

OPERATOR'S MANUAL

FPD 10-48W POWER SUPPLY SERIES

Flat Pack Single Output DC to DC Converter

KEPCO INC.
An ISO 9001 Company.

MODEL FPD 10-48W POWER SUPPLY

ORDER NO.

REV. NO.

IMPORTANT NOTES:

- 1) This manual is valid for the following Model and associated serial numbers:

MODEL	SERIAL NO.	REV. NO.
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- 2) A Change Page may be included at the end of the manual. All applicable changes and revision number changes are documented with reference to the equipment serial numbers. Before using this Operator's Manual, check your equipment serial number to identify your model. If in doubt, contact your nearest Kepco Representative, or the Kepco Documentation Office in New York, (718) 461-7000, requesting the correct revision for your particular model and serial number.
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FLAT PACK Single Output DC to DC Converters

I INTRODUCTION:

SCOPE OF MANUAL: This instruction brief contains information for the installation and operation of the Kepco FPD 10-48W DC to DC Converter Series of switching power supplies. For further operating and service information for the FPD 10-48W DC to DC Converter Series contact your Kepco Representative directly, or write to Kepco, Inc., 131-38 Sanford Avenue, Flushing, New York 11352 U.S.A.

DESCRIPTION: The Kepco FPD 10-48W DC to DC Converter Series consists of four switching power supplies, having a nominal 24-48 Vdc input and different DC output voltages, rated as listed in Section II. FPD 10-48W Converter 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. The units feature input/output isolation and remote ON/OFF. Remote ON/OFF is by an isolated TTL level signal that may use either mechanical or solid state closure for turn-off. All models are guaranteed for one year when operated within the specifications given herein.

II MODELS:

The following specifications apply to the power supply models listed below:

MODEL	INPUT	OUTPUT
FPD 5-2-48W	24-48 Vdc	5 Vdc 2A
FPD 12-0.8-48W	24-48 Vdc	12 Vdc 0.8A
FPD 15-0.65-48W	24-48 Vdc	15 Vdc 0.65A
FPD 24-0.4-48W	24-48 Vdc	24 Vdc 0.4A

NOTE: Normal conditions are nominal input, nominal output, and 25 degrees C.

III SPECIFICATIONS:

Nominal Input Voltage:	24-48 Vdc
Input Voltage Range:	20-56 Vdc
Input Current:	0.5A Typical 0.7A maximum at 24 Vdc Input 0.3A Typical 0.4A maximum at 48 Vdc Input
Efficiency:	80 percent Typical 24 Vdc Input 76 percent Typical 48 Vdc Input
Switching Frequency:	500~700 kHz Typical
Circuit Type:	Forward Converter

IV OUTPUT SPECIFICATIONS:

MODEL	FPD 5-2K	FPD 12-0.8K	FPD 15-0.65K	FPD 24-0.4K
Output Voltage Nominal	5V	12V	15V	24V
Output Current Nominal	2A	0.8A	0.65A	0.4A
Output Power Maximum (Fig. 9)	10W	9.6W	9.75W	9.6W
Voltage Adjustment Range	± 10 percent with external trimmer and resistor (see Figures 4A and 4B)			
Output Voltage Accuracy	± 5 percent Maximum			
Ripple, Maximum 0-50 Degrees C 10-100 % Load	200mV p-p	200mV p-p	200mV p-p	300mV p-p
Noise, DC to 50 MHz, Maximum 0-50 Degrees C 10-100% Load	250mV p-p	300mV p-p	300mV p-p	400mV p-p
Overcurrent Setting – Foldback Winker Operation Characteristic	2.4~4.0A	1.0~1.6A	0.8~1.3A	0.5~0.8A
Overvoltage Setting Shut Down Characteristic	5.5~6.9V	13.2~15.7V	16.5~19.0V	26.4~31.5

Source Effect	1% Typical — 2% Maximum (20-30 Vdc, 40-56 Vdc Input)
Load Effect	1% Typical — 2% Maximum (10-100% Load)
Temperature Effect	1% Typical — 2% Maximum (0-50 Degrees C)
Combined Effect	2.5% Typical — 5% Maximum (Source, Load, Temperature)
Time Effect	0.1% Typical — 0.5% Maximum (0.5~8 Hours at 25 Degrees C)
Recovery Characteristics 50 to 100% Load Change	Less Than ± 4 Percent Excursion . Recovery to within 1 percent in less than 1ms (tr, tf of load change ≥ 50 μs (See Figure 3)

