INSTRUCTION MANUAL

KEPCO An ISO 9001 Company.

RKW
30W SERIES

30 WATT SINGLE OUTPUT
OPEN FRAME POWER SUPPLIES

I — INTRODUCTION

SCOPE OF MANUAL. This instruction manual covers the installation and operation of the Kepco RKW 30W Series of Open Frame, RoHS (Reduction of Hazardous Substances) compliant, switching power supplies.

DESCRIPTION. The Kepco RKW 30W Series consists of six models of switching power supplies, with a single output as shown in Table 1. Units may be operated with a nominal 100V a-c to 240V a-c (input voltage range 85 to 265 Va-c), 50-60 Hz (input frequency range 47-66Hz; units operate up to 440Hz although leakage current and efficiency specifications may not be met). They will also operate on 110V to 370V d-c input. The RKW 30W Series employs a MOSFET switch flyback converter with a fixed switching frequency of approximately 60kHz. Regulation is provided by pulse width modulation. A thermistor prevents excessive turn-on current surge. Overvoltage and overcurrent protection is provided. Current limiting with automatic recovery from short circuit is featured. Units are convection cooled L-chassis construction. A steel cover (Model CA 33-R) is available as an option (contact factory for derating with cover).

Specifications and operating limits for individual RKW 30W models are listed in Table 1. Section II describes RKW 30W features. Section III contains specifications and operating limits common to all RKW 30W Series Models. Section IV describes installation and Section V describes operation.

TABLE 1. OUTPUT RATINGS AND SPECIFICATIONS, RKW 30W SERIES

MODEL		RKW 3.3-7K	RKW 5-6K	RKW 12-2.5K	RKW 15-2K	RKW 24-1.3K	RKW 48-0.65K
OUTPUT VOLTS, d-c		3.3V	5V	12V	15V	24V	48V
ADJUSTMENT RANGE, Vd-c		2.85-4.0	4.0-5.8	9.6-13.2	12-16.5	19.2-26.4	38.4-52.8
OUTPUT CURRENT (AMPS) -10 to +50 °C		7.0	6.0	2.5	2.0	1.3(4)	0.65
CURRENT LIMIT(1) (AMPS)		7.9 min	6.3 min	2.6 min	2.1 min	2.1 min	0.68 min
OVP SETTING(2) (VOLTS)		4.2-5.2	6.0-6.9	13.7-15.7	17.0-19.0	27.0-30.5	55.0-60.0
EFFICIENCY	100 Va-c	75%	77%	81%	81%	84%	84%
	200 Va-c	76%	78%	82%	83%	85%	85%
RIPPLE AND NOISE(3) (mV p-p)	Switching ripple (typ)	80	80	100	100	100	130
	spike noise (typ)(1)	120	120	150	150	150	200

(1) After the cause of the overload is removed, output is automatically restored.
(2) An overvoltage shuts down the output. Recover by recycling a-c input (60 second delay required before resetting).
(3) Bandwidth 100 MHz. Ripple and noise will be approximately 1.5 times these values in the operating temperature range -10 ~ 0°C. The ripple and noise values tabulated are valid when the output is derated as shown in figure 2 from 50 ~ 65°C.
(4) Peak Current: 2.0A (useful for motor start applications).

II — FEATURES

- Green Output on LED indicator
- Overvoltage/Overcurrent protection
- Power Factor Corrected, wide range a-c input
- Convection cooling
- SEMI-47 compliant
- RoHS compliant
- DIN-Rail mountable
- Series Operation

III — SPECIFICATIONS

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

INPUT:

Voltage: 100-240V a-c nominal; Range 85-265V a-c (0 to 100% load, -10 to 71°C); 110-370V d-c. (polarity insensitive; consult factory) Safety agency approval applies only to a-c input operation.

Frequency: Nominal 50-60 Hz; Range 47-440Hz (0 to 100% load, -10 to 71°C), (at 440Hz leakage current exceeds UL/VDE safety specification limit).

Current (nominal output at 100% load):
@100-120V a-c rms:
5V-48V models: 0.85A a-c rms max. 0.65A typ.
3.3V model: 0.7A rms max., 0.55A typ.

@200-240V a-c rms:
5V-48V models: 0.45A a-c rms max. 0.38A typ.
3.3V model: 0.4A rms max., 0.33A typ.

