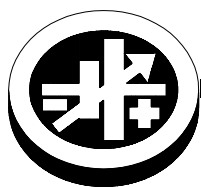
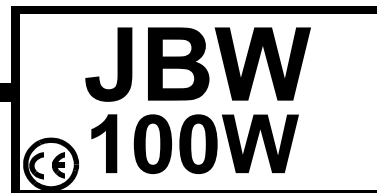


# INSTRUCTION MANUAL



**KEPCO** An ISO 9001 Company.



## 100 WATT SINGLE OUTPUT SWITCHING POWER SUPPLIES

### I — INTRODUCTION

**SCOPE OF MANUAL.** This instruction manual covers the installation and operation of the Kepco JBW 100W Series of Switching Power Supplies.

**DESCRIPTION.** The Kepco JBW 100W Series consists of four models of RoHS (Reduction of Hazardous Substances) compliant 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 120V to 370V d-c input. The JBW 100W Series employs a light weight ferrite core. Regulation is provided by pulse width modulation. Power Factor Correction (PFC) is provided by a boost converter operating at 80KHz. A FET power stage, operating as a forward converter with a fixed switching frequency of 150KHz 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 100W Series models. Section II (following) contains specifications and operating limits common to all JBW 100W 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 100W SERIES**

MODEL	JBW 5-20K	JBW 12-8.5K	JBW 15-6.7K	JBW 24-4.3K
OUTPUT VOLTS, d-c	5V ±0.25V	12V ±0.6V	15V ±0.75V	24V ±1.2V
ADJUSTMENT RANGE	4.5-5.5V	10.8-13.2V	13.5-16.5V	21.6-26.4V
CURRENT/MAX. POWER RATINGS	20.0A/100W	8.5A/102W	6.7A/100.5W	4.3A <sup>(2)</sup> /103.2W
OVERCURRENT (AMPS)	21.0 min.	10.6 min.	8.38 min.	5.38 min
OVP RANGE (VOLTS)	5.75-6.9	13.8-16.8	17.2-21.0	27.6-33.6
EFFICIENCY (typ.)	100 Va-c	78%	80%	82%
	240 Va-c	80%	82%	85%
ACCEPTABLE EXTERNAL OUTPUT CAPACITOR μFmax., (fixed load resistance)	30,000	30,000	30,000	30,000
RIPPLE AND NOISE <sup>(1)</sup> (mV p-p)	ripple (typ)	80	120	120
	ripple (typ) (-10 to 0°C)	140	160	160
	spike noise (typ)	120	150	150
	spike noise (typ) (-10 to 0°C)	160	180	180
(1) 0 to 100% load, 0 to 50 °C, tested with 100μF electrolytic and 0.1μF film capacitors across the load, connected to the power supply via 5.9 in (150mm) wires				
(2) 5.0A peak, t ≤ 10 seconds.				

#### 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.

#### 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):

1.4A typ., 1.8A max. (100 Va-c input, 100% load);  
0.7A typ., 1.0.A 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 5A, 250V.

**INPUT SURGE:** cold start 15A typ, 30.0A max. (100 V a-c, 100% load); 30A typ., 60.0A max. (240 Va-c, 100% load)

**POWER FACTOR:** 0.99 typ. at 100 Va-c, 0.95 typ. at 240 Va-c

#### LEAKAGE CURRENT:

0.75mA max, 0.2mA typ at 100V a-c and 60 Hz (single pole switching) (operating in conformance with DENAN),  
0.75mA max, 0.35mA typ at 240V a-c and 60 Hz (operating in conformance to UL 1950/IEC 950)

KEPCO, INC. ● 131-38 SANFORD AVENUE ● FLUSHING, NY. 11352 U.S.A. ● TEL (718) 461-7000 ● FAX (718) 767-1102

## 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 60°C. Recovery time is 1mS maximum.

**OUTPUT HOLDING TIME:** Upon input interruption the output is maintained for 40 milliseconds typical with 240 Va-c input voltage or 100 Va-c input voltage. The condition for output load is 100%.

