

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 | |
|-----------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 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. |
| <ol style="list-style-type: none"> 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

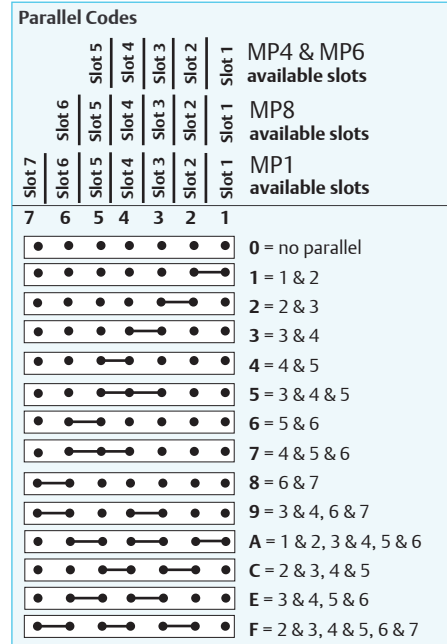
| | |
|--------------------------|--------------------------------------------------------------------------------------------------------------------------------|
| Operating temperature: | -20 °C to 50 °C (start @ 0 °C) (derate each output linearly to 50% at 70 °C) (-20 °C to 40 °C max. with rear air 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 |
| 2V | A | 35 A | 60 A | 120 A | — | 10 A | — | — | 2 A |
| 2.2V | B | 35 A | 60 A | 120 A | — | 10 A | — | — | 2 A |
| 3V | C | 35 A | 60 A | 120 A | — | 10 A | — | — | 2 A |
| 3.3V | D | 35 A | 60 A | 120 A | — | 10 A | — | — | 2 A |
| 5V | E | 35 A | 60 A | 120 A | 10 A | 10 A | — | — | 2 A |
| 5.2V | F | 35 A | 60 A | 115 A | — | 10 A | — | — | 2 A |
| 5.5V | G | 34 A | 58 A | 109 A | — | 10 A | — | — | 2 A |
| 6.0V | H | 23 A | 42 A | 78 A | — | 10 A | — | — | 2 A |
| 8.0V | I | 20 A | 36 A | 68 A | — | — | 1 A | 1 A | 1 A |
| 10V | J | 18 A | 32 A | 60 A | — | — | 1 A | 1 A | 1 A |
| 11V | K | 17 A | 31 A | 54.5 A | — | — | 1 A | 1 A | 1 A |
| 12V | L | 17 A | 30 A | 50 A | 10 A | 4 A | 1 A | 1 A | 1 A |
| 14V | M | 14 A | 21 A | 40.5 A | 9 A | 4 A | 1 A | 1 A | 1 A |
| 15V | N | 14 A | 20 A | 39 A | 8 A | 4 A | 1 A | 1 A | 1 A |
| 18V | O | 11 A | 19 A | 33.3 A | — | — | — | 0.5 A | 0.5 A |
| 20V | P | 10.5 A | 18 A | 30 A | — | — | — | 0.5 A | 0.5 A |
| 24V | Q | 8.5 A | 15 A | 23.5 A | 4 A | 2 A | — | 0.5 A | 0.5 A |
| 28V | R | 6.7 A | 12.8 A | 21.4 A | 3 A | 2 A | — | 0.5 A | 0.5 A |
| 30V | S | 6.5 A | 12 A | 20 A | — | — | — | — | — |
| 33V | T | 6.2 A | 10.9 A | 18.2 A | — | — | — | — | — |
| 36V | U | 5.8 A | 10 A | 16.6 A | — | — | — | — | — |
| 42V | V | 4.2 A | 7.5 A | 12.5 A | — | — | — | — | — |
| 48V | W | 4.0 A | 7.5 A | 12.5 A | — | — | — | — | — |
| 54V | X | 3.7 A | 6.0 A | 11 A | — | — | — | — | — |
| 60V | Y | 3.5 A | 6.0 A | 10 A | — | — | — | — | — |
| Non-std* | Z | Special Voltage - Consult Factory for specifications | | | | | | | |
| 2.4V - 2.7V | | 35 A | 60 A | 120 A | — | 10 A | — | — | 2 A |
| 3.6V - 4.5V | | 35 A | 60 A | 120 A | — | 10 A | — | — | 2 A |
| 6.6V - 9.2V | | 20 A | 36 A | 68 A | 10 A | 4 A | — | — | 1 A |
| 8.8V - 9.0V | | 18 A | 32 A | 60 A | 10 A | 4 A | — | — | 1 A |



