

# MBC800 Series

## Open Frame Power Supplies

### Medical

The MBC800 Series of open-frame medical power supplies, with its wide universal 85 - 264 VAC input range, is available at 800 W of output power 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 medical power supplies are ideal for monitoring, home health equipment as well as surgical devices.



#### Key Features & Benefits

- 5 x 8.5 x 1.61 Inch Form Factor (127 x 216 x 41 mm)
- Convection or Forced Air Cooling
- Dual Fusing
- Current Sharing Option
- Peak Power Capability
- Standard IEC60601-1-2: 2014 (4th Edition)
- 5 VDC Stand by I 12 V fan output
- Power Good / Power Fail Signal
- Suitable for BF application
- Lesser than 1U high
- Having high voltage output range up to 58 VDC
- N+1 redundant power supply
- Single wire current sharing
- Built in OR-ing diode / FET (- R suffix)

#### Applications

- |                 |                    |
|-----------------|--------------------|
| • Diagnostic    | • Home Health Care |
| • Drug Pump     | • Monitoring       |
| • Dialysis      | • Imaging          |
| • Hospital Beds | • Therapy Devices  |

## 1. MODEL SELECTION

| MODEL NUMBER* | VOLTAGE | TYPE      | MAX. LOAD (CONVECTION) | MAX. LOAD (300 LFM) | MIN. LOAD | RIPPLE & NOISE |
|---------------|---------|-----------|------------------------|---------------------|-----------|----------------|
| MBC800-1T12   | 12 V    | U-Channel | 25 A                   | 33.33 A             | 0.0 A     | 2%             |
| MBC800-1T15   | 15 V    | U-Channel | 25 A                   | 33.33 A             | 0.0 A     | 2%             |
| MBC800-1T24   | 24 V    | U-Channel | 25 A                   | 33.33 A             | 0.0 A     | 2%             |
| MBC800-1T30   | 30 V    | U-Channel | 20 A                   | 26.66 A             | 0.0 A     | 2%             |
| MBC800-1T48   | 48 V    | U-Channel | 12.5 A                 | 16.66 A             | 0.0 A     | 2%             |
| MBC800-1T58   | 58 V    | U-Channel | 10.34 A                | 13.78 A             | 0.0 A     | 2%             |

\* To order product without the redundancy diode option please add the suffix -Sxxx to your required part number. Please contact the factory for availability.

## 2. INPUT SPECIFICATIONS

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

| PARAMETER           | DESCRIPTION / CONDITION                                                      | SPECIFICATION                     |
|---------------------|------------------------------------------------------------------------------|-----------------------------------|
| Input Voltage       | Universal                                                                    | 85 – 264 VAC / 120 – 390 VDC      |
| Input Frequency     |                                                                              | 47 – 63 Hz                        |
| Input Current       | 120 VAC:<br>240 VAC:                                                         | 8.00 A max.<br>3.46 A max.        |
| Input Protection    | In Live & Neutral both                                                       | F16 A / 250 V                     |
| No Load Power       | Over entire input range with main output kept <b>OFF</b> using Remote ON/OFF | 3 W typ.                          |
| Inrush Current      | 240 VAC:                                                                     | 25 A max.                         |
| Leakage Current     | 240 VAC / 50 Hz                                                              | 400 µA                            |
| Touch Current       |                                                                              | < 100 µA                          |
| Power Factor        | 120 VAC:<br>240 VAC:                                                         | 0.98<br>0.95                      |
| Switching Frequency | PFC converter: Variable<br>Resonant converter: Variable                      | 85 kHz typical<br>100 kHz typical |

