

MP Series

400 - 1200 Watts

Total Power: 400 - 1200 Watts

Input Voltage: 85 - 264 VAC
120 - 350 VDC

of Outputs: Up to 21

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
- 2 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
- Field Demonstrated MTBF: > 550,000 hours at full load, 220 Vac & 25 °C ambient conditions

Safety

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



Electrical Specifications

Input

Input range:	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):	300µA 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 lose 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		Output (cont.)	
Adjustment range:	± 10% minimum all outputs	Thermal protection:	All outputs disabled when internal temp exceeds safe operating range. > 5ms warning (AC OK signal) before shutdown
Margining:	± 4 - 6% nominal ¹	Remote sense:	Up to 0.5 V total drop (not avbl on triple output module)
Overall regulation:	0.4% or 20mV max. (36 W modules 4% maximum)	Single wire parallel:	Current share to within 2% of total rated current ²
Ripple:	RMS: 0.1% or 10mV, whichever is greater Pk-Pk: 1.0% or 50mV, whichever is greater Bandwidth limited to 20 MHz	DC OK:	-2% to -8% of nominal for any monitored output ²
Dynamic response:	< 2% or 100 mV, with 25% load step	Minimum load:	Not required on single or triple output. 10% required on main of dual output ³
Recovery time:	To within 1% in < 300 µsec	Housekeeping bias voltage:	5 Vdc @ 1.0 A max. present whenever AC input is applied
Overcurrent protection:**	Single output module & main output of dual output module 105-120% of rated output current. Aux output of dual output module 105-140% of rated output current	Module inhibit:	TTL, isolated, singles and dual (both outputs) only
Short-circuit protection:	Protected for continuous short-circuit Recovery auto upon removal of short	Switching frequency:	250k Hz
Overvoltage protection: (measured at sense connection)		Output/Output isolation:	>1 Megohm
Single output module: 2-5.5 V 122-134% ; 6-60 V 100-120%		VME signal option board:	POR signal & quad external DC OK
Dual output module: 2-6 V 122-134% ; 8-28 V 110-120%		Hold-up module (HUP):	1-slot module providing additional 34mSec (60mSec total); hold-up @ 600 W loading.
Triple output module: No overvoltage protection provided. Recycle AC input voltage to reset OVP circuit		1. Single output modules only. 2. Single and main of dual output modules only 3. Contact factory for optional preload if required Field Demonstrated MTBF: > 550,000 hours at full load, 220 Vac and 25 °C ambient conditions	
Reverse voltage protection:	100% of rated output current		

Environmental Specifications

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)

Output Module Line-up

Module Type	Single	Single	Single	Dual	Triple
Output	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	2-28V
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

Output Module Voltage/Current

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Voltage	Voltage Code	Single Output Module Code			Dual Output**		Triple Output		
		1	2	3	V1	V2	V1	V2	V3
2 V	A	35 A	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	35 A	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	35 A	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	Special Voltage - Consult Factory for specifications							
2.4 V - 2.7 V		35 A	60 A	120 A	—	10 A	—	—	2 A
3.6 V - 4.5 V		35 A	60 A	120 A	—	10 A	—	—	2 A
6.6 V - 9.2 V		20 A	36 A	68 A	10 A	4 A	—	—	1 A
8.8 V - 9.0 V		18 A	32 A	60 A	10 A	4 A	—	—	1 A

Parallel Codes							
Slot 7	Slot 6	Slot 5	Slot 4	Slot 3	Slot 2	Slot 1	MP4 & MP6 available slots
							MP8 available slots
							MP1 available slots
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
—	—	●	—	—	—	—	A = 1 & 2, 3 & 4, 5 & 6
—	—	—	●	—	—	—	C = 2 & 3, 4 & 5
—	—	—	—	●	—	—	E = 3 & 4, 5 & 6
—	—	—	—	—	●	—	F = 2 & 3, 4 & 5, 6 & 7

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".

