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

RoHS 2002/95/EC

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

ASTEC

EMERSON Network Power

Output

Adjustment range:	± 10% minimum all outputs
Margining:	± 4 - 6% nominal[1]
Overall regulation:	0.4% or 20mV max. (36 W modules 4% maximum)
Ripple:	RMS: 0.1% or 10mV, whichever is greater Pk-Pk: 1.0% or 50mV, 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 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
Short-circuit protection:	Protected for continuous short-circuit Recovery auto upon removal of short
Overvoltage protection: (measured at sense connection)	
Single output module:	2-5.5 V 122-134% ; 6-60 V 100-120%
Dual output module:	2-6 V 122-134% ; 8-28 V 110-120%
Triple output module:	No overvoltage protection provided. Recycle AC input voltage to reset OVP circuit
Reverse voltage protection:	100% of rated output current

Output (cont.)

Thermal protection:	All outputs disabled when internal temp exceeds safe operating range. > 5ms warning (AC OK signal) before shutdown
Remote sense:	Up to 0.5 V total drop (not avbl 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. 10% required on main of dual output[3]
Housekeeping bias voltage:	5 Vdc @ 1.0 A max. present whenever AC input is applied
Module inhibit:	TTL, isolated, singles and dual (both outputs) only
Switching frequency:	250k Hz
Output/Output isolation:	>1 Megohm
VME signal option board:	POR signal & quad external DC OK
Hold-up module (HUP):	1-slot module providing additional 34mSec (60mSec total); hold-up @ 600 W loading.

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

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)

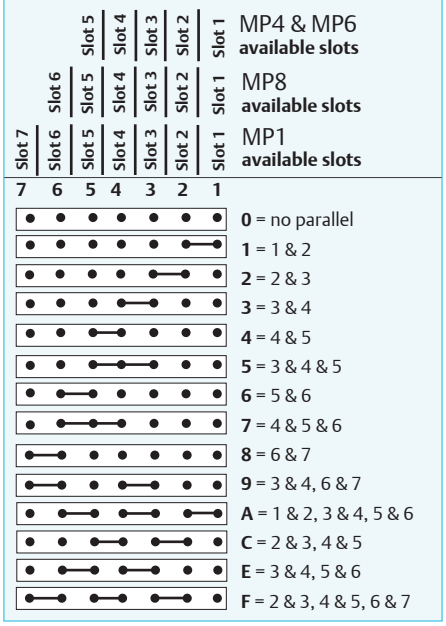
Output Module Line-up

Module Type	Single	Single	Single	Dual	Triple
Output	1	1		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

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



Notes:
1. Omit digits that do not apply.
2. Specify modules from lowest number of outputs to highest. (Single/Dual/Triple)
3. 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 . . .).
4. Always start with Slot 1.
5. All MP model configurations created using this selection guide are standard MP products with standard availability and lead times.
6. Optional VME/DCOK module must always be located in the last slot. Module designator is "VME".

Ordering Information

Case Size

MP**1**

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/Voltage/Option Codes
First - Module Code
Second - Voltage Code

