

# FSP400-1K SERIES

### FEATURES

- BF Class insulation
- 4 x 7 x 1.58 inch profile
- Meet EN55011 / 55032 and FCC Class B
- 100-240V input with active PFC
- Efficiency 92% typical
- Output inhibit control & power failed indication
- Standby output 5Vdc at 100mA
- 7 CFM low forced air for 400W output
- Support Fan power 12Vdc



### SAFETY STANDARD APPROVAL



### DESCRIPTION

This AC-DC switching power supplies series in a package of 4 x 7 x 1.58 inches is a single output with +5Vsb PSU. The single main output is capable of delivering 400 watts continuous power at 7 CFM forced air cooling or 300 watts at convection cooling. Two form factors are supported as U-Bracket or Enclosed with fan assembly. It's designed for medical application and certified also to IEC62368-1 for data networking, industrial and telecommunication application.

### INPUT SPECIFICATIONS

Input voltage:	90-264 VAC
Input frequency:	47-63 Hz
Input current:	4.2 A (rms) @ 115 VAC, 60 Hz 2.1 A (rms) @ 230 VAC, 50 Hz
Earth leakage current:	300 $\mu$ A max. @ 264 VAC, 63 Hz 100 $\mu$ A max. @ 264 VAC, 63 Hz

### OUTPUT SPECIFICATIONS

Output voltage/current:	See rating chart.
Maximum output power:	See rating chart.
Ripple and noise:	1% peak to peak maximum
Remote sense	Compensation for cable losses up to 0.5V
Protection:	
OVP	Auto recovery
OPP & Shorted	Auto recovery
OTP	Latch off
Temperature coefficient:	All outputs $\pm$ 0.04% / $^{\circ}$ C maximum
Transient response:	Maximum excursion of 4%, recovering to 1% of final value within 500 $\mu$ s after a 25% step load change
Standby power	5 V at 100 mA maximum
Fan power	12 V at 250 mA maximum

### ENVIRONMENTAL SPECIFICATIONS

Operating temperature:	-10 $^{\circ}$ C to +70 $^{\circ}$ C
Storage temperature:	-40 $^{\circ}$ C to +85 $^{\circ}$ C
Relative humidity:	5% to 95% non-condensing
Operating altitude	High altitude 5000 meters
Derating:	Derate from 100% at +50 $^{\circ}$ C linearly to 50% at +70 $^{\circ}$ C, applicable to convection and forced-air cooling conditions

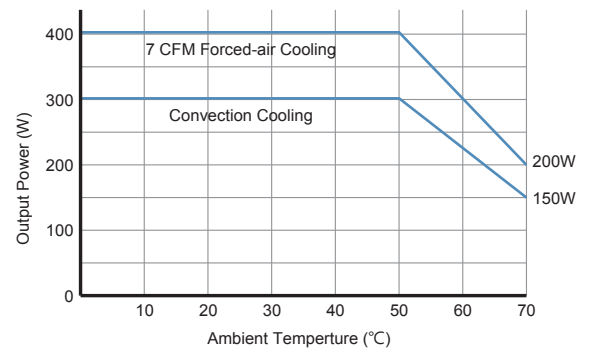
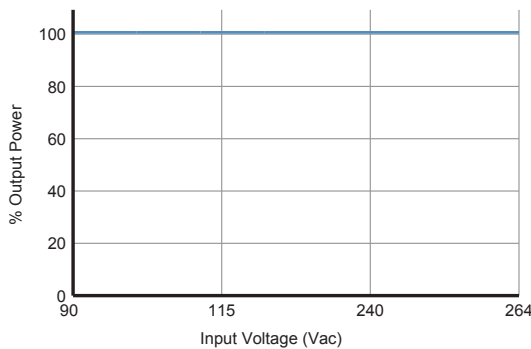
### GENERAL SPECIFICATIONS

Switching frequency:	85 KHz (typical)
Power factor:	0.98 typical @ 115VAC,60Hz
Efficiency:	Refer to rating table
Hold-up time:	12 ms minimum at 110 VAC & 400 W
Line regulation:	$\pm$ 0.5% maximum at full load
Inrush current:	20 A @ 115 VAC, or 40 A @ 230 VAC, at 25 $^{\circ}$ C cold start
Withstand voltage:	4000 VAC from input to output (2 MOPP) 1780 VAC from input to ground (1 MOPP) 1500 VAC from output to ground
MTBF:	350,000 hours at full load at 25 $^{\circ}$ C ambient, calculated per MIL-HDBK-217F
EMC Performance (EMC60601-1-2)	
EN55011/EN55032:	Class B conducted, class A radiated
EN61000-3-2:	Harmonic distortion, class A and D
EN61000-3-3:	Line flicker
EN61000-4-2:	ESD, $\pm$ 15 KV air and $\pm$ 8 KV contact
EN61000-4-3:	Radiated immunity, 9-28 V/m
EN61000-4-4:	Fast transient/burst, $\pm$ 2 KV
EN61000-4-5:	Surge, $\pm$ 1 KV diff., $\pm$ 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, >95% reduction for 10 ms.

