

AC-DC Converters

POWER
SOLVE

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MP Series Modular Configurable Power Supplies 400-1200 Watts Single & Multi Outputs

Features

- Current share on all outputs with ratings of 10A or greater
- Remote sense on all outputs with ratings greater than 2A
- Overload protection on all outputs
- Voltage adjustment on all outputs
- Margining on all single output modules
- Input OK signal and status indicator LED
- Global DC OK signal and status indicator LED
- Global and individual module inhibits/enable
- 2 year warranty
- Forced air cooling, field replaceable fan
- Isolated 5V bias voltage
- Power factor correction
- EN61000-3-2 harmonic distortion compliance
- CISPR 22, EN55022 Curve B conducted / radiated EMI
- European CE Mark requirements
- Optional VME timing and system DC OK module
- Customer-provided air option
- Additional 200W output @ high line (180-264 VAC)
- Low leakage option for medical applications
- EN61000 immunity standards
- Standard modification flexibility (consult factory)
 - Low noise fan
 - Fan fail signal
 - Module enable
 - Outputs down to 0.5V



MP4



MP6



MP8



MP1

Powersolve Electronics Ltd. Units 8A, Arnhem Road, Newbury, RG14 5RU. England

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Electrical Specification

INPUT

Input voltage	85-264 VAC 120-350 VDC
Frequency	47-440 Hz
Inrush current	40 A peak max. (soft start)
Efficiency	70-80% typ. @ full case load
Power factor	0.99 typ. meets EN61000-3-2
Turn-on time	AC on 1.5 sec typ., Inhibit / Enable 150 ms typ.
EMI filter standard	CISPR 22EN55022 Level "B"
EMI filter (low leakage option)	CISPR 22EN55022 Level "A"
Leakage current standard	2.0 mA max. @ 240 VAC
Leakage current (low leakage option)	300 µA max. @ 240 VAC
Radiated EMI	CISPR 22, EN55022 Level "B"
Holdover storage	20 ms minimum (independent of input VAC)
AC OK	>5 ms early warning min. before outputs loose regulation. Full cycle ride thru (50 Hz)
Harmonic distortion	Meets EN61000-3-2
Isolation	Meets EN60950
Global Inhibit/Enable	TTL, Logic "1" and Logic "0"
Input fuse (internal)	MP4: 10 A, MP6: 15 A, MP8: 20 A, MP1: 20 A
Warranty	2 years

OUTPUT

Adjustment range	±10% min. all outputs
Margining	±4-6% nom. ¹
Overall reg	0.4% or 20 mV max. (36 W modules 4% max.)
Ripple RMS	0.1% or 10 mV, whichever is greater, Pk-Pk: 1.0% or 50 mV, whichever is greater Bandwidth limited to 20 MHz
Dynamic response	<2% or 100 mV, with 25% load step
Recovery time	To within 1% in <300 µsec
Overcurrent protection	Single, main of dual output module, 105-120% of rated output current Aux output of dual output module, 105-140% of rated output current Triple output module internally protected.
Short circuit protection	Protected for continuous short circuit. Recovery is automatic upon removal of short.
Overvoltage protection (measured at sense connection)	Single output modules: 2-5.5V 122-134%, 6-60V 110-120% Dual output module: 2-6V 122-134%, 8-28V 110-120% Triple output module: No overvoltage protection provided. Recycle the AC input voltage to reset OVP circuit
Reverse voltage protection	100% of rated output current
Thermal protection	All outputs disabled when internal temp exceeds safe operating range >5 ms warning (AC OK signal) before shutdown.
Remote sense	Up to 0.5 V total drop (not available on triple output module)
Single wire parallel	Current share to within 2% of total rated current ²
DC OK	-2% to -8% of nominal for any monitored output ²
Minimum load	Not required on single or triple output modules. 10% required on main of dual output modules ³
Housekeeping bias voltage	5 VDC @ 1.0A mA max. present whenever AC input is applied
Module inhibit	TTL, isolated, singles and dual (both outputs) only
Switching frequency	250 kHz
Output/Output isolation	>1 Meg ohm
VME signal option board	POR signal & quad external DC OK
Hold-up module (HUP)	1-slot module providing an additional 34mSec (60mSec total) hold-up @ 600W loading.