V GENERAL SPECIFICATIONS

SPECIFICATIONS	CONDITIONS	
Temperature	Operating 0~71 Degrees C Storage – 40 ~ 75 Degrees C	
Humidity	Operating and Storage: 5 ~ 95 percent RH	Wet bulb temperature < 35 Degrees C Non-Condensing
Vibration	5 ~10Hz — 10mm Amplitude 10 ~55Hz — 2G Acceleration	Non-Operating 1 Hour on each 3 axis
Shock	20 G 11± 5 ms Pulse Duration	Non-Operating, 1/2 Sine Pulse - 3 Shocks each axis
Withstand Voltage	Input-Output: 500 Vdc 1 minute	
Isolation Resistance	Input-Output Output-Signal Ground: >100M ohm, 500 Vdc	at 25 degrees C 65 percent RH
Dimensions	2.0 (50.8) x 2.0 (50.8) x 0.33 (8.5)	
Weight	1.06 oz. (30 grams) Typical, 1.41 oz. (40 grams) Maximum	
Cover Material	Plastic (UL94V-O) With Aluminum Base	

VI REMOTE ON/OFF:

A TTL compatible logic signal between the RC terminal and the minus input side of the FPD 10-48W DC to DC Converter can be used to control the Power Supply as follows:

Power ON	H Level	2.4-24V or open
Power OFF	L Level	0.4V or short

VII EXTERNAL OUTPUT VOLTAGE CONTROL

The output voltage of the DC to DC Converter can be controlled (to within ± 10 percent) by placing a resistor between the RV1 and RV2 terminals, and a trimmer between the RV2 and (-) output terminals, see Figure 4A and the following table.

OUTPUT	V	5V	12V	15V	24V
TRIMMER	ohms	5K	10K	10K	10K
RESISTOR	ohms	270	8.2K	12K	33K

VIII EXTERNAL POWER SUPPLY CONTROL

Applications in which the FPD 10-48W DC to DC Converter is controlled by fixed and trimmer resistors (at terminals RV1 and RV2) and in which the connecting lines to the Converter are long (over 7.9 in. (20cm)), may result in a malfunctioning Power Supply. For these situations connect a capacitor, no more than 1000 pF, across the lines and as close as possible to terminals RV1 and RV2 (see Figure 4B).

IX APPLICATIONS

For applications where the input lines to the DC to DC Converter are long (over 7.9 in. (20cm)), the output voltage waveform may show extra oscillations attributable to line inductance or noise. To reduce these oscillations place a capacitor (about 100 μ f) across the input terminals of the Converter (and as close to them as possible) see Figure 5.