## 3. OUTPUT SPECIFICATIONS

| PARAMETER                   | DESCRIPTION / CONDITION                                  | SPECIFICATION                  |
|-----------------------------|----------------------------------------------------------|--------------------------------|
| Output Power                | Forced Air Cooling                                       | Up to 800 W                    |
| Efficiency                  | 120 VAC:<br>240 VAC:                                     | 88% Typical<br>93%             |
| Hold-up Time                | 120 VAC / 240 VAC:                                       | 8 ms                           |
| Line Regulation             |                                                          | +/-0.5%                        |
| Load Regulation             |                                                          | +/-1.0%                        |
| Transient Response          | 50% to 100% load change, 50 Hz, 50% duty cycle, 0.1 A/µs | < 10%,<br>recovery time < 5 ms |
| Voltage Adjustment          |                                                          | +/-3%                          |
| Set Point Tolerance         |                                                          | +/-1%                          |
| Rise Time                   |                                                          | <100 ms                        |
| Over Current Protection     | Hic-Up Type, autorecovery                                | 110%                           |
| Over Voltage Protection     | Latch Type, AC Power to be recycled for recovery         | 114%                           |
| Short Circuit Protection    | Latch Type, AC Power to be recycled for recovery         |                                |
| Over Temperature Protection | Autorecovery                                             | 130 - 140°C primary heat sink  |
| Current Share               | Up to 3 supplies connected in parallel (optional)        |                                |

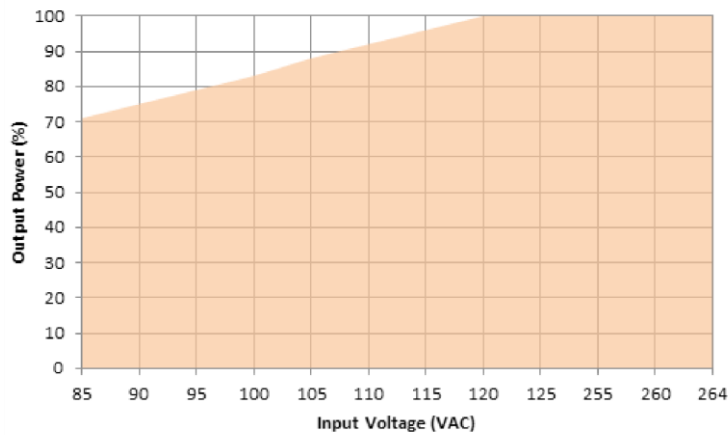
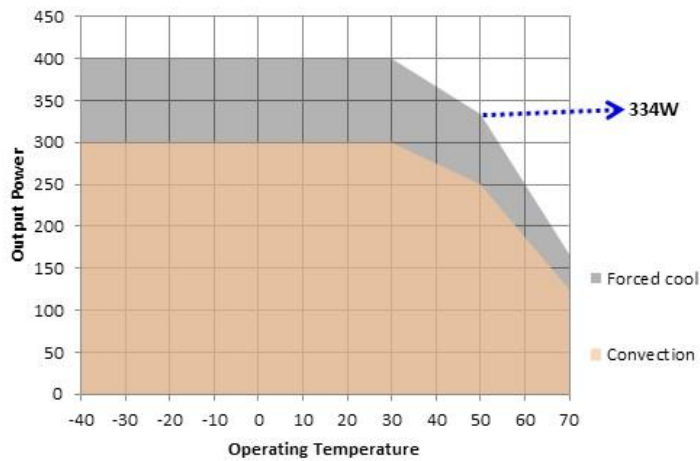


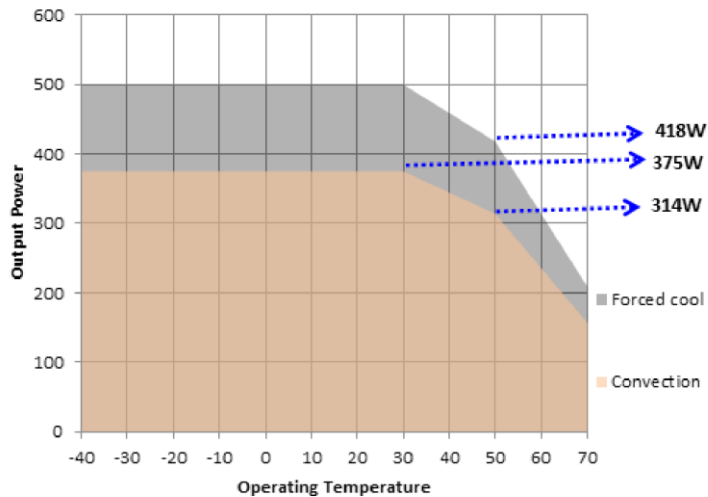
Figure 1. Power Derating w.r.t Input



Convection load: 300 W up to 30 °C  
De-rate between 30-50 °C @ 0.833% per °C  
De-rate above 50 °C @ 2.5% per °C