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Electrical Specification (ctd)

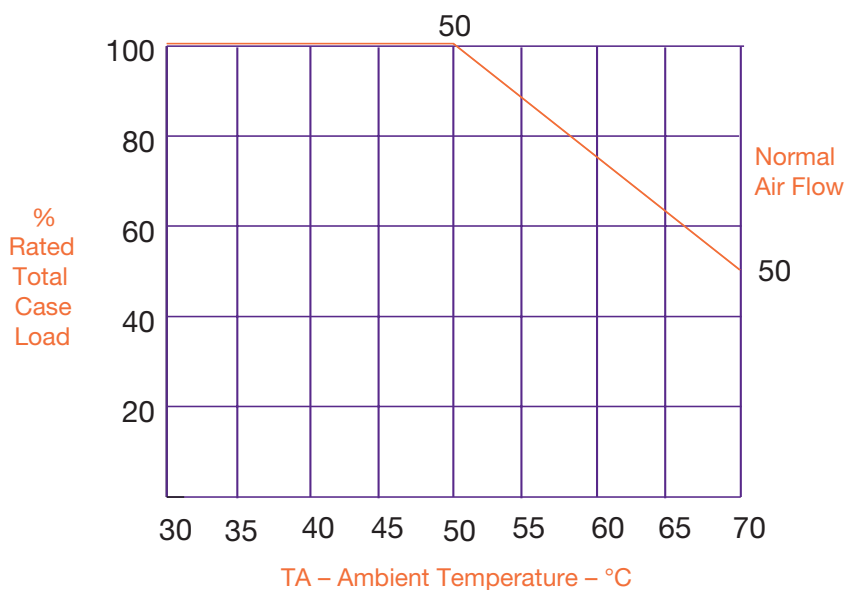
ENVIRONMENTAL

Operating temperature	-20°C to 50°C (start @ 0°C) (derate each output linearly to 50% at 70°C) (-20°C to 40°C max. with rear air option)
Shock/Vibration	Mil-Hdbk 810E
Humidity	95% non-condensing
Storage temperature	-40°C to +85°C
Temperature coefficient	0.02% per °C
Cooling	Internal DC fan or customer provided air (option)
Safety Approvals	UL, CSA, IEC, VDE, BABT, CB, CE

Note:

1. Single output modules only.
2. Single and main of dual output modules only.
3. Contact factory for optional preload if required.

Power Derating Curve



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Common Examples and Specifications



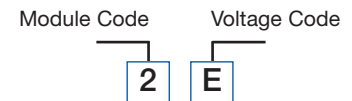
Modules

		Single			Dual		Triple
Outputs	1	1	1	1	2	3	
Max output power	210W	360W	600W	144W	36W		
Max output current	35 A	60	120 A	10 A	2 A		
Volts	2-60 V	2-60 V	2-60 V	2-28 V	2-28 V		
Standard voltage increments	25	25	25	19	18		
Remote sense on outputs	Yes	Yes	Yes	Yes, both	No		
Remote margin/V-Program	Yes	Yes	Yes	No	No		
Module inhibit (isolated)	Yes	Yes	Yes	---	---		
Single wire active current share	Yes	Yes	Yes	Yes, main only	---		
Over voltage / Over current protection	Yes	Yes	Yes	Yes	Over current		
Minimum load required	No	No	No	Yes (10%). main only	No		
Slots occupied in any MP case	1	2	3	1	1		

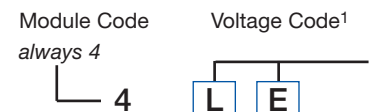
Modules

Voltage	Voltage Code	Single Output Module Code			Dual Output ¹		Triple Output ¹		
		1 ¹	2 ²	3 ³	V1	V2	V1	V2	V3
2V	A	35A	60A	120A	-	10A	-	-	2A
2.2V	B	35A	60A	120A	-	10A	-	-	2A
3V	C	35A	60A	120A	-	10A	-	-	2A
3.3V	D	35A	60A	120A	-	10A	-	-	2A
5V	E	35A	60A	120A	10A	10A	-	-	2A
5.2V	F	35A	60A	120A	-	10A	-	-	2A
5.5V	G	34A	60A	120A	-	10A	-	-	2A
6.0V	H	23A	42A	78A	-	10A	-	-	2A
8.0V	I	20A	36A	68A	-	-	1A	1A	1A
10V	J	18A	32A	60A	-	-	1A	1A	1A
11V	K	17A	31A	54.5A	-	-	1A	1A	1A
12V	L	17A	30A	50A	10A	4A	1A	1A	1A
14V	M	14A	21A	40.5	9A	4A	1A	1A	1A
15V	N	14A	20A	39A	8A	4A	1A	1A	1A
18V	O	11A	19A	33.3A	-	-	-	0.5A	0.5A
20V	P	10.5A	18A	30A	-	-	-	0.5A	0.5A
24V	Q	8.5A	15A	23.5A	4A	2A	-	0.5A	0.5A
28V	R	6.7A	12.8A	21.4A	3A	2A	-	0.5A	0.5A
30V	S	6.5A	12A	20A	-	-	-	-	-
33V	T	6.2A	10.9A	18.2	-	-	-	-	-
36V	U	5.8A	10A	16.6A	-	-	-	-	-
42V	V	4.2A	7.5A	12.5A	-	-	-	-	-
48V	W	4.0A	7.5A	12.5A	-	-	-	-	-
54V	X	3.7A	6.0A	11A	-	-	-	-	-
60V	Y	3.5A	6.0A	10A	-	-	-	-	-
Non-std	Z								
2.4V-2.7V		35	60	120	-	10	-	-	2
3.6V-4.5V		35	60	120	-	10	-	-	2
6.6V-9.2V		20	36	68	10	4	-	-	1
8.8V-9.0V		18	32	60	10	4	-	-	1