Input Protection and Soft Start: Units are protected against shorts by an input fuse. Fuse value 2A, 250V.

Initial Turn-on Surge: (cold start 25 °C, 100% load, first surge only, not including the current flow into the EMI filter):
@100V a-c rms: 12.5A typ.,
@200V a-c rms: 25A typ.

Switching Frequency: 60kHz typical (flyback) nominal load

LEAKAGE CURRENT:
@120V a-c and 60 Hz: 0.55mA max, 0.32mA typ.
@240V d-c and 60 Hz: 0.75mA max, 0.50mA typ.
(operating in conformance with UL 1950/IEC 950)

STABILIZATION:

Source Effect (Range 85 to 132Va-c or 170-265 Va-c):
5V to 48V Models: 0.1% typ., 0.2% max.
3.3V Model: 5mV typ., 10mV max.

Load Effect, measured at sensing terminals (0% - 100% of rated output current):
5V to 48V Models: 0.3% typ., 0.6% max;
3.3V Model: 15mV typ., 30mV max.

Temperature effect: (-10 to 71°C)
0.5% typ., 1.0% max.

Combined effect: 0.9% typ., 1.8% max.

Drift: (1/2 to 8 hr. at 25°C) 0.2% typ., 0.5% max.

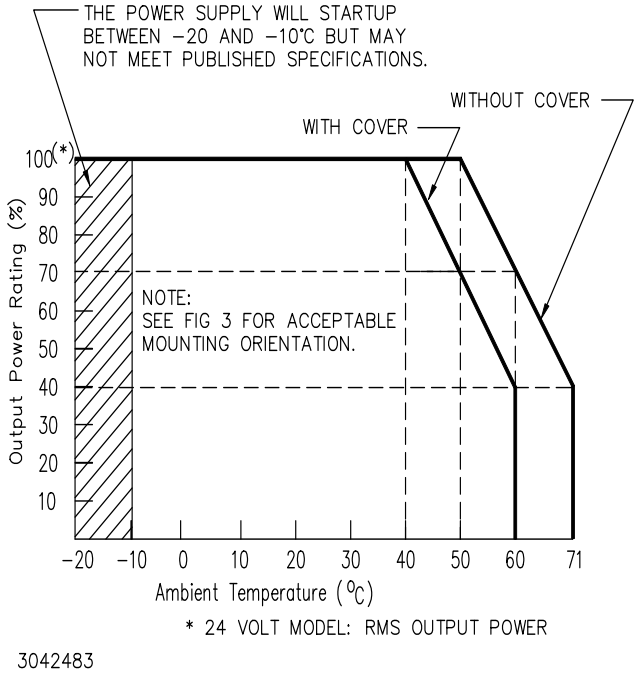

FIGURE 1. OUTPUT POWER VS. TEMPERATURE

TRANSIENT RECOVERY: A step load change from 50% to 100% of rated output current in 50 microseconds or more, produces no more than 4% output voltage excursion (3.3V model: ±200mV max.). Recovery time is 1ms maximum.

OUTPUT HOLDING TIME: Upon input interruption the output is maintained for:

@100V a-c: 35 mS typ. (20 mS min.)

@240V a-c: 230 mS typ. (130mS min.).

START UP TIME:

@100V a-c: 900mS max., 600mS typ.

@240V a-c: 400mS max., 200mS typ.

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

OVERCURRENT: Output voltage returns to rated level upon removal of cause of malfunction.

OPERATING TEMPERATURE: -10 to 71°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.

HUMIDITY: 10% to 95% RH, operating and storage, noncondensing, wet bulb temperature < or = 35°C.

DIELECTRIC STRENGTH: (at 15 to 35°C ambient, 10 to 85% relative humidity, cutout current 20 ma):

Between input and output terminals:
3.0 KV a-c for one minute.

Between input terminals and ground:
2 KV a-c for one minute.

Between output terminals and ground:
500V a-c for one minute.

INSULATION RESISTANCE: Between input and output, input and ground, output and ground: 100 megohms minimum (500V d-c, 15 to 35°C ambient, 10 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^2).

