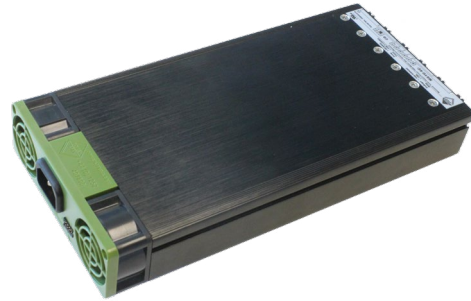




- Up to 1000W in <1U chassis
- MIL-STD-810G: Shock & Vibration
- MIL-STD-461F: EMC
- Conformal Coated & Ruggedised
- -55 to +70°C Operating Temperature
- 47-440Hz input frequency
- Anti-Vibration Compound



Multistax® - hi-rel

### POWER SUPPLY DESIGN EXCELLENCE

The Multistax® Hi-Rel family of high reliability configurable power supplies provides up to 1000W in an extremely compact 1U package. These units are ideally suited to solving complex power system requirements where a full custom design is not an option. The fully floating outputs can be combined in series or parallel (or series-parallel) to achieve virtually any output combination you can imagine.

Designed for use in harsh operating environments, the Multistax® Hi-Rel family is conformal coated and ruggedised to withstand extremes in shock and vibration as well as operation over a wide temperature range of -55 to 70°C. Applications include Harsh Industrial, Test and Measurement, Communications, Fixed and Mobile Radar and Military Electronics which require COTS solutions.

The architecture is based upon low loss technologies, thus

reducing thermal build-up in your system and providing market leading power densities up to 12W/in<sup>3</sup> and efficiencies up to 90%.

The Multistax® Hi-Rel family is fully characterised for EMC according to MIL-STD-461F. All configurations meet the MIL-STD-810G standard for shock and vibration. EMC characterisation, Shock and Vibration and Thermal Stress reports are available.

Each Multistax® Hi-Rel chassis is a fully functioning power supply, multiple supplies can be combined into a 1U 19" rack to produce complex system-level power – in a very short time-scale.

The system is fully UL/EN60950 approved and is CE marked to the Low Voltage Directive – meaning that any custom combination immediately carries these approvals.

CHASSIS NUMBER	MODULE SLOTS	OUTPUT POWER	MAX. INPUT CURRENT <sup>1</sup>	INPUT FUSE <sup>2</sup>	DIMENSIONS mm (inches)	CASE
MC1U-6A	6	400W	7.5A @ 400W	8A	127w x 40.4h x 269.8l (5.0w x 1.6h x 10.6l)	C
MC1U-6B	6	700W	9.5A @ 700W	10A	127w x 40.4h x 269.8l (5.0w x 1.6h x 10.6l)	C
MC1U-6C	6	1000W	11.5A @ 850W	12A	127w x 40.4h x 269.8l (5.0w x 1.6h x 10.6l)	C

NOTES: 1. At 85VAC input.  
2. 250V HRC, 5 x 20mm.

**OTHER Multistax® PRODUCTS**  
Multistax® Standard  
Multistax® Low Noise  
Multistax® Ultra Quiet  
Multistax® High Temperature  
Medistax® Medical

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### GENERAL SPECIFICATIONS

INPUT SPECIFICATIONS	
Input Voltage Range	85-264VAC single phase / 120-380VDC
Input Frequency Range	47-63Hz / DC / 390-440Hz (limited to 90-120VAC)
Input Current	see model table
Inrush Current @ 230VAC, 25°C	25A
Under Voltage Lockout	65-74V (shut-down)
Leakage Current @250VAC, 60Hz, 25°C	<1.5mA

ENVIRONMENTAL SPECIFICATIONS	
Temperature Range	-55° to +70°C operating, -55°C to +75°C storage
Derating	see graphs
Humidity	5-95%RH, non-condensing
Cooling	two internal fans
Shock	3000 Bumps, 10G (16ms) half sine
Vibration, 1.5G	10-500Hz, MIL-STD-810G
Reliability @25°C, full load	chassis - 77kh excluding fans, module - 86kh - MIL-STD-217F