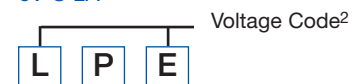
Single Output Example 5V @ 60A



Dual Output Example 12V @ 10A 5V @ 10A



Triple Output Example³ 12V @ 1A 20V @ 0.5A 5V @ 2A



Note:

1. Total load not to exceed 144W.
2. No module code required.
3. Total load not to exceed 36W.

AC-DC Converters



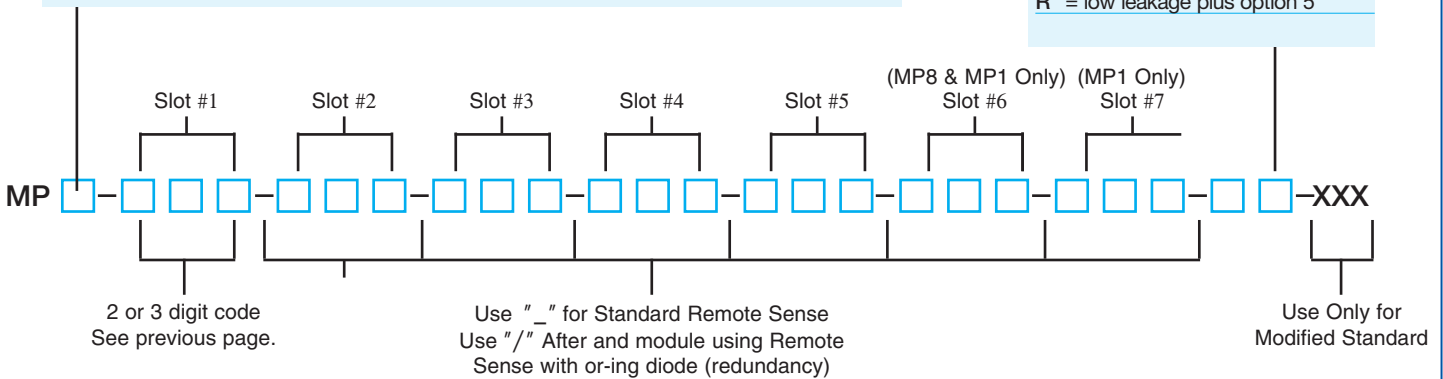
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Ordering Information

Case Size (inches)	Slots	INPUT	
		85-264 VAC	180-264 VAC
4 = 2.5 x 5 x 10	5 available slots	400 W max.	600 W max.
6 = 2.5 x 5 x 11	5 available slots	600 W max.	800 W max.
8 = 2.5 x 7 x 10	6 available slots	800 W max.	1000 W max.
1 = 2.5 x 8 x 11	7 available slots	1000 W max.*	1200 W max.

*1200 W available at high line operation

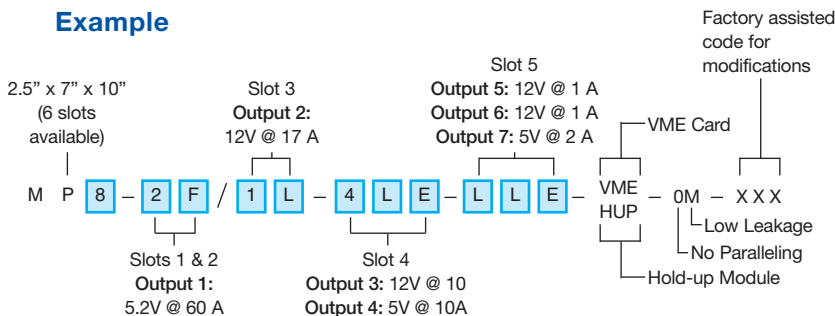
Option Code	
0	= no options
1	= rear air exhaust
3	= global enable
5	= option package (options 1 & 3)
M	= low leakage
N	= low leakage plus option 1
P	= low leakage plus option 3
R	= low leakage plus option 5



Note:

- Omit digits that do not apply.
- Specify modules from lowest number of outputs to highest. (Single/Dual/Triple)
- If number of outputs are equal, specify modules from highest to lowest power increments. If power increments are equal, specify in descending alphabetical order (1A, B, C . . .).
- Always start with Slot 1.
- All MP model configurations created using this selection guide are standard MP products with standard availability and lead times.
- Optional VME/DCOK module must always be located in the last slot. Module designator is "VME".

