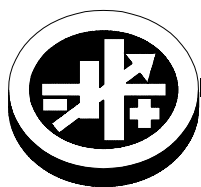
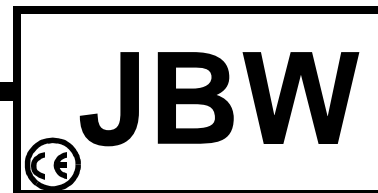


# INSTRUCTION MANUAL



KEPCO An ISO 9001 Company.



## 50 WATT SINGLE OUTPUT SWITCHING POWER SUPPLIES

### I — INTRODUCTION

**SCOPE OF MANUAL.** This instruction manual covers the installation and operation of the Kepco JBW 50W Series of Switching Power Supplies.

**DESCRIPTION.** The Kepco JBW 50W Series consists of four models of switching power supplies, with a single output as shown in Table 1. 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 JBW 50W Series employs a light weight ferrite core. Regulation is provided by pulse width modulation. A FET power stage, operating as a forward converter with a fixed switching frequency of 140KHz provides a smooth isolated d-c output. A thermistor circuit prevents excessive turn-on current surge. Overvoltage protection is provided. Current limiting with automatic recovery from short circuit is featured. Units are manufactured on an open frame PC board.

Table 1 contains specifications and operating limits of individual JBW 50W Series models. Section II (following) contains specifications and operating limits common to all JBW 50W Series Models.

### II — SPECIFICATIONS

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

**TABLE 1. OUTPUT RATINGS AND SPECIFICATIONS, JBW 50W SERIES**

MODEL		JBW 05-10R	JBW 12-4R3	JBW 15-3R5	JBW 24-2R1
OUTPUT VOLTS, d-c		5V	12V	15V	24V
ADJUSTMENT RANGE		4.5-5.5V	10.8-13.2V	13.5-16.5V	21.6-26.4V
CURRENT/POWER RATINGS		10.0A/50W	4.3A/51.6W	3.5A/52.5W	2.1A/50.4W
CURRENT LIMIT (AMPS)		10.5 min	5.4 min	4.4 min	3.0 min
OVP RANGE (VOLTS)		5.75-6.9	13.8-16.8	17.2-21.0	27.6-33.6
EFFICIENCY	100 Va-c	77%	80%	80%	81
	240 Va-c	79%	81%	81%	83%
ACCEPTABLE EXTERNAL OUTPUT CAPACITOR μFmax., (fixed load resistance)		10,000	10,000	10,000	10,000
RIPPLE AND NOISE <sup>(1)</sup> (mV p-p)	ripple (typ)	80	120	120	120
	spike noise (typ) <sup>(2)</sup>	120	150	150	150
(1) 0 to 100% load, 0 to 50 °C, tested with 100μF electrolytic and 0.1μF film capacitors across the load and connected to the power supply via 5.9 in (150mm) wires					
(2) Measured with a 20 MHz bandwidth.					

#### INPUT VOLTAGE:

Nominal 100-120V a-c, 220-240V a-c, range: 85-265V a-c (0 to 100% load, -10 to 60°C)

d-c range: 120 -370V d-c [the power supply may shut down if operated below the input voltage range or if the input voltage increases slowly at start up (> 1 second)]. To reset the power supply, wait one minute and reapply input power. Operation for longer than 10 minutes at input voltage outside the recommended range may result in component degradation.

#### INPUT SOURCE FREQUENCY:

Nominal 50/60 Hz; Range 47-66 Hz. (Above 66Hz to 440 Hz the leakage current exceeds the VDE safety specification limit.)

#### INPUT CURRENT: (maximum load at 25°C with nominal output voltage):

0.7A typ. (except 24V Model: 0.8 typ), 0.88A max. (100 Va-c input, 100% load);  
0.35A typ., 0.5A max. (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 3.15A, 250V.