X COMMON MODE NOISE SUPPRESSION

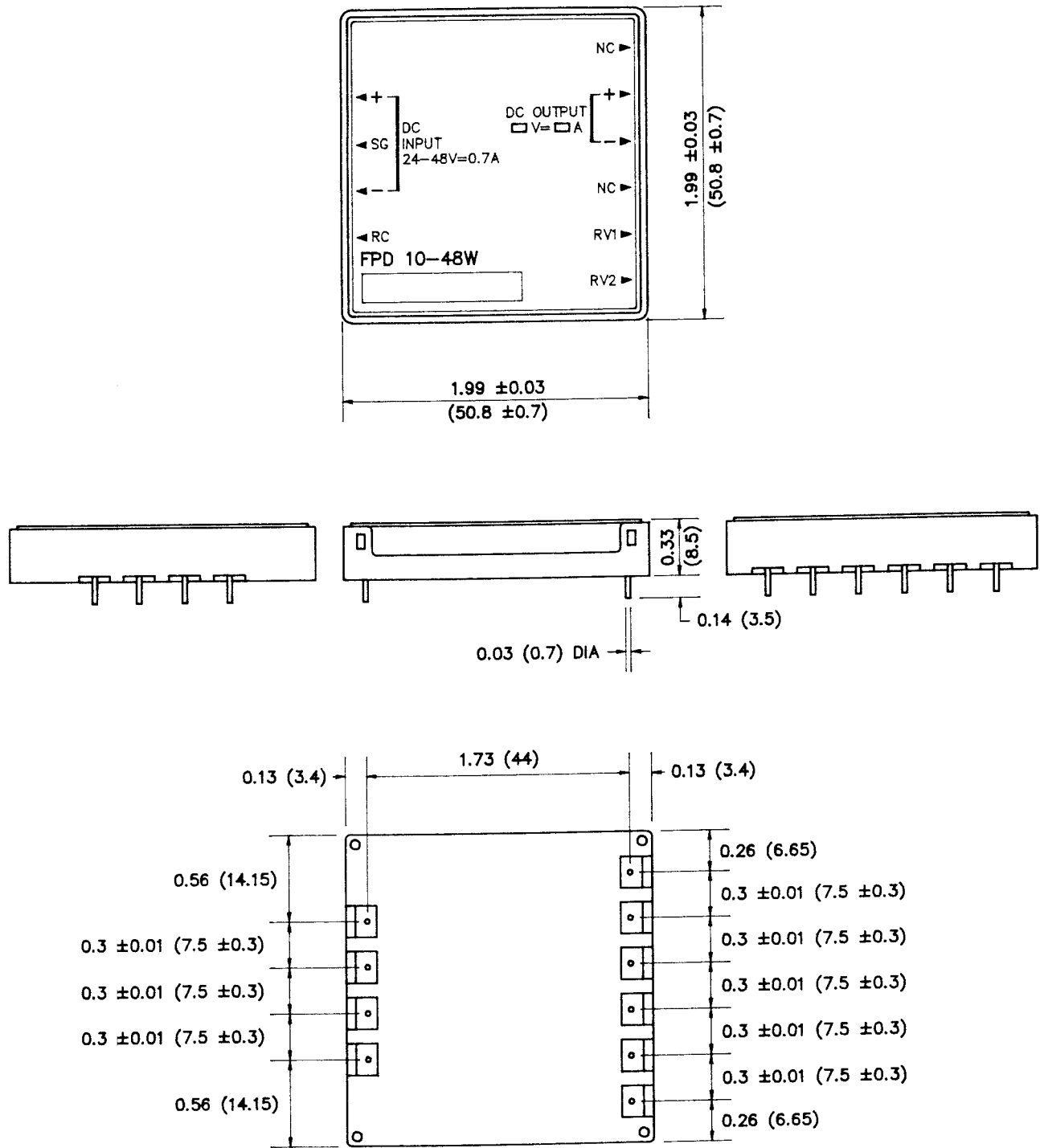
For applications where the load lines from the DC to DC Converter are long (over 19.7 in. (50cm)) the output voltage waveform may show extra oscillations attributable to line inductance or noise. Use a common mode noise suppression circuit to reduce mutual interference and ground loop noise (see Figure 6).

XI EXTERNAL SURGE VOLTAGE

Applications where voltage surges (external) are present at the input terminals to the DC to DC Converter may result in a malfunctioning Power Supply. To reduce the effects of these voltage surges use a noise suppression circuit (see Figures 7A and 7B).

XII OVERVOLTAGE PROTECTION CHARACTERISTIC

When the output voltage of the FPD 10-48W exceeds the level specified in Section IV, the Power Supply shuts down (see Figure 8). To reset the DC to DC converter it is then necessary to disconnect the DC input power lines from the unit and reconnect the input lines before turning ON the Power Supply.

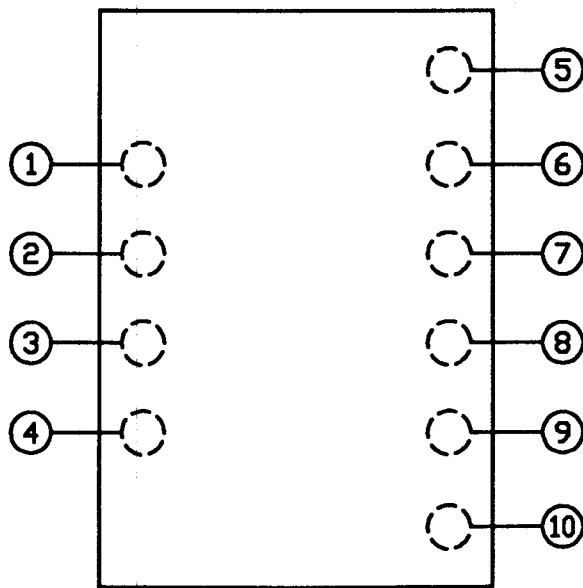


NOTES:

1. DIMENSIONS IN PARENTHESIS ARE IN MILLIMETERS, ALL OTHERS ARE IN INCHES.
2. ± 0.02 in. (± 0.5 mm) TOLERANCE UNLESS OTHERWISE SPECIFIED.

FIGURE 1 MECHANICAL OUTLINE DRAWING OF THE FPD 10-48W DC TO DC CONVERTER

TERMINAL LOCATION



TOP VIEW

- ① DC INPUT (+)
- ② SIGNAL GROUND (SG)
- ③ DC INPUT (-)
- ④ REMOTE ON-OFF CONTROL (RC)
- ⑤ NC
- ⑥ DC OUTPUT (+)
- ⑦ DC OUTPUT (-)
- ⑧ NC
- ⑨ REMOTE VOLTAGE CONTROL (RV1)
- ⑩ REMOTE VOLTAGE CONTROL (RV2)

NOTE: ② SG TERMINAL MUST BE CONNECTED TO TERMINAL ① (+) OR ③ (-)
② SG TERMINAL IS CONNECTED TO ALUMINUM BASE.

