TECHNICAL DATASHEET

# 200W Medical Open Frame

## FSP202 Series

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### FEATURES

- Compact size 3 x 5 x 1.5 inches
- Certified medical safety IEC 60601-1
- High altitude 5000 meters operation
- Power Fail Detect (PFD) signal
- Inhibit – TTL high to disable output
- BF Class insulation
- Meet EN55011 and FCC Class B
- Over voltage protection
- Over current protection
- Over temperature protection
- Compliant with RoHS requirement

### SAFETY STANDARD APPROVAL

E178020

### DESCRIPTION

The FSP202 series is Class-I design in 3 x 5 inches, AC/DC switching power supplies are capable of delivering 200 watts of continuous output power at 5.3 CFM forced air cooling or 150 watts at convection cooling. The unit is constructed on a printed circuit board with a U-bracket for mechanical support and heat sinking. All models meet EN55011 and FCC class B emission limits, and are designed for medical applications.

### INPUT SPECIFICATIONS

| | |
|---|---|
| Input voltage: | 90-264 VAC |
| Input frequency: | 47-63 Hz |
| Input current: | < 2.5 A (rms) for 115 VAC<br>< 1.25 A (rms) for 230 VAC |
| Earth leakage current: | < 220 μA @ 264 VAC, 63 Hz |
| Touch current: | < 100 μA @ 264 VAC, 63 Hz |

### OUTPUT SPECIFICATIONS

| | |
|---|---|
| Output voltage/current: | See rating chart |
| Maximum output power: | See rating chart |
| Protection: | |
| Over voltage: | Provided on output. Set at 112% to 140% of its nominal output voltage. |
| Over current: | The power supply will shut down without damage and enter auto-recovery mode. |
| Over temperature: | The power supply will enter into shut down while the abnormal thermal rise occurs. |
| Temperature coefficient: | All outputs ±0.04% /℃ maximum. |
| Transient response: | Maximum excursion of 4% or better on all models, recovering to 1% of final value within 500μs after a 25% step load change. |
| Fan power: | 12 V at 250 mA maximum |

### ENVIRONMENTAL SPECIFICATIONS

| | |
|---|---|
| Operating temperature: | 0℃ to +70℃ |
| Storage temperature: | -40℃ to +85℃ |
| Operating humidity: | 10% to 90% RH non-condensing |
| Storage humidity: | 5% to 95% RH non-condensing |
| Temperature derating: | Derate from 100% at +50℃ linearly to 50% at +70℃, applicable to convection and forced-air cooling conditions |

### GENERAL SPECIFICATIONS

| | |
|---|---|
| Switching frequency | 100 KHz (typical) |
| Power factor: | 0.98 typical |
| Efficiency: | See rating chart |
| Hold-up time: | 10 ms minimum at 110 VAC |
| Line regulation: | ±0.5% maximum at full load |
| Inrush current: | 20 A @ 115 VAC, or 40 A @ 230 VAC, at 25℃ cold start |
| Operating altitude : | 5000 meters |
| Withstand voltage: | 4000 VAC from input to output (2 MOPP)<br>1500 VAC from input to ground (1 MOPP)<br>1500 VAC from output to ground |
| MTBF: | 300,000 hours at full load at 25℃ ambient , calculated per MIL-HDBK-217F |
| EMC Performance (IEC60601-1-2) | |
| EN55011: | Class B conducted, class B radiated |
| FCC: | Class B conducted, class B radiated |
| VCCI: | Class B conducted, class B radiated |
| EN61000-3-2: | Harmonic distortion, Class A and D |
| EN61000-3-3: | Line flicker |
| EN61000-4-2: | ESD, ±15 KV air and ±8 KV contact |
| EN61000-4-3: | Radiated immunity, 10 V/m |
| EN61000-4-4: | Fast transient/burst, ±2 KV |
| EN61000-4-5: | Surge, ±1 KV diff., ±2 KV com. |
| EN61000-4-6: | Conducted immunity, 10 Vrms |
| EN61000-4-8: | Magnetic field immunity, 30 A/m |
| EN61000-4-11: | Voltage dip immunity, 30% reduction for 500 ms, 60% reduction for 100 ms, and >95% reduction for 10 ms |