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 | -### |
| <p>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)</p> | <p>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</p> <p>Voltage Codes: See Output Module Voltage/Current table above</p> | <p>HUP = Hold up module VME = VME POR signal and isolated DC</p> | <p>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</p> | <p>Factory assigned for modifications</p> |

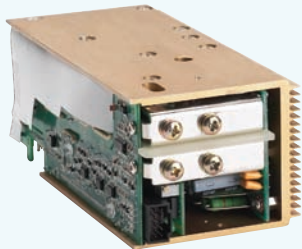
Single



210 W

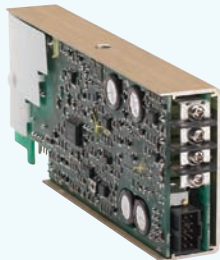


360 W



600 W

Dual



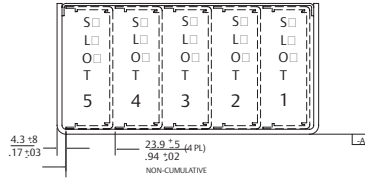
144 W

Triple



36 W

MP4 & MP6



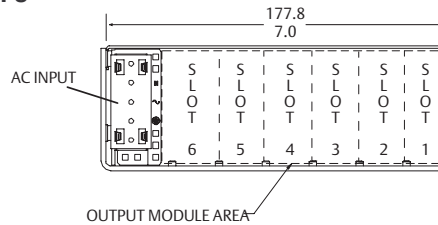
Input
85-264 Vac 180-264 Vac
400 W max. 600 W max.

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)

600 W max. 800 W max.

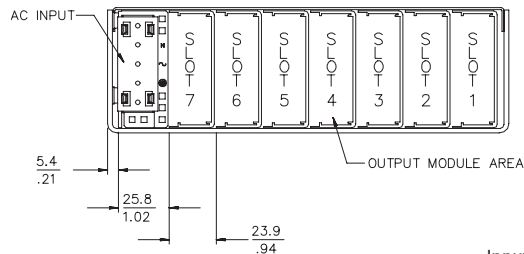
MP8



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

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

MP1

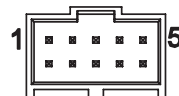


Input
85-264 Vac 180-264 Vac
1000 W max. 1200 W max.

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

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

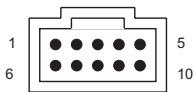
MP Modules

DC-DC Converter Output Modules

PFC Input Connector

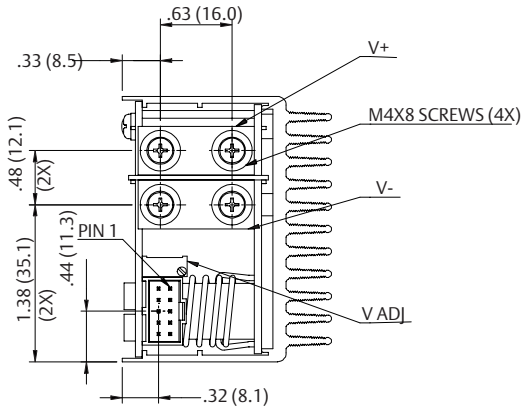
| Pin No. | Function | |
|---------|----------------------------|---------------------------|
| 1 | + Remote Sense | single or dual o/p main |
| 2 | Remote Margin / V. Program | single o/p |
| 3 | Margin High | single o/p |
| 4 | - Remote Sense/Margin Low | single or dual o/p main |
| 5 | Spare | |
| 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

