

# MBC201 Series

## Open Frame Power Supplies

### Medical

The MBC201 Series of open-frame medical power supplies, with its wide universal input range 90-264 VAC, is available at 200 W of output power with forced-air cooling and a variety of single output voltages.

The MBC Series is designed and approved to the latest medical standards (EN/IEC 60601-1), providing 2 x MOPP isolation for Class I & Class II applications.

These power supplies are ideal for medical, telecom, datacom, industrial equipment and other applications.



#### Key Features & Benefits

- 5 x 3 x 1.5 Inch Form Factor
- 200 W with Forced-Air Cooling
- Approved to EN / IEC 60601-1
- High Efficiency > 88%
- 12 V Fan Output
- 5 V Standby Output
- Remote Sense
- IEC Protection Class Options:
  - Class I: Earthing Tab J4 (no suffix)
  - Class II: No Earthing Tab (-2 suffix)
- Medical Safety Agency Approvals
- CE Marked

#### Applications

- Diagnostic
- Drug Pump
- Monitoring
- Dialysis
- Home Health Care
- Portable Equipment

## 1. MODEL SELECTION

| MODEL <sup>1</sup>         | CONNECTOR                   | OUTPUT VOLTAGE | MAX LOAD <sup>2</sup> |         | MIN LOAD | POWER |
|----------------------------|-----------------------------|----------------|-----------------------|---------|----------|-------|
|                            |                             |                | CONVECTION            | 300 LFM |          |       |
| MBC201-1005G               | JST (Header)                | 5 VDC          | 16.67 A               | 26.0 A  | 0.0 A    | 130 W |
| MBC201-1T05G               | Screw Terminal              |                |                       | 35.0 A  |          | 175 W |
| MBC201-1012G               | JST (Header)                | 12 VDC         | 13.33 A               | 16.67 A | 0.0 A    | 200 W |
| MBC201-1T12G               | Screw Terminal              |                |                       |         |          |       |
| MBC201-1015G               | JST (Header)                | 15 VDC         | 10.67 A               | 13.33 A | 0.0 A    | 200 W |
| MBC201-1T15G               | Screw Terminal              |                |                       |         |          |       |
| MBC201-1024G               | JST (Header)                | 24 VDC         | 6.67 A                | 8.33 A  | 0.0 A    | 200 W |
| MBC201-1T24G               | Screw Terminal              |                |                       |         |          |       |
| MBC201-1030G               | JST (Header)                | 30 VDC         | 5.33 A                | 6.67 A  | 0.0 A    | 200 W |
| MBC201-1T30G               | Screw Terminal              |                |                       |         |          |       |
| MBC201-1048G               | JST (Header)                | 48 VDC         | 3.33 A                | 4.17 A  | 0.0 A    | 200 W |
| MBC201-1T48G               | Screw Terminal              |                |                       |         |          |       |
| COVER-201-XBC <sup>3</sup> | Metal Cover Kit (accessory) |                |                       |         |          |       |

<sup>1</sup> Class I products have an Earthing tab. For Class II version (without Earthing tab) add suffix -2 (e.g.: MBC201-1012G-2).

<sup>2</sup> Combined output power from V1, VSTBY and VFAN should not exceed the total output power rating.

<sup>3</sup> When used in Cover Kit, de-rate output power to 70 % under all operating conditions.

## 2. INPUT SPECIFICATIONS

Specifications are for nominal input voltage, 25°C unless otherwise stated.

| PARAMETER           | DESCRIPTION / CONDITION       | SPECIFICATION                 |
|---------------------|-------------------------------|-------------------------------|
| Input Voltage       | Universal                     | 90 – 264 VAC / 120 – 390 VDC  |
| Input Frequency     |                               | 47 – 63 Hz                    |
| Input Current       | 120 VAC:                      | 2.4 A max.                    |
|                     | 230 VAC:                      | 1.2 A max.                    |
| Inrush Current      | 120 VAC:                      | 35 A max.                     |
|                     | 230 VAC:                      | 65 A max.                     |
| Leakage Current     | 120 VAC:                      | < 150 µA                      |
|                     | 230 VAC:                      | < 300 µA                      |
| No Load Power       |                               | 0.8 W                         |
| Switching Frequency | PFC converter (variable)      | 35 to 250 kHz, 90 kHz typical |
|                     | Resonant converter (variable) | 35 to 250 kHz, 90 kHz typical |

