

Intelligent MP Series

Up to 1500 Watts

Data Sheet

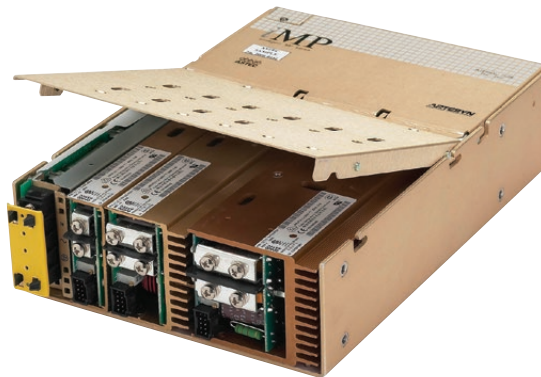
Total Power: Up to 1500 W
Input Voltage: 85 - 264 Vac
 88 - 300 Vdc
of Outputs: Up to 24

SPECIAL FEATURES

- Full medical EN60601 approval
- Intelligent I²C control
- Voltage adjustment on all outputs (manual or I²C)
- Configurable input and output OK signals and indicators
- Configurable inhibit/enable
- Configurable output UP/DOWN sequencing
- Configurable current limit (foldback or constant current)
- High power density (8.8 W/cu-in)
- Intelligent fan (speed control/fault status)
- Downloadable GUI from website
- Customer provided air option
- uP controlled PFC input with active inrush protection
- I²C monitor of voltage, current, and temp
- Programmable voltage, current limit, inhibit/enable through I²C
- Optional extended hold-up module (SEMI F47 compliance)
- Increased power density to 50% over standard MP
- External switching frequency sync input
- Optional conformal coating
- Industrial temp range (-40 °C to 70 °C)
- No preload required
- Industrial shock/vibration (> 50G's)

SAFETY

- UL UL60950/UL2601**
- CSA CSA22.2 No. 234 Level 5
- UV EN60950/EN60601-1**
- BABT Compliance to EN60950/EN60601 BS7002
- CB Certificate and report
- CE Mark to LVD



iMP™



Electrical Specifications

| Input | |
|-------------------------|--|
| Input range | 85 - 264 Vac 88 - 300 Vdc (limited to 300 Vdc in medical applications) |
| Frequency | 47 - 440 Hz |
| Inrush current | 40 A peak maximum (soft start) |
| Efficiency | Up to 85% @ full case load |
| Power Factor | 0.99 typ. meets EN61000-3-2 (n/a @ 440 Hz) |
| Turn-on time | AC on 2.0 sec typ., inhibit/enable 150 ms typical Programmable delay; 50 ms internal turn-on delay (Dual Output only) |
| EMI filter | CISPR 22/EN55022 Level "B"*** |
| Leakage current | 300 µA max. @ 240 Vac; 47 - 63 Hz |
| Radiated EMI | CISPR 22/EN55022 Level "B"*** |
| Holdover storage | 20 ms minimum (independent of input Vac) additional 34 ms holdover storage with optional HUP module (SEMI F47 compatible). For iMP4 15 ms (low-line), 10 ms (high-line) |
| AC OK | > 5 ms early warning min. before outputs lose regulation Full cycle ride thru (50 Hz) (n/a on iMP4 > 750 W @ 90 Vac) |
| Harmonic distortion | Meets EN61000-3-2 |
| Isolation | Meets EN60950 and EN60601 Input to output, input to ground: 2000 Vac; output to ground: 400 Vdc |
| Global inhibit / enable | TTL, Logic "1" and Logic "0"; configurable |
| Input fuse (internal) | iMP4: 16 A; iMP8: 20 A; iMP1: 25 A (both lines fused) |
| Warranty | 2 years |

Electrical Specifications

| Output | |
|--|--|
| Adjustment range* | ± 10% minimum all outputs (manual) (full module adjustment range using I ² C) |
| Factory set point accuracy | 1% |
| I ² C output program accuracy | ± 5% |
| Margining | ± 4 - 6% nominal analog (single output module only) |
| Overall regulation | 0.4% or 20 mV max. (1500 W modules 1% 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** | Configurable through I ² C (calibration required). Single output module and main output of the 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 is automatic upon removal of short |
| Overvoltage protection* | Configurable through I ² C |
| | 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: 110 - 120% of highest voltage rating |

| Output (cont.) | |
|--|--|
| Reverse voltage protection: | 100% of rated output current |
| Thermal protection* (OTP and OTW) | Configurable through I ² C 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 |
| DC OK* | ± 5% of nominal. Configurable through I ² C |
| Minimum load | Not required |
| Housekeeping bias voltage | 5 Vdc @ 1.0 A max. present whenever AC input is applied (Optional 2.0 A available) |
| Module inhibit* | Configured and controlled through I ² C |
| Switching frequency | 250k Hz accepts external sync signal |
| Output/Output isolation | > 1 Megohm, 500 V |
| External sync | TTL clock input signal used to adjust switching frequency. Frequency 500 kHz ± 20%; Duty cycle 40 - 55% |