**START UP TIME:** 500mS max., 400mS typ. at 100 Va-c and 500ms max., 300ms typ. at 240 Va-c

**OVERVOLTAGE PROTECTION:** Fixed, factory set. See Table 1. 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:** Horizontal or vertical (see Figure 2)

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

## WITHSTAND 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 60950-1.c, and TÜV Rheinland EN60950-1 (ambient temp. 50°C max.). JBW 100W 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 2, 3 and 4. The unit may be mounted on one mounting surface. The air temperature 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:** At least 0.39 inches (10mm) clearance from adjacent equipment is recommended for proper ventilation.

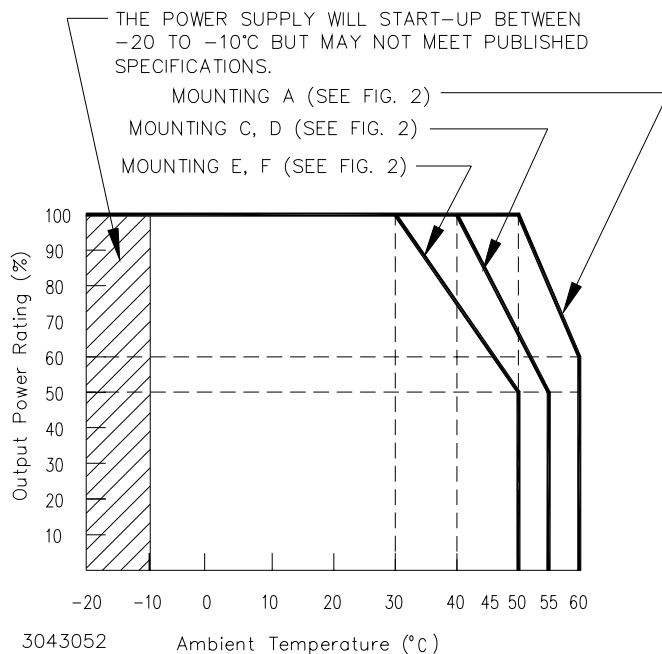
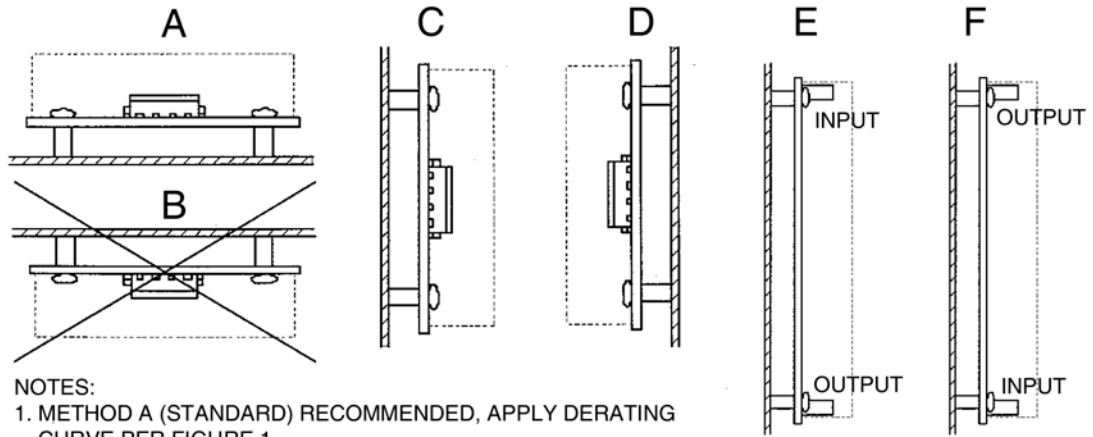


FIGURE 1. DERATING PLOT

**CONNECTIONS:** Connect a load to the output of the power supply by connecting pins 5 through 8 (+) of output connector CP2 to the load (+) terminal, and pins 1 through 4 (-) to the load (-) terminal. See Figure 4 for input/output connector and pin locations. When connecting the power supply to the load, keep the wires as short as possible, and use twisted pairs (use Wire Size AWG No. 22). Make sure there is only a single ground point in the load circuit. Capacitors (100UF electrolytic and 0.1UF film) can be placed across the load to filter out noise. The AC input power is applied via input connector CP1. Make sure to connect the AC input Neutral and Line wires to pins 3 and 1, respectively, of CON1. See Figure 5 for mating connector information. A Cable Kit (P/N 219-0495) is available as an option from Kepco. The kit includes one input and one output cable (one meter long) with the mating connectors for Input and Output connectors at one end and unterminated wires at the other end.

