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## 650W Open Frame type Medical power supply < PM650

### DESCRIPTION

The PM650 series comprising single and multiple output models for 650-700 watts of continuous output power is specially designed for medical and ITE applications, not for life-support. They operate at 90-264 VAC input voltage without the need of a selector strap. The units are constructed on a printed circuit board with a U-bracket for mechanical support and heat sinking. A cover-and-fan assembly can be added during manufacturing.

### FEATURES

- EN61000-3-2 class A and D compliant
- Power Factor 0.98 typical
- Overvoltage protection
- Short-circuit protection
- Thermal protection
- Power Fail Detect (PFD)
- 100% burn-in at full rated load
- Remote sense on output #1 and output #2
- Remote inhibit – TTL high disables output
- Compliant with RoHS requirements

### INPUT SPECIFICATIONS

Input voltage : 90-264 VAC  
 Input frequency : 47-63 Hz  
 Input current : 10 A (rms) for 115 VAC  
 5 A (rms) for 230 VAC  
 Earth leakage current : 100 uA max. @ 115 VAC, 60 Hz  
 165 uA max. @ 230 VAC, 50 Hz

### OUTPUT SPECIFICATIONS

Output voltage/current : See rating chart  
 Total output power : See rating chart  
 Ripple and Noise : 2% peak to peak maximum  
 Overvoltage protection : Provided on output #1 only; set at 115-140% of its nominal output voltage  
 Overcurrent protection : All outputs protected to short circuit conditions  
 Temperature coefficient : All outputs  $\pm 0.04\%$  / $^{\circ}\text{C}$  maximum  
 Transient response : Maximum excursion of 4% or better on all models, recovering to 1% of final value within 500us after a 25% step load change  
 PFD signal : TTL logic high for normal operation and TTL logic low upon loss of input power. This signal appears at least 1ms prior to master output dropping 5% below its nominal value. This signal also provides a minimum delay of 100 ms after master output is within regulation.  
 Remote inhibit : Requires an external TTL high level signal to inhibit outputs for standard models.

### PM650 SERIES

CE (LVD)  
 RoHS



*New!!*

### Safety Standard Approvals :



UL60601-1, CSA C22.2 No. 601.1  
 File No. E178020



UL 60950-1, CSA C22.2 No. 60950-1



TUV EN60601-1



TUV EN60950-1

### ENVIRONMENTAL SPECIFICATIONS

Operating temperature : 0 $^{\circ}\text{C}$  to +70 $^{\circ}\text{C}$   
 Storage temperature : -40 $^{\circ}\text{C}$  to +85 $^{\circ}\text{C}$   
 Relative humidity : 5% to 95% non-condensing  
 Derating : Derate from 100% at +50 $^{\circ}\text{C}$  linearly to 50% at +70 $^{\circ}\text{C}$

### GENERAL SPECIFICATIONS

Switching frequency : 70 KHz  $\pm$  10 KHz  
 Power factor : 0.98 typical  
 Efficiency : 80% minimum on all models  
 Hold-up time : 12 msec minimum at 110 VAC  
 Line regulation :  $\pm 0.2\%$  maximum at full load  
 Inrush current : 50 A @ 115 VAC or 100 A @ 230 VAC at 25 $^{\circ}\text{C}$  cold start  
 Withstand voltage : 4000 VAC from input to output  
 1500 VAC from input to ground  
 500 VAC from output to ground  
 MTBF : 300,000 hours minimum at full load at 25 $^{\circ}\text{C}$  ambient, calculated per MIL-HDBK- 217F  
 EMC Performance (EN60601-1-2)  
 EN55011: Class B conducted, Class A radiated  
 EN61000-3-2: Harmonic distortion, Class A and D  
 EN61000-3-3: Line flicker  
 EN61000-4-2: ESD,  $\pm 8$  KV air and  $\pm 6$  KV contact  
 EN61000-4-3: Radiated immunity, 3 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, 3 Vrms  
 EN61000-4-8: Magnetic field immunity, 3 A/m  
 EN61000-4-11: Voltage dips, 30% reduction for 500 ms, 60% reduction for 100 ms and >95% reduction for 10 ms



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**OUTPUT VOLTAGE/CURRENT RATING CHART**