Forced air cooled load: 400 W up to 30°C  
De-rate between 30-50 °C @ 0.825% per °C  
De-rate above 50 °C @ 2.5% per °C

Figure 2. Power Derating Curve 12 V



Convection load: 375 W up to 30 °C  
De-rate between 30-50 °C @ 0.8133% per °C  
De-rate above 50 °C @ 2.5% per °C

Forced air cooled load: 500 W up to 30°C  
De-rate between 30-50 °C @ 0.82% per °C  
De-rate above 50 °C @ 2.5% per °C

Figure 3. Power Derating Curve 15 V

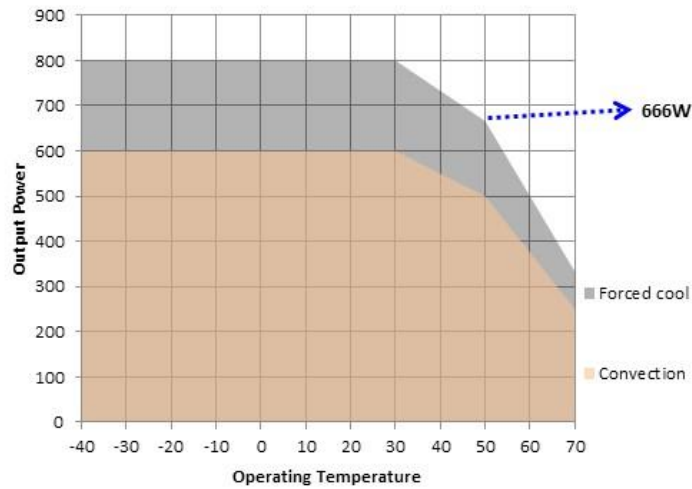


Figure 4. Power Derating Curve 24 V and above

Convection load: 600 W up to 30 °C  
De-rate between 30-50 °C @ 0.833% per °C  
De-rate above 50 °C @ 2.5% per °C

Forced air cooled load: 800 W up to 30°C  
De-rate between 30-50 °C @ 0.8375% per °C  
De-rate above 50 °C @ 2.5% per °C

#### 4. ENVIRONMENTAL SPECIFICATIONS

| PARAMETER             | DESCRIPTION / CONDITION      | SPECIFICATION            |
|-----------------------|------------------------------|--------------------------|
| Operating Temperature | Refer to derating curve      | -40 to +70°C             |
| Storage Temperature   |                              | -40 to +85°C             |
| Relative Humidity     | Non-condensing               | 95% Rh                   |
| Altitude              | Operating:<br>Non-operating: | 16,000 ft.<br>40,000 ft. |
| MTBF                  | Telcordia -SR332-issue 3     | 3.37 million hours       |

#### 5. EMC SPECIFICATIONS

| PARAMETER                          | DESCRIPTION / CONDITION             | CRITERIA                                                                        |
|------------------------------------|-------------------------------------|---------------------------------------------------------------------------------|
| Conducted Emissions                | EN 55011-B, CISPR22-B, FCC PART15-B | Class B                                                                         |
| Radiated Emissions                 | EN 55011                            | Class A<br>(Class B with External king core<br>K5B RC 25x12x15-M or equivalent) |
| Input Current Harmonics            | EN 61000-3-2                        | Class A                                                                         |
| Voltage Fluctuation and Flicker    | EN 61000-3-3                        | Complies                                                                        |
| ESD Immunity                       | EN 61000-4-2                        | A                                                                               |
| Radiated Field Immunity            | EN 61000-4-3                        | A                                                                               |
| Electrical Fast Transient Immunity | EN 61000-4-4                        | A                                                                               |
| Surge Immunity                     | EN 61000-4-5                        | A                                                                               |
| Conducted Immunity                 | EN 61000-4-6                        | A                                                                               |
| Magnetic Field Immunity            | EN 61000-4-8                        | A                                                                               |
| Voltage Dips, Interruptions        | EN 61000-4-11                       | A & B                                                                           |