Ordering Information

Case Size	Module/Voltage/Option Codes First - Module Code Second - Voltage Code	Add-on Modules	Case Option Codes	Hardware Code
MP1	-3L - 2E - 1Q -4LL	- HUP	- 00	-###
Case Size (mm) 4 = 2.5" x 5" x 10"; 400 W-600 W, 5 Slots (63.5 x 127 x 254) 6 = 2.5" x 5" x 11"; 600 W-800 W, 5 Slots (63.5 x 127 x 279.4) 8 = 2.5" x 7" x 10"; 800 W-1000 W, 6 Slots (63.5 x 177.8 x 254) 1 = 2.5" x 8" x 11"; 1000 W-1200 W, 7 Slots* (63.5 x 203.2 x 279.4)	Module Codes Module/Voltage/Option Codes Module codes: (None) = 36 W triple O/P (1 slot) 1 = 210 W single O/P (1 slot) 2 = 360 W single O/P (2 slot) 3 = 600 W single O/P (3 slot) 4 = 144 W dual O/P (1 slot) 5 - 9 = future Voltage Codes: See Output Module Voltage/Current table above	HUP = Hold up module VME = VME POR signal and isolated DC	Case Option Codes First digit 0 - 9 = parallel code (See Parallel Codes table above) Second digit Standard Options 0 = No options 1 = Rear Air Exhaust 3 = Global enable 5 = Opt 1 + Opt 3 M = Low Leakage N = Low Leakage + Opt 1 P = Low Leakage + Opt 3 R = Low Leakage + Opt 5	Factory assigned for modifications

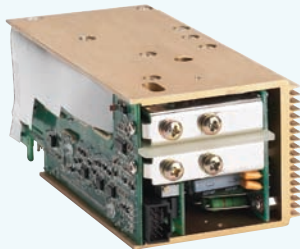
Single



210 W



360 W



600 W

Dual



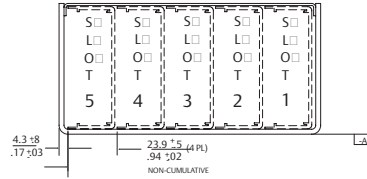
144 W

Triple



36 W

MP4 & MP6



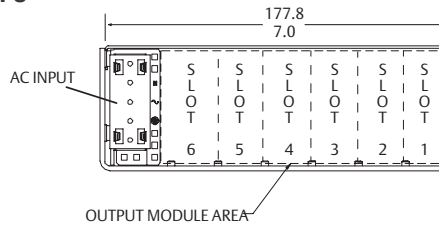
MP4 = 2.5" x 5" x 10" 5 available slots
(63.5 x 127 x 254mm)

MP6 = 2.5" x 8" x 11" 5 available slots
(63.5 x 127 x 279.4mm)

Input	
85-264 Vac	180-264 Vac
400 W max.	600 W max.

600 W max.	800 W max.
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MP8

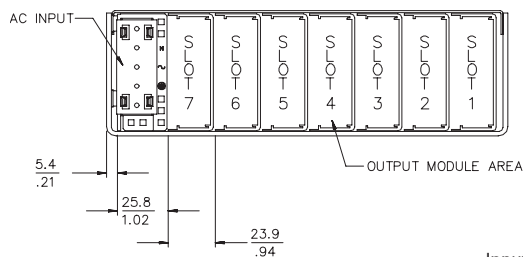


MP8 = 2.5" x 7" x 10" 6 available slots
(63.5 x 177.8 x 254mm)

Input	
85-264 Vac	180-264 Vac
800 W max.	1000 W max.

800 W max.	1000 W max.
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MP1



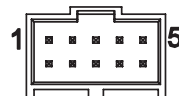
MP1 = 2.5" x 8" x 11" 7 available slots
(63.5 x 203.2 x 279.4mm)

Input	
85-264 Vac	180-264 Vac
1000 W max.	1200 W max.

1000 W max.	1200 W max.
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Pin Connectors

Figure 1. Connector J1



Mates with
Molex 90142-0010 Housing
90119-2110 Pin

PFC Input Connector

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 5 V housekeeping
J1-10	SE:V 5 V housekeeping return

