

Data Sheet

Total Power: 400 - 1200 W
Input Voltage: 85 - 264 VAC
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
- Two 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



Electrical Specifications

| Input | |
|--------------------------------------|--|
| Input range | 85 - 264 Vac |
| 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 lose regulation Full cycle ride thru (50 Hz) |
| Harmonic distortion | Meets EN61000-3-2 |
| Isolation | Meets EN60950 |
| Efficiency | 70 - 80% typ. @ full case load |
| 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 |

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

| 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 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 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 |
| Shortcircuit 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 110 - 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. > 5 ms 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 34 mSec (60 mSec total); hold-up @ 600 W loading. |
| Field Demonstrated MTBF | > 550,000 hours at full load, 220 Vac and 25 °C ambient conditions |

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

Environmental Specifications

| | |
|---------------------------------|--|
| Operating temperature | -20 °C to 70 °C for standard airflow, -20 °C to 40 °C for reverse airflow (cold start @ 0 °C) Derate each output from 100% down to 50% load from 50 °C to 70 °C for forward airflow |
| Shock/Vibration | Mil-Hdbk 810E |
| Humidity | 95% non-condensing |
| Storage temperature | -40 °C to 85 °C |
| Temperature co-efficient | 0.02% per °C |
| Cooling | Internal DC fan or customer provided air (option) |

Output Module Line-up

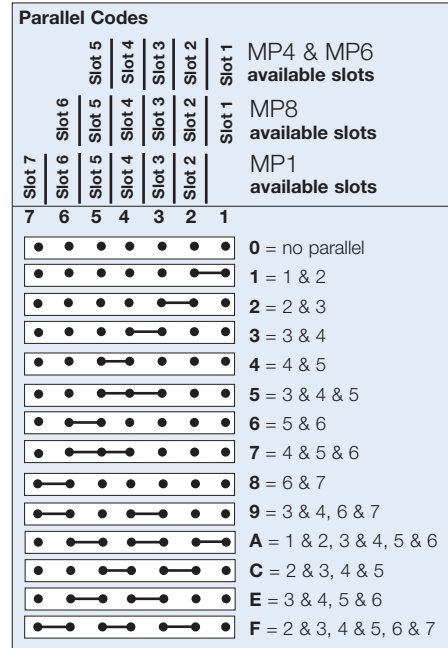
| Module Type | Single | Single | Single | Dual | Triple |
|------------------------------------|----------|----------|----------|---------------------|--------------|
| Output | 1 | 1 | | 2 | 3 |
| Max output power | 210 W | 360 W | 600 W | 144 W | 36 W |
| Max output current | 35 A | 60 A | 120 A | 10 A | 2 A |
| Volts | 2 - 60 V | 2 - 60 V | 2 - 60 V | 2 - 28 V | 2 - 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 | - |
| Overvoltage/overcurrent 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 |

Internal Part Number Reference Table

| Part # | Where X = | Description | Module Code |
|-------------|-----------|-------------|-------------|
| 73-690-0001 | N/A | MP1 Case | MP1 |

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 - 2.7 V | | 35 A | 60 A | 120 A | — | 10 A | — | — | 2 A |
| 3.6 - 4.5 V | | 35 A | 60 A | 120 A | — | 10 A | — | — | 2 A |
| 6.6 - 9.2 V | | 20 A | 36 A | 68 A | 10 A | 4 A | — | — | 1 A |
| 8.8 - 9.0 V | | 18 A | 32 A | 60 A | 10 A | 4 A | — | — | 1 A |



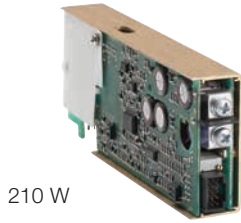
Notes:

- 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 | 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 - 600 W, 5 Slots (63.5 x 127 x 254) 6 = 2.5" x 5" x 11"; 600 - 800 W, 5 Slots (63.5 x 127 x 279.4) 8 = 2.5" x 7" x 10"; 800 - 1000 W, 6 Slots (63.5 x 177.8 x 254) 1 = 2.5" x 8" x 11"; 1000 - 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, A - Z parallel code (See Parallel Codes table above)</p> <p>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> |