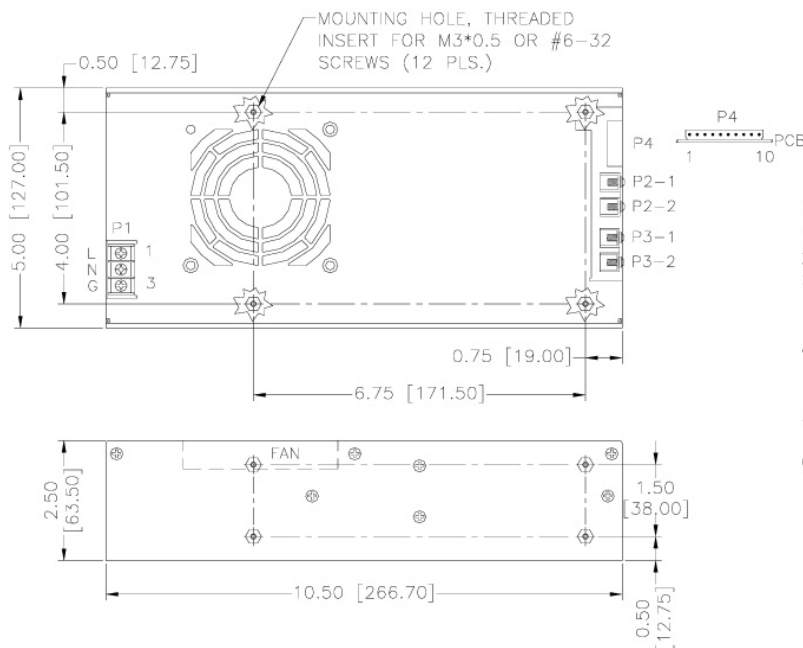
MODEL	Output # 1				Output # 2				Output # 3				Maximum Output Power
	Vnom.	Imin.	Imax.	Tol.	Vnom.	Imin.	Imax.	Tol.	Vnom.	Imin.	Imax.	Tol.	
PM650-12	12 V	0 A	54.2 A	2%									650 W
PM650-13	15 V	0 A	43.4 A	2%									650 W
PM650-14	24 V	0 A	27.1 A	2%									650 W
PM650-15	27 V	0 A	24.1 A	2%									650 W
PM650-16	30 V	0 A	21.7 A	2%									650 W
PM650-17	36 V	0 A	18.1 A	2%									650 W
PM650-18	48 V	0 A	14.6 A	2%									700 W
PM650-20	24 V	1.5 A	18 A	2%	12 V	1.2 A	22 A	5%					650 W
PM650-21	24 V	1.5 A	18 A	2%	15 V	1.0 A	18 A	5%					650 W
PM650-22	48 V	0.75 A	9 A	2%	24 V	0.6 A	12 A	5%					650 W
PM650-23	48 V	0.75 A	9 A	2%	12 V	1.2 A	22 A	5%					650 W
PM650-24	48 V	0.75 A	9 A	2%	15 V	1.0 A	18 A	5%					650 W
PM650-30	24 V	1.5 A	18 A	2%	12 V	1.2 A	22 A	5%	3.3 V	0 A	10 A	3%	650 W
PM650-31	24 V	1.5 A	18 A	2%	15 V	1.0 A	18 A	5%	3.3 V	0 A	10 A	3%	650 W
PM650-32	24 V	1.5 A	18 A	2%	12 V	1.2 A	22 A	5%	5.1 V	0 A	10 A	3%	650 W
PM650-33	24 V	1.5 A	18 A	2%	15 V	1.0 A	18 A	5%	5.1 V	0 A	10 A	3%	650 W
PM650-34	48 V	0.75 A	9 A	2%	12 V	1.2 A	22 A	5%	3.3 V	0 A	10 A	3%	650 W
PM650-35	48 V	0.75 A	9 A	2%	15 V	1.0 A	18 A	5%	3.3 V	0 A	10 A	3%	650 W
PM650-36	48 V	0.75 A	9 A	2%	12 V	1.2 A	22 A	5%	5.1 V	0 A	10 A	3%	650 W
PM650-37	48 V	0.75 A	9 A	2%	15 V	1.0 A	18 A	5%	5.1 V	0 A	10 A	3%	650 W

**NOTES:**

1. Add suffix "B" for U-bracket format or "C" for enclosed format with fan control function, e.g. PM650-14C.
2. All outputs are floating. It can be connected externally for positive or negative output.
3. Output #1 can be adjusted within +/- 5% of their nominal voltage.
4. Output #3 can be adjusted within +/- 15% of their nominal voltage.
5. 650-700 watts for "C" version with cover-and-fan assembly. 325-350 watts for "B" version without moving air (maximum current of output #1 and #2 derated to 70%), or 650 watts with 50 CFM forced air provided by user.
6. All models may operated at no-load. At no-load, output voltage tolerance increases to 10%.