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2019.07 spec

## OUTPUT VOLTAGE/CURRENT RATING CHART

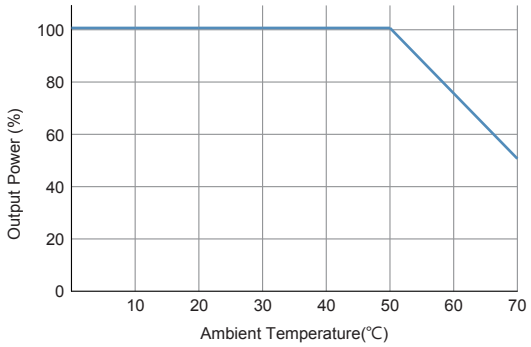
| Model | Output | | | | | | | Average Active Efficiency (typical) @ 115 / 230 VAC |
|---|---|---|---|---|---|---|---|---|
| | V1 | Min. Current | Max. Current at convection | Max. Current at 5.3 CFM | Tolerance | Ripple & Noise(1) | Max. Power(2) | |
| FSP202-1K20M1 | 12 V | 0 A | 12.50 A | 16.67 A | ±2% | 120 mV | 150 W / 200 W | 88% / 91% |
| FSP202-1K30M1 | 15 V | 0 A | 10.00 A | 13.34 A | ±2% | 150 mV | 150 W / 200 W | 88% / 91% |
| FSP202-1K31M1 | 18 V | 0 A | 8.34 A | 11.12 A | ±2% | 180 mV | 150 W / 200 W | 88% / 91% |
| FSP202-1K40M1 | 24 V | 0 A | 6.25 A | 8.34 A | ±2% | 240 mV | 150 W / 200 W | 88% / 91% |
| FSP202-1K50M1 | 28 V | 0 A | 5.36 A | 7.15 A | ±2% | 280 mV | 150 W / 200 W | 88% / 91% |
| FSP202-1K70M1 | 36 V | 0 A | 4.17 A | 5.56 A | ±2% | 360 mV | 150 W / 200 W | 88% / 92% |
| FSP202-1K80M1 | 48 V | 0 A | 3.13 A | 4.17 A | ±2% | 480 mV | 150 W / 200 W | 89% / 92% |

NOTES:
1. Ripple and noise is maximum peak-to-peak voltage value measured at output within 20 MHz bandwidth, at rated line voltage and output load ranges, and with a 10 μF tantalum capacitor in parallel with a 0.1 μF ceramic capacitor across the output.
2. The first value of max. output power is at convection cooling. The second value is with 5.3 CFM forced air provided by user.

## INTERFACE SIGNALS

| | |
|---|---|
| **PFD** | TTL logic high for normal operation and TTL logic low upon loss of input power.<br>This signal appears at least 1ms prior to V1 output dropping 5% below its nominal value.<br>This signal also provides a minimum delay of 100 ms after V1 is within regulation. |
| **Inhibit** | Requires an external TTL high level signal to inhibit outputs. |