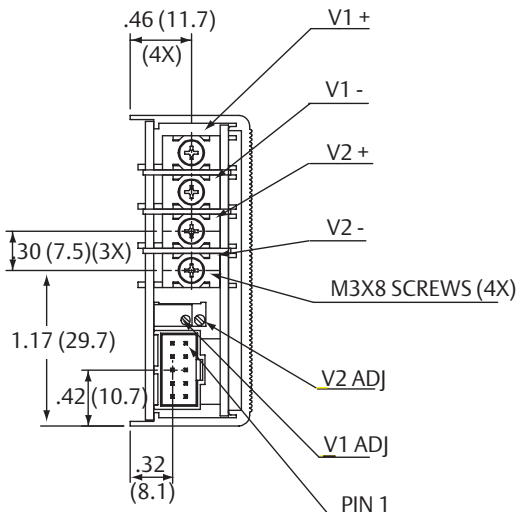


Mates with
Molex 90142-0010 Housing
90119-2110 Pin

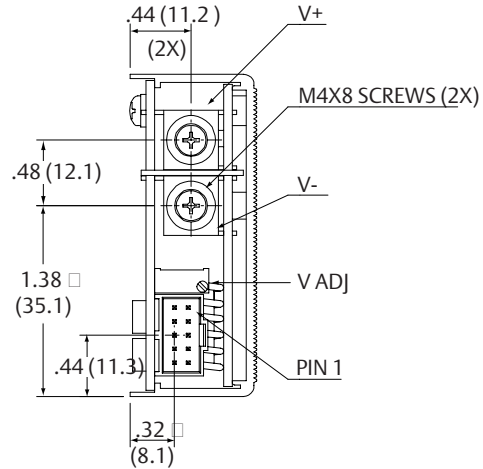
Single 360 Watt



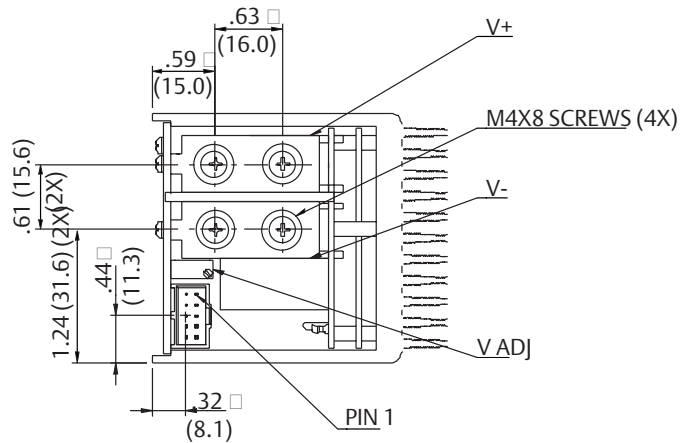
Dual 144 Watt



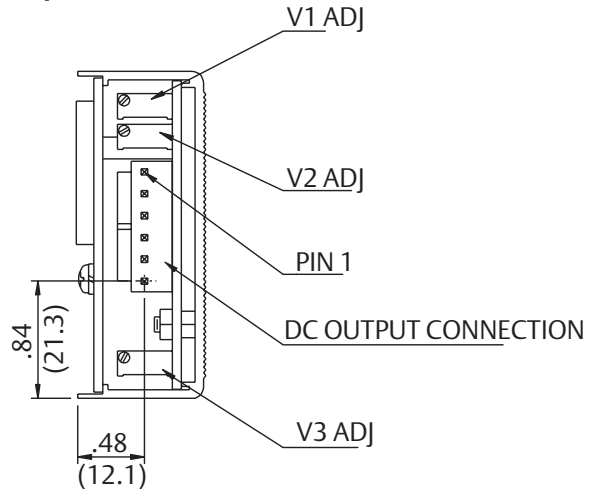
Single 210 Watt