* Can be controlled via I²C

** Controlled via I²C but requires load calibration

Environmental Specifications

| | |
|---------------------------------------|--|
| Operating temperature | -40 ° to 70 °C ambient. Derate each output 2.5% per degree from 50 ° to 70 °C. (-20 °C start up) |
| Storage temperature | -40 °C to +85 °C |
| Electromagnetic susceptibility | Designed to meet EN61000-4; -2, -3, -4, -5, -6, -8, -11 Level 3 |
| Humidity | Operating; non-condensing 10% to 95% RH |
| Vibratio | IEC68-2-6 to the levels of IEC721-3-2 |
| MTBF demonstrated: | > 550,000 hours at full load, 220 Vac and 25 °C ambient conditions |

Output Module Line-up

| Module Code | 1 | 2 | 3 | 5 | 4 | — |
|---|----------|----------|----------|----------|--|---|
| Module Type | Single | Single | Single | Single | Dual | Triple |
| Max output power | 210 W | 360 W | 750 W | 1500 W | 144 W | 36 W |
| Max output current | 35 A | 60 A | 150 A | 140 A | 10 A | 2 A |
| Output voltages available* | 2 - 60 V | 2 - 60 V | 2 - 60 V | 6 - 60 V | 8 - 15*, 24 - 28; 8 - 15*, 8 - 15*; 8 - 15*, 2 - 6; 2 - 6, 2 - 6; 24 - 28, 24 - 28; 24 - 28, 2 - 6 | 8-15, 8-15, 2-6; 8-15, 8-15, 8-15; 8-15, 8-15, 18-28; 8-15, 18-28, 2-6 |
| Standard voltage increments | 25 | 25 | 25 | 18 | 16 | 18 |
| Remote sense | Yes | Yes | Yes | Yes | Yes | No |
| Remote margin | Yes | Yes | Yes | Yes | No | No |
| V-Program - I ² C Control | Yes | Yes | Yes | Yes | Yes | No |
| Active Current Share | Yes | Yes | Yes | Yes | Yes | No |
| Module Inhibit - I ² C Control | Yes | Yes | Yes | Yes | Yes | Yes |
| Module Inhibit - Analog | Yes | Yes | Yes | Yes | Yes | No |
| Overvoltage/Overcurrent protection | Yes | Yes | Yes | Yes | Yes | Yes |
| Minimum load required | No | No | No | No | No | No |
| Slots occupied in any iVS case | 1 | 2 | 3 | 4 | 1 | 1 |

* Note: Contact Factory for extended range down to 6 V

Output Module Voltage/Current*

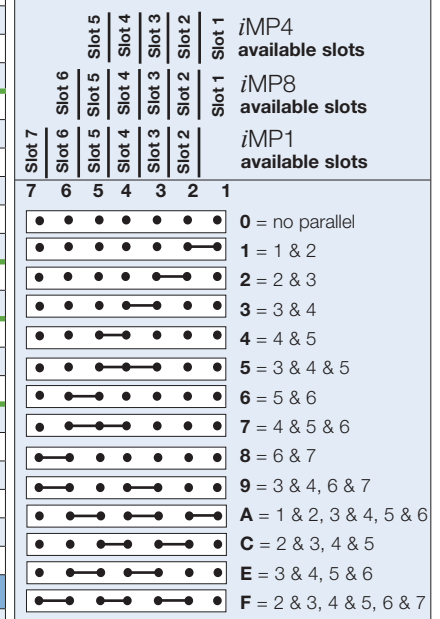
| Voltage | Voltage Code | Single Output Module Code | | | | Dual Output*** | | Triple Output | | | I ² C Adjustment Ranges**** |
|---------|--------------|---------------------------|--------|--------|---------|----------------|-------|---------------|-------|-------|--|
| | | 1 | 2 | 3 | 5 | 4 | 4 | - | - | - | |
| 2 V | A | 35 A | 60 A | 150 A | 300 A | 10 A | 10 A | - | - | 2 A | 1.8 - 2.2 |
| 2.2 V | B | 35 A | 60 A | 150 A | 300 A | 10 A | 10 A | - | - | 2 A | 2.0 - 2.4 |
| 3 V | C | 35 A | 60 A | 150 A | 300 A | 10 A | 10 A | - | - | 2 A | 2.7 - 3.3 |
| 3.3 V | D | 35 A | 60 A | 150 A | 300 A | 10 A | 10 A | - | - | 2 A | 3.0 - 3.6 |
| 5 V | E | 35 A | 60 A | 150 A | 300 A | 10 A | 10 A | - | - | 2 A | 4.5 - 5.5 |
| 5.2 V | F | 35 A | 60 A | 144 A | 288 A | 10 A | 10 A | - | - | 2 A | 4.7 - 5.7 |
| 5.5 V | G | 34 A | 58 A | 136 A | 273 A | 10 A | 10 A | - | - | 2 A | 5.0 - 6.1 |
| 6.0 V | H | 23 A | 42 A | 97.5 A | 250 A | 10 A* | 10 A* | - | - | 2 A | 5.4 - 6.6 |
| 8.0 V | I | 20 A | 36 A | 84.4 A | 140 A | 10 A | 4 A | 1 A | 1 A | 1 A | 7.2 - 8.8 |
| 10 V | J | 18 A | 32 A | 75 A | 140 A | 10 A | 4 A | 1 A | 1 A | 1 A | 9.0 - 11.0 |
| 11 V | K | 17 A | 31 A | 68 A | 136.3 A | 10 A | 4 A | 1 A | 1 A | 1 A | 9.9 - 12.1 |
| 12 V | L | 17 A | 30 A | 62.5 A | 125 A | 10 A | 4 A | 1 A | 1 A | 1 A | 10.8 - 13.2 |
| 14 V | M | 14 A | 21 A | 53.5 A | 107 A | 9 A | 4 A | 1 A | 1 A | 1 A | 12.6 - 15.4 |
| 15 V | N | 14 A | 20 A | 50 A | 100 A | 8 A | 4 A | 1 A | 1 A | 1 A | 13.5 - 16.5 |
| 18 V | O | 11 A | 19 A | 41.6 A | 83.3 A | - | - | - | 0.5 A | 0.5 A | 16.2 - 19.8 |
| 20 V | P | 10.5 A | 18 A | 37.5 A | 75 A | - | - | - | 0.5 A | 0.5 A | 18.0 - 22.0 |
| 24 V | Q | 8.5 A | 15 A | 30 A | 62.5 A | 4 A | 2 A | - | 0.5 A | 0.5 A | 21.6 - 26.4 |
| 28 V | R | 6.7 A | 11 A | 26.8 A | 53.5 A | 3 A | 2 A | - | 0.5 A | 0.5 A | 25.2 - 30.8 |
| 30 V | S | 6.5 A | 11 A | 25 A | 50 A | - | - | - | - | - | 27.0 - 33.0 |
| 33 V | T | 6.2 A | 10.9 A | 22.7 A | 35.8 A | - | - | - | - | - | 29.7 - 36.3 |
| 36 V | U | 5.8 A | 10 A | 20.8 A | 35.8 A | - | - | - | - | - | 32.4 - 39.6 |
| 42 V | V | 4.2 A | 7.5 A | 16 A | 35.7 A | - | - | - | - | - | 37.8 - 46.2 |
| 48 V | W | 4.0 A | 7.5 A | 15.6 A | 31.2 A | - | - | - | - | - | 43.2 - 52.8 |
| 54 V | X | 3.7 A | 6.0 A | 13.9 A | 27.7 A | - | - | - | - | - | 48.6 - 59.4 |
| 60 V | Y | 3.5 A | 6.0 A | 12.5 A | 25 A | - | - | - | - | - | 54.0 - 66.0 |