SAFETY & EMC SPECIFICATIONS	
Safety Standards	EN60950, UL60950, CSA22.2 No.950 (UL file no. E223750)
Isolation	1500VAC input - chassis 3000VAC input - output 500VAC output - output / output - chassis
Emissions (Conducted & Radiated)	Conducted EN55011, EN55022, FCC - Level B Radiated EN55011, EN55022, FCC - Level B Harmonic Distortion EN61000-3-2 Class A & MIL-STD-1399 Section 300A Flicker & Fluctuation EN61000-3-3
Immunity	ESD EN61000-4-2 Level 2 Radiated EN61000-4-3 Level 3 & MIL-STD-461F Fast Transients - Burst EN61000-4-4 Level 3 Input Line Surges EN61000-4-5 Level 3 & MIL-STD-1399 Conducted EN61000-4-6 Level 3 & MIL-STD-461F Voltage Dips EN61000-4-11 & MIL-STD-704

BIAS OUTPUT, SIGNALS & CONTROLS	
Bias Supply Voltage, Tolerance	5VDC, 4.8-5.2VDC
Bias Supply Current	250mA max. (500mA available to special order, please call.)
AC Fail	>5mS warning, optical isolated 4mA sink current
Inhibit <sup>1</sup>	contact closure inhibits all module outputs and fans
Enable <sup>1</sup>	contact closure enables all module outputs and fans

1. bias supply remains on whenever input supply is present.

Multistax® - hi-rel



### AVAILABLE MODULES & OUTPUT SPECIFICATIONS

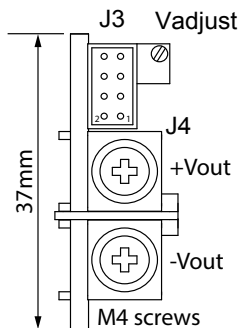
MODULE NUMBER	Vmin (trim)	Vmin (pot)	Vnom	Vmax	I <sub>max</sub>	POWER
Mx1C	1.0V	1.5V	2.5V	3.6V	50A	125W
Mx2C	1.5V	3.2V	5.0V	6.0V	40A	200W
Mx3C	4.0V	6.0V	12.0V	15.0V	20A	240W
Mx4C	8.0V	12.0V	24.0V	28.0V	10A	240W
Mx5C	8.0V	24.0V	48.0V	53.0V	6A	288W
Mx7C	-	5.0V	24.0V	28.0V	5A	120W
Mx8C	-	V1 - 5.0V V2 - 5.0V	V1 - 24.0V V2 - 24.0V	V1 - 28.0V V2 - 28.0V	V1 - 2.5A V2 - 2.5A	V1 - 60W V2 - 60W

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OUTPUT SPECIFICATIONS	
Output Power	see model table
Output Voltage(s)	dependent on installed modules (see separate module datasheet)
Minimum Load	0A
Line Regulation	±0.1% for ±10% change in input from nominal
Load Regulation	±0.2% for 25% to 75% load change
Cross Regulation	±0.2%
Ripple & Noise, 20MHz bandwidth	100mV or 1.0% pk-pk
Overvoltage Protection	Vset Tracking - 110%, Vmax Latching - 125%
Overcurrent Protection	Straight line with hiccup activation at <30% of Vnom - 110/120%
Remote Sense Compensation	0.5VDC max. (except Mx7C & Mx8C)
Overshoot	<2%
Turn On Delay	AC ON - <600mS, Enable ON - 30mS
Rise Time, monotonic	<5mS
Hold Up Time	Vnom, Full Load - 20mS
Efficiency @ 230VAC, 750W/24V	91%

### MODULE CONNECTIONS

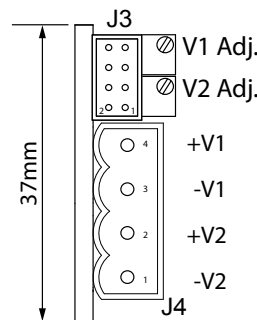
#### Mx1C - Mx7C



Module	J3 Pin Function	
Mx1 to Mx5	1: +Sense 3: Vtrim 5: +Inh/En 7: +PG	2: -Sense 4: Itrim 6: -Inh/En 8: -PG
Mx7	1: - 3: - 5: -PG 7: Inh	2: - 4: Com 6: +PG 8: Com