Example



Parallel Code:

MP4 & MP6 available slots	Slot 5	Slot 4	Slot 3	Slot 2	Slot 1		
MP1 available slots	Slot 6	Slot 5	Slot 4	Slot 3	Slot 2	Slot 1	
MP8 available slots	Slot 7	Slot 6	Slot 5	Slot 4	Slot 3	Slot 2	Slot 1

Standard Parallel Codes*

Code	7	6	5	4	3	2	1
0 = no parallel	o	o	o	o	o	o	o
1 = 1 & 2	o	o	o	o	o	o	o
2 = 2 & 3	o	o	o	o	o	o	o
3 = 3 & 4	o	o	o	o	o	o	o
4 = 4 & 5	o	o	o	o	o	o	o
5 = 3 & 4 & 5	o	o	o	o	o	o	o
6 = 5 & 6	o	o	o	o	o	o	o
7 = 4, 5 & 6	o	o	o	o	o	o	o
8 = 6 & 7	o	o	o	o	o	o	o
9 = 3 & 4, 6 & 7	o	o	o	o	o	o	o

* For custom parallel configurations contact Astec Power Technical Support.

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Single Outputs

Total Power	Output (Volts/Amps)	Size (Inches)	Model Number
360W	2 / 180	2.5 x 5 x 10	MP4-3A-2A-30
400W	5 / 80	2.5 x 5 x 10	MP4-3E-00 - 429
600W	2 / 275	2.5 x 8 x 11	MP6-3A-3A-1A-90
600W	5 / 120	2.5 x 5 x 11	MP6-3E-00
600W	48 / 12.5	2.5 x 5 x 11	MP6-3W-00
800W	5 / 160	2.5 x 7 x 10	MP8-3E-2E-30 - 415
800W	48 / 16.6	2.5 x 7 x 10	MP8-3W-1W-30
1000W	5 / 200	2.5 x 8 x 11	MP1-3E-3E-30 - 404

Multiple Outputs

Total Power	Output 1 (Volts/Amps)	Output 2	Output 3	Output 4	Output 5	Output 6	Size (Inches)	Model Number
400W	5 / 60	3.3 / 35	12 / 1	12 / 1	12 / 1	—	2.5 x 5 x 10	MP4-2E-1D-LLL-00
400W	24 / 15	12 / 17	5 / 35	—	—	—	2.5 x 5 x 10	MP4-2Q-1L-1E-00
400W	5 / 60	12 / 17	12 / 10	5 / 10	—	—	2.5 x 5 x 10	MP4-2E-1L-4LE-00
400W	5 / 35	12 / 10	3.3 / 10	12 / 1	12 / 1	5 / 2	2.5 x 5 x 10	MP4-1E-4LD-LLE-00
600W	3 / 60	5 / 60	12 / 10	12 / 4	—	—	2.5 x 5 x 11	MP6-2C-2E-4LL-00
600W	5 / 120	12 / 17	12 / 10	5 / 10	—	—	2.5 x 5 x 11	MP6-3E-1L-4LE-00
600W	12 / 30	5 / 35	—	—	—	—	2.5 x 5 x 11	MP6-2L-1E-00
800W	36 / 16.6	24 / 4	5 / 10	12 / 10	12 / 4	—	2.5 x 7 x 10	MP8-3U-4QE-4LL-00
800W	5 / 120	3.3 / 35	12 / 17	12 / 10	12 / 4	—	2.5 x 7 x 10	MP8-3E-1D-1L-4LL-00
800W	15 / 20	5 / 35	15 / 14	24 / 8.5	15 / 8	5 / 10	2.5 x 7 x 10	MP8-2N-1E-1N-1Q-4NE-00
800W	2 / 180	5 / 60	—	—	—	—	2.5 x 7 x 10	MP8-3A-2A-2E-30
1000W	3.3 / 120	5 / 120	—	—	—	—	2.5 x 8 x 11	MP1-3D-3E-00

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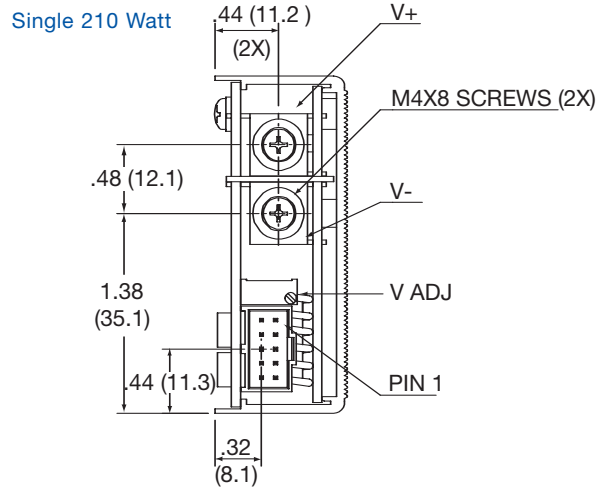
MP Modules