| Contact Factory | | | | | | | | | | | |
|-----------------|---|------|------|-------|-------|---|------|--|--|--|-----------|
| Special* | Z | 35 A | 60 A | 150 A | 300 A | - | 10 A | | | | 2.3 - 2.6 |
| Special* | Z | 35 A | 60 A | 150 A | 300 A | - | 10 A | | | | 3.7 - 4.4 |
| Special* | Z | 20 A | 36 A | 80 A | 140 A | - | 8 A | | | | 6.7 - 7.1 |

Ordering Notes:

- The cases and modules of both MP and iMP series can be interchangeable to allow more flexibility. If intelligent modules are used with non-intelligent cases, a numeric code "4" is placed at the end of the module code (ex. 4LL0 becomes 4LL4).
- USB to I²C module order code 73-769-001

Parallel Codes



* Note: Contact Factory for extended range down to 6 V.

** Increments of current not shown can be achieved by paralleling modules (add currents of each module selected).

*** Total output power on dual model must not exceed 144 W.

**** For single output modules only.

Ordering Information

| Case Size | Module/Voltage/Option Codes | Case Option Codes | Software Code | Hardware Code |
|--|---|---|---|---|
| <p>iMP1*</p> <p>Case Size (mm) 4 = 2.5" x 5" x 10"; 750 W - 1158 W, 5 Slots (63.5 x 127 x 254 mm) 8 = 2.5" x 7" x 10"; 1000 W - 1200 W, 6 Slots (63.5 x 177.8 x 254 mm) 1 = 2.5" x 8" x 11"; 1200 W - 1500 W, 7 Slots (63.5 x 203.2 x 279.4 mm)</p> | <p>3L0 - 2E2 - 1Q1 - 4LL0</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 = 750 W single O/P (3 slot) 4 = 144 W dual O/P (1 slot) 5 = 1500 W single O/P (4 slot) 6 - 9 = future</p> <p>Voltage Codes: See Output Module Voltage/Current table above</p> <p>Option Codes: 0 = Standard 1 = Module enable 2 = Constant current 3 = 1 & 2 combined 4 = Set for use in standard (non-intelligent case) 5 = Shutdown mode for 1500 W 6 = 1 & 5 combined 7 - 9 = future</p> | <p>00</p> <p>Case Option Codes First digit 0 - 9, A - Z parallel code (See Parallel Codes table above)</p> <p>Second digit 0 = No options 1 = Reverse air 3 = Global enable 4 = Fan idle with inhibit 5 = Opt 1 + Opt 3 6 = Opt 1 + Opt 4 7 = Opt 3 + Opt 4 8 = Opt 1 +3 +4 9 = RS485 73-544-002 C = Opt 3 + Opt 9 D = CAN BUS 73-544-003 E = Opt 3 + Opt D</p> | <p>A</p> <p>Software code used for configuration change. "A" is standard</p> | <p>###</p> <p>Factory assembled for hardware of firmware mods.</p> |

* Note: Add "E" after iMP4 to denote IEC input option. e.g. iMP4E (Not available on iMP8 or iMP1)

