

# INSTRUCTION MANUAL

**KEPCO** An ISO 9001 Company.



**ERD60W-24**

## SINGLE OUTPUT SWITCHING POWER SUPPLIES

### I—INTRODUCTION

**SCOPE OF MANUAL.** This instruction manual contains information for the installation and operation of the Kepco ERD60W-24 Series of Switching Power Supplies. For extended operating and service information, please refer to the Service Manual for the ERD60W-24 Series, which can be purchased, when available, either from your Kepco Representative, or by writing directly to: Kepco Inc., 131-38 Sanford Avenue, Flushing, New York, 11352, U.S.A.

**DESCRIPTION.** The Kepco ERD60W-24 Series consists of several switching power supplies, having a d-c input and a single d-c output, rated as listed in Table 1. ERD60W-24 switching power supplies have similar electrical specifications, except for the output ratings. They are low-dissipative stabilizers, using pulse-width modulation to control the output. ERD60W-24 switching power supplies may be operated from 20V to 30V d-c sources, as listed in the specification table below.

### II—SPECIFICATIONS:

All specifications, except as noted, are given at nominal input voltage and maximum rated output current.

PARAMETER	CONDITION	SPECIFICATION
<b>D-C Source Voltage</b>	Nominal Input Voltage: Input Voltage Range:	24V d-c 20V to 30V d-c
<b>D-C Source Current</b>	at 24V d-c input, 50°C rating per Table 1 at 20V d-c input, 50°C rating per Table 1 at 24V d-c input, no load	3.3A Typical, 3.5A Maximum 4.3A Maximum. 150 mA maximum.
<b>D-C Output ratings</b>	0-71°C ambient temperature	See Table 1
<b>Remote on/off</b>	The ± RC terminals may be used to turn the power supply on/off	TTL Logic Level or manual switch. Unit is normally "on"
<b>Efficiency</b>	Maximum load, nominal source voltage	79% typical
<b>Fuse<sup>(1)</sup></b>	Slow-Acting type, Kepco P/N 541-0084 or SOC ST4 6.3A	6.3A — 250V (¼" x 1¼" size)

<sup>(1)</sup> Accessible after cover removal, refer to FIG. 5.

MODEL	NOMINAL OUTPUT VOLTS	ADJ. RANGE VOLTS	MAXIMUM OUTPUT RATINGS (AMPS, WATTS) VS. AMBIENT OPERATING TEMPERATURE					SWITCHING COMPONENT RIPPLE, p-p		SPIKE NOISE DC to 50 MHz MAXIMUM
			30°C	40°C	50°C	60°C	71°C	TYPICAL	MAXIMUM	
ERD 5-12-24	5	4.0- 5.5	12.0A/60W	12.0A/60W	12.0A/60W	8.4A/42W	4.8A/24W	30 mV	50 mV	100 mV
ERD 12-5-24	12	8.4-13.2	5.0A/60W	5.0A/60W	5.0A/60W	3.5A/42W	2.0A/24W	50 mV	80 mV	170 mV
ERD 15-4-24	15	12.0-16.5	4.0A/60W	4.0A/60W	4.0A/60W	2.8A/42W	1.6A/24W	50 mV	80 mV	200 mV
ERD 24-2.5-24	24	16.8-26.4	2.5A/60W	2.5A/60W	2.5A/60W	1.8A/42W	1.0A/24W	50 mV	100 mV	290 mV
ERD 48-1.2-24	48	32.6-52.8	1.2A/57.6W	1.2A/57.6W	1.2A/57.6W	0.8A/40W	0.5A/23W	60 mV	150 mV	530 mV

TABLE 1 RIPPLE/NOISE AND D-C OUTPUT RATINGS VS. AMBIENT TEMPERATURE, ERD60W-24 SERIES, FOR VERTICAL INSTALLATION. FOR HORIZONTAL INSTALLATION, DERATE AS SHOWN IN FIG. 3.