Single 600 Watt



Triple 36 Watt

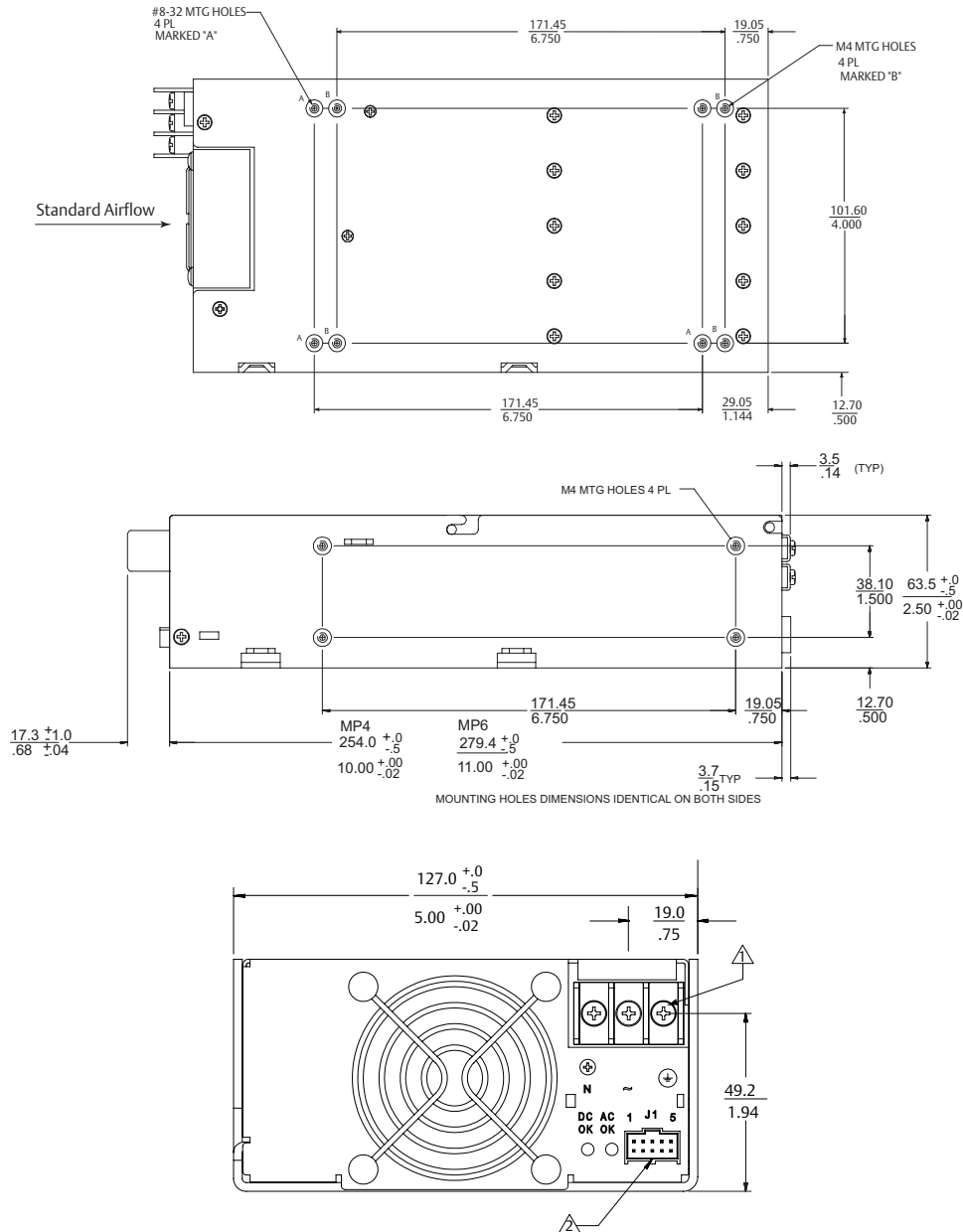


- ☒ V1+
- ☒ V1-
- ☒ V2+
- ☒ V2-
- ☒ V3+
- ☒ V3-

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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MP Series
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