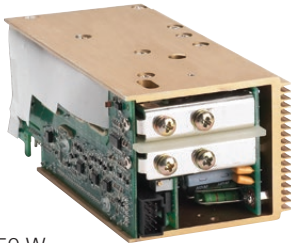
Single



210 W



360 W



750 W



1500 W

Dual



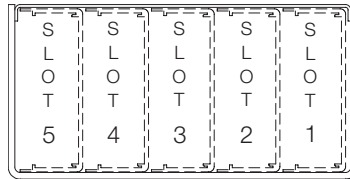
144 W

Triple



36 W

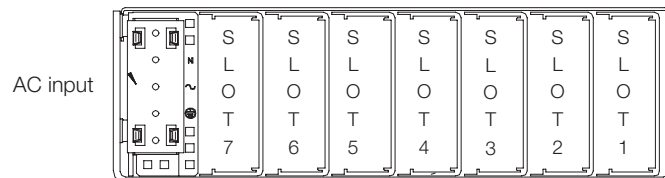
iMP4 (AC input on opposite side)



iMP4 = 2.5" x 5" x 10" 5 available slots
(63.5 x 127 x 254 mm)

| | |
|--------------|---------------|
| | Input |
| 90 - 264 Vac | 180 - 264 Vac |
| 750 W max. | 1158 W max. |

iMP8 and iMP1



iMP1 only

iMP8 = 2.5" x 7" x 10" 6 available slots
(63.5 x 177.8 x 254 mm)

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

iMP1 = 2.5" x 8" x 11" 7 available slots
(63.5 x 203.2 x 279.4 mm)

| | |
|-------------|-------------|
| 1200 W max. | 1500 W max. |
|-------------|-------------|

Pin Connectors

Figure 1. AC Input

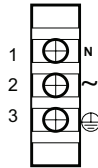
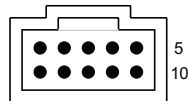


Figure 2. Connector J1



Mates with
Molex 90142-0010 Housing
90119-2110 Pin

Connector Kit Part No.:
70-841-004

Figure 3. Connector J2



Mates with
Landwin 2050S1000 Housing
2053T011V Pin

or
JST PHDR-10VS Housing
JST SPHD-002T-P0.5 (28-24)
JST SPHD-001T-P0.5 (26-22)

Connector Kit Part No.:
70-841-023

| AC Input | |
|---|--|
| Pin No. | Function |
| 1 | AC neutral |
| 2 | AC line (hot) |
| 3 | Chassis (earth) ground |
| PFC Input Connector (control and signals) | |
| Pin No. | Function |
| 1 | Input AC OK - "emitter" |
| 2 | Input AC OK - "collector" |
| 3 | Global DC OK - "emitter" |
| 4 | Global DC OK - "collector" |
| 5 | External Sync |
| 6 | Global inhibit/optional enable logic "0" |
| 7 | Global inhibit/optional enable logic "1" |
| 8 | Global inhibit/optional enable return |
| 9 | +5 VSB housekeeping |
| 10 | +5 VSB housekeeping return |
| I ² C Bus Output Connector | |
| Pin No. | Function |
| 1 | No connection |
| 2 | No connection |
| 3 | No connection |
| 4 | Serial clock signal (SCL) |
| 5 | Serial data signal (SDA) |
| 6 | Address bit 0 (A0) |
| 7 | Address bit 1 (A1) |
| 8 | Address bit 2 (A2) |
| 9 | Secondary return (GND) |
| 10 | 5 Vcc external bus (5 VCC. Bus) |

Mechanical Drawings

iMP Modules

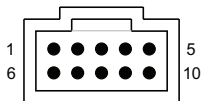
DC-DC Converter Output Modules

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 |

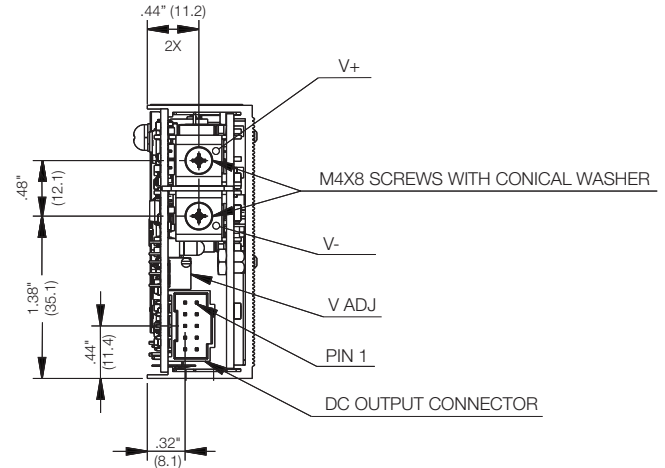
* Note: All iMP modules have a green DCOK LED. (except for 36 W module)