## II—SPECIFICATIONS, Cont'd:

PARAMETER	CONDITION	SPECIFICATION
<b>Source Effect</b> (Line Regulation)	20V to 30V d-c	Typical: 0.2% Maximum: 0.8%
<b>Load Effect</b> (Load Regulation)	Nominal source voltage For load change: 10%–100%	Typical: <0.3% Maximum: 1.0%
<b>Combined Effect</b> maximum voltage change after initial setting	For all conditions of rated source voltage, load current and temperature	Typical: <0.6% Maximum: 2.0%
<b>Time Effect</b> (8 hr. drift)	Constant source voltage, load and temperature	Typical: <0.1% Maximum: 0.5%
<b>Temperature Effect</b> from 0° to 71°C	Nominal source voltage Maximum Load	Envelope (0-71°C): Typical: <0.3% Maximum: 1.0%
<b>Current Limit</b> (Nominal Input Voltage @25°C)	Factory set to the tabulated values. Change of setting for source and Temperature variations: ± 10%	ERD 5-12-24 13.2—13.8A ERD 12-5-24 5.6— 6.0A ERD 15-4-24 4.5— 4.9A ERD 24-2.5-24 2.8— 3.1A ERD 48-1.2-24 1.4— 1.7A
<b>Over-Voltage</b>	Factory set to approximately 120% of nominal output voltage on each model	Reset: turn input power off for 5 sec.
<b>Operating Temperature- Range</b>	Nominal Source Voltage Maximum Load	0°C to +71°C (See Table 1)
<b>Storage Temperature-Range</b>	Non-operating	– 20°C to + 75°C
<b>Humidity</b>	Non-Condensing	20 to 95% RH.
<b>Transient Recovery</b>	Step load change 50–100% Recovery within 1.0% of output voltage Rise & Fall Time of load step >50μsec.	Excursion: <4% Recovery time: <1 millisecond
<b>Withstand Voltage</b>	Between input and output terminals or case	2.0 KV a-c for 1 minute
<b>Isolation Resistance</b>	Between output terminals and case	500V d-c, 100 Megohms minimum
<b>Vibration</b>	5-10 Hz. 10-55 Hz.	10 mm, 3 axes 2 g, 3 axes
<b>Shock</b>	11 ms ± 5 ms.	20 g, 3 axes
<b>Size</b>	N.A.	See Fig. 5
<b>Weight</b>	English Metric	1.2 lb. max. 0.55 Kg max.
<b>Safety</b>	Used within ratings	UL 478 Recognized CSA C22.2-154 Certified MIL-STD-810 Environmental Test Methods for Ground Equipment
<b>EMI</b>	Conducted Noise: Filters built-in Radiated Noise: Units have metal case	MIL-STD-461, Method CE03 MIL-STD-461, Method RE03
<b>Warranty</b>	Used within ratings	1 Year

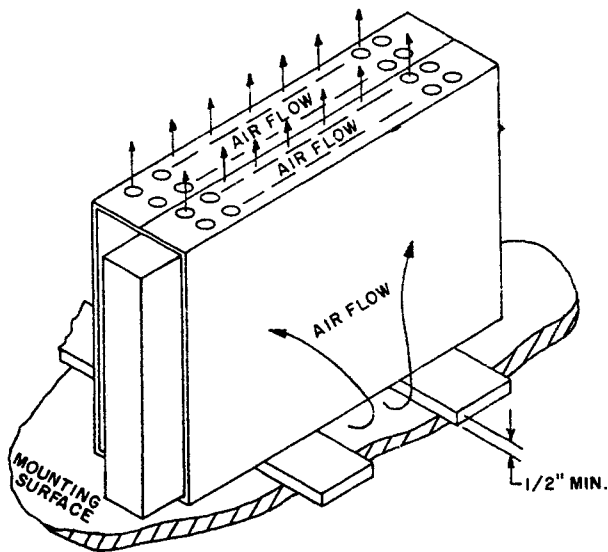


FIG. 1 RECOMMENDED MOUNTING METHOD (VERTICAL) FOR ERD60W-24 POWER SUPPLIES.  
Output current rating per Table 1