DC-DC Converter Output Modules

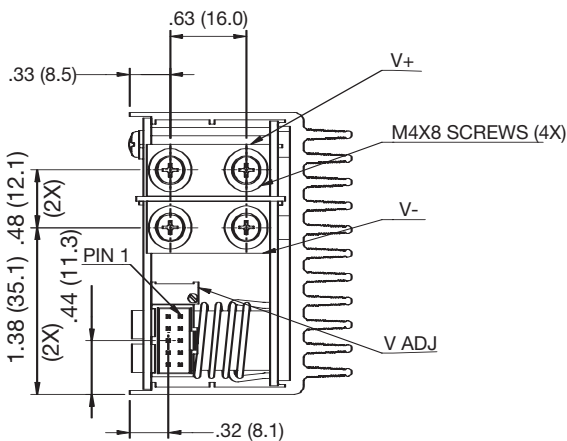
Pin Connection

Control Signal Information, J1 Control Connector

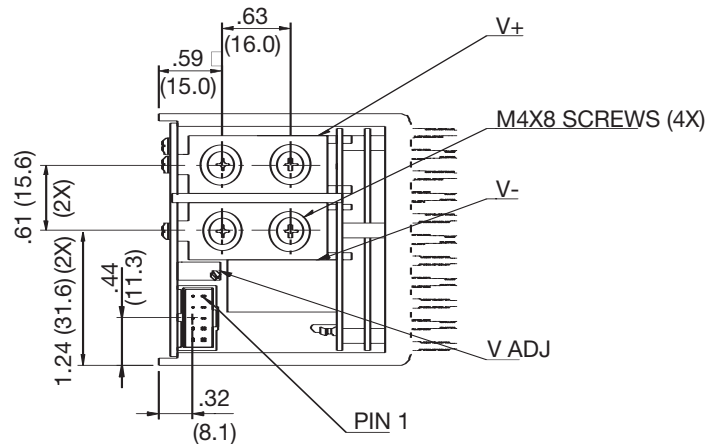
Pin No.	Function	
1	+ Remote Sense	single or dual o/p main
2	Remote Margin / V. Program	single o/p
3	Margin High	single o/p
4	- Remote Sense / Margin Low	single or dual o/p main
5	Spare	
6	Module, Isolated Inhibit	single or dual o/p
7	Module Inhibit return	single or dual o/p
8	Current Share (SWP)	single or dual o/p main
9	+ Remote Sense V2	dual o/p, single is spare
10	- Remote Sense V2	dual o/p, single is spare



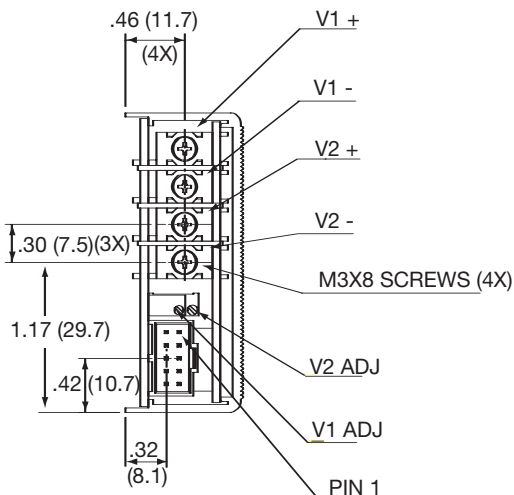
Single 360 Watt



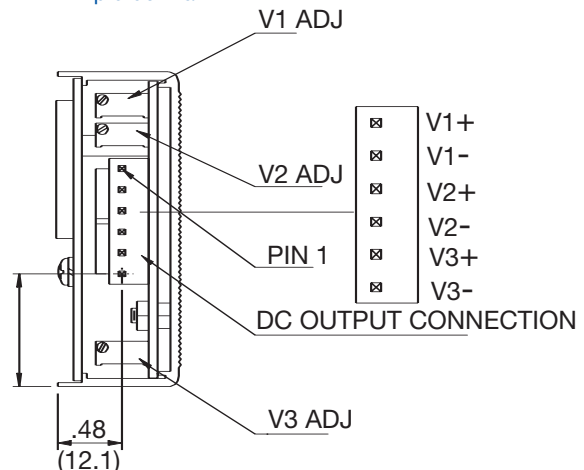
Single 600 Watt



Dual 144 Watt



Triple 36 Watt



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MP Series

MP4 (400/600 Watts Max)

MP6 (600/800 Watts Max)

5-Inch Case Size: MP4: 2.5" x 5" x 10" (63.5mm x 127mm x 254mm)

5-Inch Case Size: MP6: 2.5" x 5" x 11" (63.5mm x 127mm x 279.4mm)