**J3 Mating Connector**  
Housing:  
Molex 51110-0860 - Locking  
Molex 51110-0850 - Non Locking  
Crimp Terminal: Molex 50394

#### Mx8C



Module	J3 Pin Function	
Mx8	1: -PG V2 3: Inh V2 5: -PG V1 7: Inh V1	2: +PG V2 4: Com V2 6: +PG V1 8: Com V1

**J3 Mating Connector**  
Housing:  
Molex 51110-0860 - Locking  
Molex 51110-0850 - Non Locking  
Crimp Terminal: Molex 50394

**J4 Mating Connector**  
Camden 9200/4A

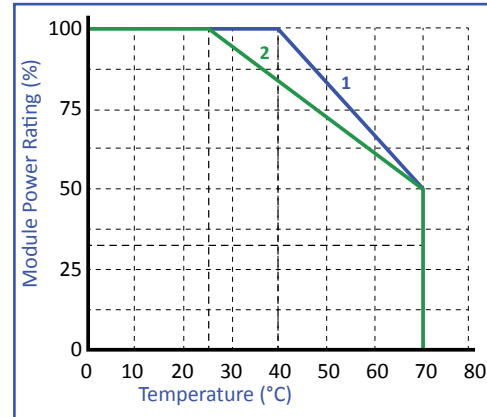


### MODULE DERATING

The output rating of Multistax® Hi-Rel modules is dependent on two factors, location within the chassis and ambient temperature according to the table and derating curves below. For correct application the resultant derating should be applied to each affected module before applying the overall chassis derating shown later in this datasheet.

Slot	Mx1C	Mx2C	Mx3C	Mx4C	Mx5C	Mx7C	Mx8C
A	1	2	1	1	1	1	1
B	2 *	2 *	1	1	1	2	2
C	2	1	1	1	1	1	1
D	1	1	1	1	1	1	1
E	1	1	1	1	1	1	1
F	1	1	1	1	1	1	1

\* Module can deliver 95% of rated power at 25°C ambient.

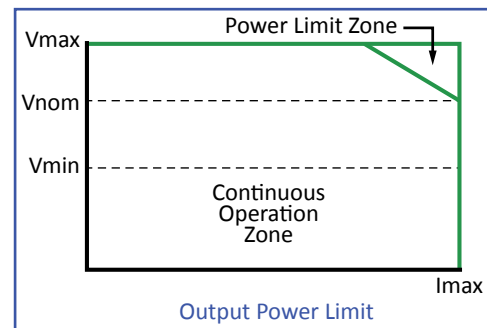


Multistax® - hi-rel

### MODULE POWER LIMITING

Multistax® Hi-Rel modules have a several levels of protection to ensure that power supply is not damaged if used under overload conditions. When the output voltage setting (Vset) is less than or equal to the nominal setting (Vnom), the current limiting is at the current limit set point. However if Vset is greater than Vnom, the output power is limited to ensure that the module does not exceed its power rating.

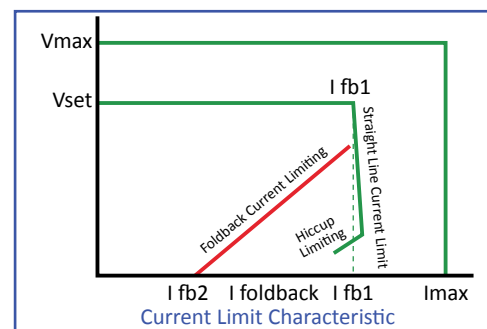
For example, Mx4C is adjustable between 12V and 30V. I<sub>max</sub> is 10A. Power rating is 240W. At 24V the module can deliver 10A continuously, i.e. 240W. At 30V, the module can still deliver 240W, 8A continuous.



### MODULE CURRENT LIMIT PROGRAMMING

A variety of over current protection methods are possible with the Multistax® Hi-Rel modules. Modules type Mx1C to Mx5C can be programmed for Straight-line current limiting or Foldback current limiting while Mx7C employs only Straight-line current limiting. Simple external application circuits may be used to achieve programmable foldback current and user programmable reduced current limit levels. See the Multistax® Designers Manual for full details.

