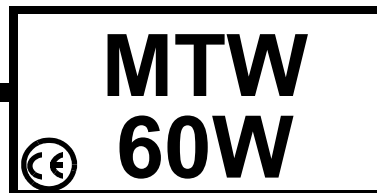


INSTRUCTION MANUAL



KEPCO An ISO 9001 Company.



60 WATT TRIPLE OUTPUT SWITCHING POWER SUPPLY

I — INTRODUCTION

SCOPE OF MANUAL. This instruction manual covers the installation and operation of the Kepco MTW 60W Switching Power Supply, Model MTW 60-51212K.

DESCRIPTION. The Kepco MTW 60W is a PC card style, triple-output switching power supply. Units may be operated with a nominal 100 to 120V a-c and 220 to 240V a-c (input voltage range 85 to 265 Va-c), 50-60 Hz (input frequency range 47-440Hz). They will also operate on 110V to 370V d-c input. The MTW 60W employs a light weight ferrite core with 70 KHz switching frequency for the +5V output and 100KHz for the $\pm 12V$ outputs. Regulation is provided by pulse width modulation. A FET power stage, operating in the flyback mode provides smooth isolated d-c outputs. The $\pm 12V$ outputs have a common return. DC Output power is shared between +5V, +12V and -12V (60W max. total). A thermistor circuit prevents excessive turn-on current surge. Overvoltage protection is provided. Overcurrent protection with automatic recovery from short circuit is featured. A steel cover (Model CA 41) is available as an option.

Table 1 contains output specifications. Section II (following) contains specifications and operating limits.

II — SPECIFICATIONS

The following specifications are at nominal input voltages at 25°C unless otherwise specified.

TABLE 1. MTW 60W OUTPUT SPECIFICATIONS

SPECIFICATION		OUTPUT 1	OUTPUT 2	OUTPUT 3	CONDITON
OUTPUT VOLTS, d-c		5V	+12	-12V	+5V floating from $\pm 12V$
SETTING TOLERANCE (V)		4.9-5.3	11.4-12.6	11.4-12.6	
ADJUSTMENT RANGE		FIXED	FIXED	FIXED	
OUTPUT CURRENT (A)	RATED	5.0	2.5	0.5	
	MINIMUM	0	0	0	
	PEAK ⁽⁵⁾	7.0	3.5	0.7	Within 10 seconds.
SOURCE EFFECT		1% max.	0.4% max.	0.4% max.	85-132Va-c, 170-265Va-c
LOAD EFFECT		2% max.	2% max.	1% max.	10-100% load
TEMPERATURE EFFECT		2% max.	2% max.	1% max.	-10 to 50°C
COMBINED EFFECT		2.5% max.	2.5% max.	2% max.	Overshoot at startup: 4% typ.
TIME EFFECT (Drift)		1% max.	1% max.	1% max.	1/2 to 8 hr.
OVERCURRENT (AMPS) ⁽²⁾		7.4 min.	3.7 min.	0.75 min.	
OVERVOLTAGE SETTING (VOLTS) ⁽³⁾		5.8 min.	13.8 min.	-	
EFFICIENCY (typ.)	100 Va-c	76%	76%	76%	
	240 Va-c	76%	76%	76%	
ACCEPTABLE OUTPUT CAP. ⁽⁴⁾ ($\mu F_{max.}$)		10000	5000	3000	Fixed load resistance
RIPPLE AND NOISE ⁽¹⁾ (mV p-p)	ripple (typ)	80	100	100	
	ripple (-10-0°C)	140 max.	160 max.	160 max.	
	spike noise (typ)	120	150	150	
	spike noise (-10-0°C)	160 max.	180 max.	180 max.	
(1) Switching component $\leq 20KHz$, 0 to 100% load, 0 to 60 °C, tested with 100 μF electrolytic and 0.1 μF film capacitors across the load and connected to the power supply via 5.9 in (150mm) wires.		(3) Zener diode clamp method; protects load against faulty power supply; operation could require power supply service.			
(2) Hiccup type; automatic recovery after cause of overcurrent is removed. Avoid overcurrent operation to prevent component degradation.		(4) +5V output may drop during startup.			
		(5) Peak current acceptable as long as rms output current within 10 seconds is within rated value.			

INPUT VOLTAGE: CAUTION: Operation at voltage below specified range for more than 10 minutes may cause component degradation. Nominal 100-120V a-c, 200-240V a-c, range: 85-265V a-c (0 to 100% load, -10 to 60°C) d-c range: 110 -370V d-c (Safety agency approval applies only to a-c input operation.)

INPUT SOURCE FREQUENCY:

Nominal 50/60 Hz; Range 47-440 Hz. (0 to 100% load, -10 to 60°C). At 440 Hz the leakage current exceeds the VDE safety specification limit.

