



- Up to 1200W in <1U chassis
- Efficiency up to 92%
- 1.5V to 58V standard output voltages
- All outputs fully floating
- Series / Parallel of Multiple outputs
- 19" Rack-Mount Version Available
- Dual Safety Approvals
 - UL/EN60950-1 2nd Edition
 - UL/EN60601-1 3rd Edition



POWER SUPPLY DESIGN EXCELLENCE

The Multistax® Premium family of configurable power supplies provides up to 1200W 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.

The Multistax® premium family comprises 2 different chassis, 4 slot 600W and 6 slot 1200W, and a total of 11 output module types giving you almost infinite possibilities to configure the outputs you need. Output voltages may be set manually via a potentiometer or dynamically using the various control inputs.

A bias supply is included to power areas of your circuit needing to be kept on at all times.

The architecture is based upon low loss technologies, thus reducing thermal build-up in your system and providing market leading power densities up to 14.1W/in³ and efficiencies up to 92%.

Each Multistax® premium 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/EN60950-1 2nd Edition as well as UL/EN60601-1 3rd Edition 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 ¹	INPUT FUSE ³	DIMENSIONS mm (inches)
MF1U-4	4	600W	7.5A @ 400W ¹	8A	89w x 40.4h x 269.8l (3.5w x 1.6h x 10.6l)
MF1U-6	6	1200W	11.5A @ 850W ²	12A	127w x 40.4h x 269.8l (5.0w x 1.6h x 10.6l)

NOTES: 1. 85VAC input, 400W output .
2. 85VAC input, 850W output.
3. 250V HRC, 5 x 20mm.



GENERAL SPECIFICATIONS

INPUT SPECIFICATIONS	
Input Voltage Range	85-264VAC single phase / 120-380VDC
Input Frequency Range	47-440Hz / DC
Input Current	see model table
Inrush Current @ 230VAC, 25°C	<25A
Under Voltage Lockout	65-74V (shut-down)
Leakage Current @250VAC, 60Hz, 25°C	<300µA standard, 150µA option 4

ENVIRONMENTAL SPECIFICATIONS	
Temperature Range Operating Storage	-40°C to +70°C, operates to specification below -20°C after 10 mins warm-up -40°C to +85°C
Derating	see graphs
Humidity	5-95%RH, non-condensing
Cooling	4-slot - single internal fan, 6-slot - two internal fans
Shock	>60G
Vibration	MIL-STD810G
Reliability @ 40°C, full load	MF1U-4 with 2 x MZA modules - >870kHrs (Telcordia SR-332)
Altitude	Up to 3,000m (10,000ft)

SAFETY & EMC SPECIFICATIONS		
Safety Standards	EN60950-1, UL609501-1, CAS22.2 No.60950-1 2nd Ed. (UL file no. E223750) EN60601-1, UL60601-1, CSA22.2 No.60601-1 3rd Ed. (UL file no. E223749)	
Isolation	1500VAC input - chassis 4000VAC 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 Compliant
	Flicker & Fluctuation	EN61000-3-3 Compliant
Immunity	ESD	EN61000-4-2 Level 2
	Radiated	EN61000-4-3 Level 3
	Fast Transients - Burst	EN61000-4-4 Level 3
	Input Line Surges	EN61000-4-5 Level 3
	Conducted	EN61000-4-6 Level 3
	Voltage Dips	EN61000-4-11 Compliant

BIAS OUTPUT, SIGNALS & CONTROLS	
Bias Supply Voltage, Tolerance	5VDC, 4.8-5.2VDC
Bias Supply Current	500mA max.
AC Fail	>5mS warning, optical isolated 4mA sink current
Inhibit ¹	contact closure inhibits all module outputs and fans
Enable ¹	contact closure enables all module outputs and fans

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



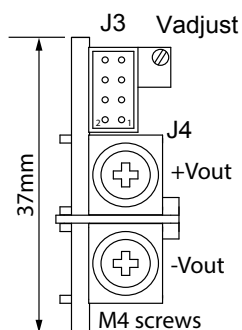
AVAILABLE MODULES & OUTPUT SPECIFICATIONS