### 3. OUTPUT SPECIFICATIONS

| PARAMETER                 | DESCRIPTION / CONDITION                                        | SPECIFICATION                                                                     |
|---------------------------|----------------------------------------------------------------|-----------------------------------------------------------------------------------|
| Output Voltage            | Refer to Model Selection table                                 | 5 V to 48 V                                                                       |
| Output Power <sup>4</sup> | Peak Power: 250 W for 2 s                                      | 160 to 200 W                                                                      |
| Fan Output <sup>5</sup>   | @ 5 A                                                          | 12 V                                                                              |
| Efficiency                | 120 VAC:<br>230 VAC:                                           | 84% typical<br>86% typical                                                        |
| Hold Up Time              | 120 VAC / 230 VAC:                                             | 10 ms                                                                             |
| Power Factor              | 120 VAC:<br>230 VAC:                                           | 0.99<br>0.95                                                                      |
| Line Regulation           |                                                                | ± 0.5%                                                                            |
| Load Regulation           |                                                                | ± 2.0%                                                                            |
| Transient Response        | 50 to 100% load change, 50 Hz, 50% duty cycle, 0.1 A / $\mu$ s | < 10%,<br>recovery time < 5 ms                                                    |
| Ripple <sup>6</sup>       | All outputs                                                    | 1.0 % max                                                                         |
| Rise Time                 |                                                                | < 100 ms                                                                          |
| Set Point Accuracy        | Main output                                                    | ± 1%                                                                              |
| Output Voltage Adjustment | V1                                                             | ± 3 %                                                                             |
| Over Current Protection   |                                                                | 110% typical above rating                                                         |
| Over Voltage Protection   | V1                                                             | 110 to 150%                                                                       |
| Short Circuit Protection  | Short term, Automatic recovery                                 |                                                                                   |
| Cooling                   | Convection<br>300 LFM                                          | 83 W (5 V model), 160 W (other models)<br>175 W (5 V model), 200 W (other models) |

<sup>4</sup> Derate output power linearly to 80% from 90 VAC to 80 VAC input.

<sup>5</sup> Fan output voltage tolerance is +/-20%. During V1 full load, VFAN needs min. 20 mA load to be within regulation band.

Peak current for fan output is 1 A.

<sup>6</sup> Ripple is 2% up to 20% load and < 1% above 20% load. Ripple is peak to peak with 20 MHz bandwidth and 10  $\mu$ F (Electrolytic capacitor) in parallel with a 0.1  $\mu$ F capacitor at rated line voltage and load ranges.

### 4. EMC SPECIFICATIONS

| PARAMETER                          | DESCRIPTION / CONDITION             | SPECIFICATION        |
|------------------------------------|-------------------------------------|----------------------|
| Conducted Emissions                | EN 55011-B, CISPR22-B, FCC PART15-B | Pass                 |
| Radiated Emissions                 | EN 55011 B                          | Pass                 |
| Input Current Harmonics            | EN 61000-3-2                        | Class D              |
| Voltage Fluctuation and Flicker    | EN 61000-3-3                        | Pass                 |
| ESD Immunity                       | EN 61000-4-2                        | Level 4, Criterion A |
| Radiated Field Immunity            | EN 61000-4-3                        | Level 3, Criterion A |
| Electrical Fast Transient Immunity | EN 61000-4-4                        | Level 3, Criterion A |
| Surge Immunity                     | EN 61000-4-5                        | Level 3, Criterion A |
| Conducted Immunity                 | EN 61000-4-6                        | Level 3, Criterion A |
| Magnetic Field Immunity            | EN 61000-4-8                        | Level 4, Criterion A |
| Voltage Dips, Interruptions        | EN 61000-4-11                       | Criterion A & B      |