-3L - 2E - 1Q -4LL

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

Add-on Modules

- HUP

HUP = Hold up module
VME = VME POR signal and isolated DC

Case Option Codes

- 00

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

Hardware Code

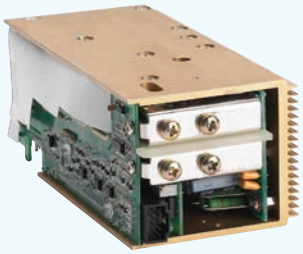
-###

Factory assigned for modifications

Single

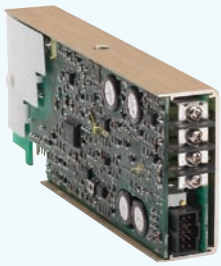
210 W

360 W



600 W

Dual

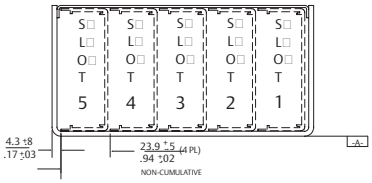


144 W

Triple

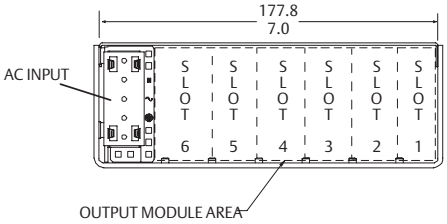
36 W

MP4 & MP6



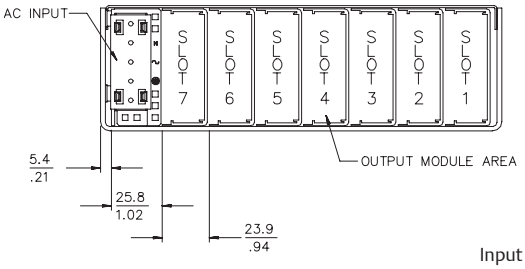
		Input 85-264 Vac	180-264 Vac
MP4 =	2.5" x 5" x 10" 5 available slots (63.5 x 127 x 254mm)	400 W max.	600 W max.
MP6 =	2.5" x 8" x 11" 5 available slots (63.5 x 127 x 279.4mm)	600 W max.	800 W max.

MP8



		Input 85-264 Vac	180-264 Vac
MP8 =	2.5" x 7" x 10" 6 available slots (63.5 x 177.8 x 254mm)	800 W max.	1000 W max.

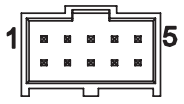
MP1



		Input 85-264 Vac	180-264 Vac
MP1 =	2.5" x 8" x 11" 7 available slots (63.5 x 203.2 x 279.4mm)	1000 W max.	1200 W max.

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

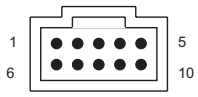
Mechanical Drawings

MP Modules

DC-DC Converter Output Modules

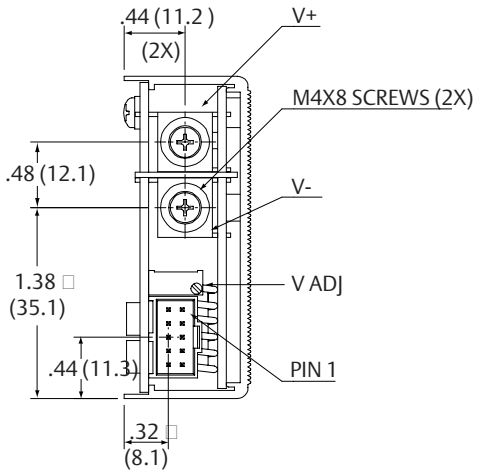
PFC Input Connector		
Pin No.	Function	
1	+ Remote Sense	single or dual o/p main
2	Remote Margin / V. Program	single o/p
3	Margin High	single o/p
4	- Remote Sense/Margin Low	single or dual o/p main
5	Spare	
6	Module, Isolated Inhibit	single or dual o/p
7	Module Inhibit Return	single or dual o/p
8	Current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