#### INPUT SURGE: cold start 15A typ, 30.0A max. (100 V a-c, 100% load); 40A typ., 60.0A max. (240 Va-c, 100% load)

#### POWER FACTOR: 0.99 typ. at 100 Va-c, 0.93 typ. at 240 Va-c

#### LEAKAGE CURRENT:

0.75mA max, 0.35mA typ at 100V a-c and 60 Hz (single pole switching) (operating in conformance with Den-An),  
0.75mA max, 0.50mA typ at 240V d-c and 60 Hz (operating in conformance to UL 1950/IEC 950)

## STABILIZATION:

Source Effect (85 to 265 Va-c) 0.4% max.  
Load Effect, measured at sensing terminals (0% - 100% load change) 0.8% max.  
Temperature effect (-10 to 50°C) 1.0% max.  
Combined effect: 2.0% max. (4% typical for overshoot at start-up)  
Time effect or drift (1/2 to 8 hr. at 25°C) 0.4% max.

**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 50°C. Recovery time is 1ms maximum.

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

**START UP TIME:** 500ms max., 400ms typ. at 100 Va-c and at 240 Va-c

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

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

**OPERATING TEMPERATURE:** -10 to 60°C (start up -20 to -10°C). See the derating, 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:** Vertical or horizontal (see Figure 3)

**HUMIDITY:** 10% to 90% relative humidity, operating and storage, noncondensing,  
wet bulb temperature < or = 35°C

## WITHSTANDING VOLTAGE

(at 5 to 35°C ambient, 45 to 85% relative humidity, cutout current 10 ma):  
Between input and output terminals, 3000V a-c for 1 minute..  
Between input terminals and ground, 2000V a-c for 1 minute.  
Between output terminals and ground, 500V a-c for 1 minute.

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

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

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

**SAFETY:** All units designed to meet UL 60950, CSA C22.2, No. 60950-1(C-UL), and TÜV Rheinland EN60950 (ambient temp. 50°C). JBW 50W units are CE marked per the Low Voltage Directive (LVD), EN60950.

## EMC - EMISSIONS:

Conducted Noise 0.15MHz to 30MHz: FCC Class B, VCCI-B, EN55011-B, EN55022-B.  
Input Harmonics (on AC Mains) 0 to 2KHZ: EN 61000-3-2.

**EMC - IMMUNITY:** Designed to meet EN 50082-2.

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.  
Interruptions and voltage dips, short variations: EN 61000-4-11, Normal operation.

**WARRANTY:** One year.

## III — INSTALLATION

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

**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 0.39 inches (10mm) clearance from adjacent equipment for proper ventilation.