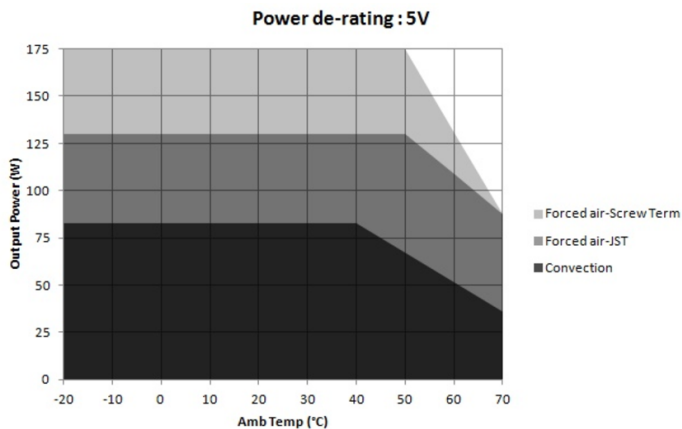
## 5. SAFETY SPECIFICATIONS

| PARAMETER         | DESCRIPTION / CONDITION                                                            | SPECIFICATION |
|-------------------|------------------------------------------------------------------------------------|---------------|
| Isolation Voltage | Input to Output:                                                                   | Min. 5900 VDC |
| Safety Standards  | EN 60601-1, IEC 60601-1 (ed.3),<br>ANSI / AAMI ES 60601 - 1, CSA C22.2 No. 60601-1 |               |
| Agency Approvals  | Nemko, UL, C-UL                                                                    |               |
| CE mark           | Complies with LVD Directive                                                        |               |

## 6. ENVIRONMENTAL SPECIFICATIONS

| PARAMETER                          | DESCRIPTION / CONDITION                    | SPECIFICATION             |
|------------------------------------|--------------------------------------------|---------------------------|
| Operating Temperature <sup>7</sup> | -20 to 0°C start-up is guaranteed          | -20 to 70°C<br>-20 to 0°C |
| Storage Temperature                |                                            | -40 to 85° C              |
| Humidity                           | Non Condensing                             | 95%                       |
| Altitude                           | Operating:<br>Non-Operating:               | 10,000 ft.<br>40,000 ft.  |
| Reliability                        | MTBF according to Telcordia –SR332-Issue 3 | 1.6 million hours         |

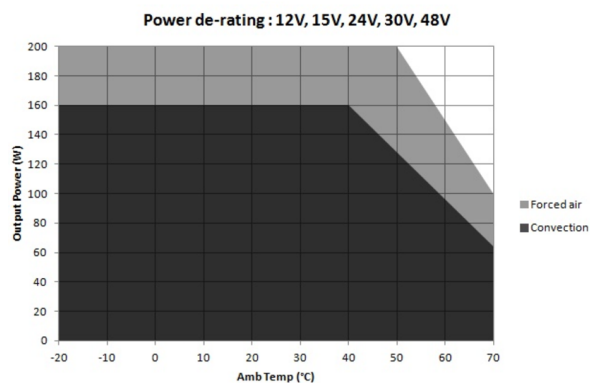
<sup>7</sup> Refer to derating curves



Convection load: 83 W up to 40 °C  
De-rate above 40 °C @ 1.89% per °C

Forced air cooled load: 130 W up to 50°C  
(for screw terminal version)  
De-rate above 50 °C @ 1.63% per °C

Forced air cooled load: 175 W up to 50°C  
(for JST connector version)  
De-rate above 50 °C @ 2.5% per °C



Convection load: 160 W up to 40 °C  
De-rate above 40 °C @ 2% per °C

Forced air cooled load: 200 W up to 50°C  
De-rate above 50 °C @ 2.5% per °C

Figure 1. Derating Curves

## 7. SIGNALS

| PARAMETER         | DESCRIPTION / CONDITION                                                                    |
|-------------------|--------------------------------------------------------------------------------------------|
| Power Good Signal | TTL signal goes high after main output is in regulation band. Delay is 0.1 to 0.3 sec.     |
| Power Fail Signal | TTL signal goes low 1 ms advance before output goes out of regulation due to mains failure |
| Remote Sense      | Compensates for 200 mV cable drop                                                          |
| Remote ON / OFF   | To turn on PSU short remote pin to ground                                                  |