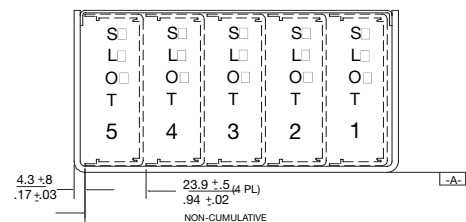
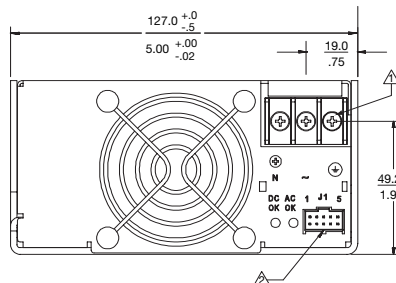
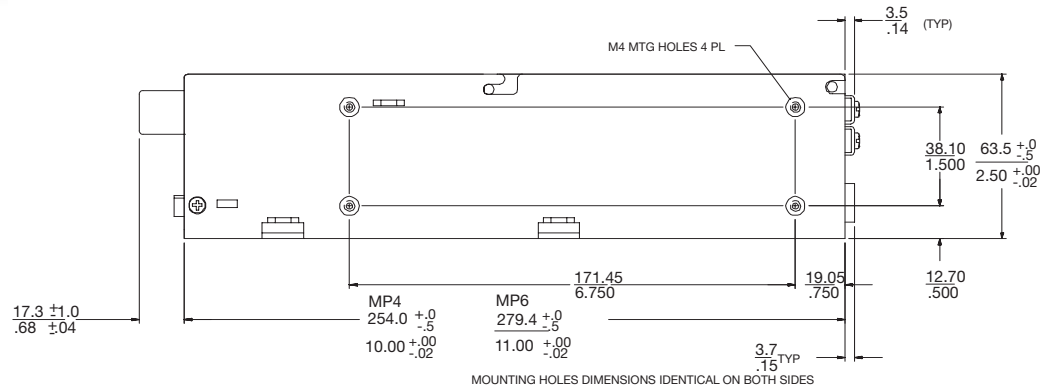
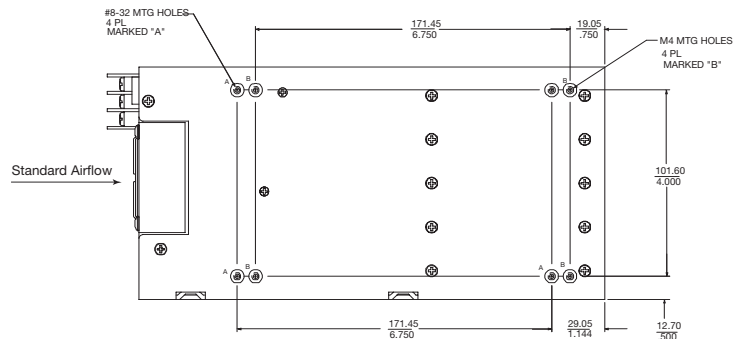
Weight:

- MP4 Case: 2.6lbs
- MP6 Case 3.2 lbs
- 36W Triple: 0.5 lb.
- 210 W Single: 0.6 lb
- 360W Single 1.0 lb
- 600W Single: 2.0 lbs.
- 144W Dual: 0.6 lb

Pin Connection

J1 Control Connector Standard for all cases

Pin No.	Function
J1-1	Input AC OK - "Emitter"
J1-2	Input AC OK - "Collector"
J1-3	Global DC OK - "Emitter"
J1-4	Global DC OK - "Collector"
J1-5	Spare J1-6 Global Inhibit/Optional Enable Logic "0"
J1-7	Global Inhibit/Optional Enable Logic "1"
J1-8	Global Inhibit/Optional Enable Return
J1-9	SELV 5V Housekeeping
J1-10	SELV 5V Housekeeping Return



Note:

1. Input: Barrier type. Three No. 6-32 B.H. screws (0.375" centers). Max torque: 6 in-lbs. (0.67 N-m).
2. Control connectors: (J1 and J2) 10 position housing, gold plated contacts. Mates with Molex 90142-0010 housing with 90119-2110 crimp contacts (Molex C - Grid III Series) or AMP Model number 87977-3 with 87309-8 pins. Connector kit includes mating connector and 10 pins, part #70-841-004.
3. Chassis material: aluminum with chemical film coating (conductive).
4. All dimensions are in millimeters and inches, and are typical.
5. Customer mounting -3 sides M4, bottom also includes 8-32 mounting holes. Max. penetration is 0.150" (3.8mm). Max. torque: 5in-lbs.
6. Output module connections: All single O/P modules are M4 x 8mm screws. Max. torque: 10in-lbs. Dual O/P module is M3 x 8mm screws. Max. torque: 5 in-lbs. Triple O/P module is .045" square pins on .156" centers. Mates with Molex 09-50-8063 or equivalent.

