

# 400 - 1200 Watts

## MP Series



MP4



MP6



MP8



MP1

### Special Features

- Current share on all outputs with ratings of 10 A or greater
- Remote sense on all outputs with ratings greater than 2 A
- 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
- 1 year warranty
- Forced air cooling, field replaceable fan
- Isolated 5 V 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 200 W 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

### 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

<b>UL</b>	UL1950
<b>CSA</b>	CSA22.2 No. 234 Level 5
<b>IEC</b>	IEC950, Class 1
<b>VDE</b>	EN60950,
<b>BABT</b>	Compliance to EN 60950, BS 7002
<b>CB</b>	Certificate and report
<b>CE</b>	Mark

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## Electrical Specs

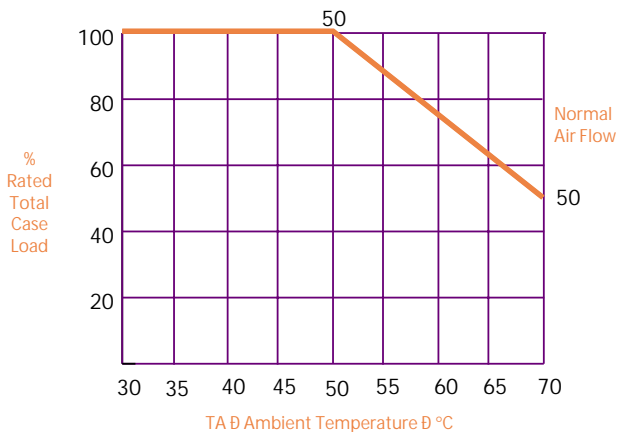
### Input

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 22 EN55022 Level "B"
EMI filter (low leakage option)	CISPR 22 EN55022 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. <sup>1</sup>
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 2-5.5 V 122-134% 6-60 V 110-120% Dual output module 2-6 V 122-134% 8-28 V 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 <sup>2</sup>
DC OK	-2% to -8% of nominal for any monitored output <sup>2</sup>
Minimum load	Not required on single or triple output modules. 10% required on main of dual output modules <sup>3</sup>
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 Megohm
VME signal option board	POR signal & quad external DC OK

Power Derating Curve



Notes:

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

# Common Examples and Specifications



## Modules

	Single	Single	Single	Dual	Triple
Outputs	1	1	1	2	3
Max output power	210 W	360 W	600 W	144 W	36 W
Max output current	35 A	60 A	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

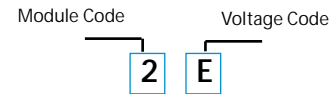
Voltage	Voltage Code	Single Output Module Code			Dual Output <sup>1</sup>		Triple Output <sup>1</sup>		
		1 <sup>1</sup>	2 <sup>2</sup>	3 <sup>3</sup>	V1	V2	V1	V2	V3
2 V	A	35A	60 A	120 A	—	10 A	—	—	2 A
2.2 V	B	35 A	60 A	120 A	—	10 A	—	—	2 A
3 V	C	35A	60 A	120 A	—	10 A	—	—	2 A
3.3 V	D	35 A	60 A	120 A	—	10 A	—	—	2 A
5 V	E	35A	60 A	120 A	10 A	10 A	—	—	2 A
5.2 V	F	35 A	60 A	115 A	—	10 A	—	—	2 A
5.5 V	G	34 A	58 A	109 A	—	10 A	—	—	2 A
6.0 V	H	23 A	42 A	78 A	—	10 A	—	—	2 A
8.0 V	I	20 A	36 A	68 A	—	—	1 A	1 A	1 A
10 V	J	18 A	32 A	60 A	—	—	1 A	1 A	1 A
11 V	K	17 A	31 A	54.5 A	—	—	1 A	1 A	1 A
12 V	L	17 A	30 A	50 A	10 A	4 A	1 A	1 A	1 A
14 V	M	14 A	21 A	40.5 A	9 A	4 A	1 A	1 A	1 A
15 V	N	14 A	20 A	39 A	8 A	4 A	1 A	1 A	1 A
18 V	O	11 A	19 A	33.3 A	—	—	—	0.5 A	0.5 A
20 V	P	10.5 A	18 A	30 A	—	—	—	0.5 A	0.5 A
24 V	Q	8.5 A	15 A	23.5 A	4 A	2 A	—	0.5 A	0.5 A
28 V	R	6.7 A	12.8 A	21.4 A	3 A	2 A	—	0.5 A	0.5 A
30 V	S	6.5 A	12 A	20 A	—	—	—	—	—
33 V	T	6.2 A	10.9 A	18.2 A	—	—	—	—	—
36 V	U	5.8 A	10 A	16.6 A	—	—	—	—	—
42 V	V	4.2 A	7.5 A	12.5 A	—	—	—	—	—
48 V	W	4.0 A	7.5 A	12.5 A	—	—	—	—	—
54 V	X	3.7 A	6.0 A	11 A	—	—	—	—	—
60 V	Y	3.5 A	6.0 A	10 A	—	—	—	—	—
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