**IV — OPERATION**

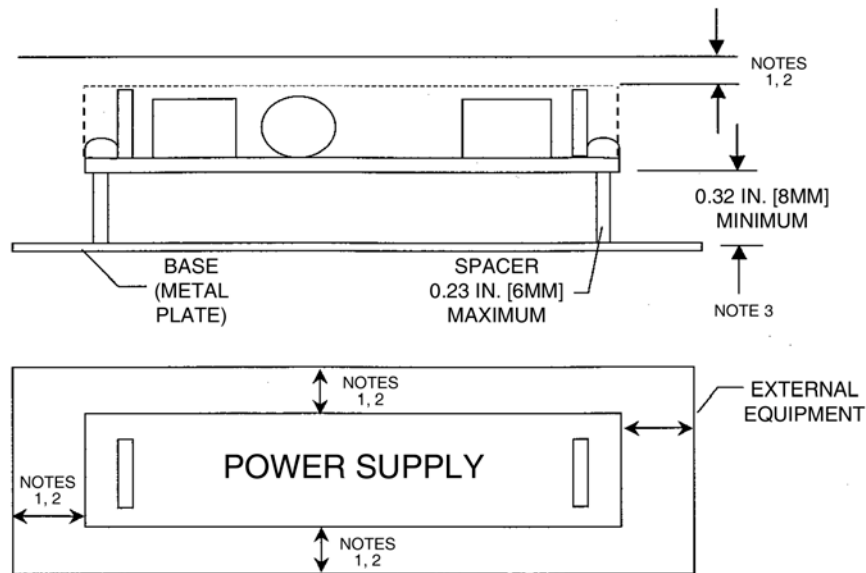
**PROTECTION DIODE:** When a number of power supplies are operating in series, the current rating is to be limited to the rating of the power supply with the lowest rating. A diode ( $V_r > 2 \sum V_o$ ,  $I_f > 2 I_o$ ,  $V_f << \text{low}$ ) must be connected to the power supply output terminals to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



- NOTES:  
 1. METHOD A (STANDARD) RECOMMENDED, APPLY DERATING CURVE PER FIGURE 1.  
 2. METHOD B IS NOT ALLOWED (INADEQUATE COOLING).  
 3. FOR METHODS C, D, E, AND F, APPLY DERATING CURVE PER FIGURE 1.