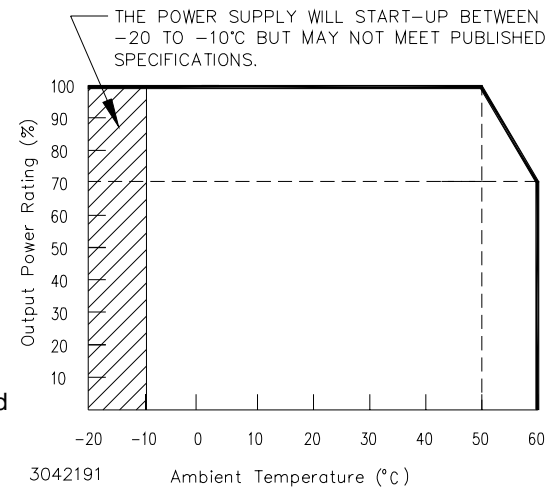
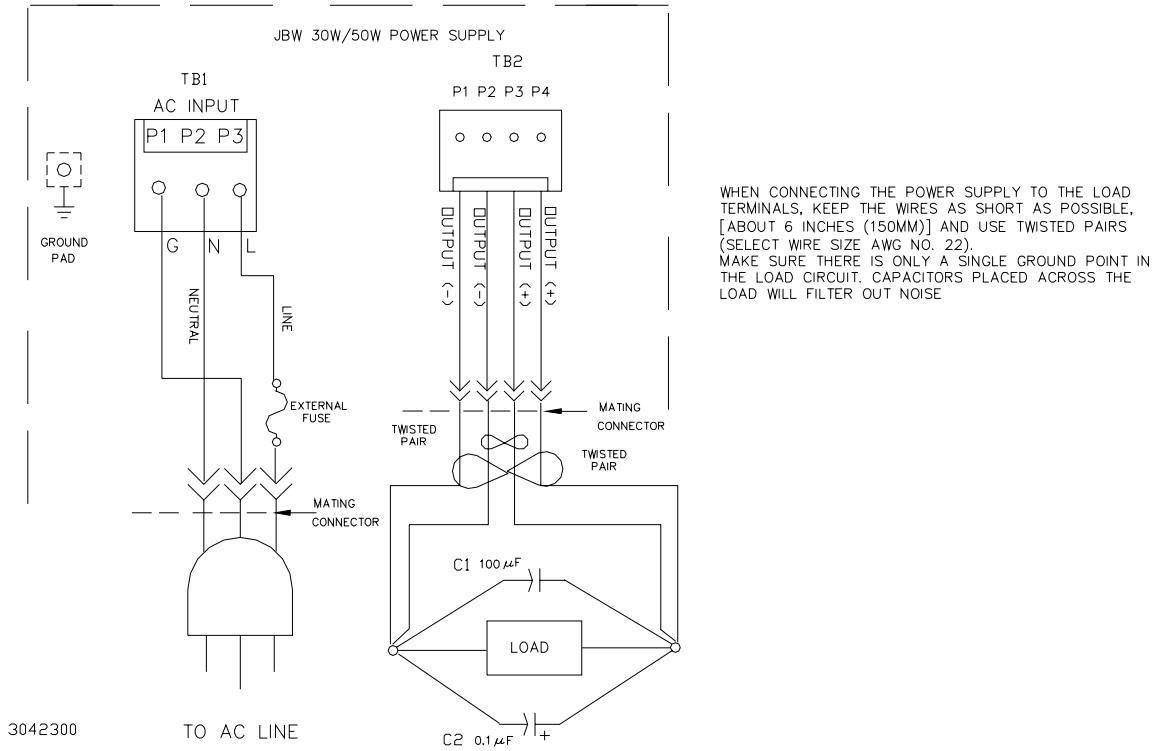


FIGURE 1. DERATING PLOT

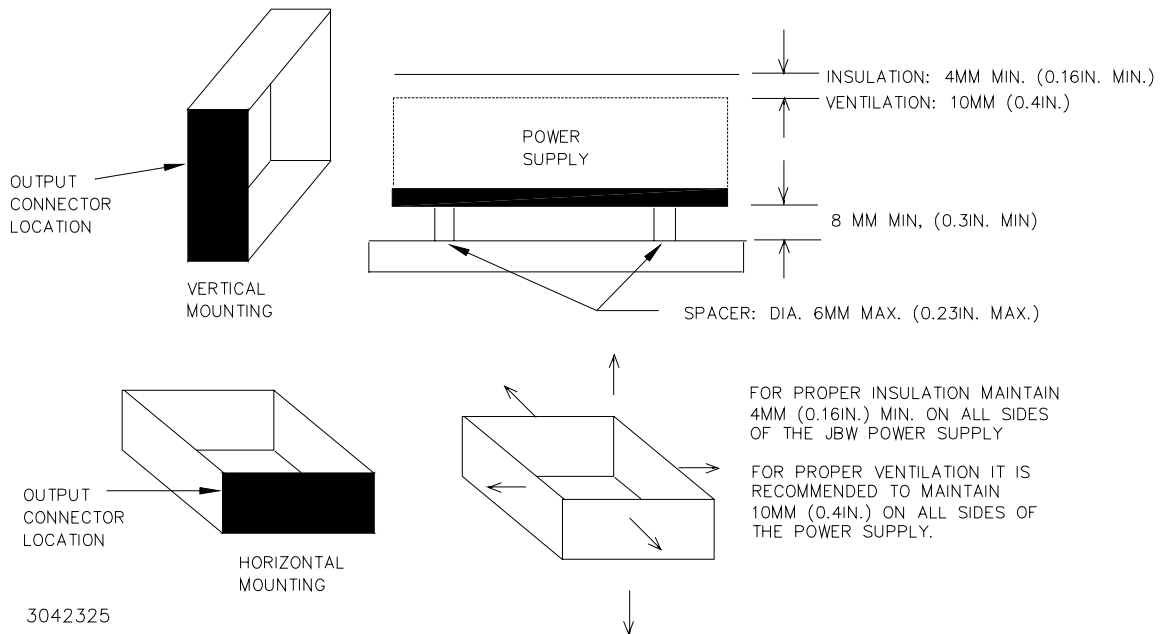
**CONNECTIONS:** Connect the load to the power supply by connecting the two (+) output wires from terminal block TB2 to the load (+) terminal, and the two (-) output wires from TB2 to the load (-) terminal. The AC input power is applied via the terminal block TB1. Make sure to connect the AC input Neutral and Line wires to the P2 and P1 pins respectively of TB1 (see Figure 2). A Cable Kit (P/N 219-0406) is available as an option from Kepco (see Figures 2 and 5). 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.