SHOCK: (non-operating, one-half sinusoidal pulse, three shocks to each axis):
Acceleration: 60G (588m/s^2),
Duration: 11mS $\pm$5mS

EMC - EMISSIONS:

Radiated Noise 30MHZ to 1GHz: FCC Class B, VCCI-B, EN55011-B, EN55022-B

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:

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.

SAFETY: All units designed to meet EN 60950 (U.S. UL 60950 3rd Ed.; Canada: CAN/CSA-22.2 No. 60950-00 3rd Ed. (ambient temp. 50°C). RKW 30W units are CE marked per the Low Voltage Directive (LVD), EN60950. [The standards do not apply with DC input operation]

WEIGHT: 10.5 oz. (300 grams) max

WARRANTY: One year.

IV — INSTALLATION

MOUNTING THE POWER SUPPLY: Refer to Figures 3 and 4. The unit may be mounted on one mounting surface. Note the restrictions for maximum penetration of mounting screws. The air surrounding the power supply must not exceed the ambient values given in the graph in Figure 1.

CONNECTIONS: Connect the load to the power supply Output + and Output – terminals shown in Figure 2. The AC input power is applied via the terminal block. Make sure to connect the AC input Neutral, Line and Ground wires to the respective terminals of the terminal block (see Figure 2).

V — OPERATION

When output voltage is available, the green LED is on. The Output Voltage Adjust trimmer (see Figure 2) allows adjustment of the output voltage within the range specified in Table 1.

SERIES OPERATION: 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 (Vr>2Σ Vo, If>2Io, Vf<< low) must be connected to the power supply output terminals to protect the unit from reverse voltage.