MODULE NUMBER	Vmin (trim)	Vmin (pot)	Vnom	Vmax	I _{max}	POWER	REMOTE SENSE	POWER GOOD
Mz1	1.0V	1.5V	2.5V	3.6V	40.0A	100W	YES	YES
Mz2	1.5V	3.2V	5.0V	6.0V	36.0A	180W	YES	YES
Mz3	4.0V	6.0V	12.0V	15.0V	18.3A	220W	YES	YES
Mz4	8.0V	12.0V	24.0V	30.0V	9.2A	220W	YES	YES
Mz5	8.0V	24.0V	48.0V	58.0V	5.0A	240W	YES	YES
Mz7	-	5.0V	24.0V	28.0V	5.0A	120W	-	YES
Mz8	-	5.0V	24.0V	28.0V	3.0A	72W	-	YES
		5.0V	24.0V	28.0V	3.0A	72W		
Mz9	-	10.8V	12.0V	15.6V	12.5A	150W	-	-
Mz10	-	19.2V	24.0V	26.4V	8.3A	200W	-	-
Mz11	-	28.8V	36.0V	39.6V	5.6A	200W	-	-
Mz12	-	38.5V	48.0V	50.4V	4.2A	200W	-	-

OUTPUT SPECIFICATIONS	
Output Power	see model table
Output Voltage(s)	dependent on installed modules
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% for 25% to 75% load change on any other output
Ripple & Noise, 20MHz bandwidth	<100mV or 1.0% pk-pk (150mV on Mz9)
Overvoltage Protection	110-150%, latching
Overcurrent Protection	Straight line with hiccup activation at <30% of V _{nom} - 110-160%
Remote Sense Compensation	0.5VDC max (Mz1-Mz5 only)
Overshoot	<2%
Turn On Delay	AC ON / Global Enable - 300mS nom, Module Enable - 2mS nom
Rise Time, monotonic	15mS nom.
Hold Up Time, V _{nom} , Full Load	15-20mS
Efficiency @ 230VAC, 1200W/24V	90-92%

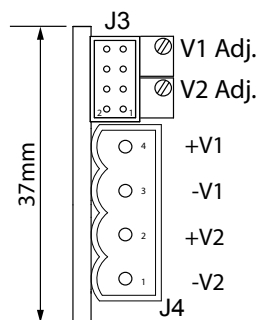
MODULE CONNECTIONS

Single Output



Module	J3 Pin Function	
Mz1 to Mz5	1: +Sense 3: Vtrim 5: +Inh/En 7: +PG	2: -Sense 4: Itrim 6: -Inh/En 8: -PG
Mz7	1: - 3: - 5: -PG 7: Inh	2: - 4: Com 6: +PG 8: Com
Mz9 to Mz12	1: - 3: - 5: +Inh 7: -	2: Com 4: - 6: -Inh 8: -

Dual Output



Module	J3 Pin Function	
Mz8	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 (Mz6 only)

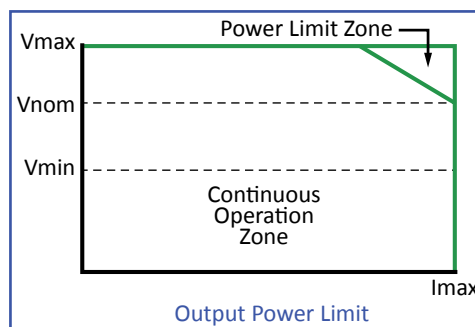
Camden 9200/4A



MODULE POWER LIMITING

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

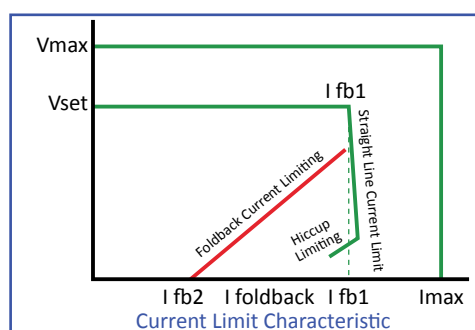
For example, Mz4 is adjustable between 12V and 30V. I_{max} is 9.2A. Power rating is 220W. At 24V the module can deliver 9.2A continuously, i.e. 240W. At 30V, the module can still deliver 220W, 7.3A continuous.