FIGURE 2 TERMINAL LOCATIONS OF THE FPD 10-48W DC TO DC CONVERTER

RECOVERY CHARACTERISTIC

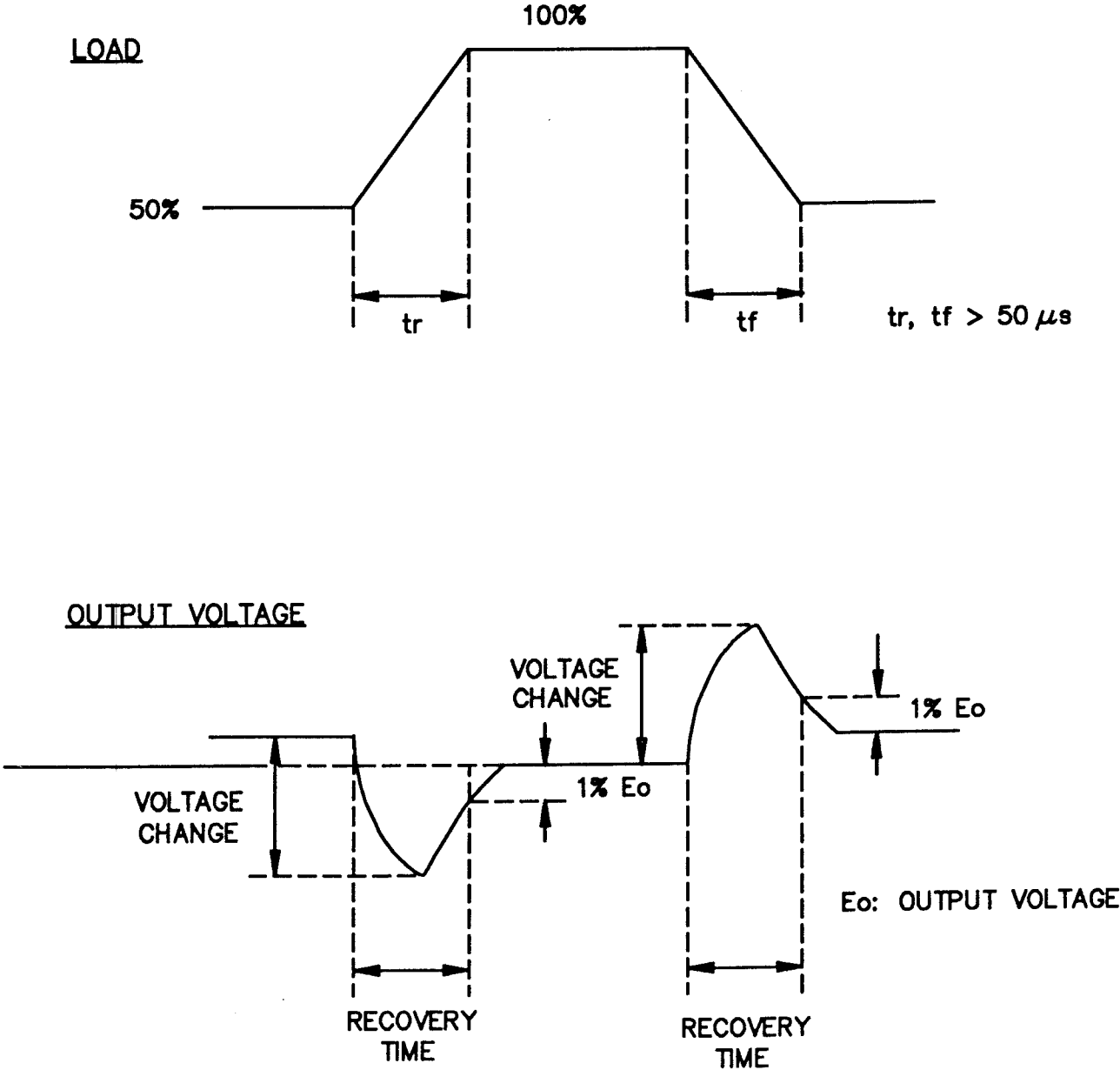
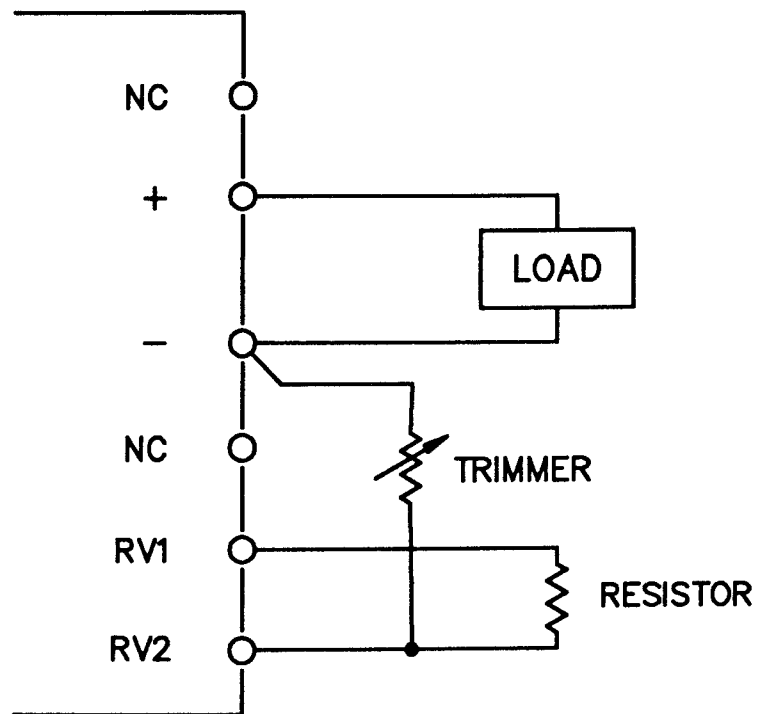