Figure 4. Connector J1

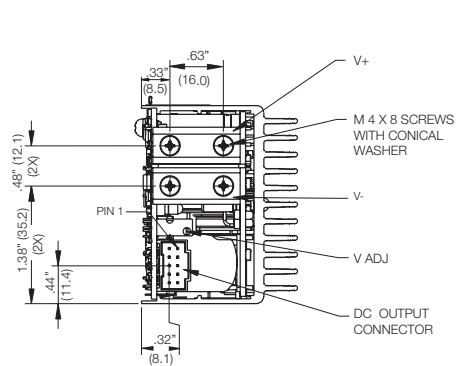


Mates with
Molex 90142-0010 Housing
90119-2110 Pin

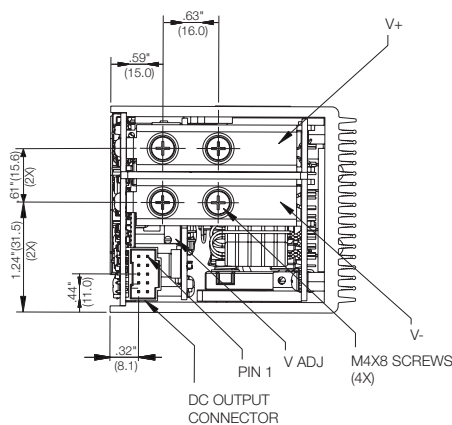
Single 210 Watt



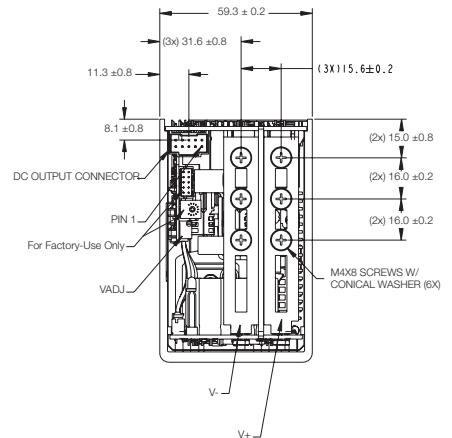
Single 360 Watt



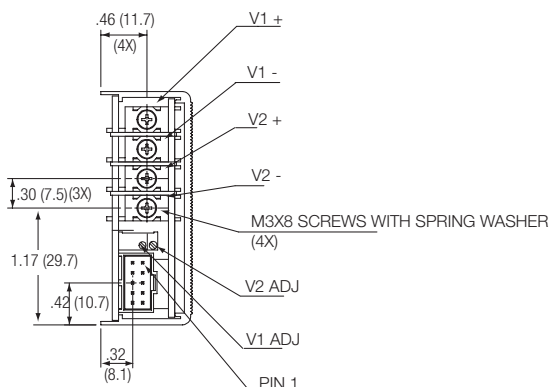
Single 750 Watt



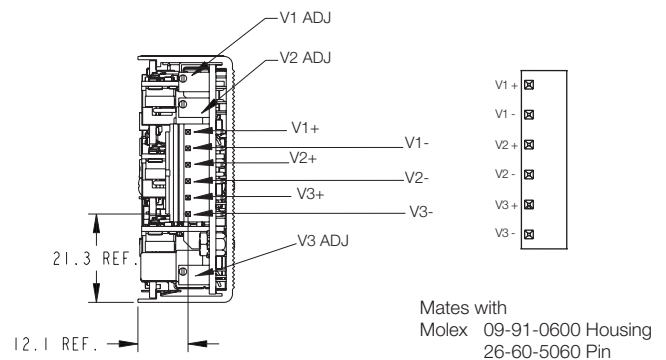
Single 1500 Watt 8 - 60 V



Dual 144 Watt



Triple 36 Watt



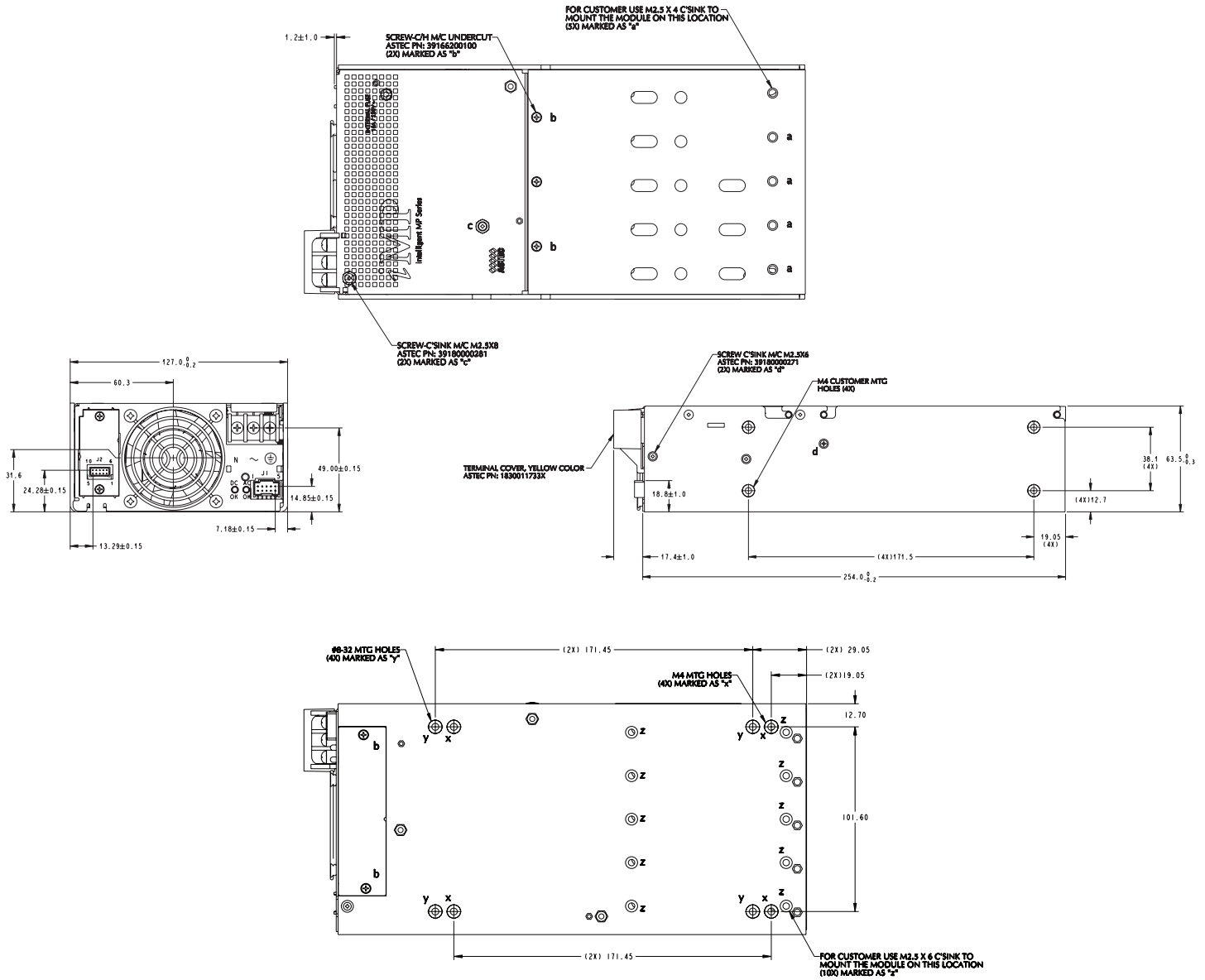
Mates with
Molex 09-91-0600 Housing
26-60-5060 Pin