**IV — OPERATION**

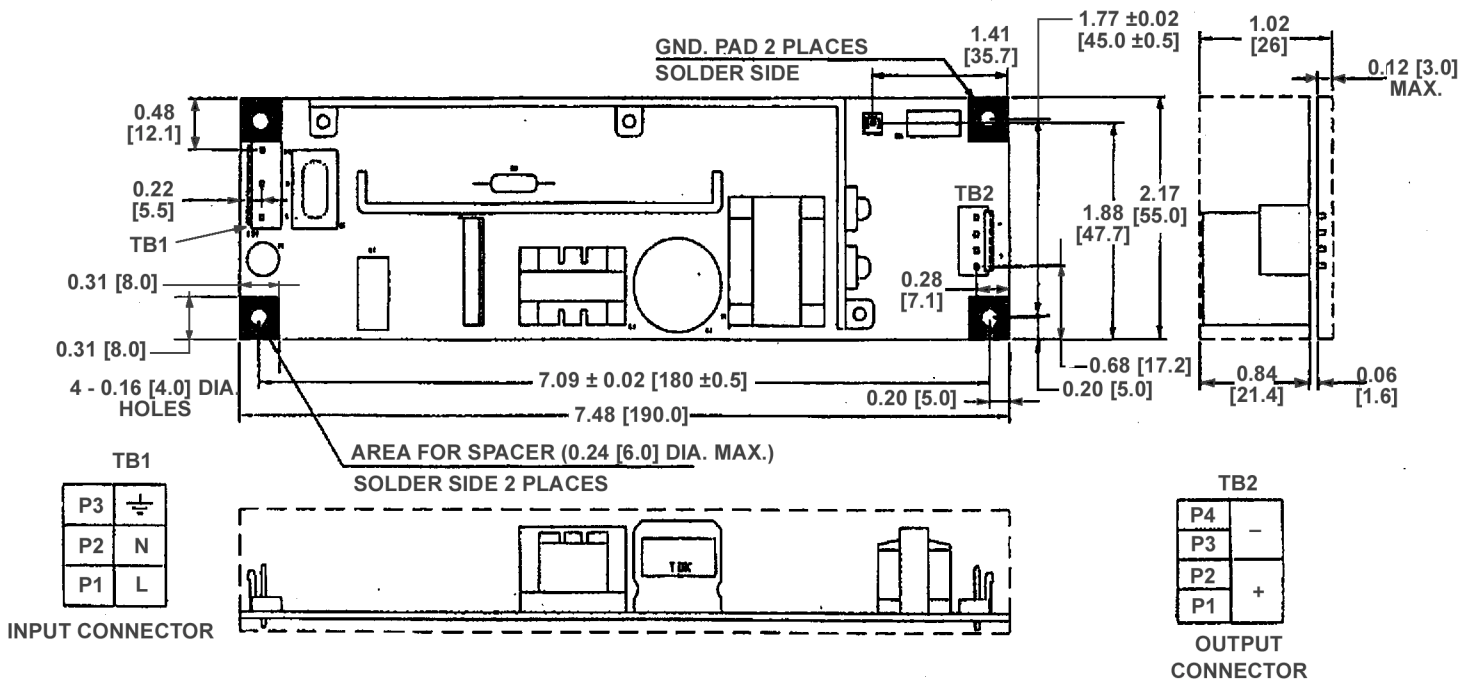
**PROTECTION DIODE:** When a number of power supplies are operating in series, the current rating is to be limited to the rating of the power supply with the lowest rating. A diode ( $V_r > 2\sum V_o$ ,  $I_f > 2I_o$ ,  $V_f \ll \text{low}$ ) must be connected to the power supply output terminals to protect the unit from reverse voltage.