FIGURE 3 THE RECOVERY CHARACTERISTICS OF THE FPD 10-48W DC TO DC CONVERTER

EXTERNAL OUTPUT VOLTAGE TRIMMING



EXTERNAL OUTPUT VOLTAGE TRIMMING (WHEN CONNECTING LINES TO THE UNIT ARE LONG)

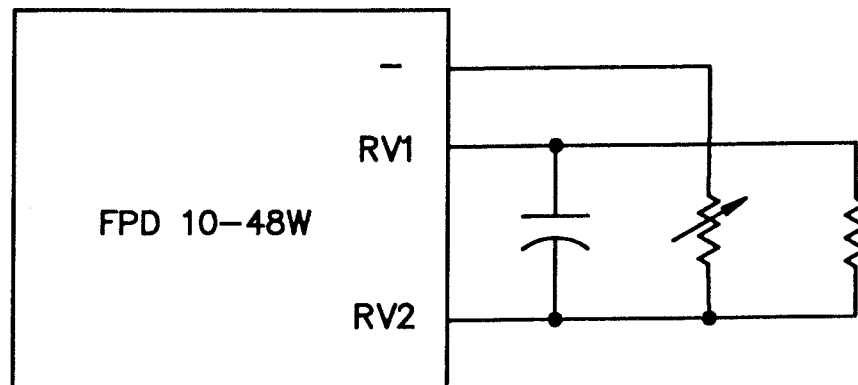


FIGURE 4A (TOP) EXTERNAL OUTPUT VOLTAGE