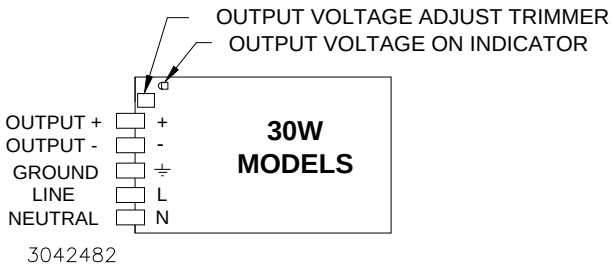

FIGURE 2. COMPONENT LOCATIONS

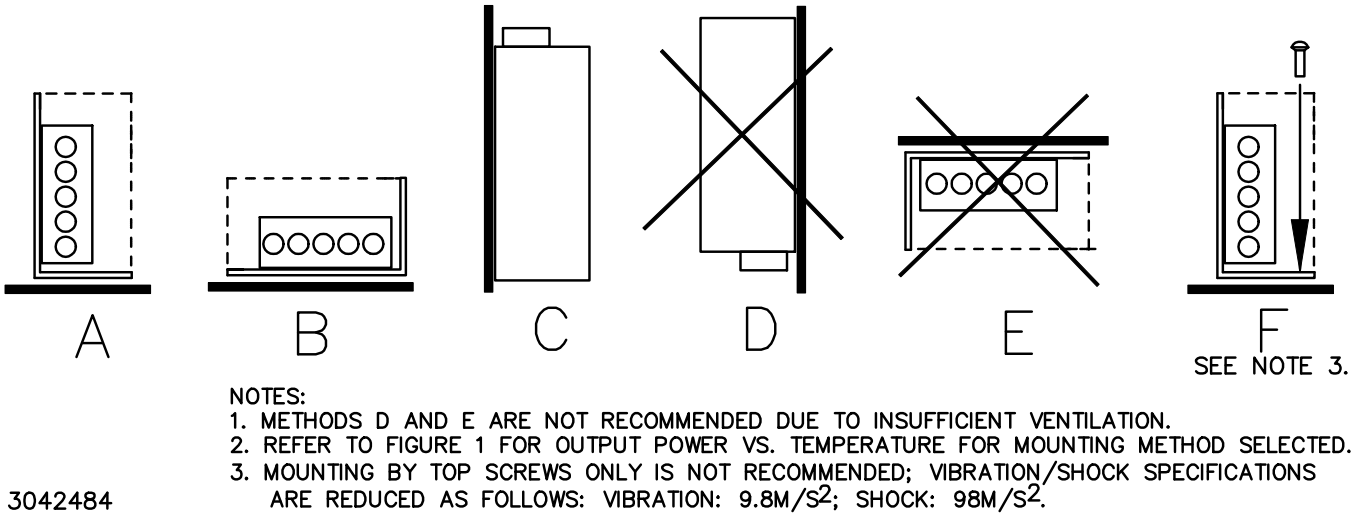

FIGURE 3. POWER SUPPLY MOUNTING

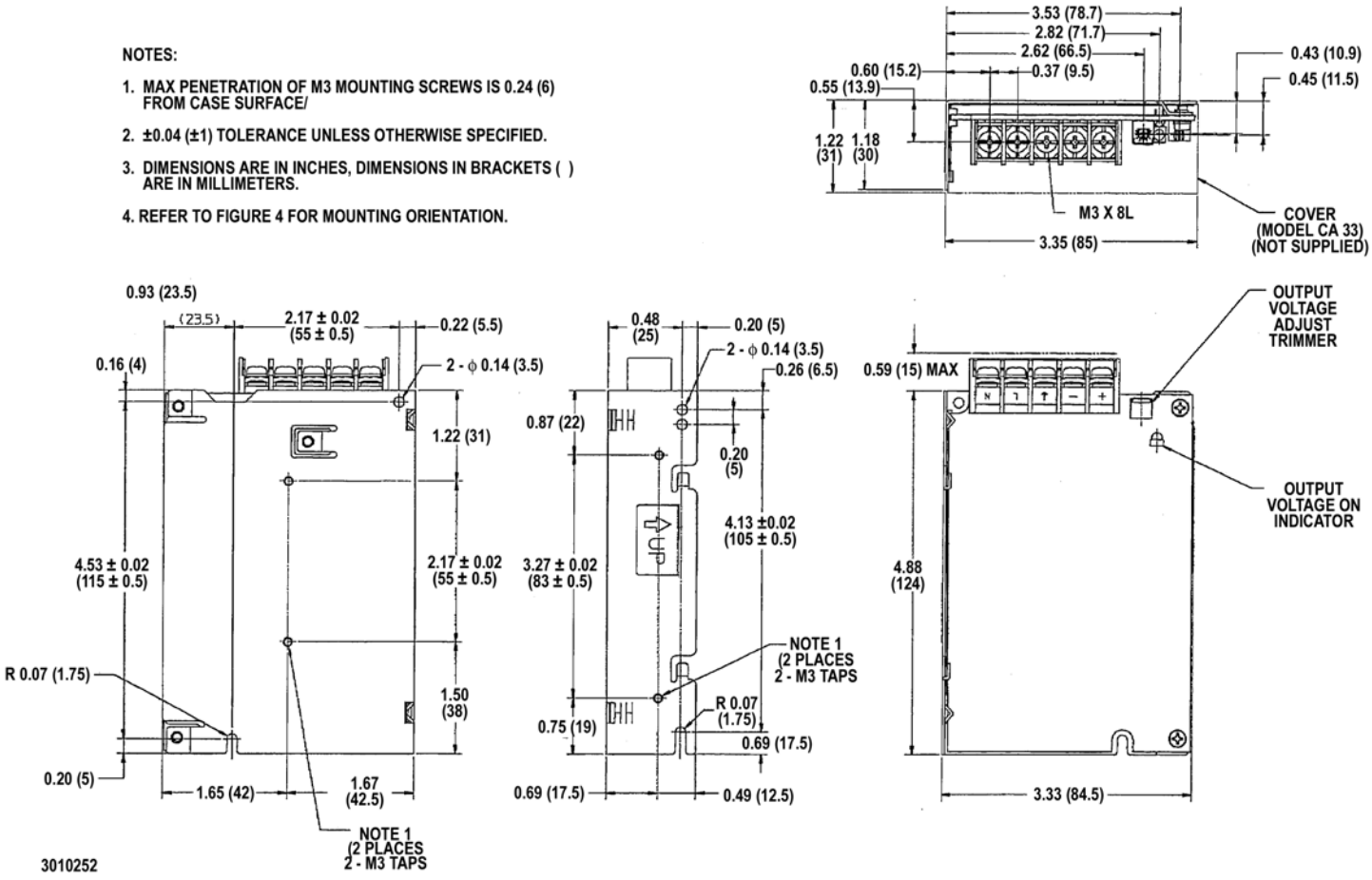

FIGURE 4. RKW 30W MECHANICAL OUTLINE DIAGRAM