MODULE CURRENT LIMIT PROGRAMMING

A variety of over current protection methods are possible with the Multistax® modules. Modules type Mz1 to Mz7 can be programmed for Straight-line current limiting or Foldback current limiting while modules Mz8 to Mz12 employ 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.



CURRENT SHARE DETAIL

Parallel Connection Setup

To parallel connect the following steps must be implemented:

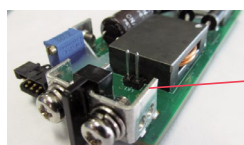
1. Switch on IShare switch to ON for modules Mz1 to Mz5 or add jumper to current share header LK1 for modules Mz9 to Mz12.
2. Connect the Negative Parallel Link.
3. Adjust the output voltages of connected modules to within 5mV of each other.
4. Connect the Positive Parallel Link.

DIP Switches for Current Share & Inhibit/Enable (Mz1 to Mz5)



DIP switch settings shown above are:
Current share = OFF
Inhibit ON = Normally ON

LK1 for Current Share (Mz9 to Mz12)



Recommended Jumper for LK1: Harwin M7567-05 (Jumper Socket, Black, 2.54mm, 2-way)

DIP Switch Option for Mz1 to Mz5

Modules Mz1 to Mz5 can be configured to be normally ON or normally OFF by appropriate setting of the DIP switch. (default mode is normally ON).

The module will deliver output voltage when mains is applied (and the chassis is enabled). The module requires an external 5V signal (between +IN/EN and -IN/EN) to disable the output. This may be reversed by setting of the dip switch to the OFF position.



Voltage Adjustment - Local

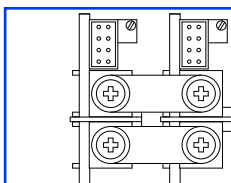
The multi-turn potentiometer that adjusts each output within the specified range may be accessed via the output panel of the power supply. Clockwise rotation increases output voltage. Resolution is approximately 5% of nominal voltage (V_{nom}) per turn.

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 V_{trim} 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 the Designers' Manual for full details.

Parallel Operation

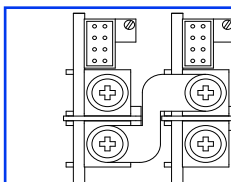
To achieve increased current capacity, simply parallel outputs using the standard parallel links. Powerstax 'wireless' sharing ensures that current hogging is not possible. See 'current share detail' on previous page.



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 Designers' Manual.

Current Limit Adjustment

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

Bias Voltage (Located in chassis)

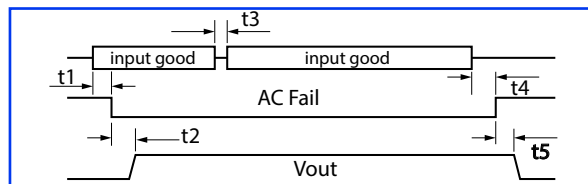
A SELV isolated 5V (always on) bias voltage rated at 500mA is provided on J2 to facilitate miscellaneous control functions.

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 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 Designers' Manual for full specifications.

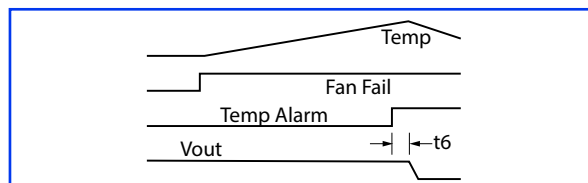


Temperature Alarm

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.