Mechanical Drawings

MP Modules

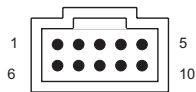
DC-DC Converter Output Modules

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PFC Input Connector

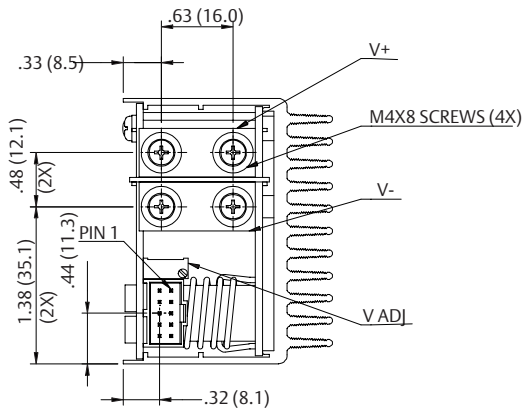
Pin No.	Function	
1	+ Remote Sense	single or dual o/p main
2	Remote Margin / V. Program	single o/p
3	Margin High	single o/p
4	- Remote Sense/Margin Low	single or dual o/p main
5	Spare	
6	Module, Isolated Inhibit	single or dual o/p
7	Module Inhibit Return	single or dual o/p
8	Current Share (SWP)	single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

Figure 4. Connector J1

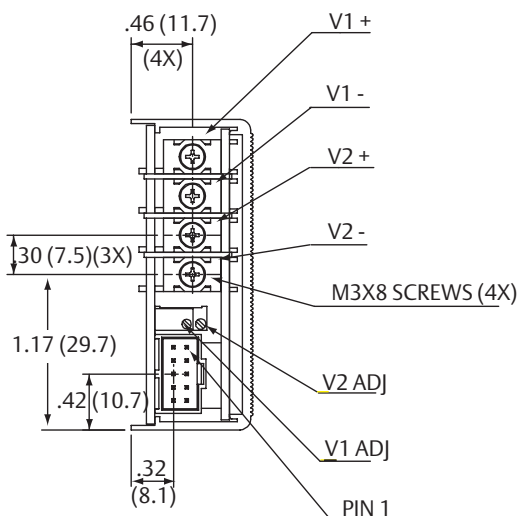


Mates with
Molex 90142-0010 Housing
90119-2110 Pin

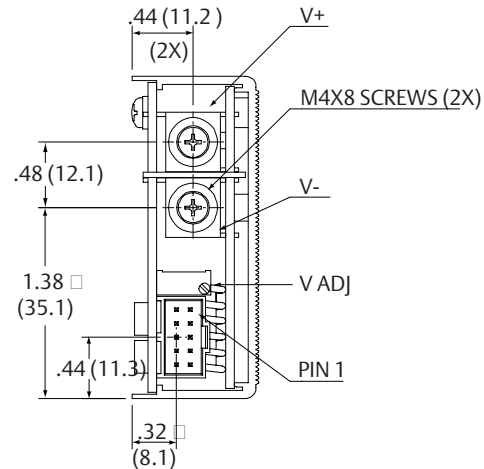
Single 360 Watt



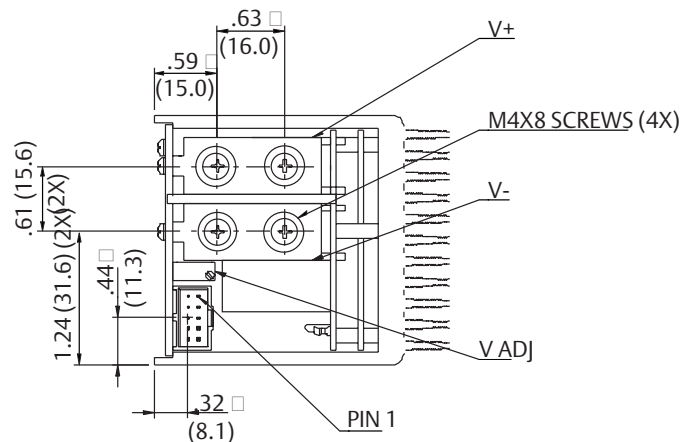
Dual 144 Watt



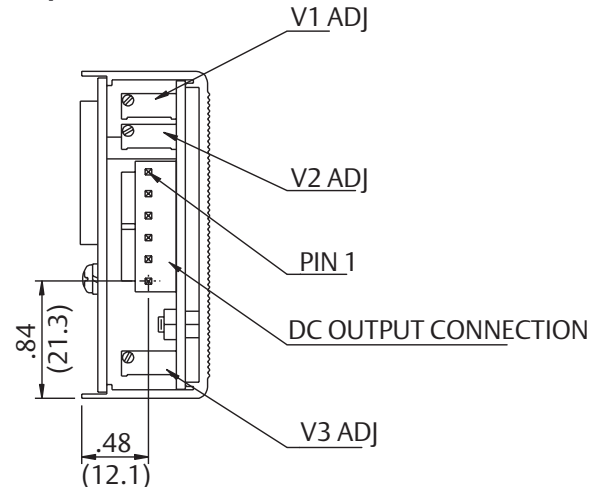
Single 210 Watt



Single 600 Watt



Triple 36 Watt



⊗	V1+
⊗	V1-
⊗	V2+
⊗	V2-
⊗	V3+
⊗	V3-

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.

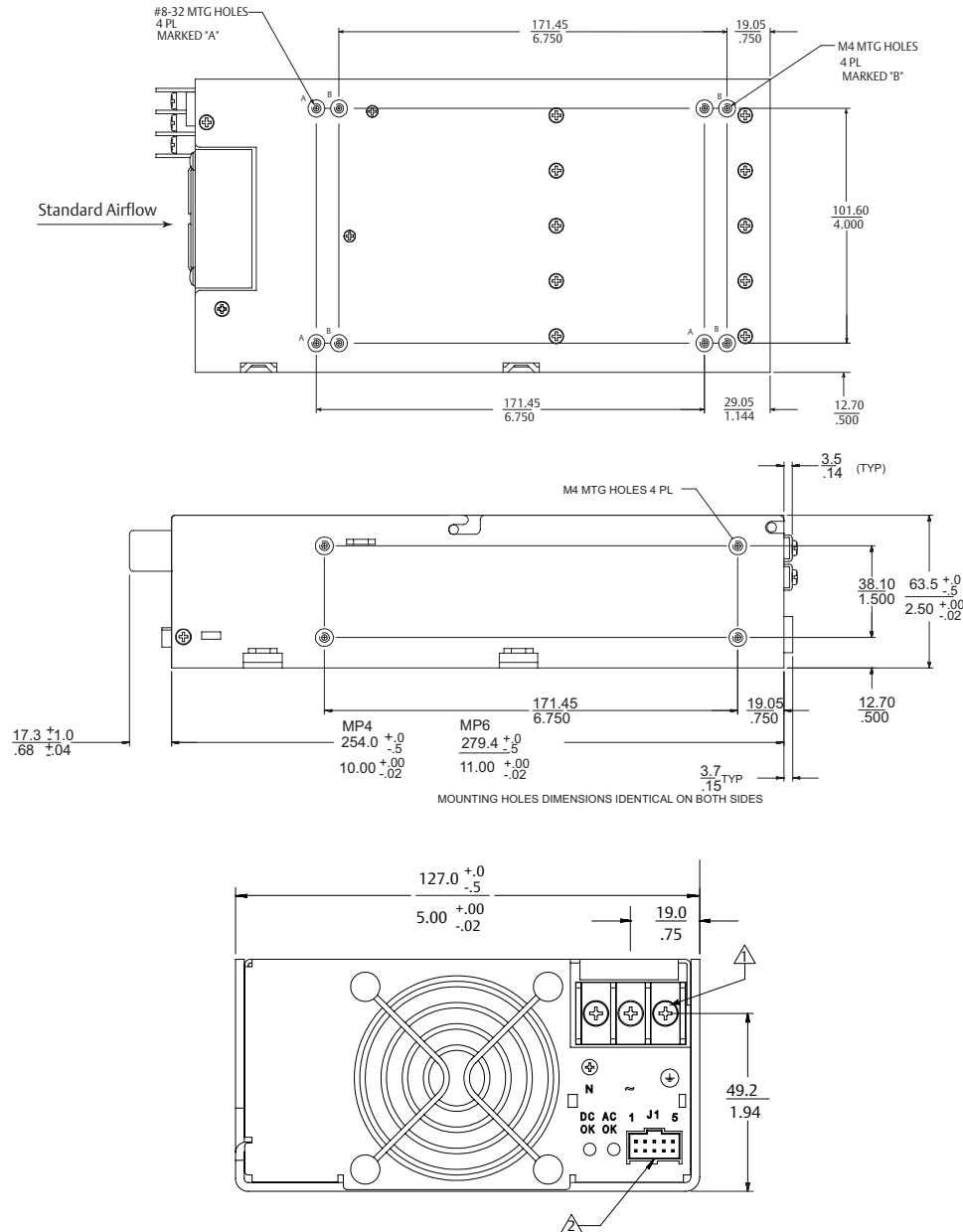
• 210 W Single: 0.6 lb. • 360 W Single: 1.0 lb. • 600 W Single: 2.0 lbs