### Notes:

- 1 Takes up one slot.
- 2 Takes up two slots.
- 3 Takes up three slots.

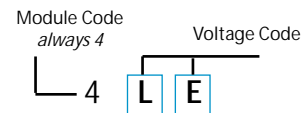
### Single Output Example

5 V @ 60 A



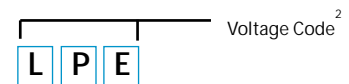
### Dual Output Example<sup>1</sup>

12 V @ 10 A  
5 V @ 10 A



### Triple Output Example<sup>3</sup>

12 V @ 1 A  
20 V @ 0.5 A  
5 V @ 2 A



### Notes:

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

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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.

MP [ ] - [ ] [ ] [ ] [ ] - [ ] [ ] [ ] [ ] [ ] - [ ] [ ] [ ] [ ] [ ] - [ ] [ ] [ ] [ ] [ ] - [ ] [ ] [ ] [ ] [ ] - [ ] [ ] [ ] [ ] [ ] [ ] (MP8 & MP1 Only) Slot #6 - [ ] [ ] [ ] [ ] [ ] [ ] (MP1 Only) Slot #7 - [ ] [ ] [ ] [ ] [ ] [ ] [ ] - XXX

2 or 3 digit code See previous page.

Use " - " for Standard Remote Sense  
Use " / " After any module using Remote Sense with or-ing diode (redundancy)

Use Only for Modified Standard

**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

- Notes:
- 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".

**PARALLEL CODE**

MP4 & MP6 available slots	Slot 5	Slot 4	Slot 3	Slot 2	Slot 1		
MP8 available slots	Slot 6	Slot 5	Slot 4	Slot 3	Slot 2	Slot 1	
MP1 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	•	•	•	•	•	•	•
1 = 1 & 2	•	•	•	•	•	•	•
2 = 2 & 3	•	•	•	•	•	•	•
3 = 3 & 4	•	•	•	•	•	•	•
4 = 4 & 5	•	•	•	•	•	•	•
5 = 3 & 4 & 5	•	•	•	•	•	•	•
6 = 5 & 6	•	•	•	•	•	•	•
7 = 4, 5 & 6	•	•	•	•	•	•	•
8 = 6 & 7	•	•	•	•	•	•	•
9 = 3 & 4, 6 & 7	•	•	•	•	•	•	•

## EXAMPLE

2.5" x 7" x 10" (6 slots available)