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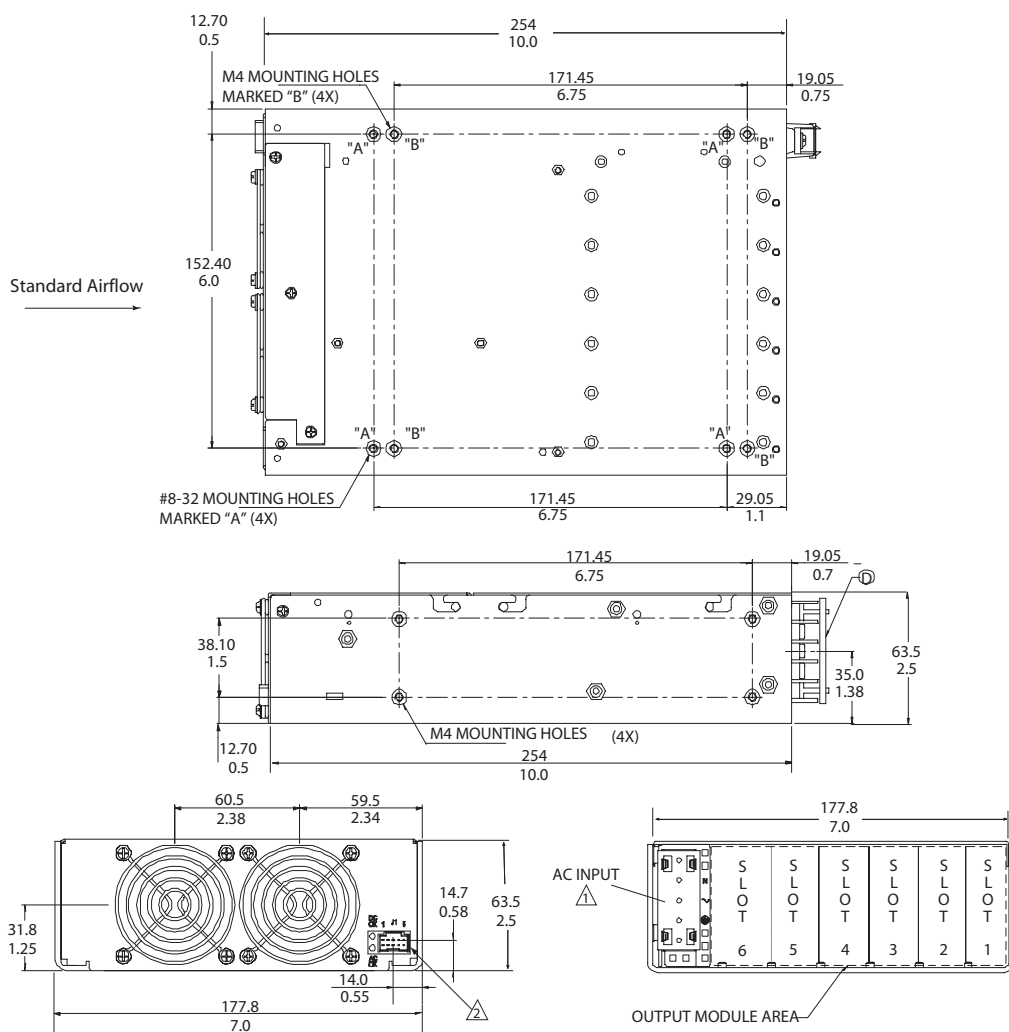


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MP Series
MP8 (800/1000 Watts Max)

7-Inch Case Size: MP8: 2.5" x 7" x 10" (63.5mm x 177.8mm x 254mm)

- Weight:
- MP8 Case: 4.1lbs
 - 36W Triple: 0.5 lb.
 - 210 W Single: 0.6 lb
 - 360W Single 1.0 lb
 - 600W Single: 2.0 lbs.
 - 144W Dual: 0.6 lb



Note:

1. Input: Barrier type. Three No. 6-32 B.H. screws (0.375" centers). Max torque: 6 in-lbs. (0.67 N-m).
2. Control connectors: (J1 and J2) 10 position housing, gold plated contacts. Mates with Molex 90142-0010 housing with 90119-2110 crimp contacts (Molex C - Grid III Series) or AMP Model number 87977-3 with 87309-8 pins. Connector kit includes mating connector and 10 pins, part #70-841-004.
3. Chassis material: aluminum with chemical film coating (conductive).
4. All dimensions are in millimeters and inches, and are typical.
5. Customer mounting -3 sides M4, bottom also includes 8-32 mounting holes. Max. penetration is 0.150" (3.8mm). Max. torque: 5in-lbs.
6. Output module connections: All single O/P modules are M4 x 8mm screws. Max. torque: 10in-lbs. Dual O/P module is M3 x 8mm screws. Max. torque: 5 in-lbs. Triple O/P module is .045" square pins on .156" centers. Mates with Molex 09-50-8063 or equivalent.