**MECHANICAL SPECIFICATIONS**

**Single Output Models**



**NOTES:**

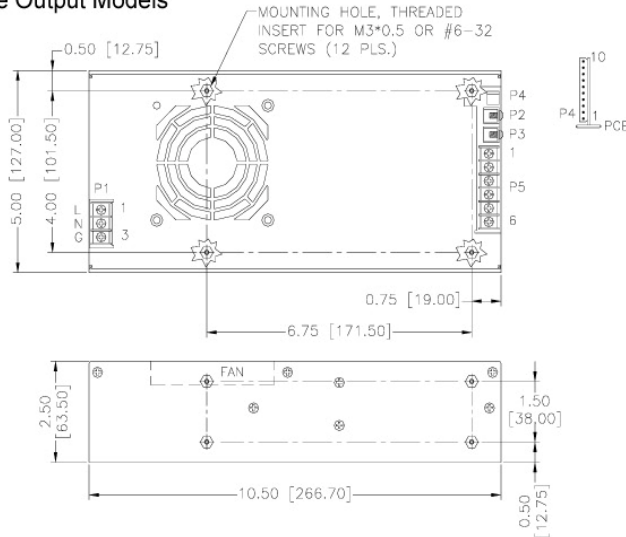
1. Dimensions shown in inches [mm]
2. Tolerance 0.02 [0.5] maximum.
3. Input connector P1 is Dinkle DT-35-B01W-03 screws with M3, nickel-plated screws.
4. Connector P4 mates with Molex housing 50-37-5103 and pins 5263.
5. P2-1, P2-2, P3-1 & P3-2: M3\*0.5 screw connections.
6. Weight: 2.04 kgs.



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**MECHANICAL SPECIFICATIONS**

**Multiple Output Models**



**NOTES:**

1. Dimensions shown in inches [mm]
2. Tolerance 0.02 [0.5] maximum
3. Input connector P1 is Dinkle DT-35-B01W-03 screws with M3, nickel-plated screws.
4. Connector P4 mates with Molex housing 50-37-5103 and pins 5263.
5. P2, P3: M3\*0.05 screw connections.
6. Output connector P5 is Dinkle DT-35-B01W-06. Screws are M3, nickel plated.
7. Weight: 2.14 kgs.

**PIN CHART**

**Single Output Models**

MODEL	CONN PIN	P1 (AC)			P2	P3	P4			
		1	2	3			1	2	3	4
PM650-12 PM650-14 PM650-16 PM650-18	PM650-13 PM650-15 PM650-17	LIVE	NEUTRAL	GROUND	+V	-V	SIGNAL GROUND (-V)	+S (V)	-S (V)	PFD

MODEL	CONN PIN	P4					
		5	6	7	8	9	10
PM650-12 PM650-14 PM650-16 PM650-18	PM650-13 PM650-15 PM650-17	INHIBIT +Ve	INHIBIT -Ve	N.C.	N.C.	0V (FAN)	FAN

**Multiple Output Models**

MODEL	CONN PIN	P1 (AC)			P2	P3	P4			
		1	2	3			1	2	3	4
PM650-20 PM650-22 PM650-24 PM650-31 PM650-33 PM650-35 PM650-37	PM650-21 PM650-23 PM650-30 PM650-32 PM650-34 PM650-36	LIVE	NEUTRAL	GROUND	+V1	-V1	SIGNAL GROUND (-V)	+S (V1)	-S (V1)	PFD

MODEL	CONN PIN	P4						P5					
		5	6	7	8	9	10	1	2	3	4	5	6
PM650-20 PM650-22 PM650-24	PM650-21 PM650-23	INHIBIT +Ve	INHIBIT -Ve	+S (V2)	-S (V2)	0V (FAN)	FAN	+V2	+V2	-V2	-V2	N.C.	N.C.
PM650-30 PM650-32 PM650-34 PM650-36	PM650-31 PM650-33 PM650-35 PM650-37							+V2	+V2	-V2	-V2	+V3	-V3