Slot 3 Output 2: 12 V @ 17 A

Slot 5 Output 5: 12 V @ 1 A  
Output 6: 12 V @ 1 A  
Output 7: 5 V @ 2 A

Factory assisted code for modifications

MP8 - 2 F / 1 L - 4 L E - L L E - O M - X X X

Slots 1 & 2 Output 1: 5.2 V @ 60 A

Slot 4 Output 3: 12 V @ 10 A  
Output 4: 5 V @ 10 A

No Paralleling Low Leakage

## SINGLE OUTPUTS

Total Power	Output (Volts/Amps)	Size (inches)	Model Numb
360 W	2 / 180	2.5 x 5 x 10	MP4-3A-2A-30
400 W	5 / 80	2.5 x 5 x 10	MP4-3E-00 - 429
600 W	2 / 275	2.5 x 8 x 11	MP6-3A-3A-1A-90
600 W	5 / 120	2.5 x 5 x 11	MP6-3E-00
600 W	48 / 12.5	2.5 x 5 x 11	MP6-3W-00
800 W	5 / 160	2.5 x 7 x 10	MP8-3E-2E-30 - 415
800 W	48 / 16.6	2.5 x 7 x 10	MP8-3W-1W-30
1000 W	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
400 W	5 / 60	3.3 / 35	12 / 1	12 / 1	12 / 1	—	2.5 x 5 x 10	MP4-2E-1D-LLL-00
400 W	24 / 15	12 / 17	5 / 35	—	—	—	2.5 x 5 x 10	MP4-2Q-1L-1E-00
400 W	5 / 60	12 / 17	12 / 10	5 / 10	—	—	2.5 x 5 x 10	MP4-2E-1L-4LE-00
400 W	5 / 35	12 / 10	3.3 / 10	12 / 1	12 / 1	5 / 2	2.5 x 5 x 10	MP4-1E-4LD-LLE-00
600 W	3 / 60	5 / 60	12 / 10	12 / 4	—	—	2.5 x 5 x 11	MP6-2C-2E-4LL-00
600 W	5 / 120	12 / 17	12 / 10	5 / 10	—	—	2.5 x 5 x 11	MP6-3E-1L-4LE-00
600 W	12 / 30	5 / 35	—	—	—	—	2.5 x 5 x 11	MP6-2L-1E-00
800 W	36 / 16.6	24 / 4	5 / 10	12 / 10	12 / 4	—	2.5 x 7 x 10	MP8-3U-4QE-4LL-00
800 W	5 / 120	3.3 / 35	12 / 17	12 / 10	12 / 4	—	2.5 x 7 x 10	MP8-3E-1D-1L-4LL-00
800 W	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
800 W	2 / 180	5 / 60	—	—	—	—	2.5 x 7 x 10	MP8-3A-2A-2E-30
1000 W	3.3 / 120	5 / 120	—	—	—	—	2.5 x 8 x 11	MP1-3D-3E-00

\*For custom parallel configurations contact Astec Power Technical Support.

# Drawings

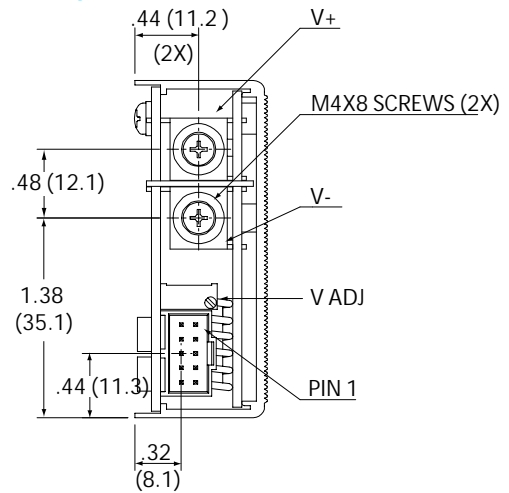
## MP MODULES

### DC-DC Converter Output Modules

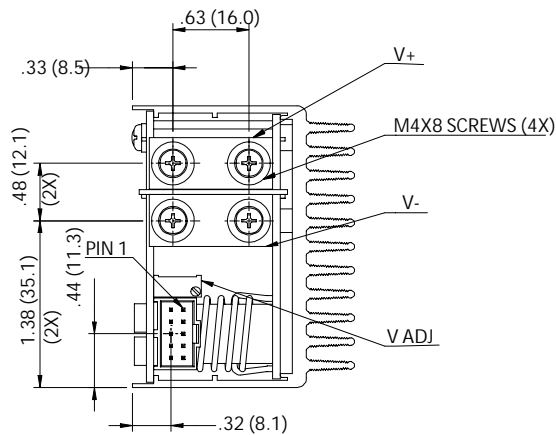
#### Control Signal Information, J1 Control Connector