INPUT CURRENT: (maximum load at 25°C with nominal output voltage):
1.4A typ. (100 Va-c input, 100% load); 0.8A typ. (240 Va-c input, 100% load)

INPUT PROTECTION AND SOFT START: A thermistor circuit reduces start-up surge. Units are protected against shorts by an input fuse. Fuse value 3A, 250V.

INPUT SURGE: First surge only, not including current flow into EMI filter.
20A typ. (100 V a-c, 100% load, 25°C cold start); 40A typ. (240 Va-c, 100% load, 25°C cold start)

LEAKAGE CURRENT:
0.60mA max, 0.45mA typ at 100V a-c (single pole switching) in conformance to DENAN .
0.75mA max, 0.55mA typ at 240V d-c (single pole switching in conformance to UL 1950/IEC 950)

POWER FACTOR: 0.55 typ. at 100 Va-c, 0.45 typ. at 240 Va-c

TRANSIENT RECOVERY: A step load change from 50% to 100% of rated load in 50 microseconds or more, produces no more than 4% output voltage excursion. Temperature range from -10 to 60°C.

OUTPUT HOLDING TIME: Upon input interruption the output is maintained for 180 milliseconds typical with 240 Va-c input voltage, and for 20 milliseconds typical with 100 Va-c input voltage. The condition for output load is 100%.

START UP TIME: 350mS max. (+5V, ±12V) at 100 Va-c, 150mS max. (+5V, ±12V) at 240 Va-c. Output voltage may not rise with constant current load. Output voltage may rise momentarily, then drop during brief input voltage interruptions.

OVERVOLTAGE PROTECTION: Fixed, factory set. See Table 1. The overvoltage circuit is set by Zener diode clamp.

OVERCURRENT: Hiccup type, output voltage returns to rated level upon removal of cause (long term overcurrent could damage unit)

OPERATING TEMPERATURE: -10 to 60°C (start up -20 to -10°C). See the derating plot, Figure 1. Do not allow the power supply to become dust covered because that will decrease the cooling efficiency of the unit and cause insulation to deteriorate.

STORAGE TEMPERATURE: -30°C to + 75°C.

COOLING: Natural convection

ORIENTATION: Horizontal (see Figure 2).

HUMIDITY: 10% to 90% relative humidity, operating and storage, noncondensing, wet bulb temperature ≤35°C

WITHSTANDING VOLTAGE:
(at 5 to 35°C ambient, 45 to 85% relative humidity, cutout current 10 ma):
Between input and output terminals, 3.0 KV a-c for 1 minute.
Between input and chassis, 2000V a-c for 1 minute.
Between output terminals and chassis, 500V a-c for 1 minute.

INSULATION RESISTANCE: (500V d-c, 5 to 35°C ambient, 45 to 85% relative humidity)
Between input and output, input and chassis, and output and chassis:100 megohms minimum.

VIBRATION: Three axes, one hour each, sweep time 10 min.: nonoperating
5-10 Hz., 10 mm amplitude;10-200 Hz., 2G (19.6m/s²) acceleration

SHOCK: Three axes, 60G (588m/s²), 11 ms ±5msec pulse duration, three shocks each axis, nonoperating, 1/2 sine pulse

SAFETY: Meets UL 60950-1.c-UL and TÜV Rheinland EN60950 (ambient temp. 50°C max.). Meets creepage and clearance requirements of DENAN Appendix 8 (at 100V a-c only). MTW 60W units are CE marked per the Low Voltage Directive (LVD), EN60950. [The standards do not apply with DC input operation]

EMC - EMISSIONS:
Conducted Noise 0.15MHz to 30MHz: FCC Class B, VCCI-B, EN55011-B, EN55022-B

EMC - IMMUNITY:
ESD: EN 61000-4-2 Level 4, Normal operation.
Radiated Field Noise: EN 61000-4-3 Level 3, Normal operation.
Electrical Fast Transient/Burst (EFT): EN 61000-4-4 Level 3, Normal operation.
Surge: EN 61000-4-5 Level 4, no damage.
Conducted Noise: EN 61000-4-6 Level 3, Normal operation.
Power Frequency Magnetic Field: EN 61000-4-8 Level 4, Normal operation.
Voltage Dips, Short Interruptions, Voltage Variation: EN 61000-4-11, Normal operation.

ELECTROLYTIC CAPACITOR: Life expectancy: 10,000 hours min. (ambient temp. 50°C)

WARRANTY: One year.

III — INSTALLATION

MOUNTING THE POWER SUPPLY: Refer to Figures 2, 3 and 4. The unit may be mounted on one mounting surface. The air surrounding the power supply must not exceed the ambient temperature values given in the graph in Figure 1.