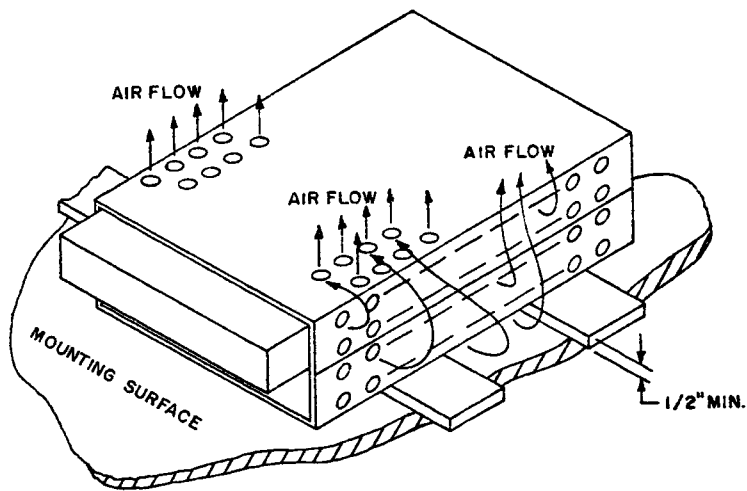


FIG. 2 RECOMMENDED MOUNTING METHOD (HORIZONTAL) FOR ERD60W-24 POWER SUPPLIES.  
Output current rating per FIG. 3

### III—OPERATION

#### SOURCE POWER TURN-ON/TURN-OFF

Source input power to the ERD power supply is applied in the conventional manner by means of an external power switch in series with one or both of the source input terminals, (see FIG. 4).

Following source turn-on, for systems applications the ERD power supply can be remotely programmed "on" and "off" by means of a contact closure, or TTL logic levels. This permits turn-on/off sequencing and avoids input surge current associated with conventional source power turn-on/off cycles. In FIG. 4 both the conventional and the remote d-c power turn-on/turn-off methods are shown:

- A) If remote turn-on/off is not needed, delete components connected to terminals + RC, - RC and leave these terminals open.
- B) If the remote turn-on/turn-off method is used, retain the SOURCE POWER switch. **NOTE:** Source power turn-on/turn-off must be retained since the overvoltage protector circuit is reset, following an overvoltage condition, by removing (5 seconds minimum) and re-applying the source power. Either the indicated switch (S1) or TTL levels may be used for remote turn-on/off as indicated in the table of FIG. 4. The switch (S1) must be "chatter-free", or the indicated components should be used to integrate the switching pulse.

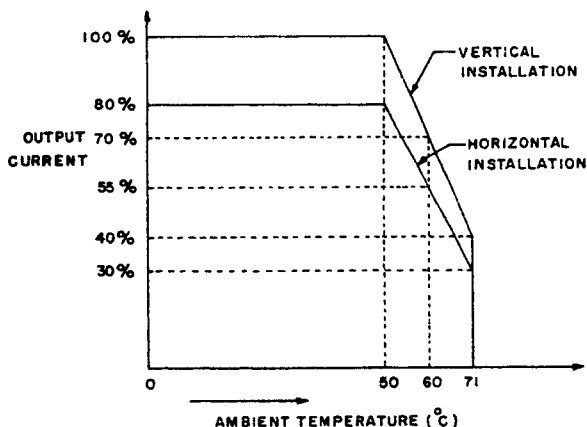


FIG. 3 OUTPUT CURRENT DERATING GRAPH.

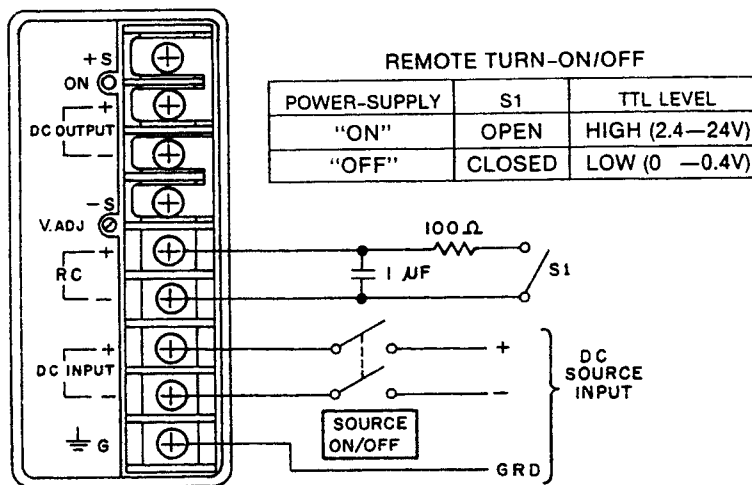


FIG. 4 CONVENTIONAL AND REMOTE SOURCE-POWER TURN-ON/OFF.