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

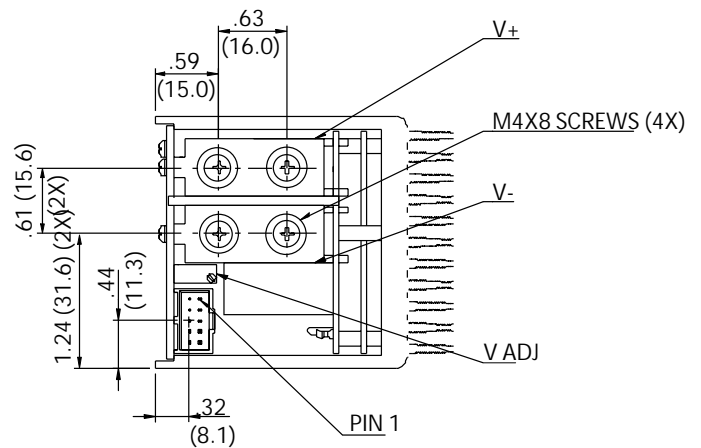
#### Single 210 Watt



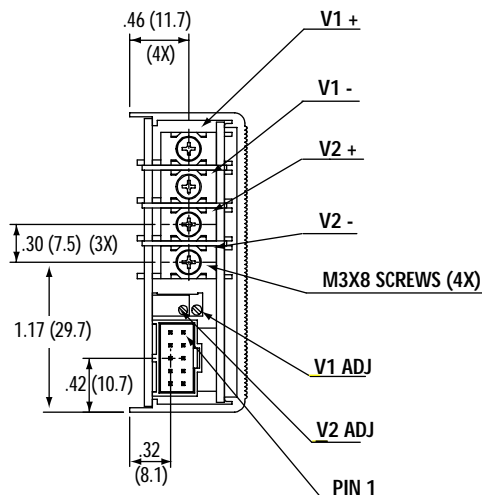
#### Single 360 Watt



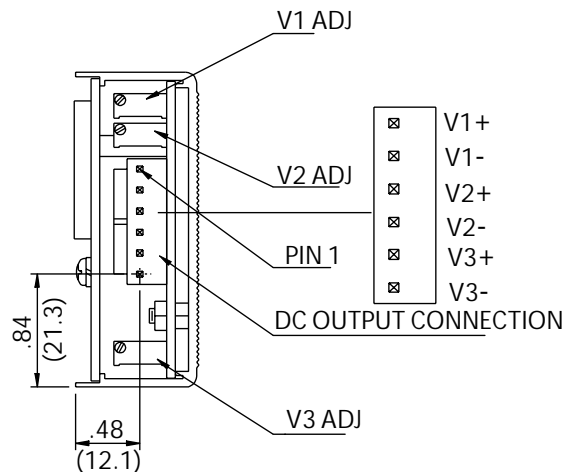
#### Single 600 Watt



#### Dual 144 Watt



#### Triple 36 Watt



**MP Series**  
**MP4 (400/600 Watts Max)**  
**MP6 (600/800 Watts Max)**

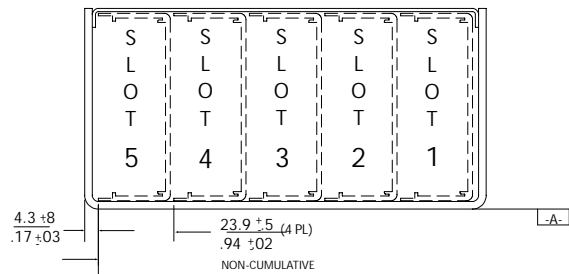
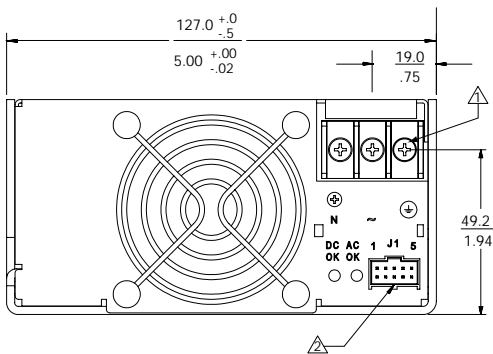
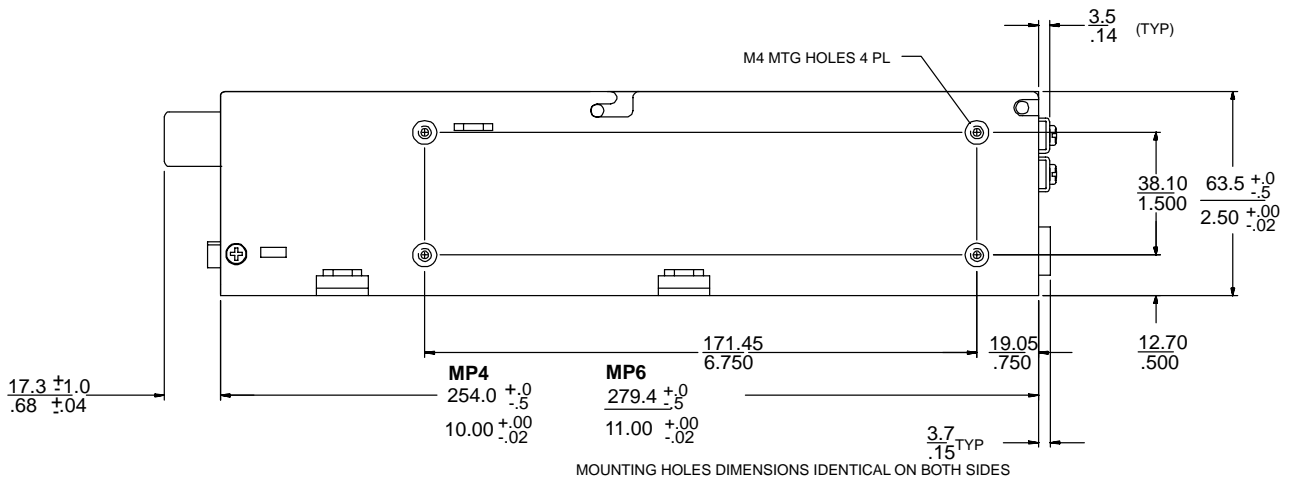
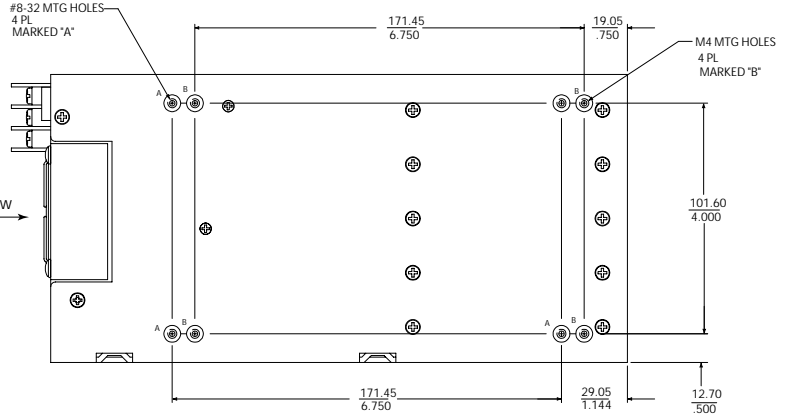
**5-Inch Case Size:** MP4: 2.5" x 5" x 10" (63.5mm x 127mm x 254mm)  
**5-Inch Case Size:** MP6: 2.5" x 5" x 11" (63.5mm x 127mm x 279.4mm)  
**Weight:** MP4 Case: 2.6 lbs. • MP6 Case: 3.2 lbs. • 36 W Triple: 0.5 lb.  
210 W Single: 0.6 lb. • 360 W Single 1.0 lb. • 600 W Single: 2.0 lbs.  
144 W Dual: 0.6 lb.

**PFC Input Information**

**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

Standard Airflow



**Notes**

- Input: Barrier type. Three No. 6-32 B.H. screws (0.375" centers). Max torque: 6 in-lbs. (0.67 N-m).
- 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, Astec part #70-841-004.
- Chassis material: aluminum with chemical film coating (conductive).
- All dimensions are in millimeters and inches, and are typical.
- Customer mounting -3 sides M4, bottom also includes 8-32 mounting holes. Max. penetration is 0.150" (3.8mm). Max. torque: 5in-lbs.
- 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.