**FIGURE 2. LOAD CONNECTIONS**



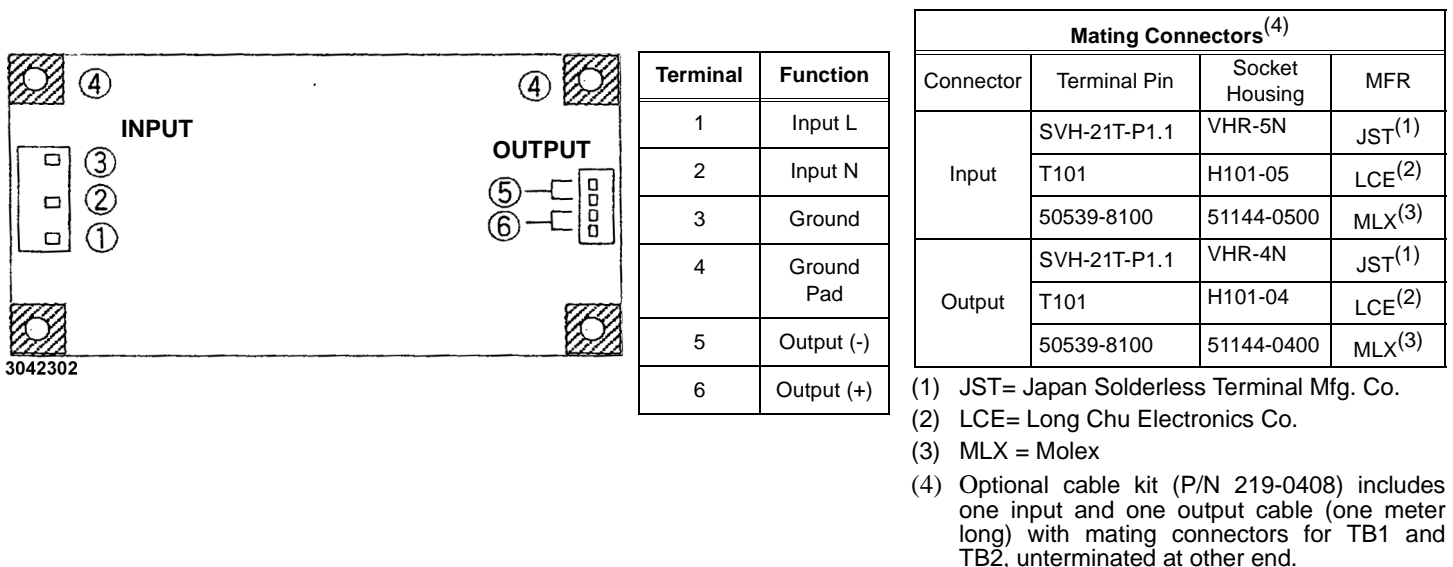
**FIGURE 3. VENTILATION, INSULATION AND MOUNTING ORIENTATION**



- NOTES:**
1. DIMENSIONS ARE IN INCHES, DIMENSIONS IN BRACKETS ARE IN MILLIMETERS.
  2. TOLERANCES:  $\pm 0.04$  IN. ( $\pm 1$  MM) UNLESS OTHERWISE SPECIFIED.
  3. PCB THICKNESS:  $0.063 \pm 0.008$  [1.6  $\pm 0.2$ ].
  4. WEIGHT: 0.49 LBS [220 GRAMS].

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**FIGURE 4. JBW 50W MECHANICAL OUTLINE DIAGRAM**



**FIGURE 5. INPUT/OUTPUT CONNECTIONS**