3043049

**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]).

3043034

**FIGURE 3. VENTILATION AND INSULATION REQUIREMENTS**

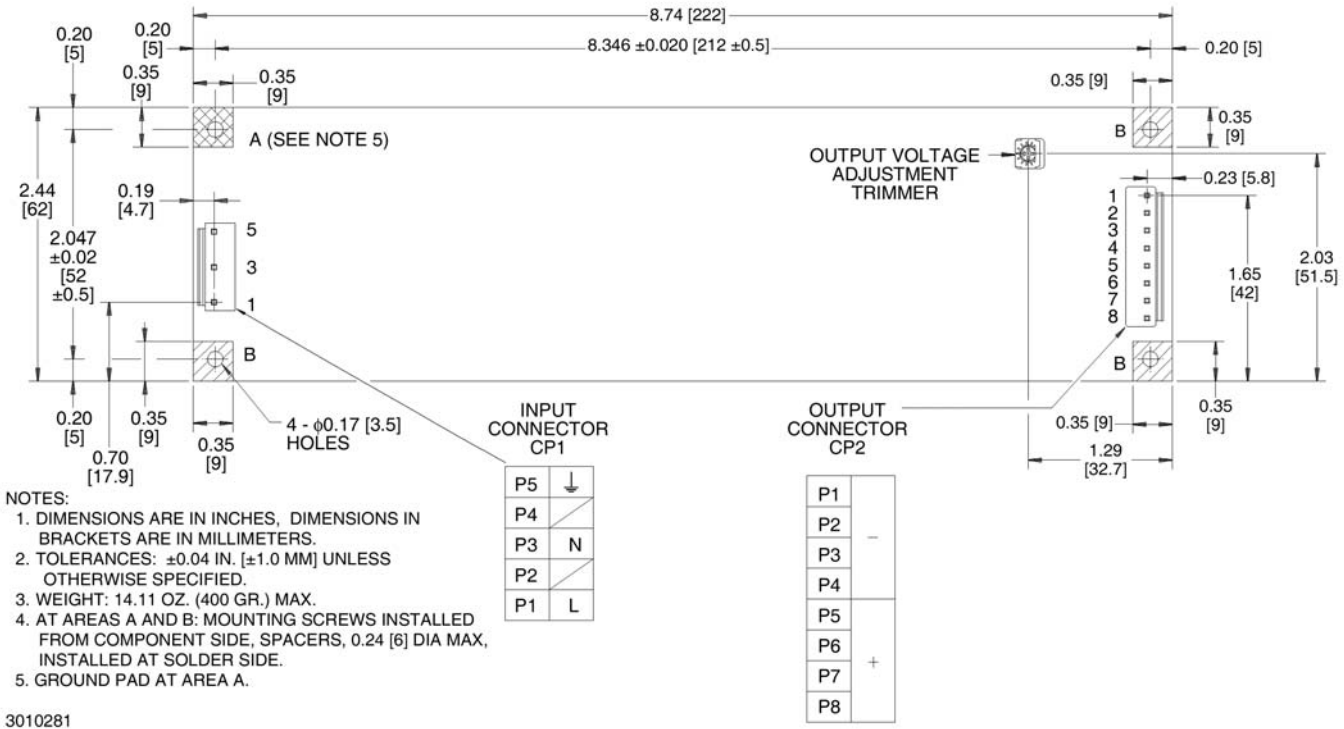
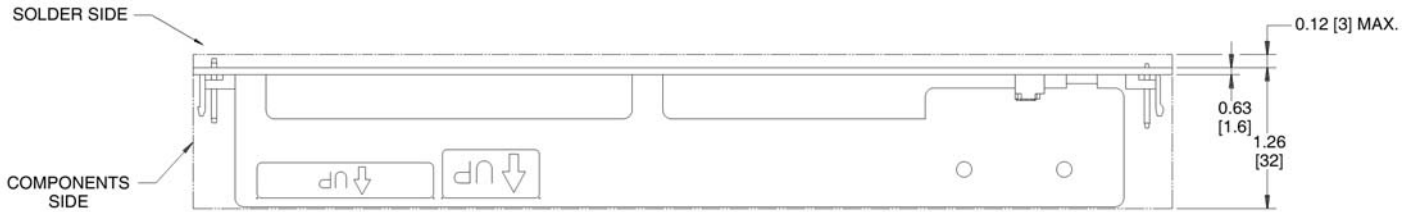
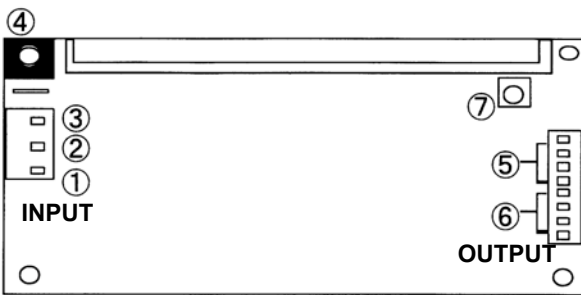


FIGURE 4. JBW 100W MECHANICAL OUTLINE DIAGRAM



3043054

Item	Function
1	Input L
2	Input N
3	Ground
4	Ground Pad
5	Output (-)
6	Output (+)
7	Vadj control

Mating Connectors <sup>(3)</sup>			
Connector	Terminal Pin	Socket Housing	MFR
Input	SVH-21T-P1.1	VHR-5N	JST <sup>(1)</sup>
	T101	H101-05	LCE <sup>(2)</sup>
Output	SVH-21T-P1.1	VHR-8N	JST <sup>(1)</sup>
	T101	H101-08	LCE <sup>(2)</sup>

- (1) JST= Japan Solderless Terminal Mfg. Co.
- (2) LCE= Long Chu Electronics Co.
- (3) Optional cable kit (P/N 219-0495) includes one input and one output cable (one meter long) with mating connectors for Input and Output connector, unterminated at other end.

FIGURE 5. INPUT/OUTPUT CONNECTIONS, ADJUSTMENT CONTROL LOCATION