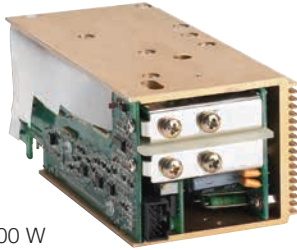
Single



210 W

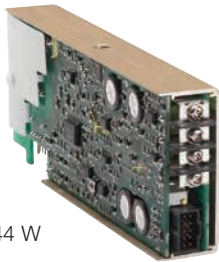


360 W



600 W

Dual

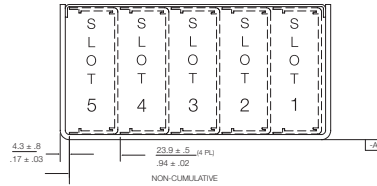


144 W

Triple

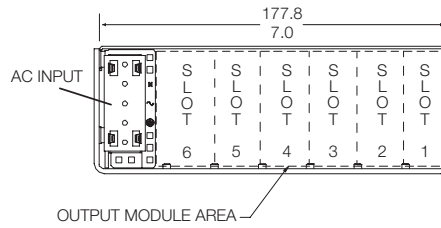


MP4 & MP6



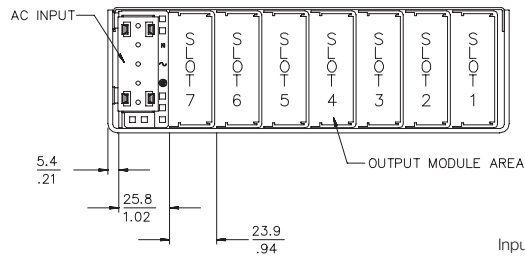
Input
 85-264 Vac 180-264 Vac
MP4 = 2.5" x 5" x 10" 5 available slots 400 W max. 600 W max.
 (63.5 x 127 x 254 mm)
MP6 = 2.5" x 5" x 11" 5 available slots 600 W max. 800 W max.
 (63.5 x 127 x 279.4 mm)