**NOTE:** Remote turn-on/off circuit may be deleted.

#### INTERNAL ADJUSTMENT (See FIG. 4 for location)

$V_{ADJ}$ , Output Voltage Adjustment. Monitor the output voltage with a precision voltmeter at the  $\pm$  sensing terminals and turn control to the desired value.

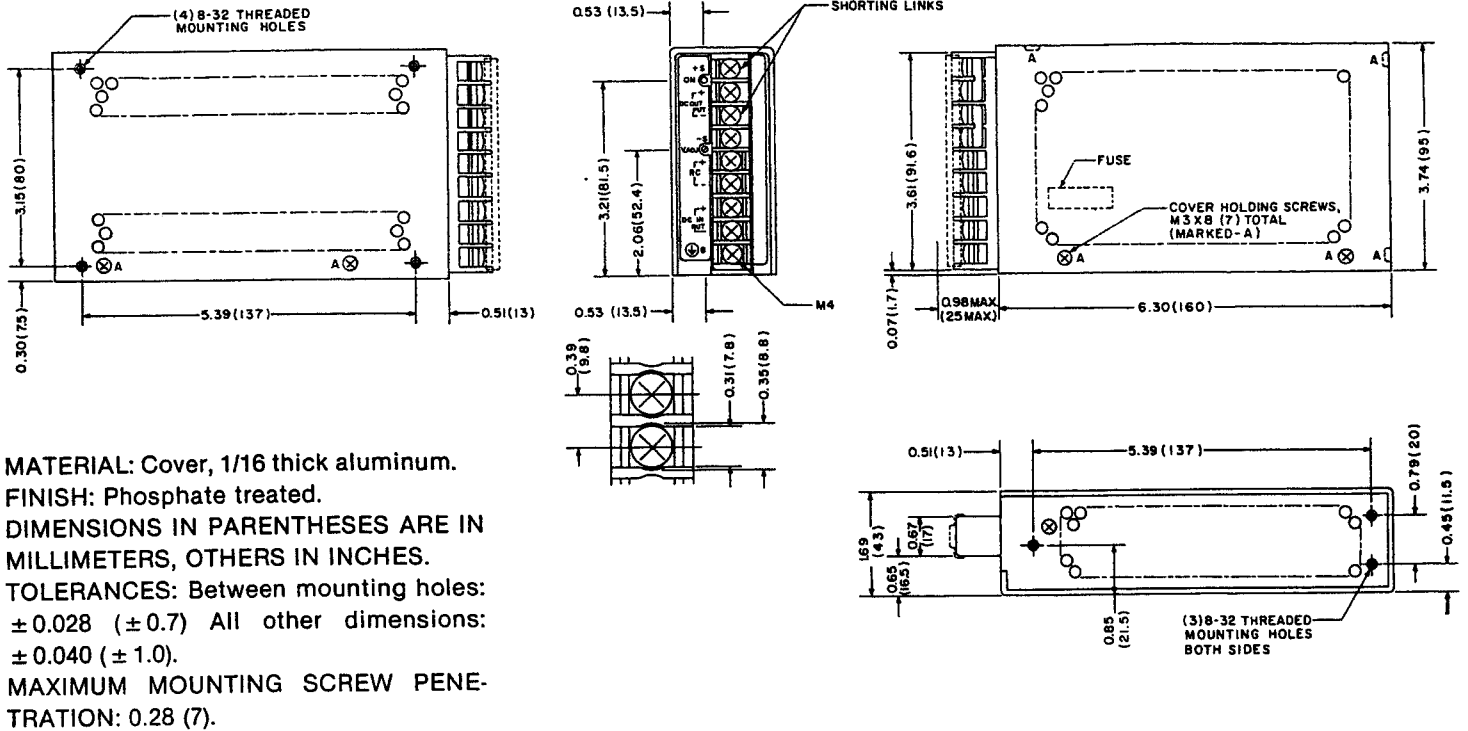


FIG. 5 MECHANICAL OUTLINE DRAWING, ERD60W-24 SERIES

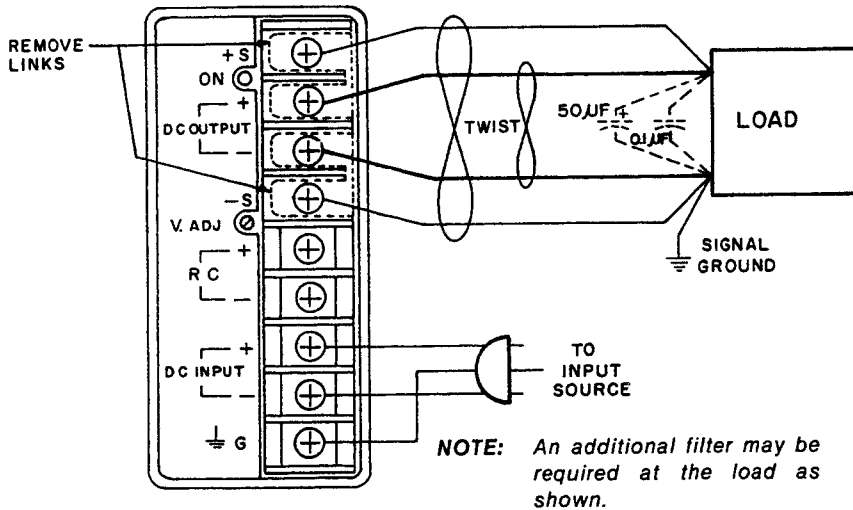


FIG. 6 LOAD CONNECTIONS WITH ERROR SENSING, ERD60W-24 SERIES.

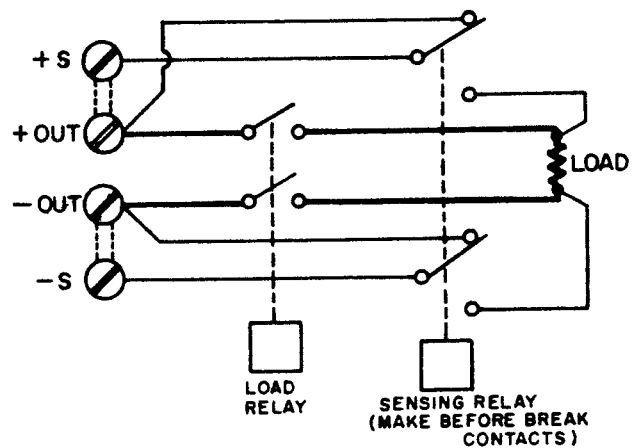


FIG. 7 LOAD SWITCHING

### LOAD CONNECTIONS

The load may be connected in the way illustrated in FIG. 6. IMPORTANT NOTE: IF ERROR SENSING IS USED, THE SHORTING LINKS BETWEEN OUTPUT AND SENSING TERMINALS MUST BE COMPLETELY REMOVED. IF ERROR SENSING IS NOT USED, THE LINKS MUST BE CONNECTED AT THE BARRIER STRIP. TIGHTEN BARRIER STRIP TERMINAL SCREWS SECURELY. LOOSE CONNECTIONS MAY CAUSE MALFUNCTIONING OF THE POWER SUPPLY. Remote error sensing can compensate for load wire voltage drops up to 0.4V per wire.

If the load is to be connected and disconnected by means of relays or other switching devices, proper contact sequencing must be observed to prevent power supply malfunctions. Refer to FIG. 7: When LOAD is switched "on", energize LOAD RELAY first, SENSING RELAY last. When LOAD is switched "off" de-energize SENSING RELAY first, LOAD RELAY last.