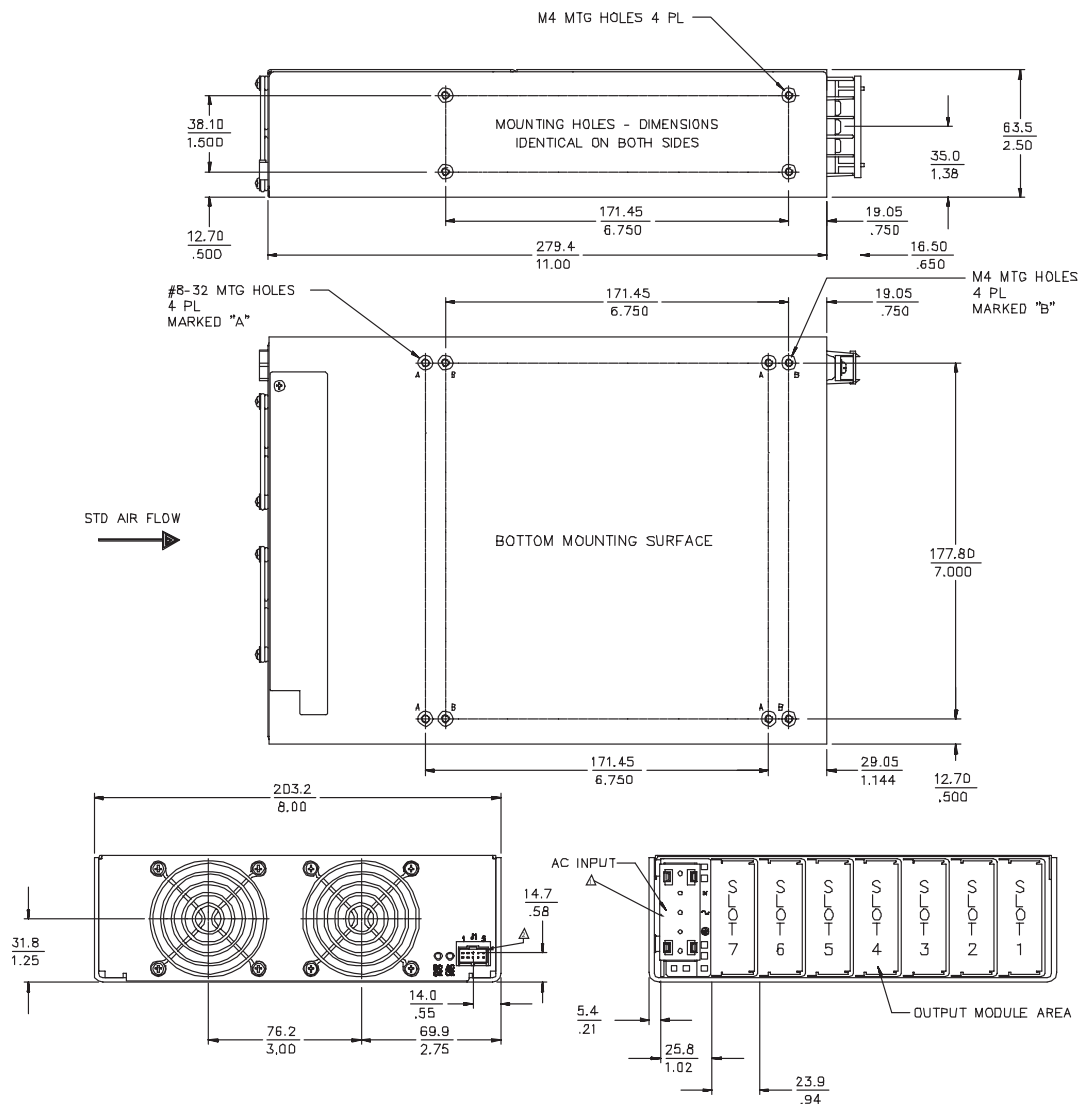
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MP Series
MP1 (1000/1200 Watts Max)

8-Inch Case Size: MP1: 2.5" x 8" x 11" (63.5mm x 203.2mm x 279.4mm)

- Weight:**
- MP1 Case: 5.0lbs
 - 36W Triple: 0.5 lb.
 - 210 W Single: 0.6 lb
 - 360W Single 1.0 lb
 - 600W Single: 2.0 lbs.
 - 144W Dual: 0.6 lb



Note:

1. Input: Barrier type. Three No. 6-32 B.H. screws (0.375" centers). Max torque: 6 in-lbs. (0.67 N-m).
2. Control connectors: (J1 and J2) 10 position housing, gold plated contacts. Mates with Molex 90142-0010 housing with 90119-2110 crimp contacts (Molex C - Grid III Series) or AMP Model number 87977-3 with 87309-8 pins. Connector kit includes mating connector and 10 pins, part #70-841-004.
3. Chassis material: aluminum with chemical film coating (conductive).
4. All dimensions are in millimeters and inches, and are typical.
5. Customer mounting -3 sides M4, bottom also includes 8-32 mounting holes. Max. penetration is 0.150" (3.8mm). Max. torque: 5in-lbs.
6. Output module connections: All single O/P modules are M4 x 8mm screws. Max. torque: 10in-lbs. Dual O/P module is M3 x 8mm screws. Max. torque: 5 in-lbs. Triple O/P module is .045" square pins on .156" centers. Mates with Molex 09-50-8063 or equivalent.