## 6. SAFETY SPECIFICATIONS

| PARAMETER          | DESCRIPTION / CONDITION                                                    | SPECIFICATION |
|--------------------|----------------------------------------------------------------------------|---------------|
| Isolation Voltage  | Input to Output                                                            | 4245 VAC      |
|                    | Input to Earth                                                             | 1625 VAC      |
|                    | Output to Earth                                                            | 1500 VAC      |
| Safety Standard(s) | EN60601-1, IEC 60601-1 (ed.3), ANSI/AAMI ES 60601-1, CSA C22.2 No. 60601-1 |               |
| Agency Approvals   | Nemko, UL, C-UL                                                            |               |
| CE mark            | Complies with LVD Directive                                                |               |

### NOTES:

1. For Ripple measurement minimum output power requirement is 25 W.  
Ripple is peak to peak with 20 MHz bandwidth and 10  $\mu$ F (Tantalum capacitor) in parallel with a 0.1  $\mu$ F capacitor at rated line voltage and load ranges. Please contact factory/ sales representative for minimum load required for ripple to be within specification.
2. Combined output power of main output, fan supply and standby supply shall not exceed max. power rating.
3. Standby output voltage 5 V / 1.5 A (convection) with tolerance including set point accuracy, line and load regulation is +/-10%. Ripple and noise is less than 5%.
4. Specifications are for nominal input voltage, 25°C unless otherwise stated.
5. Fan supply output voltage 12 V / 500 ma is +/-30% and ripple less than 10% to get 12 V output min 10% load on main output is required.

## 7. SIGNALS

| PARAMETER                | DESCRIPTION / CONDITION                                                                                                                            |
|--------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|
| Power Good / Fail Signal | Power Good: Is a TTL signal which goes high after main output reaches 90% of its set value.<br>The delay is 0.1 s to 0.5 s                         |
|                          | Power Fail: The same signal goes low at least 1ms before main output falls to 90% of set value at AC Power off                                     |
| Remote Sense             | Compensates for 200 mV drop                                                                                                                        |
| Remote On / Off          | Pin 6 & Pin 7 of J3 can be used for Remote on/off.<br>Shorting Pin 6 to Pin 7 enables main output while keeping the pins open disables main output |
| OCP Limit Set            | Pin 8 & Pin 9 of J3 must be left open                                                                                                              |