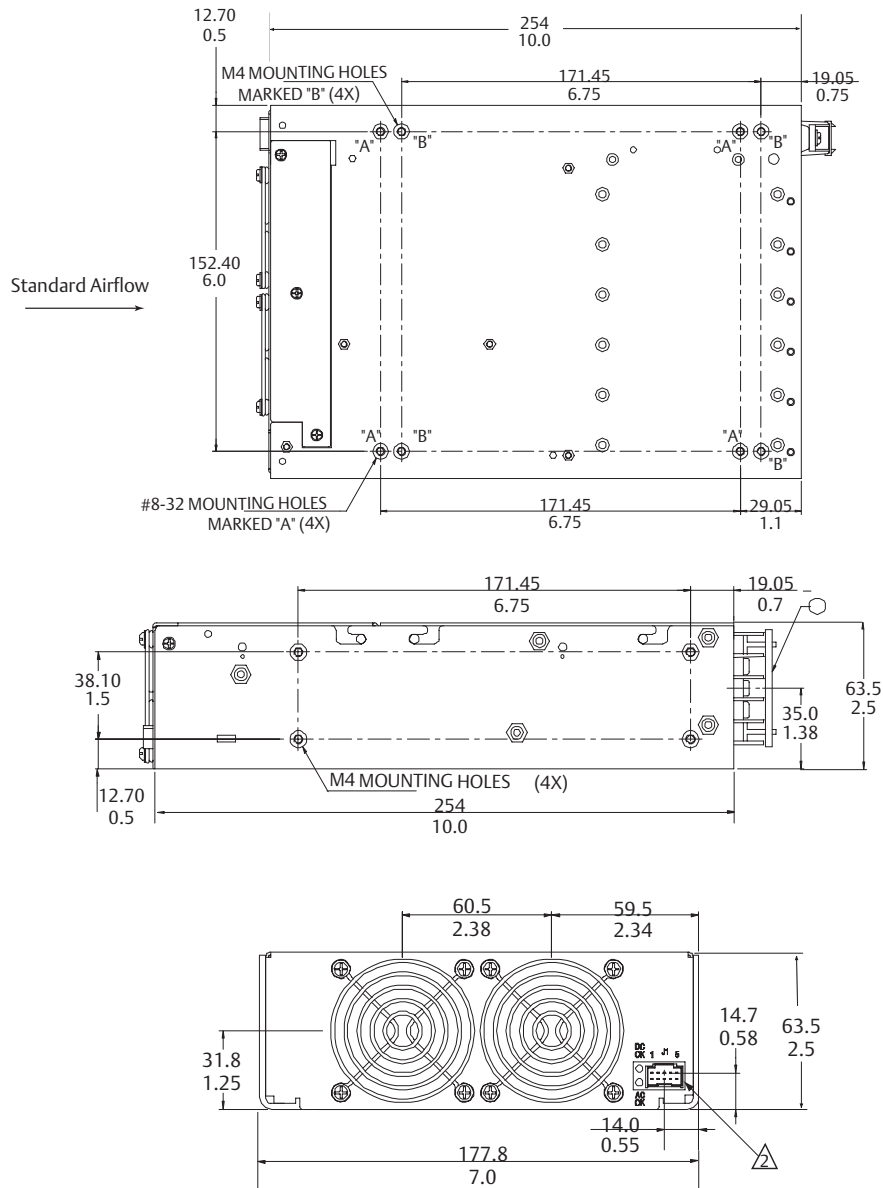
Notes

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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MP Series
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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.