MP8



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

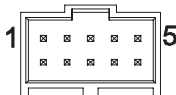
MP1



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

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

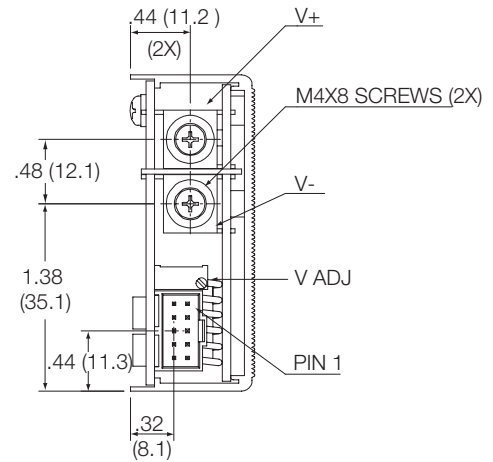
DC-DC Converter Output Modules

| 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 |

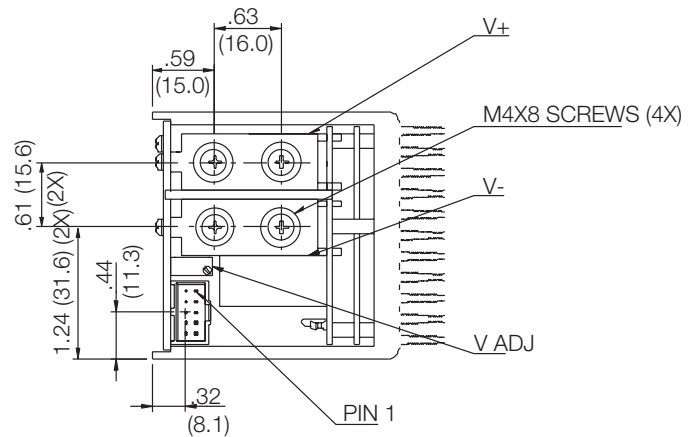
Figure 4. Connector J1



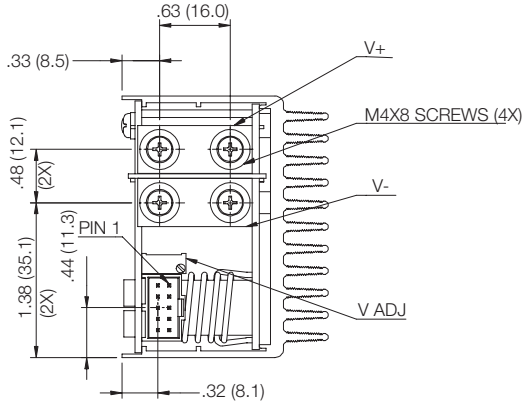
Single 210 Watt



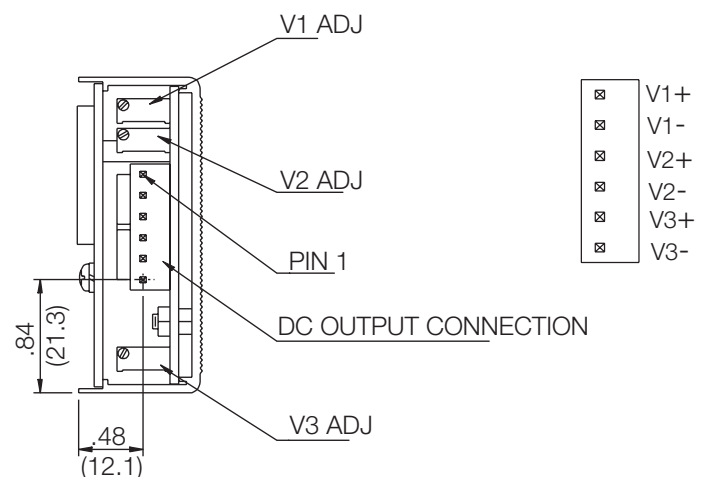
Single 600 Watt



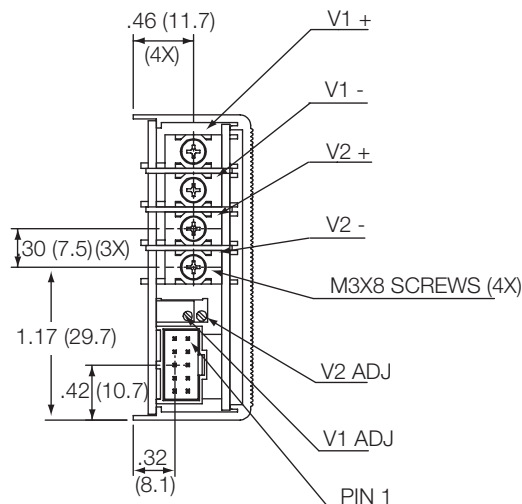
Single 360 Watt



Triple 36 Watt



Dual 144 Watt

