter the single character code: 1 for 120, 3 for 230 or 4 for 240Vac.

**Step 4:** To designate the input voltage, enter the single character code for from the **Vdc INPUT VOLTAGE CHART** below. If ordering an alarm card or cage assembly enter an asterisk(\*)

Vdc INPUT VOLTAGE CHART						
DC Volts	12	24	32	48	66	108
Designation	1	2	B	4	E	I

**Step 5:** The output frequency is designated by using the first number of the frequency(5 for 50Hz, 6 for 60Hz, 4 for 400Hz). If ordering a X-fer switch, alarm card, power module or cage assembly enter an asterisk(\*)

**Step 6:** This designates revision level (For EXELTECH use only).

**Step 7:** To designate option enter the code from the option chart below. If no option is required please leave it blank.

OPTION CHART	
Option	Code
Conformal Coating	M7

**MODULE EXAMPLE:** A 12Vdc, 120Vac, 60Hz master module would require the following module number... **MX-K-M-1-6-1**

**CAGE ASSEMBLY EXAMPLE:** A 19" redundant cage, 120Vac would require the following cage assembly number... **MX-1A-1-\*-\*1**



<b>MX SYSTEMS DESIGN CHART</b>							
<b>SYSTEMS REQUIRED</b>	<b>CAGE ASSEMBLY SIZE AND CONFIG.</b>	<b>Use X-fer or Alarm Card</b>			<b>Use CC or MM</b>		<b>POWER MODULE</b>
		<b>X-FER SWITCH</b>		<b>ALARM CARD</b>	<b>CONTROL CARD</b>	<b>MASTER MODULE</b>	
		100Vac	G	H	L* or LL	Q*	
		120Vac	X	A	C* or CC	M*	
		240Vac	X <sup>1</sup>	A <sup>1</sup>	C* or CC	M*	
230Vac	Z	F	E* or EE	O*			
Redundant 19" Cage	IA	0 or 1 <sup>1</sup>		0 or 1 <sup>1</sup>	2	0	3 or 4
Redundant 23" Cage	2A	0 or 1 <sup>1</sup>		0 or 1 <sup>1</sup>	2	0	3 to 5
Upgradable 7" Cage	7C	0 or 1		0 or 1	0	1	0
Upgradable 9" Cage	9C	0 or 1		0 or 1	0	1	up to 1
Upgradable 19" Cage	IA	0 or 1		0 or 1	0, 1 or 2	0 or 1	up to 4
Upgradable 23" Cage	2A	0 or 1		0	0, 1 or 2	0 or 1	up to 5
Expandable 7" Cage	7B	0		0	0	1	up to 1
Expandable 9" Cage	9B	0		0	0	1	up to 2
Expandable 19" Cage	IB	0		0	0	1	up to 4
Expandable 23" Cage	2B	0		0	0	1	up to 5
Split Phase 19" Cage	1E	0		0	0	2	0 or 2
Split Phase 23" Cage	2E	0		0	0	2	0,2,4
Split Phase 7" Cage	7E	0		0	0	2	0

Please note:

-240 Vac is North American Standard, call for availability

-230 Vac is European Standard, call for availability

<sup>1</sup> 1 per phase



# Power Inverter Specifications

## Output Power

CONTINUOUS POWER	SURGE POWER (3 seconds)	NO LOAD POWER	OUTPUT VOLTAGE	OUTPUT CURRENT	WEIGHT LBS.
1000W	2200W	20W	230 +/- 6%	4.3	7.5
1000W	2200W	20W	117 +/- 6%	8.6	7.5
1000W	2200W	20W	117 +/- 6%	10.0	7.5

## Input Power

MODEL VOLTAGE	MINIMUM (TYPICAL)	SYSTEM (TYPICAL)	MAXIMUM (TYPICAL)	TYPICAL EFFICIENCY @ FULL POWER	PEAK EFFICIENCY @ 1/3 POWER
12V	10.4/10.6'	13.8V	17V	85%	87%
24V	19/21V*	27.6V	34V	87%	89%
32V	26.5/28V*	36.8V	45V	87%	89%
48V	41.5/42.5V	55.2V	62V	87%	89%
66V	57.5/58.5V*	75.9V	94V	88%	90%
108V	94/95V*	124V	149V	88%	90%

\* indicates typical cut-off voltage/warning buzzer voltage

## General

CONDITIONS	MINIMUM	TYPICAL	MAXIMUM
WAVEFORM		SINUSOIDAL	
LINE REGULATION		.1%	.5%
LOAD REGULATION		.3%	.5%
DISTORTION		1.5%	2%
FREQUENCY*	-.1%	NOMINAL	+.1%

\* 50Hz optional

\* 400Hz optional

## Protection Circuitry

Over Voltage:	Shut off at maximum input voltage, per input conditions.
Under Voltage:	Shut off at minimum input voltage, per input conditions
Thermal:	105 C internal temperature. Warning buzz 5 C before shut off
Output Short:	Unit shuts off: Circuit breaker protected

## Environmental

Temperature:	-25 to 40 C full power derated above 40 C
Humidity:	5 to 95% non condensing
Altitude:	-200 to 10k feet full power, derated above 10k
Audible Noise:	Less than 45dba
Cooling:	1KW - Thermostatically controlled forced air.
Finish:	Polyurethane base paint.
Warranty:	Full year parts labor

## Mechanical

Four case sizes are available; all are: 7" high X 15" deep.	
19 inch Wide:	(includes hardware for rack or sheff mounting)
23 inch Wide:	(includes hardware for rack or sheff mounting)
24 inch Wide:	(includes hardware for rack or sheff mounting)
9.97 inch Wide:	(for 1 to 3KW applications: shelf mounting only)
7 inch Wide:	(for 1 or 2KW applications: shelf mounting only)



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