## 8. CONNECTOR & PIN DESCRIPTION

| CONNECTOR                            | PIN | DESCRIPTION / CONDITION                                                                                                                                                                            | MANUFACTURER / PN                                                                                                                                                             |
|--------------------------------------|-----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| AC Input Connector                   | J1  | Pin 1 AC Neutral<br>Pin 2 AC Line                                                                                                                                                                  | Molex: 26-60-4030 or equivalent;<br>Mating: 09-50-3031; Pins: 08-50-0106                                                                                                      |
| DC Output Connector                  | J2  | Pin 1,2,3 RTN<br>Pin 4,5,6 Vout                                                                                                                                                                    | Option 1: Tyco: 2-1776112-3 or equivalent<br>Mating: 13 AWG wire<br>Option 2: JST: B6P-VH-B (LF) (SN) or B6P-VH (LF) (SN) or equivalent<br>Mating: VHR-6M; Pins: SVH-41T-P1.1 |
| Signals & Aux Power <sup>8</sup>     | J3  | Pin 1 +VE Remote Sense<br>Pin 2 VFAN (+12 V/0.5 A)<br>Pin 3 -VE Remote Sense<br>Pin 4 Remote ON/OFF<br>Pin 5 VSTBY (+5 V/1 A, +/-5%)<br>Pin 6 RTN (Signal)<br>Pin 7 Power Fail<br>Pin 8 Power Good | Molex: 22-23-2081 or equivalent<br>Mating: 22-01-2087, Pins: 08-50-0113                                                                                                       |
| Earth <sup>9</sup> (Spade Connector) | J4  |                                                                                                                                                                                                    | Molex: 19705-4301 or equivalent<br>Mating: 190030001                                                                                                                          |

<sup>8</sup> PSU is supplied with J3 housing, pin-4 and pin-6 shorted to enable main output without remote on/off feature

<sup>9</sup> Class I product only

## 9. MECHANICAL SPECIFICATIONS

| PARAMETER  | DESCRIPTION / CONDITION                 |
|------------|-----------------------------------------|
| Weight     | 325 g (0.72 lbs.)                       |
| Dimensions | 127.0 x 76.2 x 38.1 mm (5 x 3 x 1.5 in) |