### INTERFACE SIGNALS

PFD:	Output signal, This signal appears at least 1ms prior to V1 output dropping 5% below its nominal value and 100 ms minimum delay after V1 is within regulation.
Inhibit:	TTL high for normal operation, low upon loss of input power
PS OFF:	Input signal, TTL low level to turn-off output
DC OK:	Input signal, TTL high level to turn-off output.
	Output signal, TTL high when main output voltage >95% rating.

### OUTPUT POWER DERATING CURVE



### OUTPUT VOLTAGE/CURRENT RATING CHART

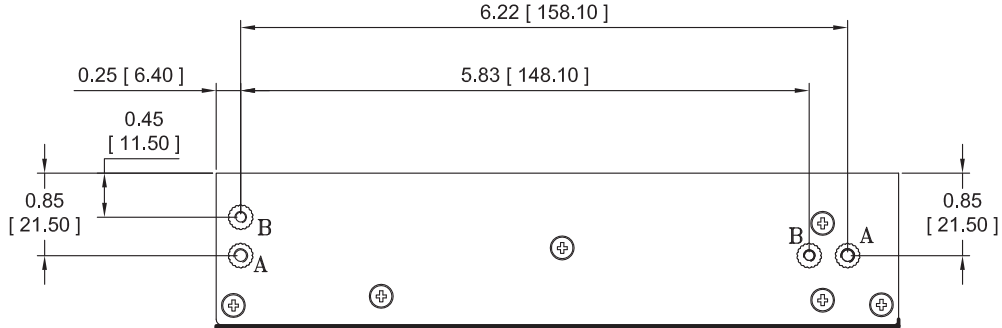
Model <sup>(1)</sup>	Output							Efficiency (typical)	
	V1	Min. Current	Max. Current at convection	Max. Current at 7 CFM <sup>(2)</sup>	Tol.	Ripple & Noise <sup>(3)</sup>	Max. Power	@ 300 W 115/230 Vac	@ 400 W 115/230 Vac
FSP400-1K20M1	12 V	0 A	25.00 A	33.34 A	±2%	120 mV	300 W / 400 W	90 / 92 %	88 / 91 %
FSP400-1K30M1	15 V	0 A	20.00 A	26.67 A	±2%	150 mV	300 W / 400 W	90 / 92 %	88 / 91 %
FSP400-1K31M1	18 V	0 A	16.67 A	22.23 A	±2%	180 mV	300 W / 400 W	90 / 92 %	88 / 91 %
FSP400-1K40M1	24 V	0 A	12.50 A	16.67 A	±2%	240 mV	300 W / 400 W	90 / 92 %	89 / 92 %
FSP400-1K50M1	28 V	0 A	10.72 A	14.29 A	±2%	280 mV	300 W / 400 W	90 / 92 %	89 / 92 %
FSP400-1K70M1	36 V	0 A	8.34 A	11.12 A	±2%	360 mV	300 W / 400 W	90 / 92 %	89 / 92 %
FSP400-1K80M1	48 V	0 A	6.25 A	8.34 A	±2%	480 mV	300 W / 400 W	90 / 92 %	89 / 92 %

NOTES:

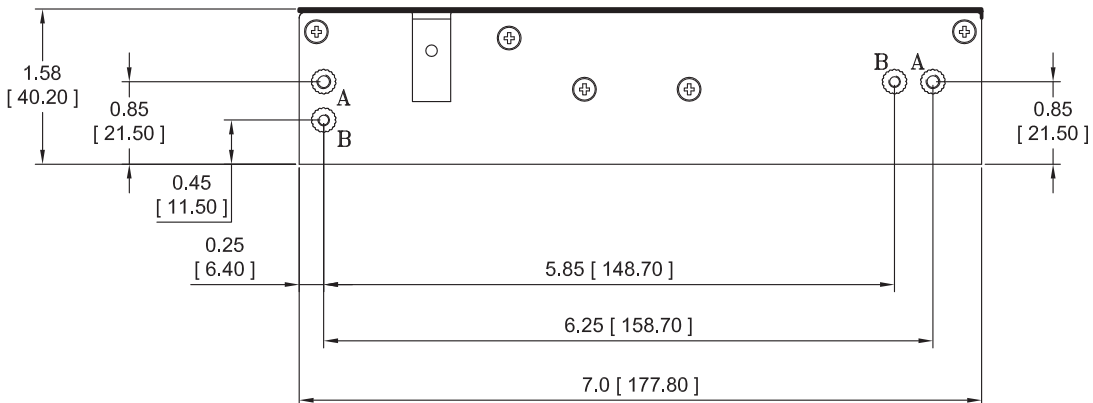
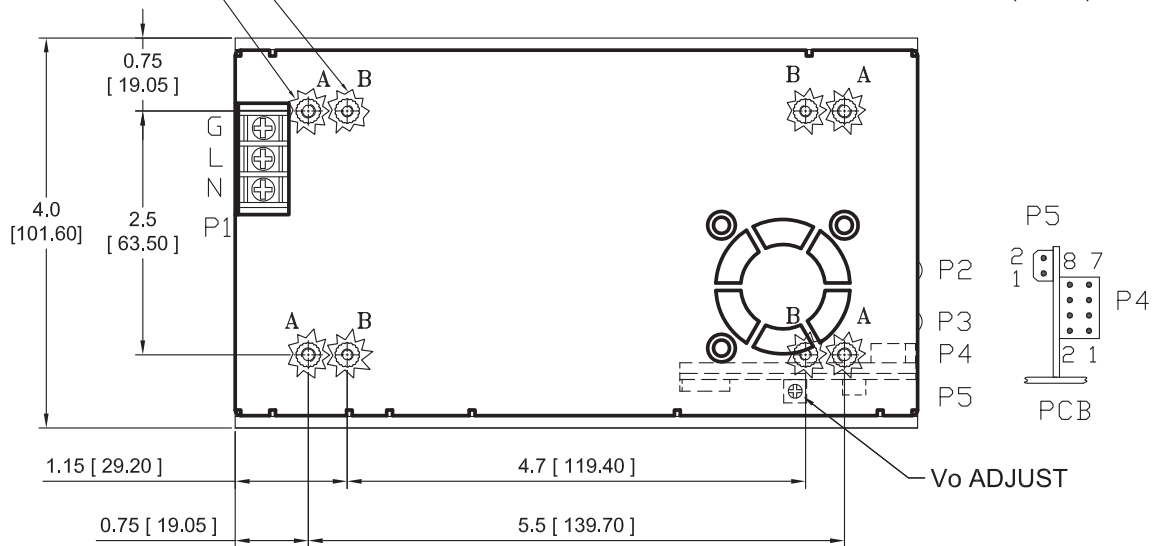
1. Add "C" on the end for enclosed form with cover and fan assembly, e.g. FSP400-1K20M1C.
2. 300 W without moving air or 400 W with 7 CFM forced air provided by user for U-bracket form.
3. Ripple and noise is maximum peak-to-peak voltage value measured at output within 20 MHz bandwidth, at rated line voltage and output load ranges, and with a 10 µF tantalum capacitor in parallel with a 0.1 µF ceramic capacitor across the output.
4. All models may be operated at no-load without damage. At no load, output voltage fluctuates beyond 5% due to the burst-mode operation of the control IC in them for energy saving.

### MECHANICAL SPECIFICATIONS

ENCLOSED:

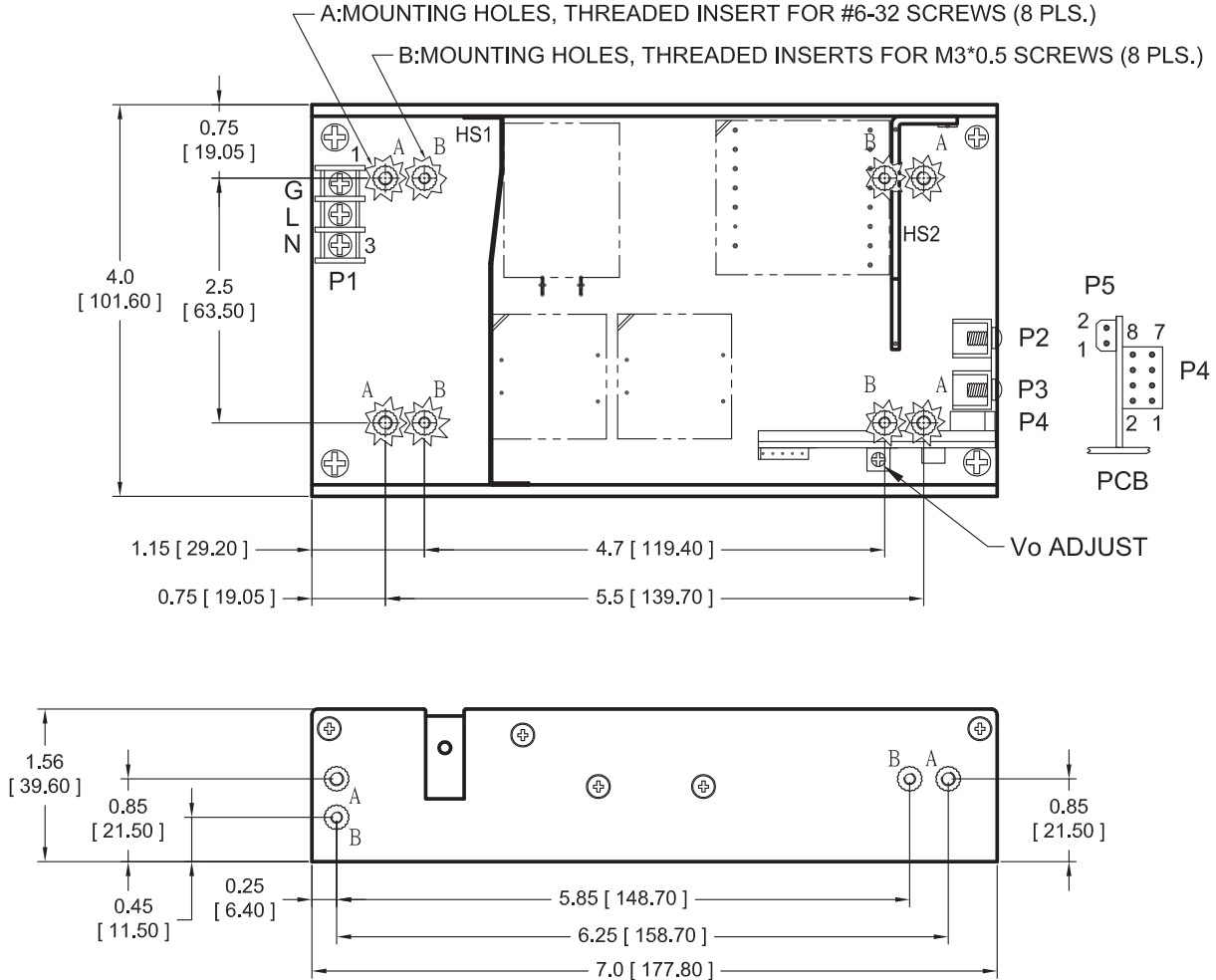


A: MOUNTING HOLES, THREADED INSERT FOR #6-32 SCREWS (8 PLS.)  
 B: MOUNTING HOLES, THREADED INSERTS FOR M3\*0.5 SCREWS (8 PLS.)



### MECHANICAL SPECIFICATIONS

U-Bracket:



#### PIN CHART

CONNECTOR	P1 (AC)			P2	P3	P5	
PIN NO.	1	2	3			1	2
OUTPUT	Ground	Live	Neutral	+V1	Common Return	+12V Fan	Common Return

CONNECTOR	P4							
PIN NO.	1	2	3	4	5	6	7	8
OUTPUT	Common Return	Inhibit	+V1 Sense	+5V Standby	-V1 Sense	DC OK	PFD	PS OFF

#### NOTES:

- Dimensions shown in inches [mm]
- Tolerance 0.02 [0.5] maximum
- Input connector P1 is Dinkle terminal P/N DT-35-B01W-03, with nickel plated M3 screws.
- P2, P3: M4 x 0.7 screw connectors
- Connector P4: Molex header 87833-08 or equivalent, mating with Molex housing 51110-0850 or equivalent.
- Fan connector P5: JST header S2B-ZR-3.4 or equivalent, mating with JST housing ZHR-2 or equivalent.
- Maximum penetration depth of fixing screws is 4 mm from the outer surface of chassis.

Weight: 1.0 Kg (2.23 lbs.) approx. for U-bracket form  
 1.14 Kg (2.52 lbs.) approx. for U-bracket form