TRIMMING FOR THE FPD 10-48W DC TO DC CONVERTER

FIGURE 4B (BOTTOM) FPD 10-48W APPLICATION WHERE THE CONNECTING LINES TO THE DC TO DC CONVERTER ARE LONG

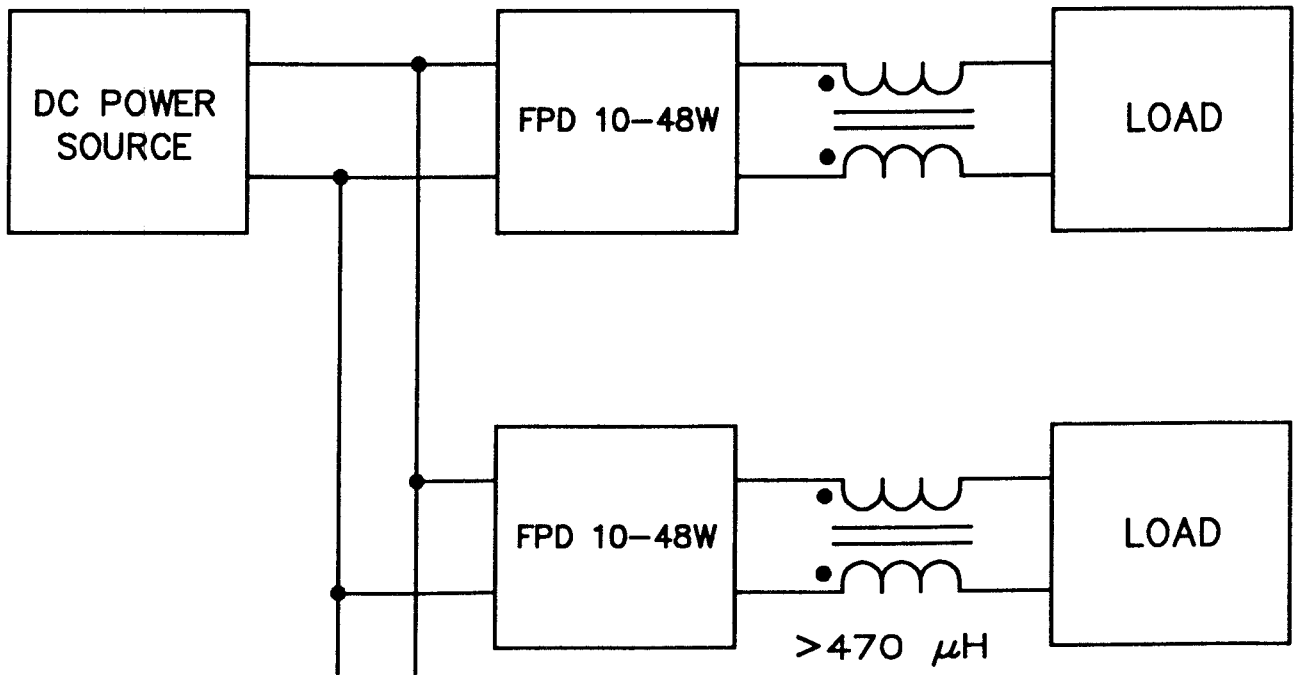
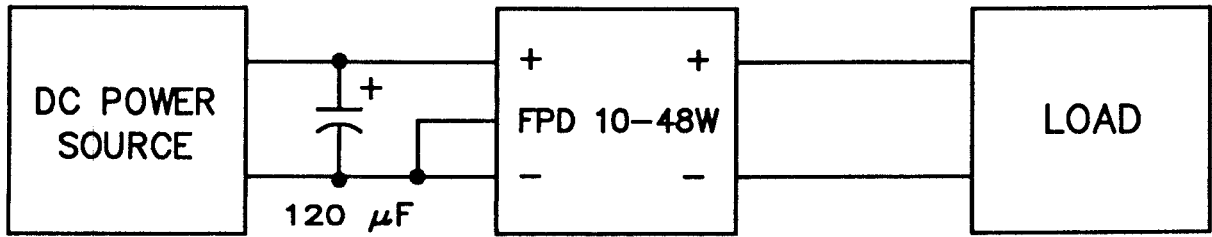
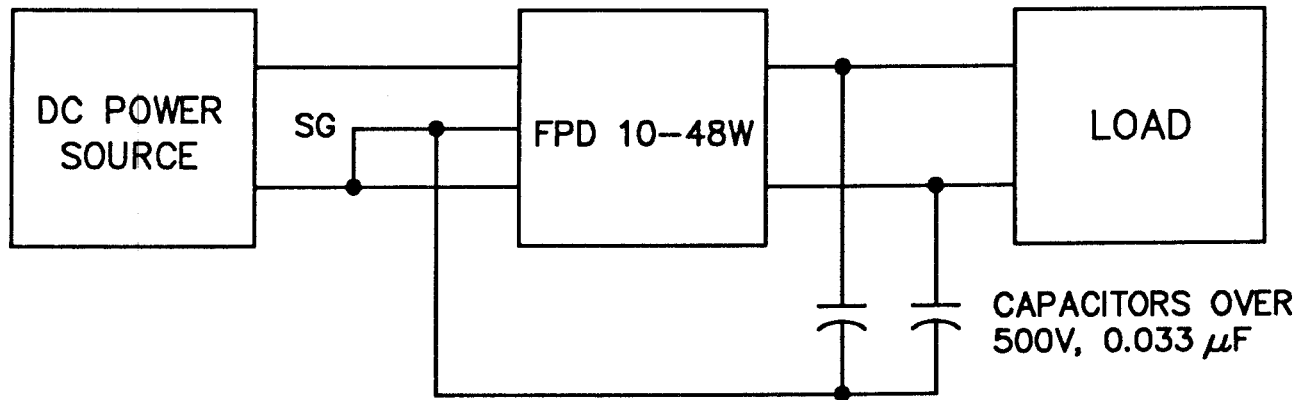