The default current limit characteristic is Straight Line Current Limiting.





### Voltage Adjustment - Local

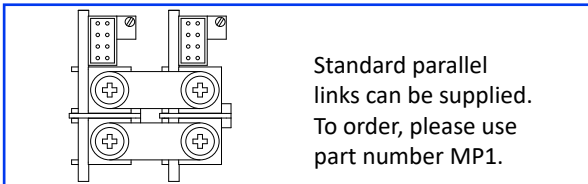
The multi-turn potentiometer that adjusts each output within the specified range may be accessed via the output panel of the power supply. Clockwise rotation increases output voltage. Resolution is approximately 5% of nominal voltage (Vnom) per turn.

### Voltage Adjustment - Remote (resistive / electronic)

The output voltage may be adjusted or trimmed by means of an external resistor or potentiometer network connected to the Vtrim pin on the J3 connector on the module. Linear Electronic programming is also possible and may be implemented according to the formula  $V_{out} = K V_{control}$ . See Powerstax MS1U series Designers' Manual for full details.

### Parallel Operation

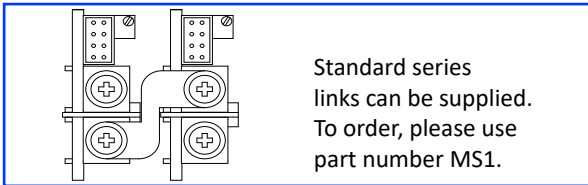
To achieve increased current capacity, simply parallel outputs using the standard parallel links. Powerstax 'wireless' sharing ensures that current hogging is not possible.



Standard parallel links can be supplied. To order, please use part number MP1.

### Serial Operation

To achieve increased output voltages, simply series outputs using standard series links, paying attention to the requirements to maintain SELV levels if required in your system.



Standard series links can be supplied. To order, please use part number MS1.

### Remote Sensing

When the load is remote from the power supply, the remote sense pins may be used to compensate for drops in the power leads. Where the power cabling contributes significant dynamic impedance, see MS1U series Designers' Manual.

### Current Limit Adjustment

The output current limit setting may be adjusted (downwards only) by means of an external resistor connection to the Itrim pin on the J3 connector on the module.

### Bias Voltage (Located in chassis)

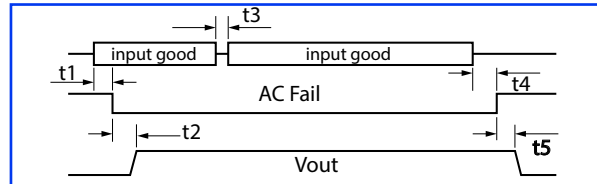
A SELV isolated 5V (always on) bias voltage rated at 250mA is provided on J2 to facilitate miscellaneous control functions.

### Inhibit/Enable

Inhibiting may be implemented either globally or on a per module basis (Power Unit or Power Module inhibiting). Reverse logic (Enabling) may also be implemented, see MS1U series Designers' Manual.

### AC Fail

Open collector signal indicating that the input voltage has failed or is less than 80Vac. This signal changes state giving 5mS of warning before loss of output regulation. See MS1U series Designers' Manual for full specifications.

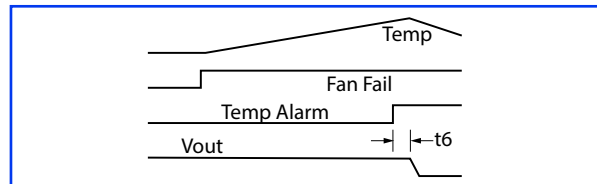


### Temperature Alarm (Option 1)

Open collector signal indicating excessive power unit temperatures due to fan failure or operation beyond ratings. This signal is activated at least 10ms prior to system shut-down.

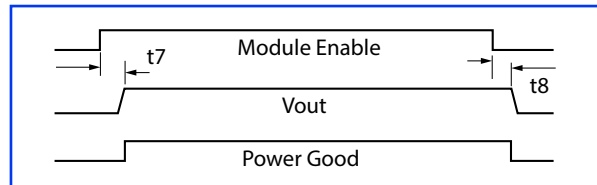
### Fan Fail (Option 1)

Open collector signal indicating that at least one of the system fans have failed. This does not cause system shut-down.