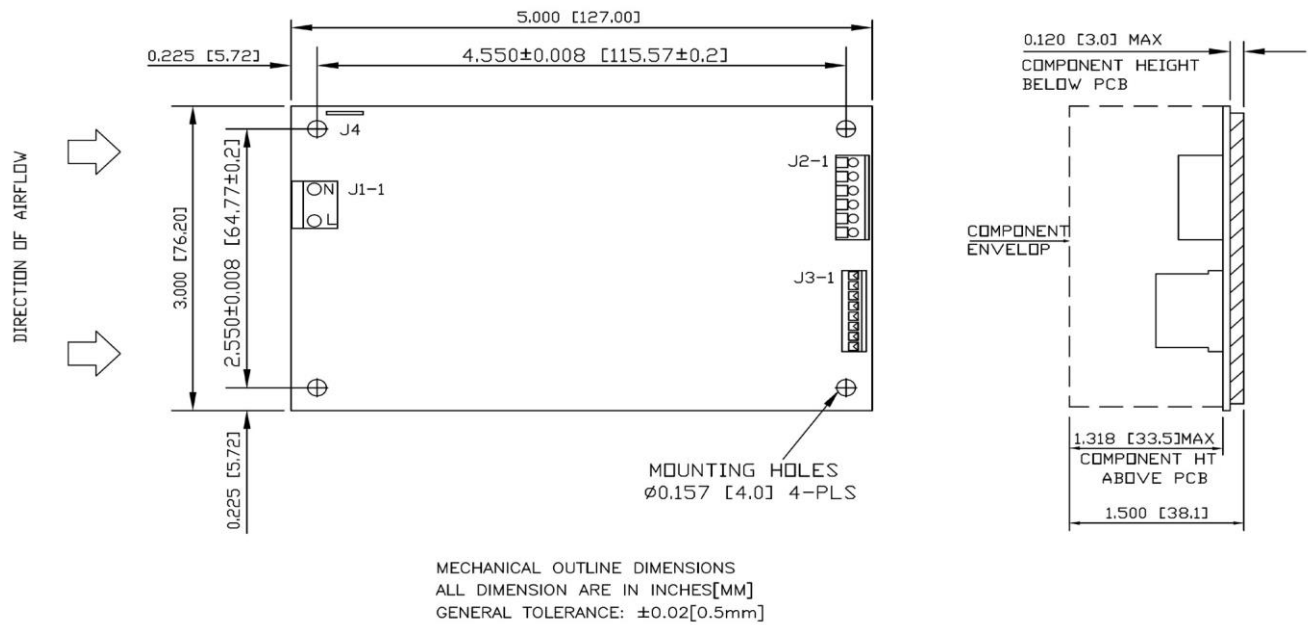


Figure 2. Mechanical Drawing

**NOTES:** In case the PCB is mounted in a metal enclosure, using metal hardware ensure the following:  
 Stand off, used to mount PCB has OD of 5.4 mm max.  
 Screws, used to fix PCB on stand off, have head dia of 6.0 mm max.  
 Washer, if used, to have dia of 6.5 mm max.

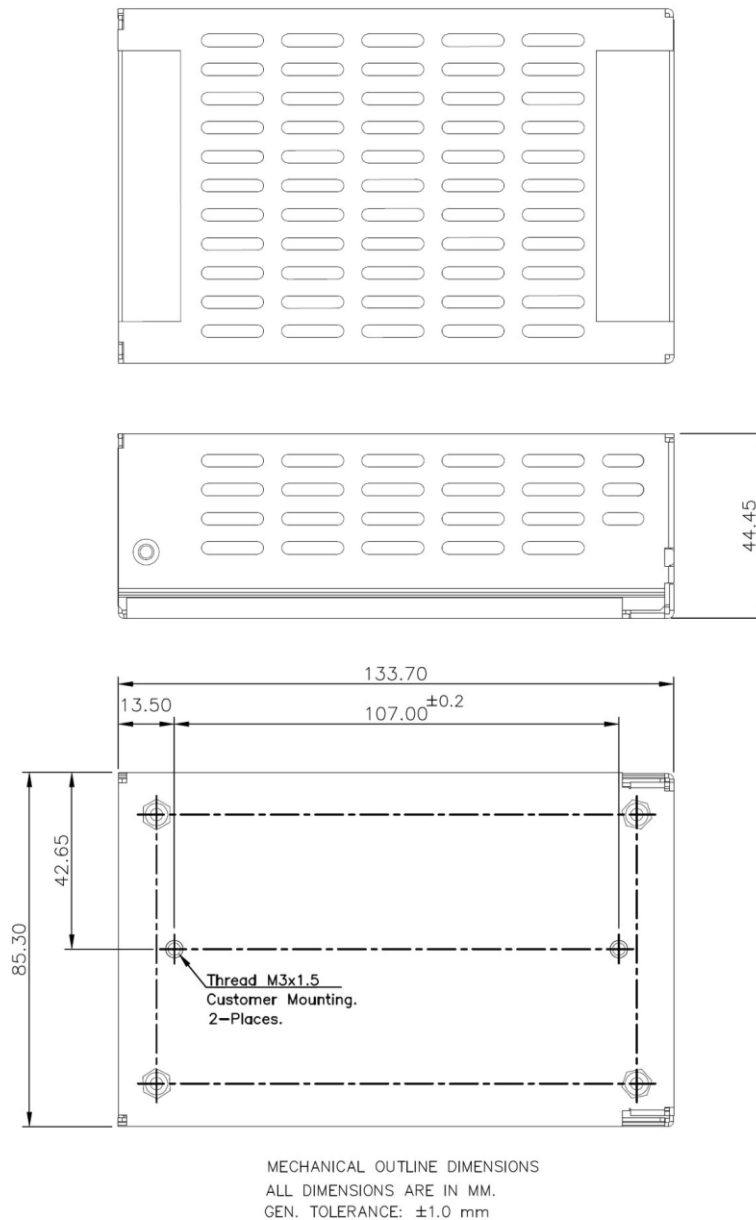


Figure 3. Mechanical Drawing with Cover Kit

**For more information on these products consult: [tech.support@psbel.com](mailto:tech.support@psbel.com)**

**NUCLEAR AND MEDICAL APPLICATIONS** - Products are not designed or intended for use as critical components in life support systems, equipment used in hazardous environments, or nuclear control systems.

**TECHNICAL REVISIONS** - The appearance of products, including safety agency certifications pictured on labels, may change depending on the date manufactured. Specifications are subject to change without notice.

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