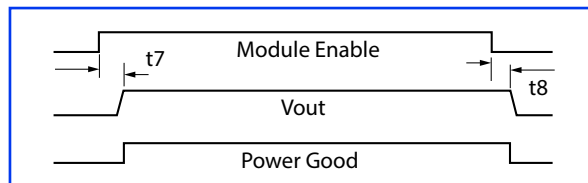
Fan Fail

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

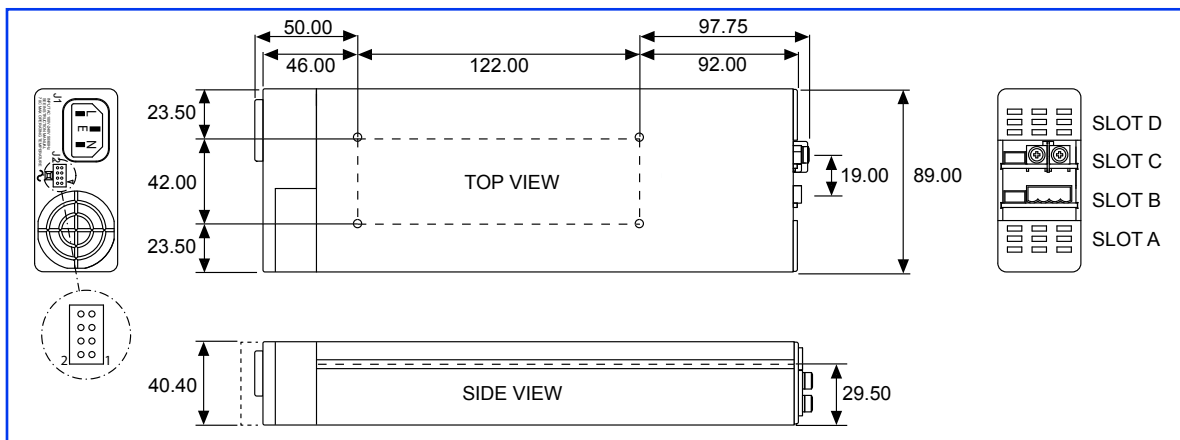
Each Power Module has a visual indicator to identify that it is operating within normal ratings. Very useful for system diagnosis.

Connecting to Capacitive Loads

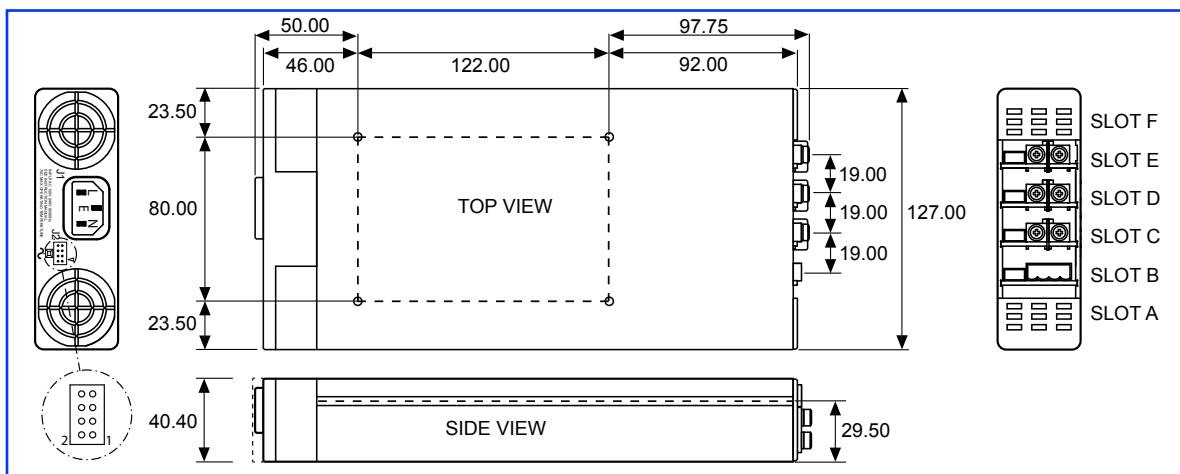
When connecting Multistax® units to capacitive loads external blocking diodes of appropriate current capacity must be used.



MECHANICALS - MF1U-4



MECHANICALS - MF1U-6



Drawings are third angle projections.
All dimensions are in mm.