FIGURE 5 (TOP) FPD 10-48W APPLICATION WHERE THE INPUT LINES TO THE DC TO DC CONVERTER ARE LONG

FIGURE 6 (BOTTOM) A COMMON MODE NOISE SUPPRESSION CIRCUIT TO REDUCE MUTUAL INTERFERENCE AND GROUND LOOP NOISE IN THE DC TO DC CONVERTER

CONNECTION WITH ISOLATION



CONNECTION WITHOUT ISOLATION

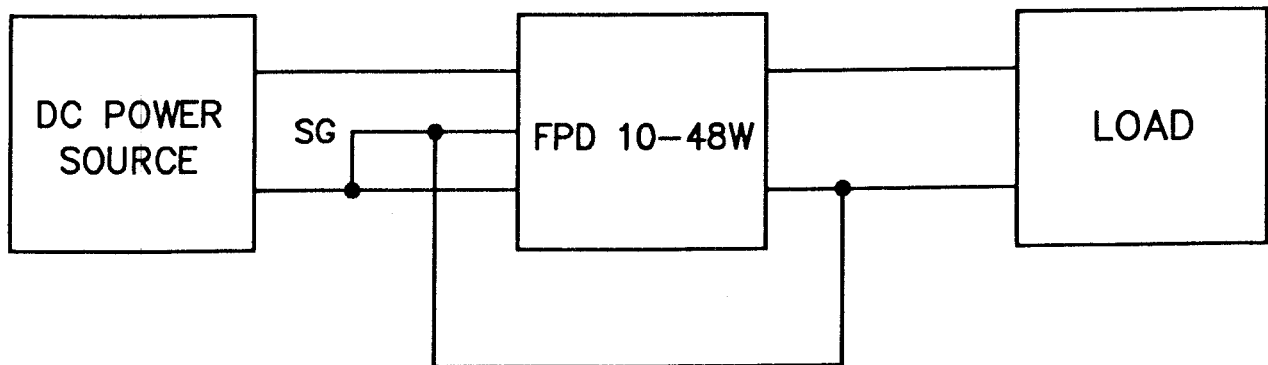


FIGURE 7A (TOP) FPD 10-48W APPLICATION WHERE VOLTAGE SURGES ARE PRESENT AT THE INPUT TERMINALS TO THE DC TO DC CONVERTER—NOISE SUPPRESSION CIRCUIT WITH ISOLATION

FIGURE 7B (BOTTOM) FPD 10-48W APPLICATION WHERE VOLTAGE SURGES ARE PRESENT AT THE INPUT TERMINALS TO THE DC TO DC CONVERTER—NOISE SUPPRESSION CIRCUIT WITHOUT ISOLATION