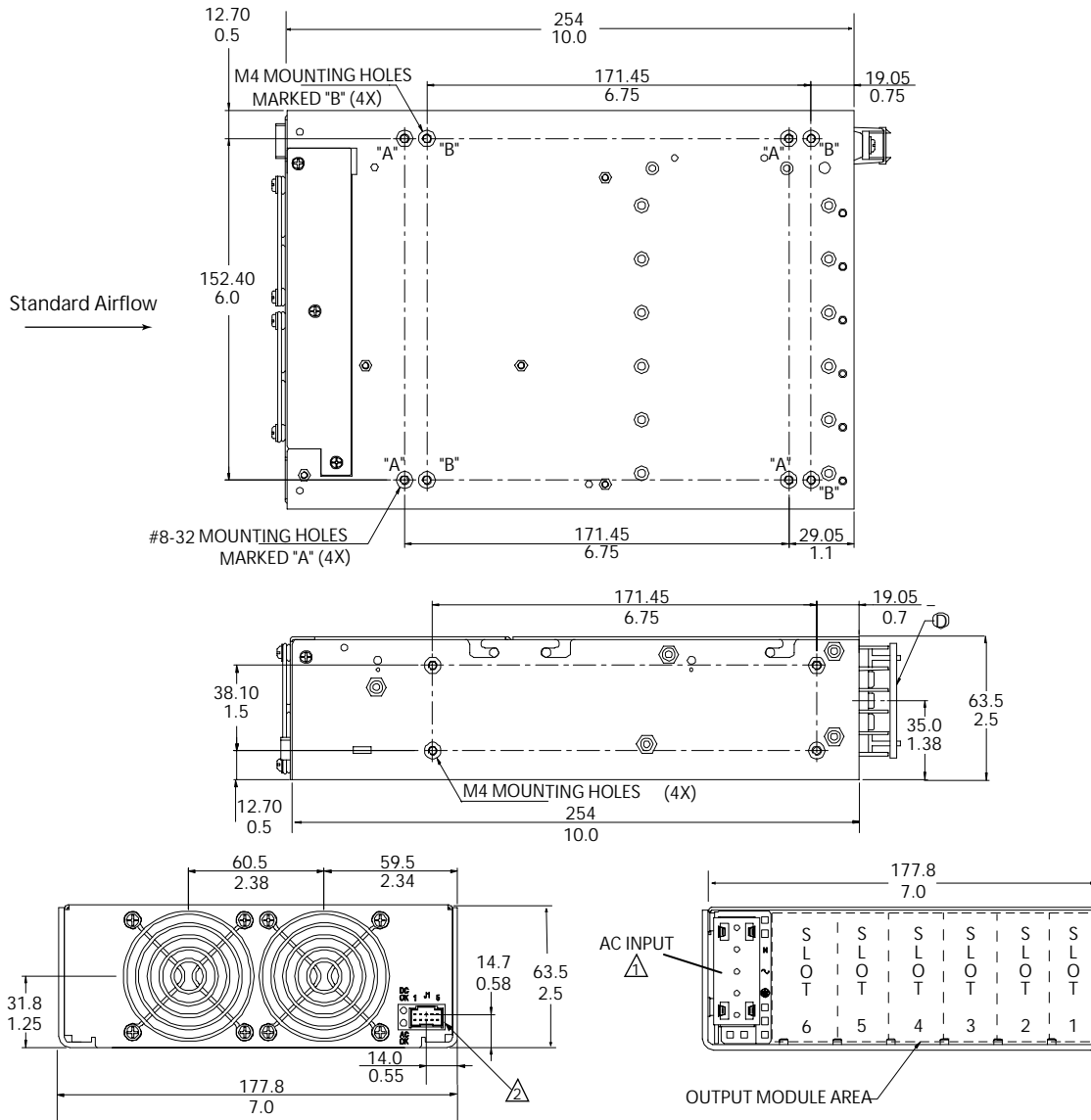
# Drawings

## 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: 4.1 lbs. • 36 W Triple: 0.5 lb. • 210 W Single: 0.6 lb. • 360 W Single: 1.0 lb. • 600 W Single: 2.0 lbs. 144 W Dual: 0.6 lb.