### Power Good

Opto-isolated output signal indicates that the power module is operating correctly and output voltage is within normal band. Opto transistor ON = Good.



### Indication LEDs

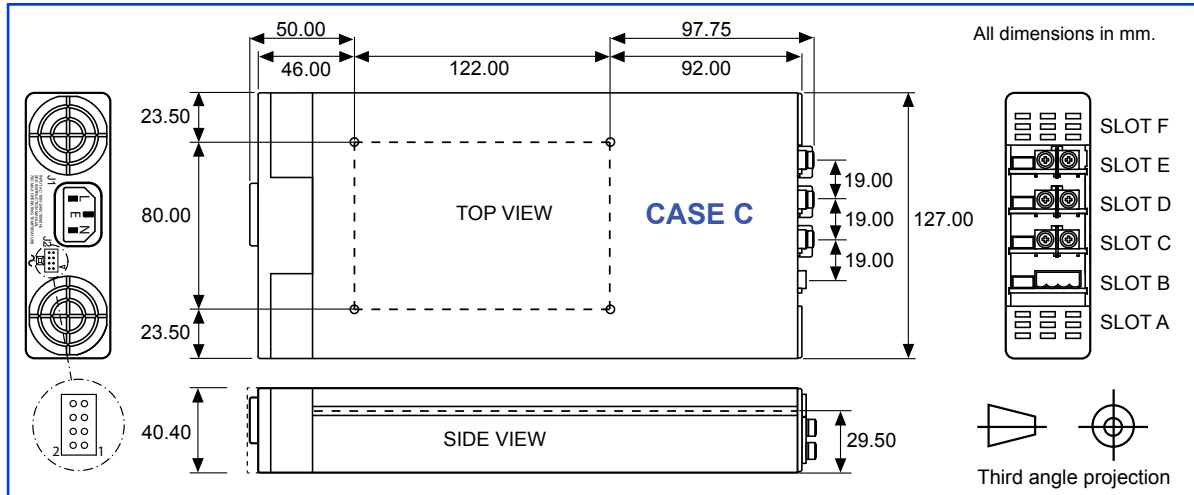
Each Power Module has a visual indicator to identify that it is operating within normal ratings. Very useful for system diagnosis.

### Connecting to Capacitive Loads

When connecting Multistax® units to capacitive loads external blocking diodes of appropriate current capacity must be used.



### MECHANICALS



Multistax® - hi-rel

J2 Pin Function	
1: Common	2: +5V Bias
3: -	4: AC Fail
5: Fan Fail*	6: Global Enable
7: Temp. Alarm*	8: Global Inhibit

\* Option 1

#### Mounting Holes

4 x M4 threaded holes on Base.  
Max screw penetration is 6mm from Base.

#### Fleximount Side Mounting Slots

Use with self-clinching PEM studs type FH-M4-X or FH-832-X (X= stud length) or equivalent

#### IEC to Screw Terminal Adaptor

Order part number **MC1**

#### J2 Mating Connector

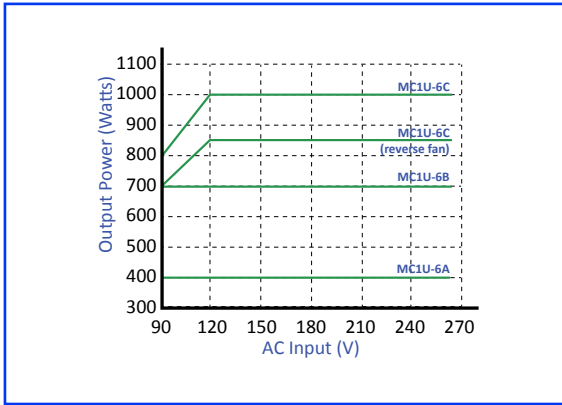
Housing: Molex 51110-0860 - Locking  
Molex 51110-0850 - Non Locking  
Crimp Terminal: Molex 50394