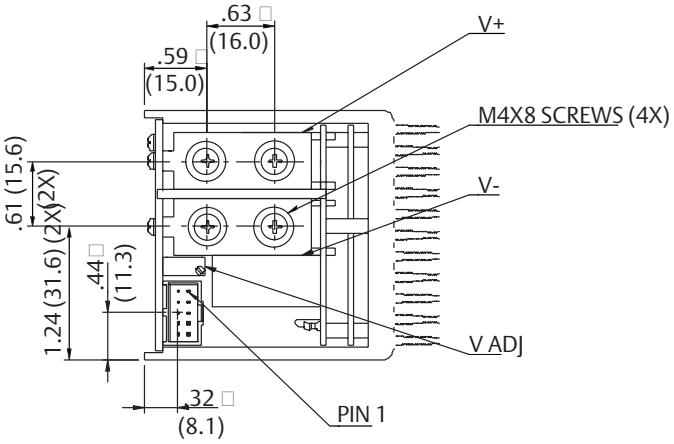


Mates with
Molex 90142-0010 Housing
90119-2110 Pin

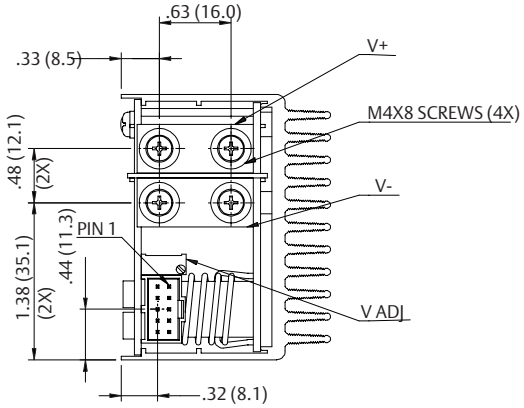
Single 210 Watt