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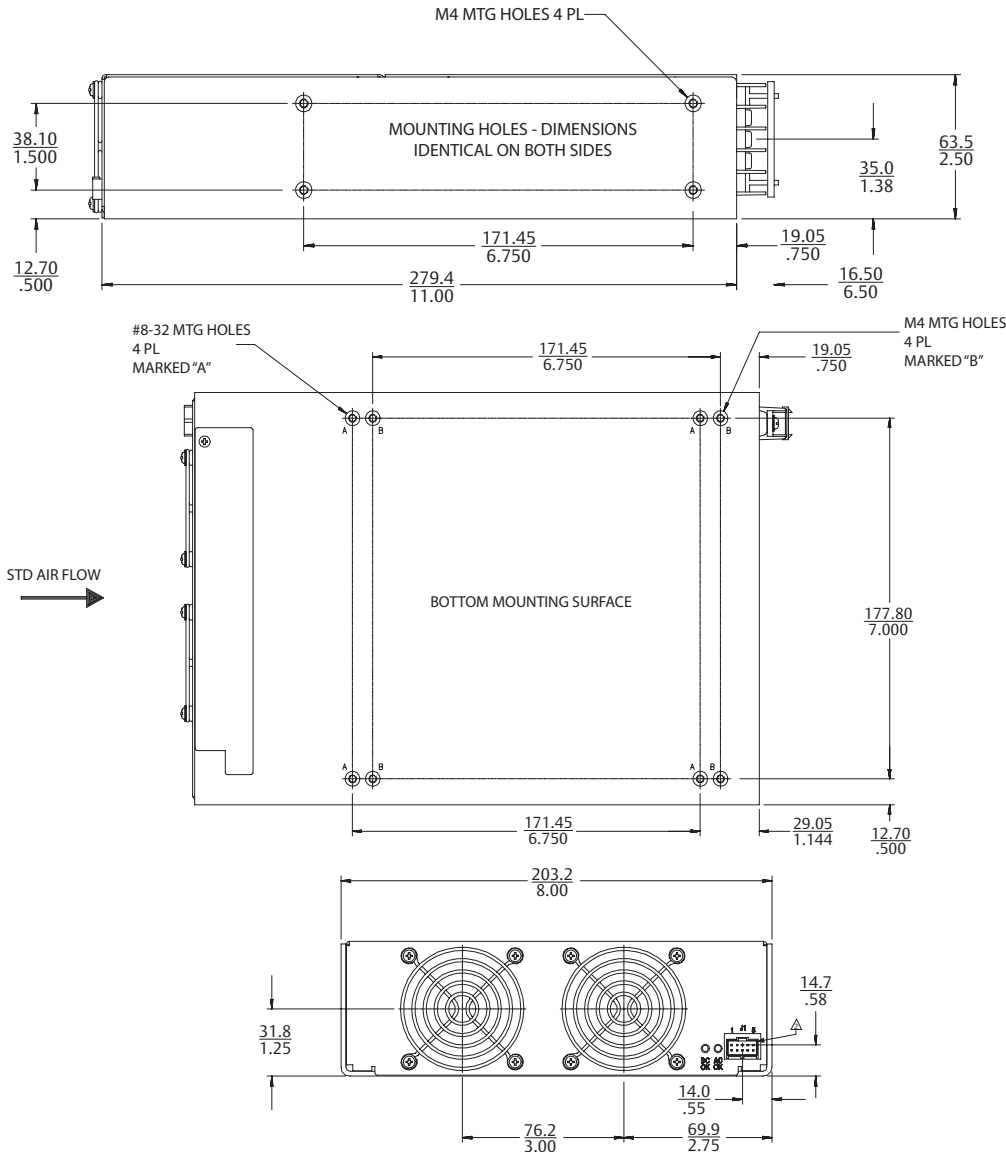
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Notes

- 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). 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" (3.8 mm). Max. torque: 5 in-lbs.
- 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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