iMP Series

iMP4 (750/1158 Watts Max)

5-Inch Case Size: iMP4: 2.5" x 5" x 10" (63.5 mm x 127 mm x 254 mm)

Weight: iMP4 Case: 3 lbs. • 360 W Single 1.0 lb. • 750 W Single: 1.6 lbs. 144 W Dual: 0.6 lb.



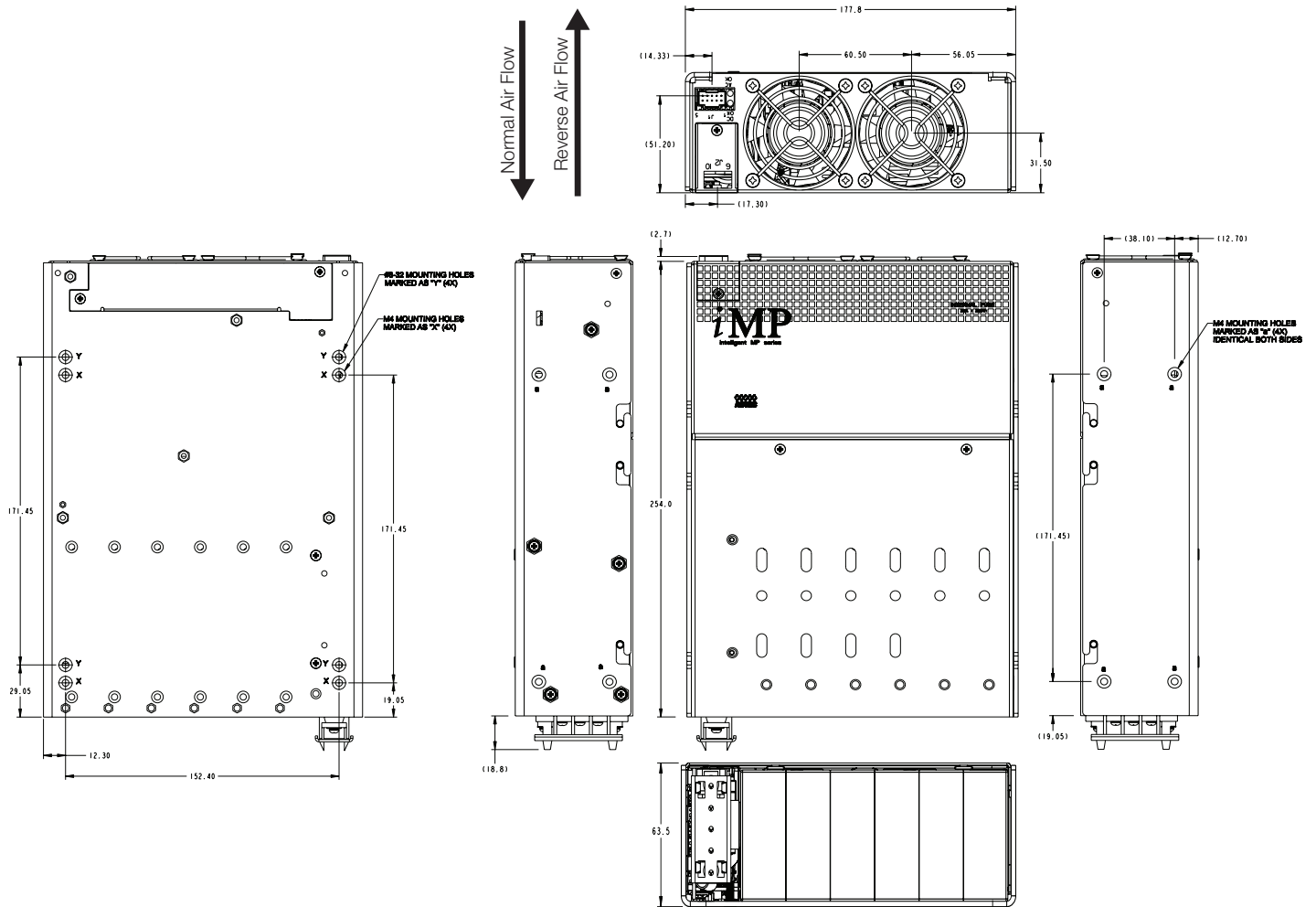
Notes:

1. Input: Barrier type. Three No. 6-32 B.H. screws (0.375" centers). Max torque: 6 in-lbs. (0.67 N-m). (Optional IEC input connector)
2. Control connectors: (J1) 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. (J2) 10 position housing (Landwin 2051P1000T). Mates with housing 2050S1000 (Landwin) with 2053T011P (Landwin) pins or JST PHDR-IOVS Housing and JST SPHD-002T-PO.5 pins.
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. (0.57 N-m).
6. Output module connections: All single O/P modules are M4 x 8 mm screws. Max. torque: 10 in-lbs. (1.13 N-m). Dual O/P module is M3 x 8 mm screws. Max. torque: 5 in-lbs. (0.57 N-m).

iMP Series

iMP8 (1000/1200 Watts Max)

7-Inch Case Size: iMP8: 2.5" x 7" x 10" (63.5 mm x 177.8 mm x 254 mm)
 Weight: iMP8 Case: 4.1 lbs. • 210 W Single: 0.6 lb. • 360 W Single: 1.0 lb.
 • 750 W Single: 1.6 lbs. 144 W Dual: 0.6 lb.



Notes:

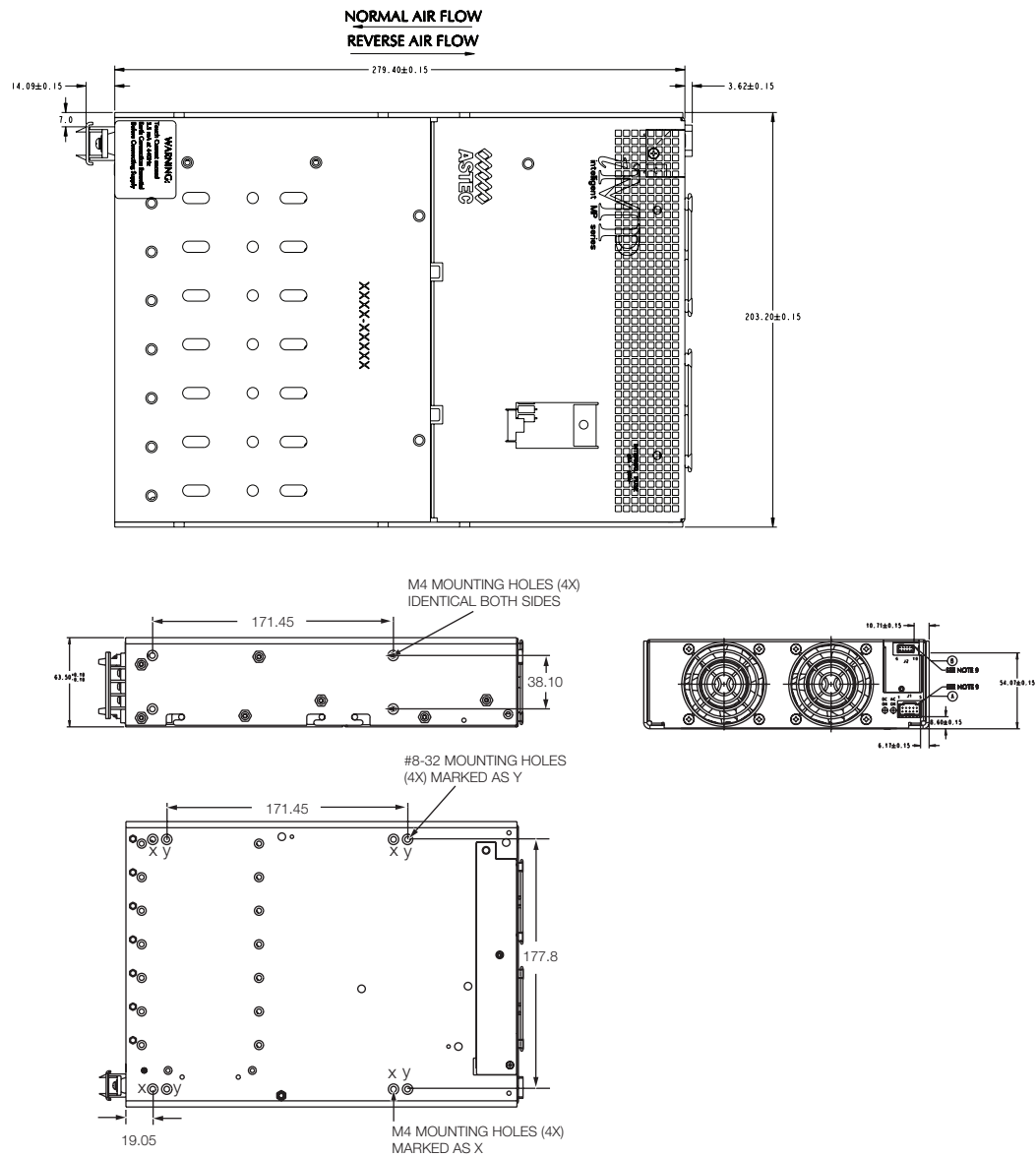
1. Input: Barrier type. Three No. 6-32 B.H. screws (0.375" centers). Max torque: 6 in-lbs. (0.67 N-m).
2. Control connectors: (J1) 10 position housing, gold plated contacts. Mates with Molex 90142-0010 housing with 90119-2110 crimp contacts (Molex C - Grid III Series) Connector kit includes mating connector and 10 pins, Astec part #70-841-004. (J2) 10 position housing (Landwin 2051P1000T). Mates with housing 2050S1000 (Landwin) with 2053T011P (Landwin) pins or JST PHDR-IOVS Housing and JST SPHD-002T-PO.5 pins.
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. (0.57 N-m).
6. Output module connections: All single O/P modules are M4 x 8 mm screws. Max. torque: 10 in-lbs. (1.13 N-m). Dual O/P module is M3 x 8 mm screws. Max. torque: 5 in-lbs. (0.57 N-m).