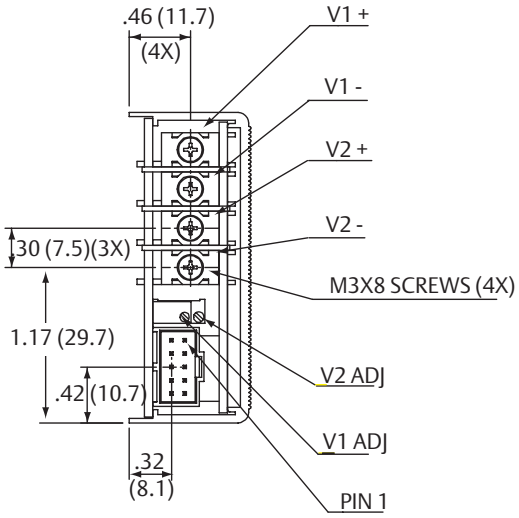
Single 600 Watt



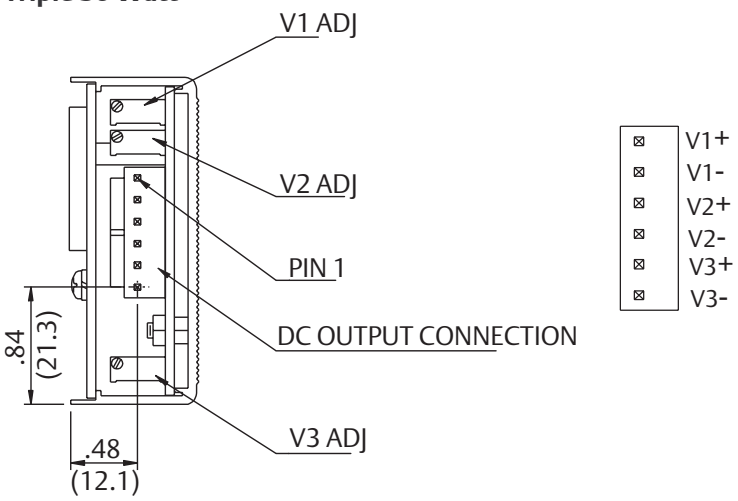
Single 360 Watt



Dual 144 Watt

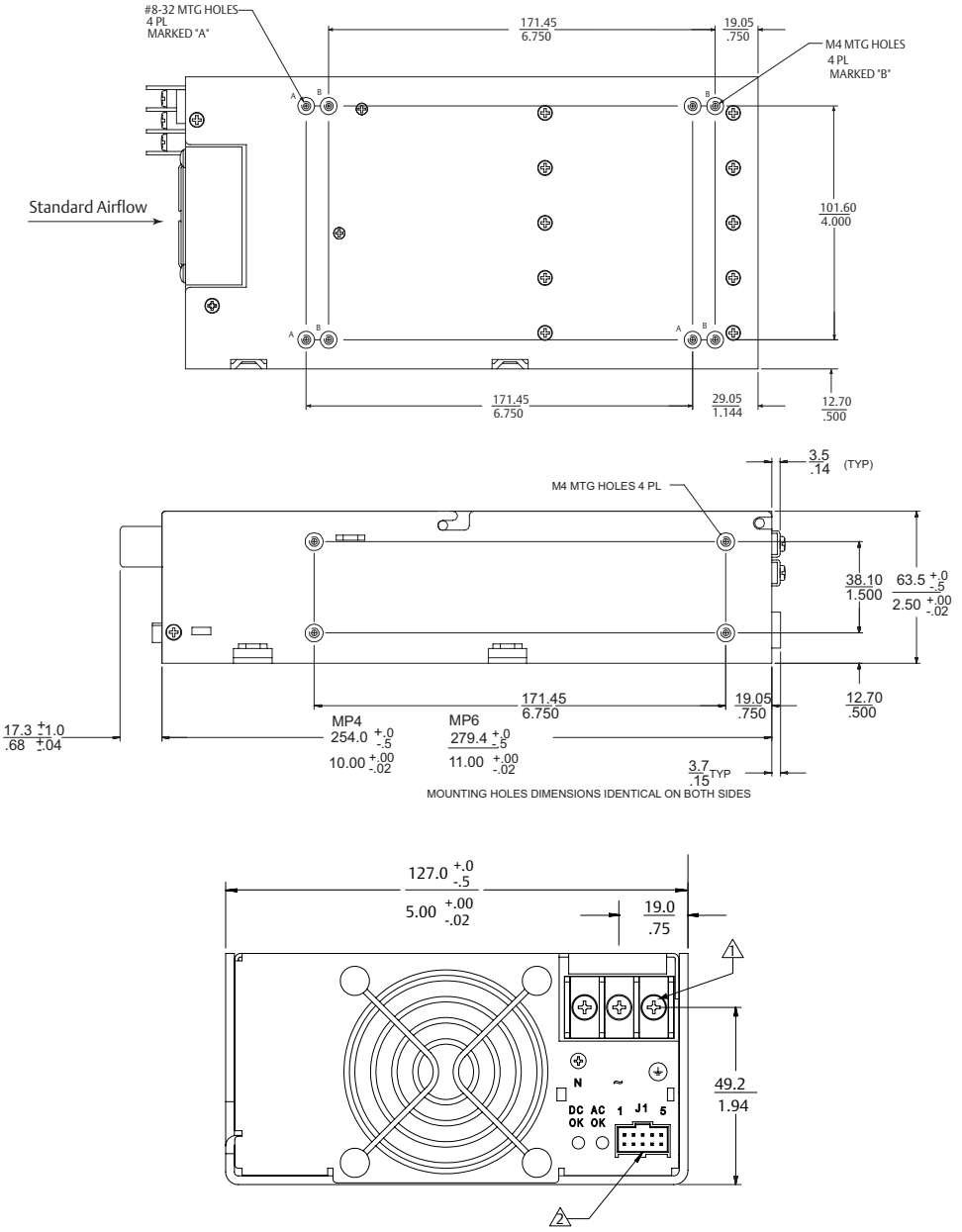