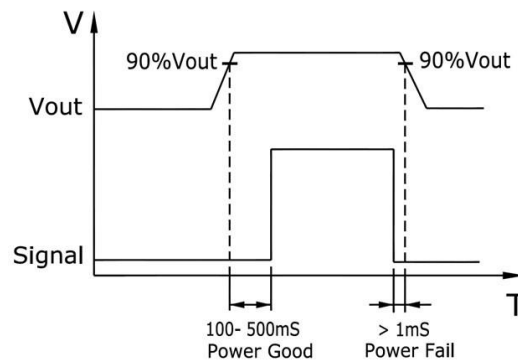


Figure 5. Power Good / Fail Signal Diagram

## 8. CONNECTOR & PIN DESCRIPTION

| CONNECTOR           | PIN             | DESCRIPTION / CONDITION                                                                 |                                                                         | MANUFACTURER / PN                                                                                                                                                                                                                                                                                |
|---------------------|-----------------|-----------------------------------------------------------------------------------------|-------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| AC Input Connector  | J1              | Pin 1<br>Pin 2<br>Pin 3                                                                 | AC Line<br>Neutral<br>Earth                                             | TE Connectivity: NC6-P107-03                                                                                                                                                                                                                                                                     |
| DC Output Connector | J2              | J2-A<br>J2-B                                                                            | +VE<br>-VE                                                              | 6-32 inches Screw Pan HD<br>Mating: Designed to accept Ring Tongue Terminal AMP: 8-31886-1, wherein one 16 AWG (max) wire can be crimped.<br>Note: One Ring Tongue Terminal with 16 AWG is recommended for current up to 11 A only.<br>Use multiple tongue terminals with wire for more current. |
| Signal Connector    | J3 <sup>1</sup> | Pin 1<br>Pin 2<br>Pin 3<br>Pin 4<br>Pin 5<br>Pin 6<br>Pin 7<br>Pin 8<br>Pin 9<br>Pin 10 | GND<br>5V AUX<br>PGPF<br>VS –<br>VS +<br>GND<br>RMT<br>CL2<br>CL1<br>LS | Molex: 22-23-2101<br>Mating: 22-01-2107; Pins: 08-50-0113                                                                                                                                                                                                                                        |
| Fan Output          | J10, J11        | Pin 1<br>Pin 2                                                                          | +VE<br>-VE                                                              |                                                                                                                                                                                                                                                                                                  |

## 9. MECHANICAL SPECIFICATIONS

| PARAMETER  | DESCRIPTION / CONDITION                     |
|------------|---------------------------------------------|
| Weight     | 1100 g                                      |
| Dimensions | 127 x 216 x 41 mm (5.0 x 8.5 x 1.61 inches) |
| Cooling    | Forced Air Cooling: 800 W (U-Channel)       |

<sup>1</sup> PSU is supplied with J3, pin-6 and pin-7 shorted to enable main output without remote on/off feature.