• 144 W Dual: 0.6 lb

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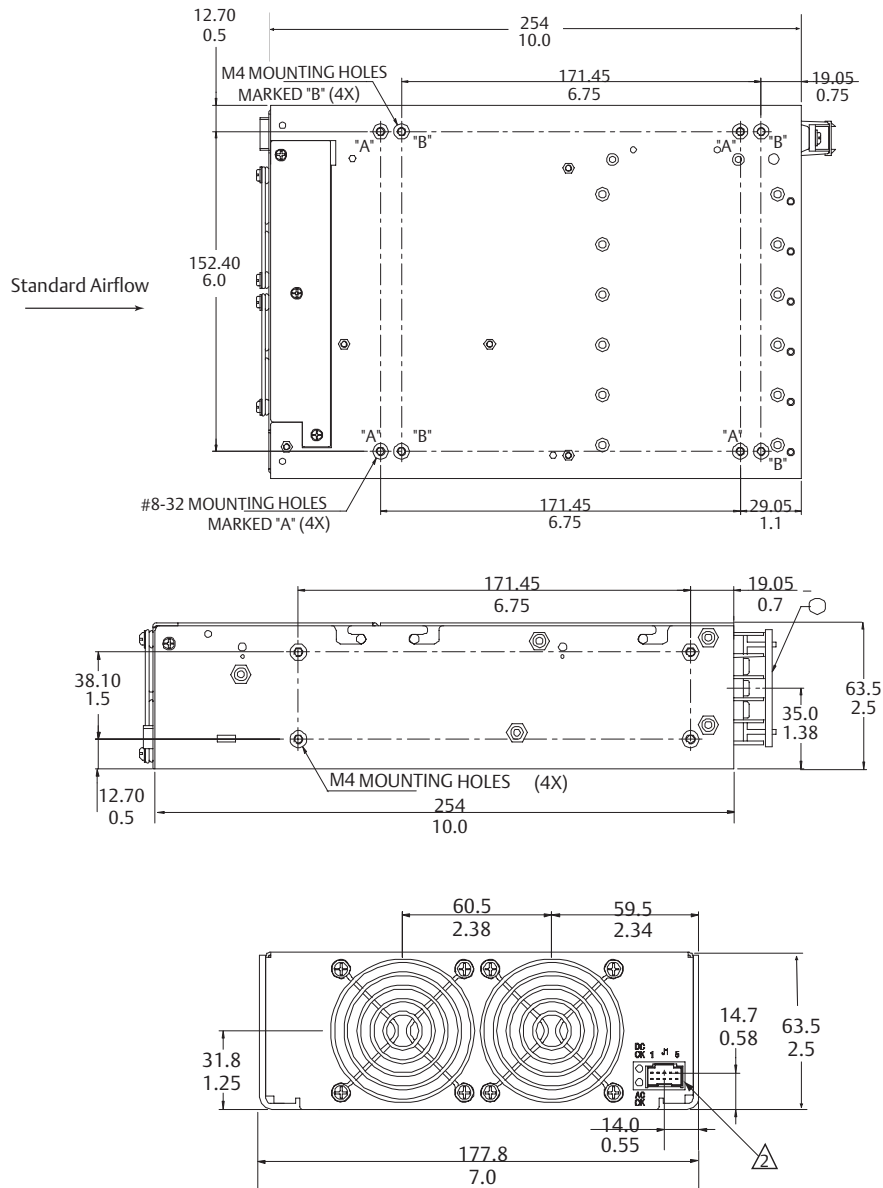
Notes

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). 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" (3.8 mm). Max. torque: 5 in-lbs.
6. Output module connections: All single O/P modules are M4 x 8mm screws. Max. torque: 10 in-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 Moelx 09-50-8063 or equivalent.

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: 2.6 lbs. • 144 W Dual: 0.6 lb.