Triple 36 Watt



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

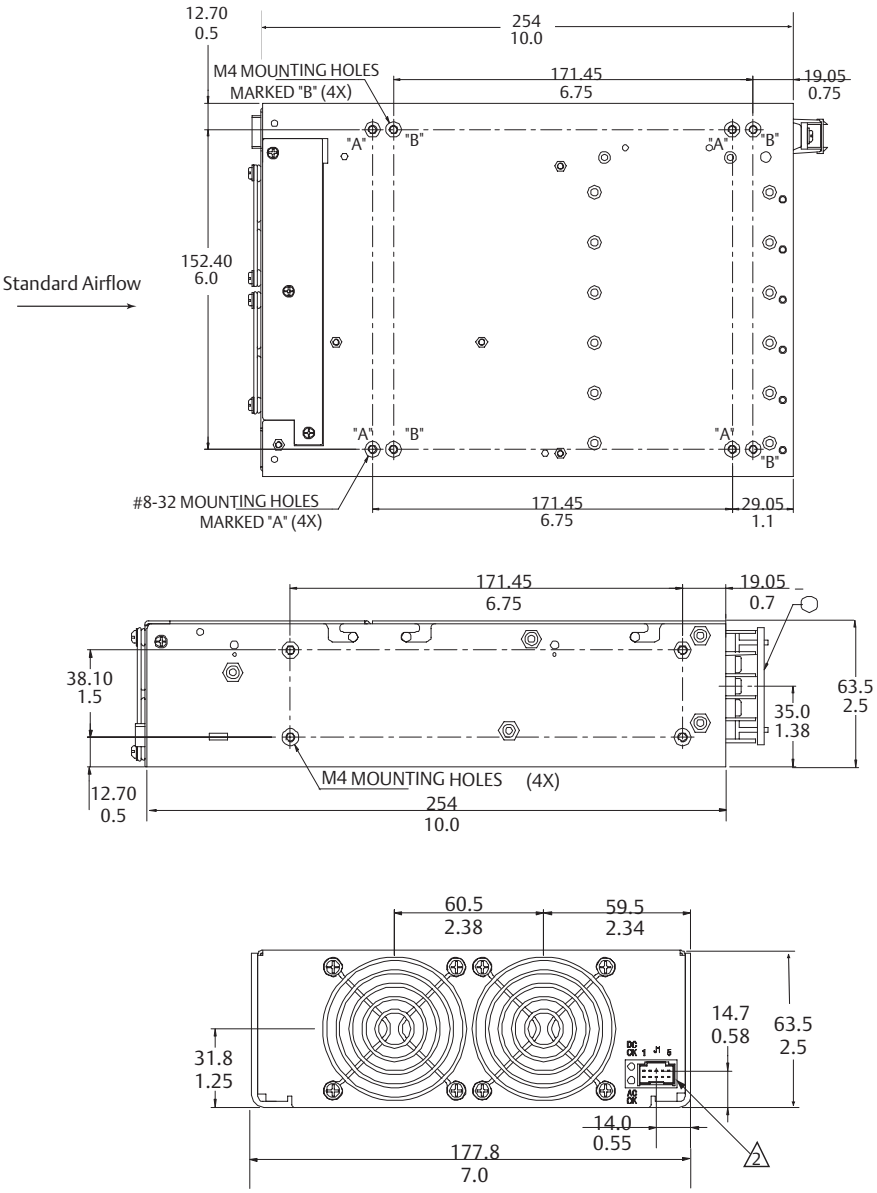


Notes

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.