iMP Series

iMP1 (1200/1500 Watts Max)

8-Inch Case Size: iMP1: 2.5" x 8" x 11" (63.5 mm x 203.2 mm x 279.4 mm)

Weight: iMP1 Case: 5.0 lb. • 210 W Single: 0.6 lb. • 360 W Single: 1.0 lb.
 • 750 W Single: 1.6 lb. • 144 W Dual: 0.6 lb.



Notes:

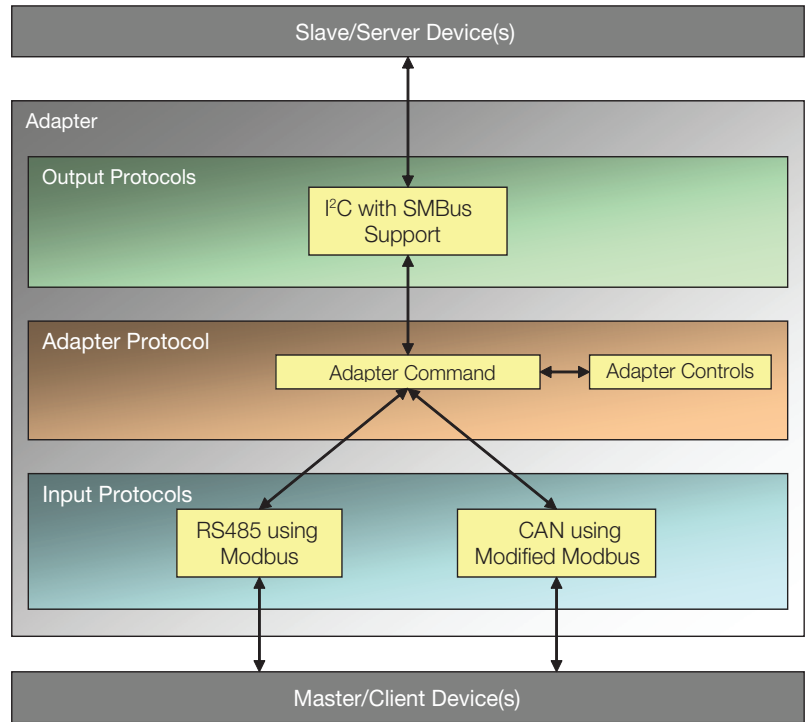
1. Input: Barrier type. Three No. 6-32 B.H. screws (0.375" centers). Max torque: 6 in-lbs (0.67 N-m).
2. Control connectors: (J1) 10 position housing, gold plated contacts. Mates with Molex 90142-0010 housing with 90119-2110 crimp contacts (Molex C - Grid III Series). Connector kit includes mating connector and 10 pins, Astec part #70-841-004. (J2) 10 position housing (Landwin 2051P1000T). Mates with housing 2050S1000 (Landwin) with 2053T011P (Landwin) pins or JST PHDR-IOVS Housing and JST SPHD-002T-PO.5 pins.
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. (0.57 N-m).
6. Output module connections: All single O/P modules are M4 x 8 mm screws. Max. torque: 10 in-lbs. (1.13 N-m). Dual O/P module is M3 x 8 mm screws. Max. torque: 5 in-lbs. (0.57 N-m).

Optional CANBUS or RS485 Interface

The RS485/CAN-to-I²C uses 2 Input Protocols and 1 Output Protocol.

The Input Protocols used are RS485 using Modbus (Command Index: 0x01), and CAN using modified Modbus (Command Index: 0x02).

The Output Protocol use is: I²C with SMBus support (Command Index: 0x80).



iMP CAN RS485

RS485/CAN - to - I²C

For Detailed Info, Download the Software Requirements Specification (SRS) from <http://www.artesyn.com/power/power-supplies/cat/101/Configurable-Power-Supplies-iMP-Series>

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