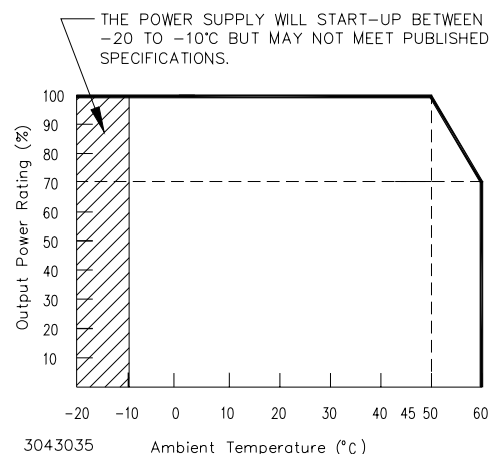
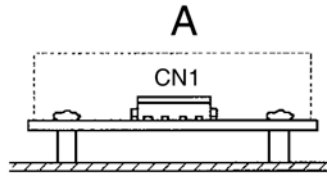


FIGURE 1. DERATING PLOT

INSTALLATION (INSULATION): Install unit 0.3 inches (8mm) away from base with the use of 0.24 inch (6mm) diameter spacers attached to the PC board. Keep at least 0.16 inches (4mm) spacing around and above the unit to comply with insulation and safety requirements. An insulator must be used if the spacing is less than 0.16 inches (4mm) (see Figure 3).

VENTILATION: It is recommended to keep at least 0.40 inches (10mm) clearance from adjacent equipment for proper ventilation

CONNECTIONS: Connect a load to the +5V output of the power supply by connecting pin 6 of output connector CN2 (+5V) to the load (+) terminal, and pin 5 (5V Return) to the load (-) terminal (see Figure 4 for input/output connector/pin locations). Connect a load to the +12V output of the power supply by connecting pin 4 (+12V) of connector CN2 to the load (+) terminal, and pin 3 (±12V Return) to the load (-) terminal. Connect a load to the -12V output of the power supply by connecting pin 1 (-12V) of connector CN2 to the load (-) terminal, and pin 2 (±12V Return) to the load (+) terminal. The AC input power is applied via input connector CN1. Make sure to connect the AC input Neutral and Line wires to pins 3 and 1, respectively, of CN1 (see Figure 2). See Table 2 for mating connector information. A Cable Kit (P/N 219-0487) is available as an option from Kepco. The kit includes an input cable, terminated on one end with an input mating connector; and an output cable, terminated on one end with an output mating connector.

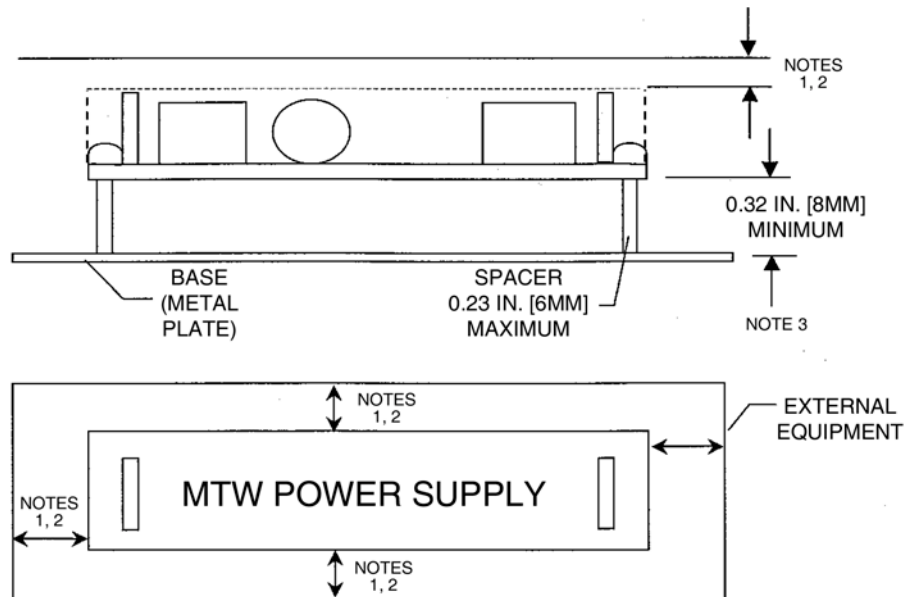


NOTES:

1. METHOD A (STANDARD) RECOMMENDED, APPLY DERATING CURVE PER FIGURE 1.
2. OTHER METHODS NOT ALLOWED (INADEQUATE COOLING).