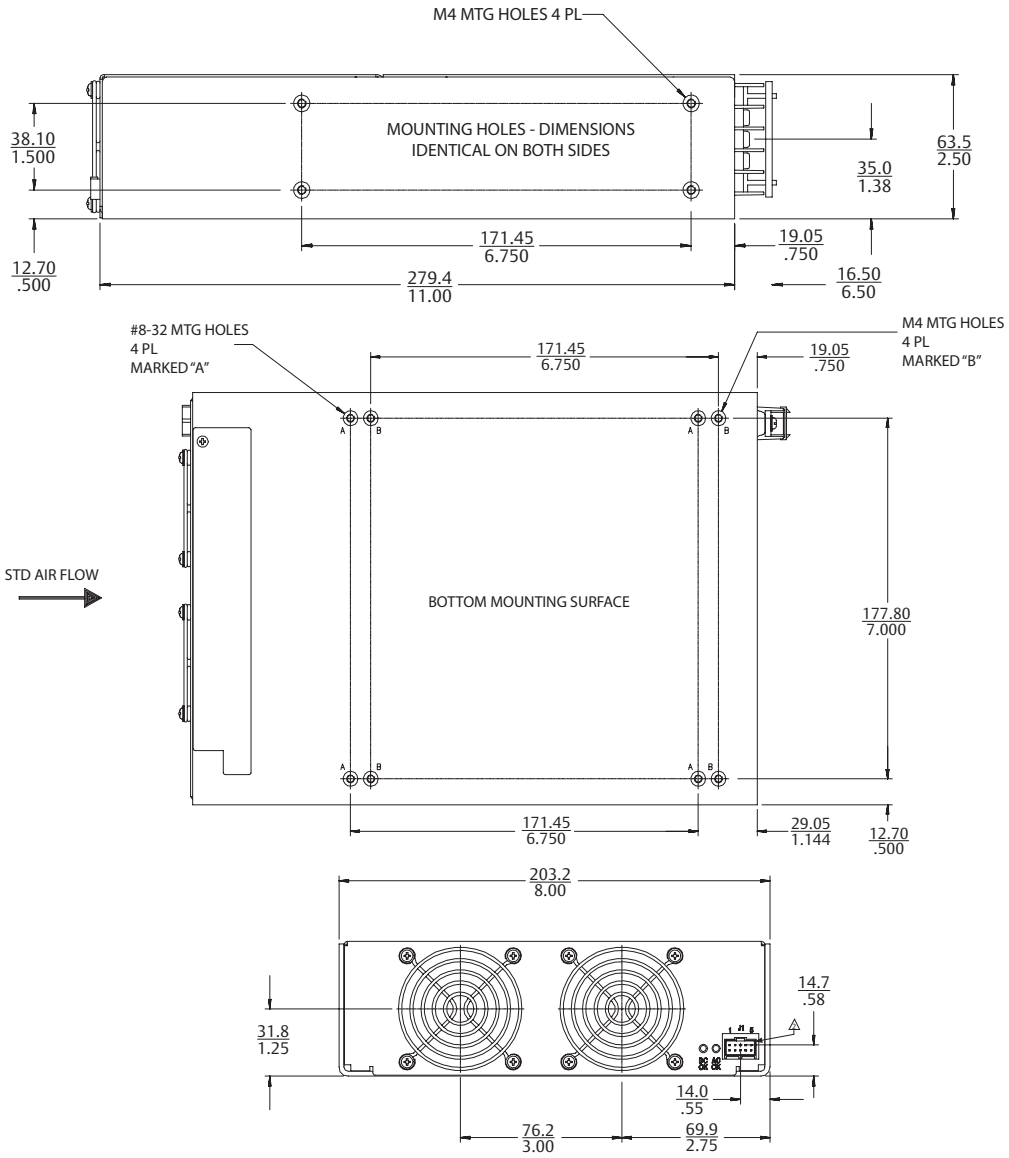


Notes

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.

Americas
5810 Van Allen Way
Carlsbad, CA 92008
USA
Telephone: +1 760 930 4600
Facsimile: +1 760 930 0698

Europe (UK)
Waterfront Business Park
Merry Hill, Dudley
West Midlands, DY5 1LX
United Kingdom
Telephone: +44 (0) 1384 842 211
Facsimile: +44 (0) 1384 843 355

Asia (HK)
14/F, Lu Plaza
2 Wing Yip Street
Kwun Tong, Kowloon
Hong Kong
Telephone: +852 2176 3333
Facsimile: +852 2176 3888

For global contact, visit:

www.Emerson.com/EmbeddedPower

techsupport.embeddedpower@emerson.com

Emerson Network Power.
The global leader in enabling business-critical continuity.

- AC Power
- Connectivity
- DC Power
- Embedded Computing
- **Embedded Power**
- Monitoring
- Outside Plant
- Power Switching & Controls
- Precision Cooling
- Racks & Integrated Cabinets
- Services
- Surge Protection

EmersonNetworkPower.com