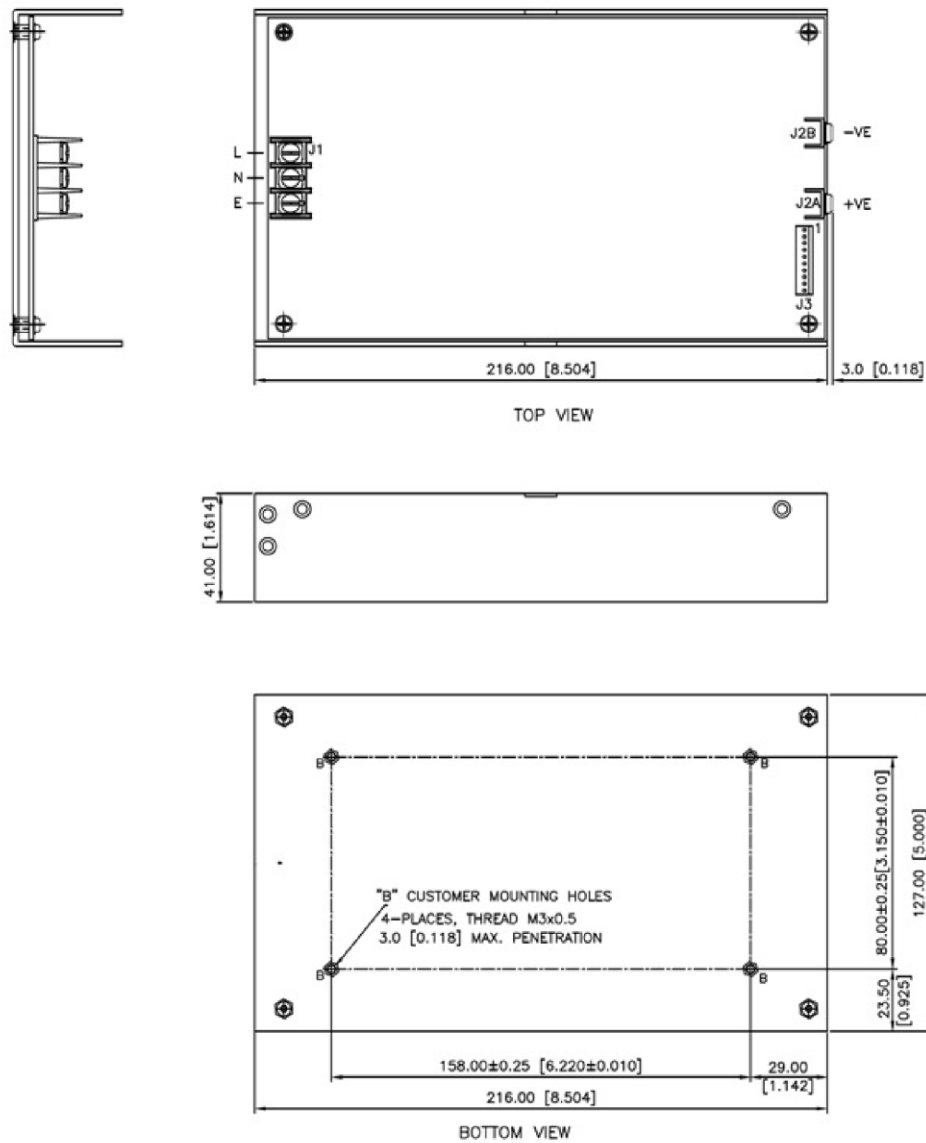


Figure 6. Mechanical drawings

## 10. INSTALLTION INSTRUCTION FOR CURRENT SHARING

During the installation and setup of parallel supplies in a system it is important that a single remote sense point be used for all the supplies. The remote sense voltage between the supplies must be adjusted to within 1% to ensure the supplies are inside the 1% capture window. If the supplies are not initially adjusted inside the capture window the supplies will not current share satisfactorily.

### SET-UP PROCEDURE:

1. Connect load cables to the outputs of each supply.
2. Connect the remote sense lines to the load in twisted style. (A common remote sense point must be used for all the supplies in parallel).
3. Connect all the "LS" signal (Pin 10) on the J3 connector between the supplies.
4. Adjust remote sense voltage of each supply to within 1% of rated output voltage or readjust to required set point. (Adjustment to be done with all other parallel supplies off).
5. Current sharing between the supplies can be verified by monitoring the output current of each supply with a hall effect DC current probe. The supplies should share to within 10% of the total load current.
6. The current share circuit has a capture window voltage of  $\pm 1\%$  of the rated output voltage. If the output remote sense voltage of one of the supplies is adjusted outside the 1% window the supplies will not current share satisfactorily.

### CURRENT SHARING BLOCK DIAGRAM

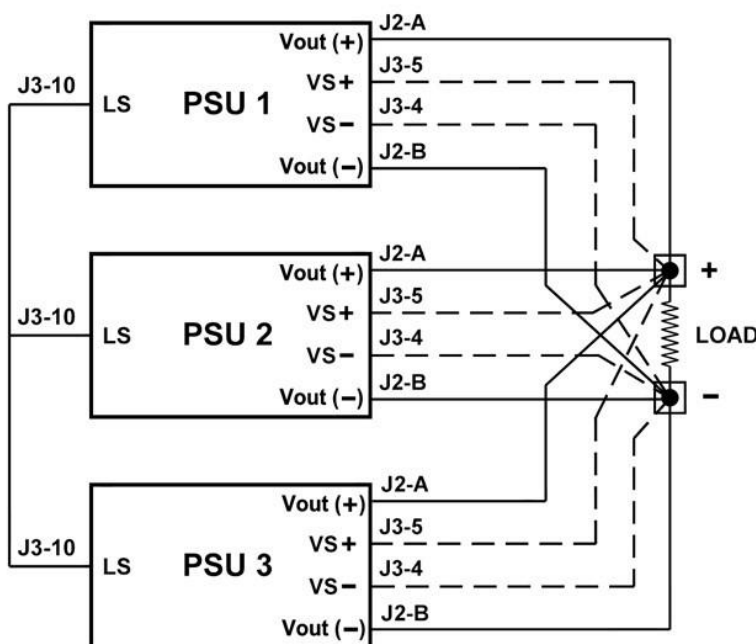


Figure 7. Current Sharing Block Diagram

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.