## Notes

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, Astec 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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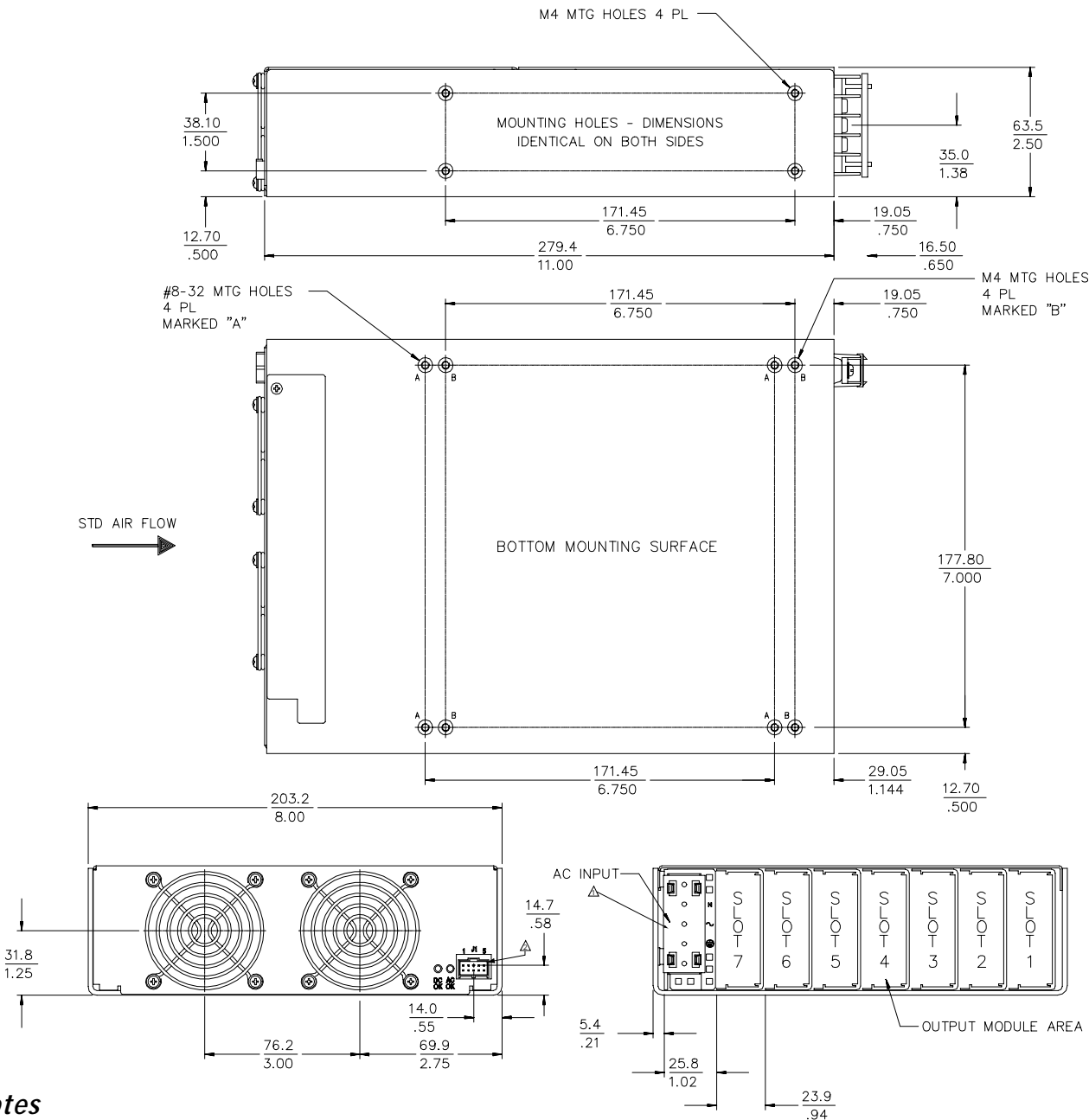
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**MP Series**  
**MP1 (1000/1200 Watts Max)**

**8-Inch Case Size:** MP1: 2.5" x 8" x 11" (63.5mm x 203.2mm x 279.4mm)  
**Weight:** MP1 Case: 5.0 lbs. • 36 W Triple: 0.5 lbs. • 210 W Single: 0.6 lbs. • 360 W Single: 1.0 lb. • 600 W Single: 2.0 lbs.  
 144 W Dual: 0.6 lb.



**Notes**

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, Astec 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.