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FIGURE 2. MOUNTING DIRECTION

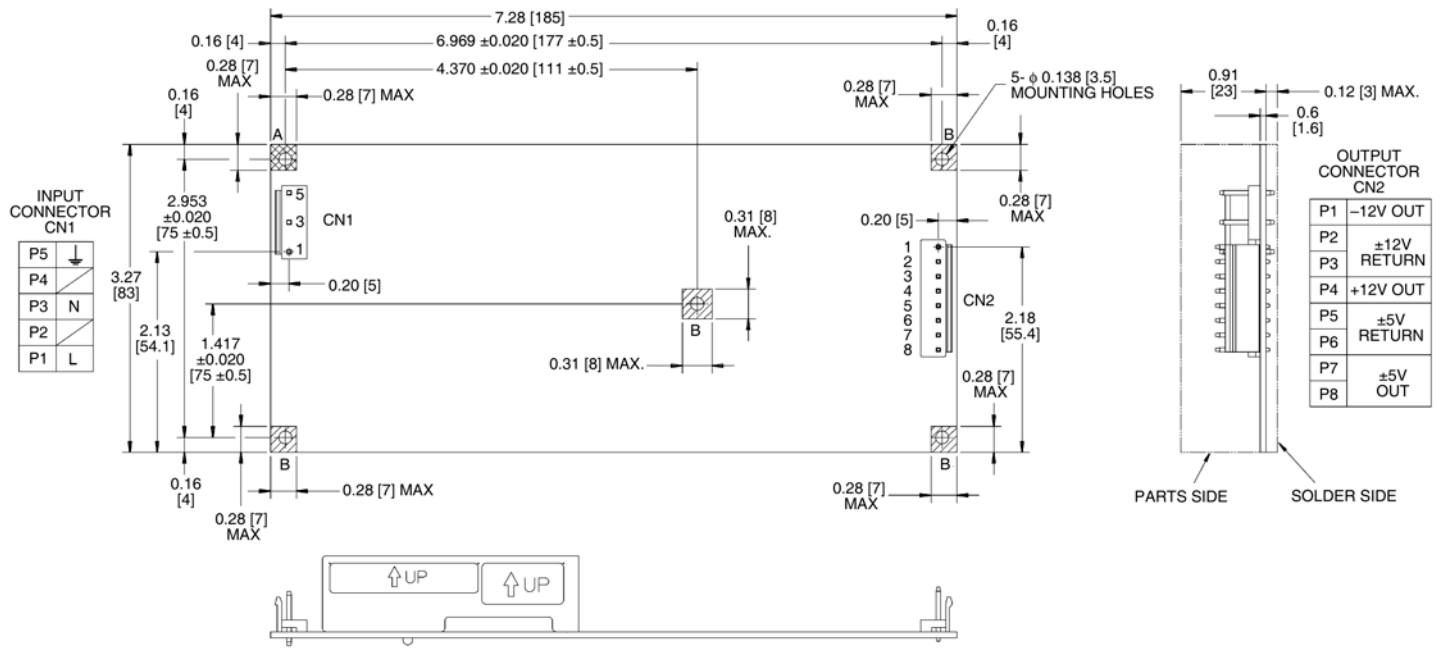


NOTES:

1. MAINTAIN MINIMUM 0.16 IN. [4 MM] CLEARANCE TO SATISFY INSULATION AND WITHSTAND VOLTAGE REQUIREMENTS; OTHERWISE USE ADEQUATE INSULATOR.
2. MINIMUM 0.39 IN. [10MM] CLEARANCE RECOMMENDED FOR ADEQUATE COOLING.
3. INSTALL POWER SUPPLY AT LEAST 0.32 IN. [8MM] ABOVE BASE USING SPACERS, (MAXIMUM DIA. 0.23 IN. [6MM]).

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FIGURE 3. VENTILATION AND INSULATION REQUIREMENTS



- NOTES:
1. DIMENSIONS ARE IN INCHES. DIMENSIONS IN BRACKETS ARE IN MILLIMETERS.
 2. TOLERANCES: ± 0.04 IN. [± 1.0 MM] UNLESS OTHERWISE SPECIFIED.
 3. WEIGHT: 11.64 OZ. (330 GR.) MAX.
 4. AT AREAS A AND B: MOUNTING SCREWS INSTALLED FROM PARTS SIDE, SPACERS, 0.24 [6] DIA MAX, INSTALLED AT SOLDER SIDE.

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FIGURE 4. MTW 60W MECHANICAL OUTLINE DIAGRAM

TABLE 2. INPUT/OUTPUT MATING CONNECTORS

Connector	MTW 60W Connector	Mating Connector ⁽²⁾	
		Socket Housing	Terminal Pin
Input	B3P5-VH-B ⁽¹⁾	VHR-5N ⁽¹⁾	SVH-21T-P1.1 ⁽¹⁾
Output	B8P-VH-B ⁽¹⁾	VHR8N ⁽¹⁾	SVH-21T-P1.1 ⁽¹⁾

NOTES:

1. Manufacturer: Japan, Solderless Terminal Mfg. Co. Ltd, VH Series
2. Optional cable kit (KIT 219-0487) includes one input and one output cable (one meter long) with mating connectors for CN 1 (input) and CN2 (output), unterminated at other end.