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

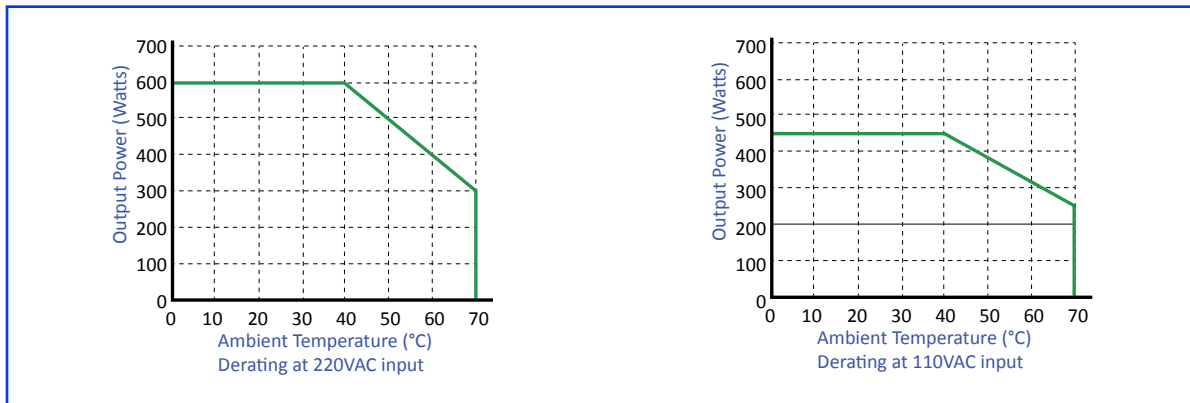
Housing: Molex 51110-0860 - Locking
Molex 51110-0850 - Non Locking
Crimp Terminal: Molex 50394

J2 Pin Function

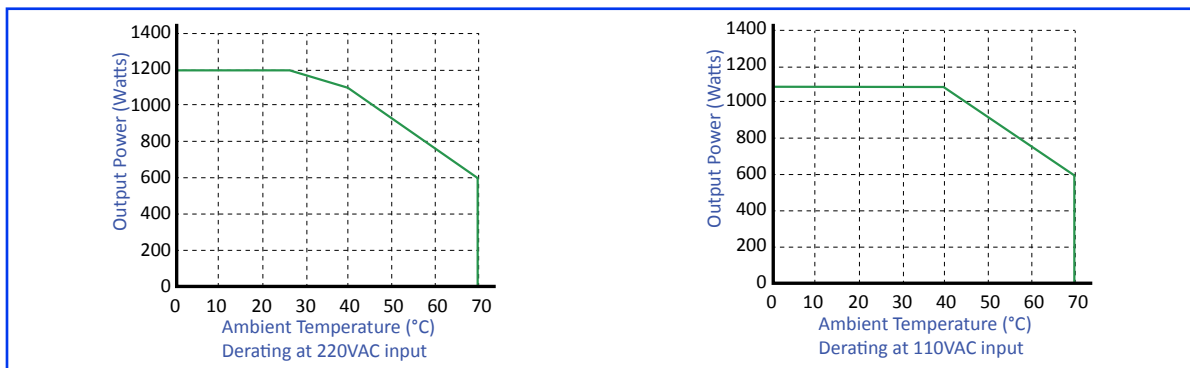
1: Common	2: +5V Bias
3: -	4: AC Fail
5: Fan Fail	6: Global Enable
7: Temp. Alarm	8: Global Inhibit



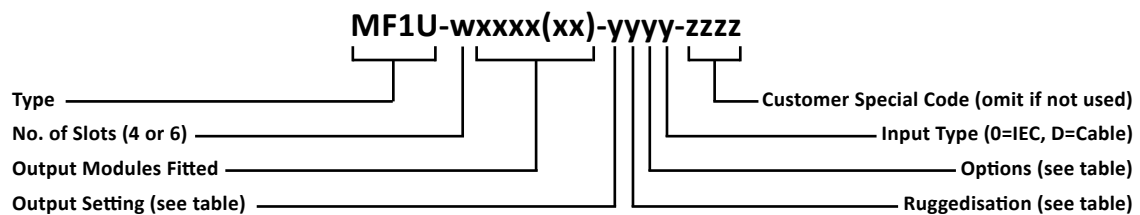
DERATING CURVES - MF1U-4



DERATING CURVES - MF1U-6



MODEL NUMBER CONFIGURATION GUIDE



OUTPUT SETTING	
C	Custom Setting
-	Default Voltage

RUGGEDISATION	
C	Conformal Coating
-	

OPTIONS	
2	Reverse Fan
4	150µA Leakage
6	Reverse Fan + 150µA Leakage
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-premium-ds-rev2-0517.indd

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