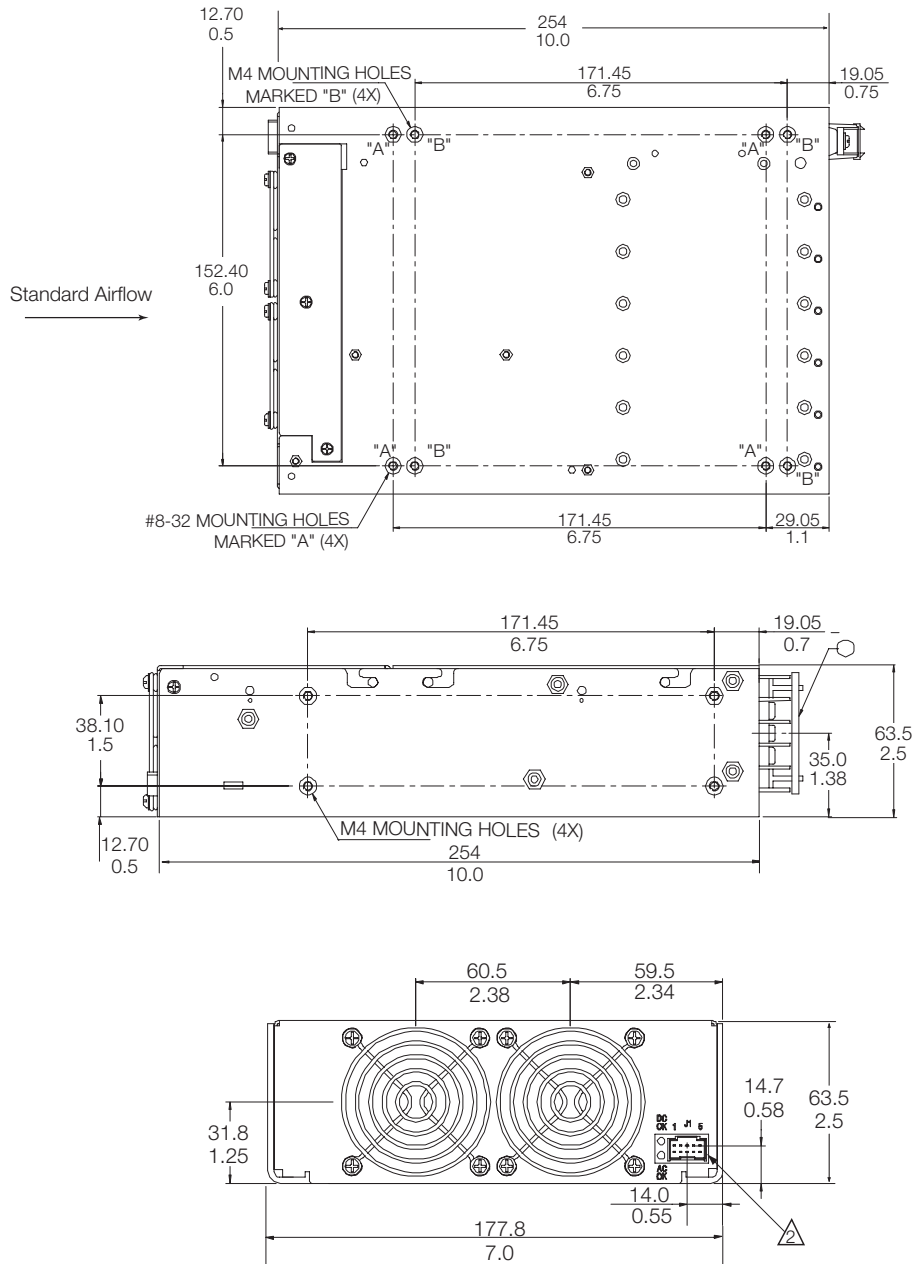


MP Series

MP8 (800/1000 Watts Max)

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

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 8 mm screws. Max. torque: 10 in-lbs.
 Dual O/P module is M3 x 8 mm 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

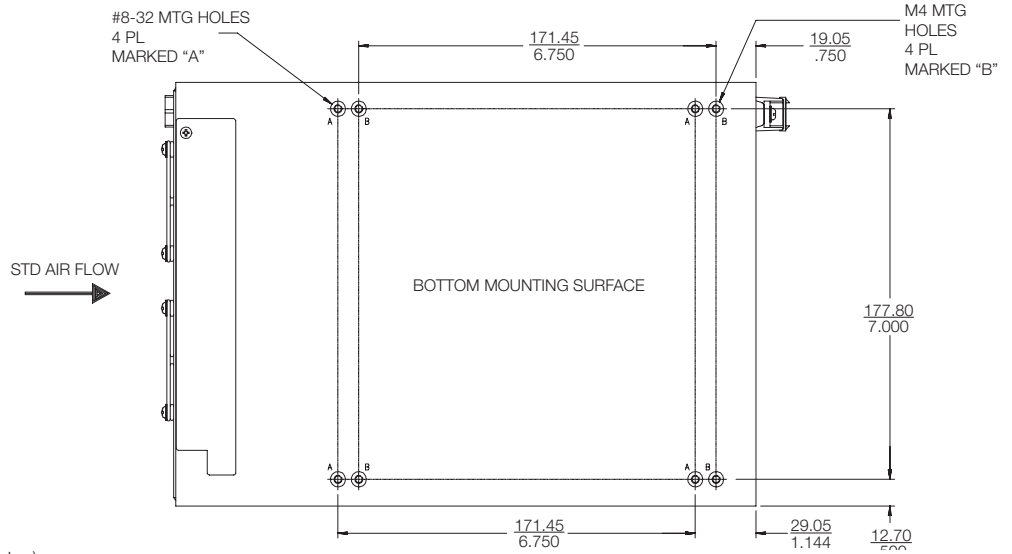
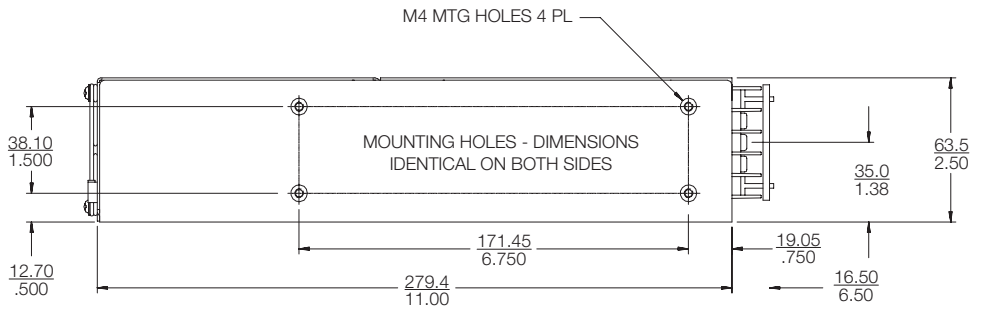
MP1 (1000/1200 Watts Max)

8-Inch Case Size:

MP1: 2.5" x 8" x 11"
(63.5 mm x 203.2 mm x 279.4 mm)

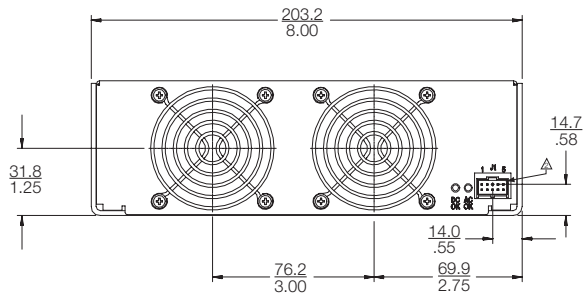
Weight:

- 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).
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