## OUTPUT POWER DERATING CURVE





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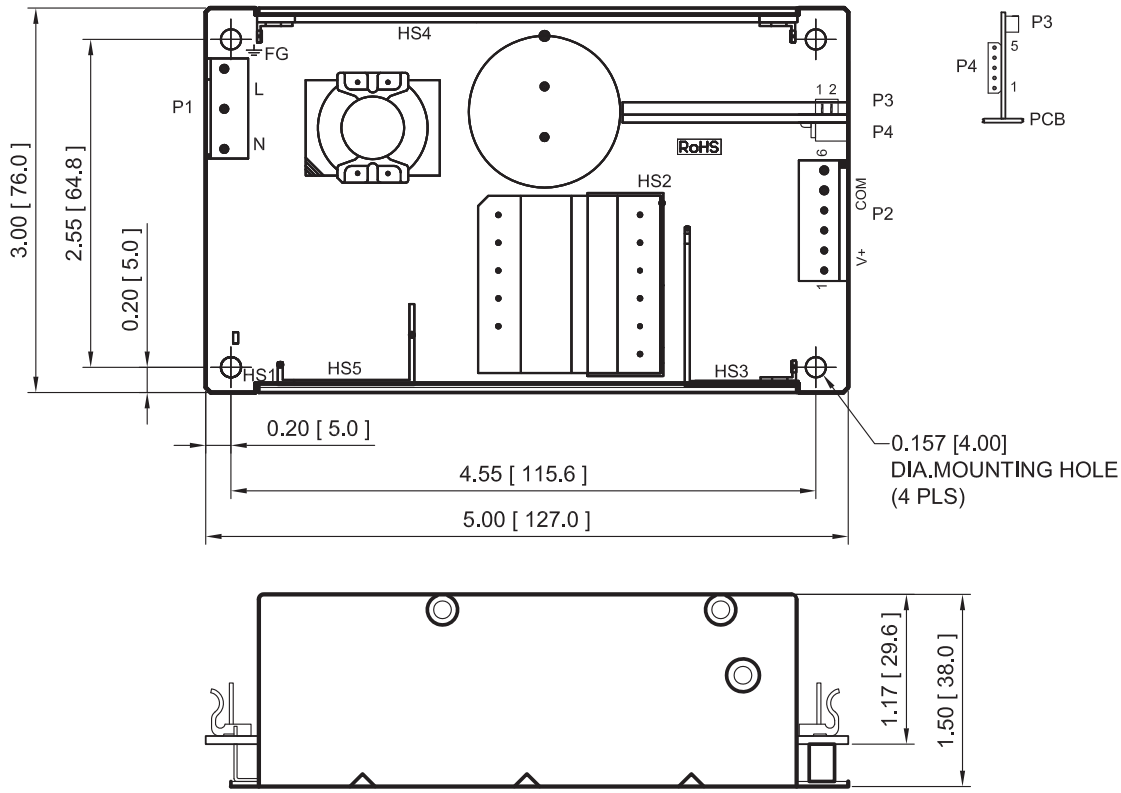
## MECHANICAL SPECIFICATIONS




NOTES:
1. Dimensions shown in inches [mm].
2. Tolerance 0.02 [0.5] maximum.
3. Input connector P1: Molex header 09-65-2058 or equivalent, mating with Molex housing 09-50-1051 or equivalent.
4. Output connector P2: Molex header 09-65-2068 or equivalent, mating with Molex housing 09-50-1061 or equivalent.
5. Fan connector P3: JST header S2B-ZR-3.4 or equivalent, mating with JST housing ZHR-2 or equivalent.
6. Connectors P4: Molex header 22-05-7055 or equivalent, mating with Molex housing 50-37-5053 or equivalent.
7. Fixing of units to end equipment is through standoffs and the four mounting holes in PCB.
8. Ground tab is 0.25 [6.35] × 0.032 [0.8] fast-on connector.
9. Weight: 390 grams (0.86 lbs.) approx.

### PIN CHART

| Connector | P1 | | | P2 | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Pin No. | 1 | 2 | 3 | 1 | 2 | 3 | 4 | 5 | 6 |
| Polarity | Ground | Live | Neutral | +V1 | | | Common Return | | |

| Connector | P3 | | P4 | | | | |
|---|---|---|---|---|---|---|---|
| Pin No. | 1 | 2 | 1 | 2 | 3 | 4 | 5 |
| Polarity | +12V Fan | Common Return | -Sense | +Sense | PFD | Inhibit | Common Return |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