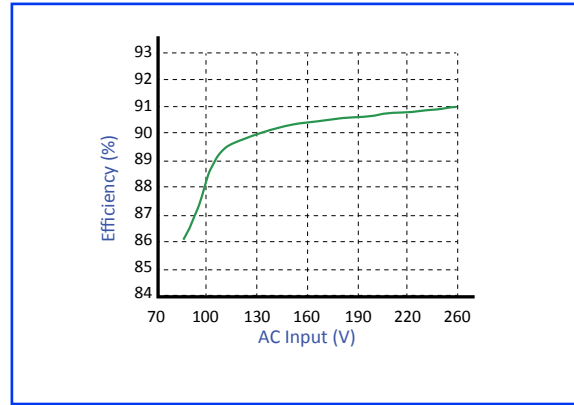
# Powerstax

**Multistax® Series - Hi-Rel COTS**  
*high reliability modular power supplies - 400W to 1000W - 7*

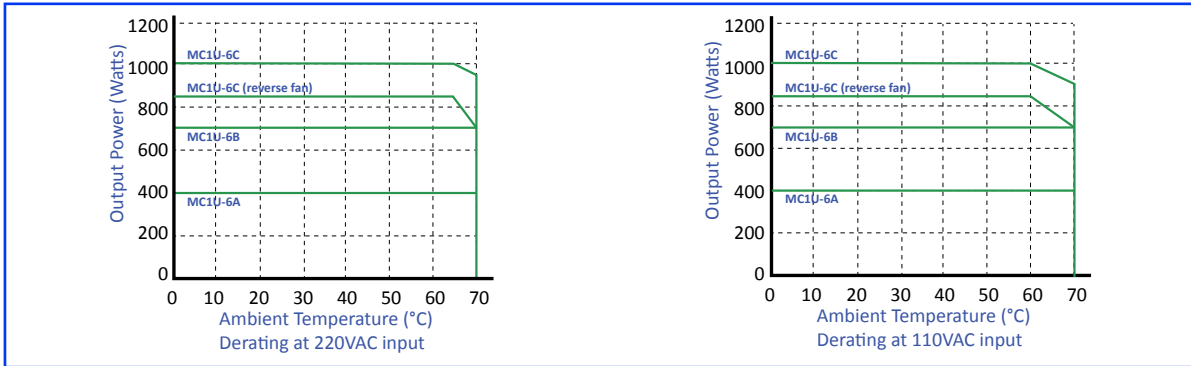
## DERATING CURVES VS. AC LINE (60°C)



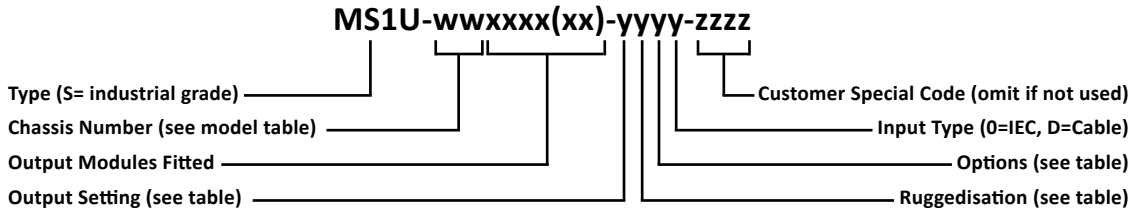
## EFFICIENCY VS. AC LINE



## TEMPERATURE DERATING CURVES



## MODEL NUMBER CONFIGURATION GUIDE



OUTPUT SETTING	
C	Custom Setting
-	Default Voltage

RUGGEDISATION	
C	Conformal Coating
R	Rugged
S	Conformal Coating & Rugged
0	No options

OPTIONS	
1	Thermal Signals
2	Reverse Fan
3	Thermal Signals & Reverse Fan
0	No options

### Pre-set Units

Units are shipped with nominal output voltages unless pre-setting is specified. Powerstax can pre-set units to exact customer requirements through use of appropriate parallel and series links as well as voltage adjustment to specific pre-set levels.

All specifications are typical at nominal line input, full load and 25°C unless otherwise stated.

**Multistax® - hi-rel**

multistax-hi\_rel-ds-rev3-0517.indd

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