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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). 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" (3.8 mm). Max. torque: 5 in-lbs.
6. Output module connections: All single O/P modules are M4 x 8mm screws. Max. torque: 10 in-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 Moelx 09-50-8063 or equivalent.

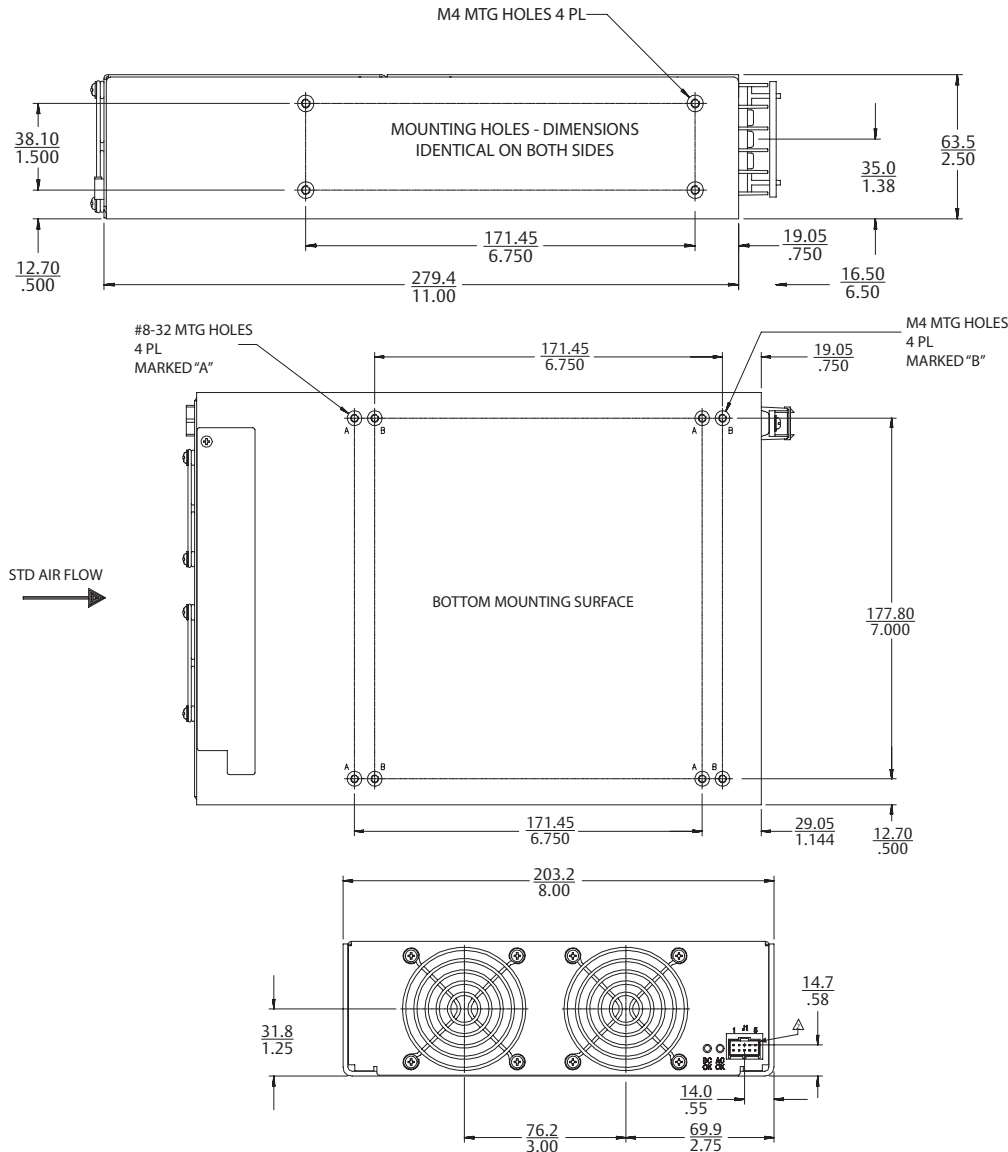
MP Series MP1 (1000/1200 Watts Max)

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 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). 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" (3.8 mm). Max. torque: 5 in-lbs.
6. Output module connections: All single O/P modules are M4 x 8mm screws. Max. torque: 10 in-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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