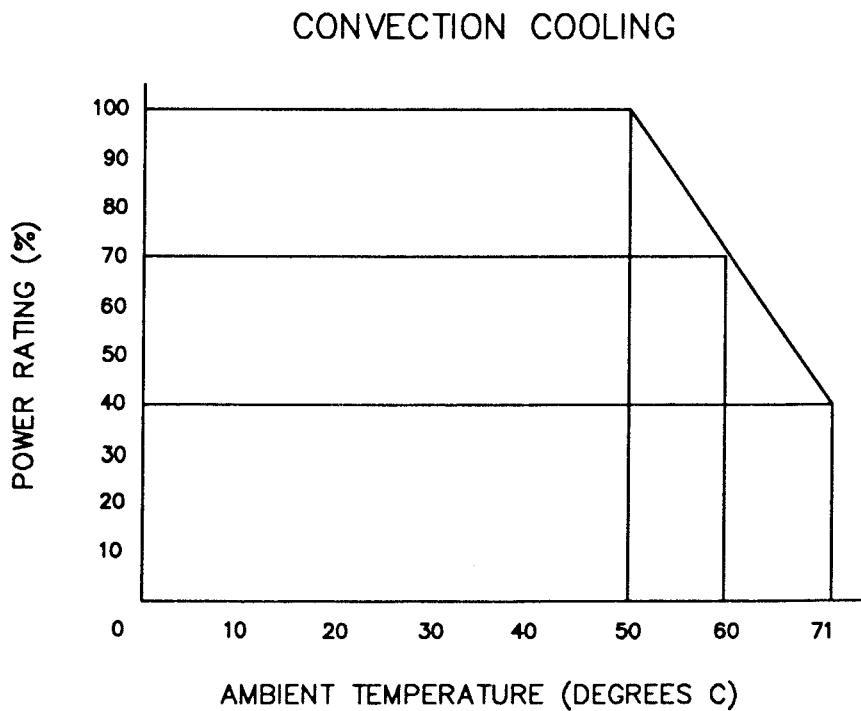
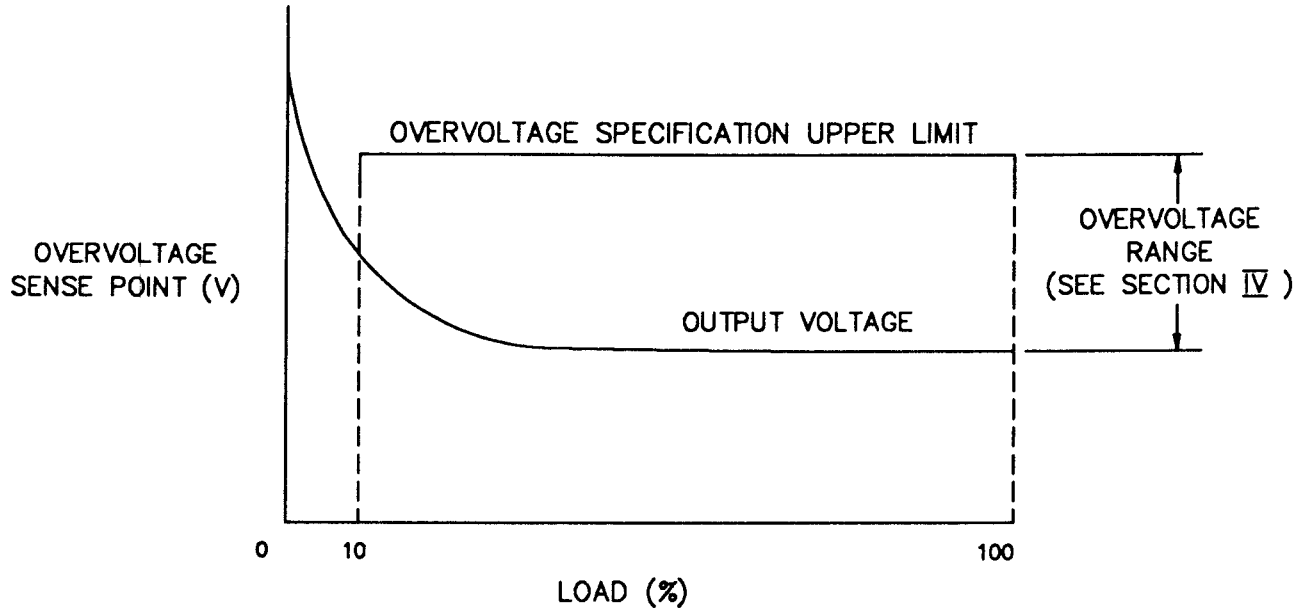


FIGURE 8 (TOP) OVERLOAD PROTECTION CHARACTERISTIC FOR THE FPD 10-48W DC TO DC CONVERTER

FIGURE 9 (BOTTOM) A PLOT OF PERCENT OUTPUT RATING VERSUS AMBIENT TEMPERATURE (WITH CONVECTION COOLING) FOR THE FPD 10-48W DC TO DC CONVERTER

You must register your product to comply with the terms of the warranty. Either fill out the form below and mail or fax to Kepco, or for rapid on-line registration go to:

<http://www.kepcopower.com/warranty.htm>

PRODUCT PURCHASED:

Model Number) _____
Serial Number _____

PURCHASE INFORMATION:

Date Purchased: _____
Date Received: _____

REQUEST ADDITIONAL INFORMATION

- Send complete Catalog
- Have Sales Engineer Call
- Contact via: E-Mail Telephone Fax S-mail

REGISTER TO:

Registered by: _____
Company Name: _____
Street: _____
City: _____
State: _____
Country: _____
Zip: _____
E-mail: _____
FAX: _____
Phone: _____

WHAT INFLUENCED YOUR CHOICE OF THIS POWER SUPPLY?

- Previous Experience (which Kepco Models do you have?)

- Magazines (which ones?) _____

- Trade Shows (which ones?) _____
- Directory? _____

- Kepco Catalog or Brochure? _____
- Sales Representative?
- Web Site
- Other (please explain): _____

What products would you like to see Kepco make?

CUT HERE

Kepco 1 Year Warranty

This is to certify that we, KEPCO, INC., (hereinafter called "Company"), Flushing, NY 11355 USA, warrants for a period of ONE YEAR, this instrument known as:

MODEL: _____

SERIAL NO. _____

The Company's products are warranted for a period of one year from date of delivery to be free from defects in materials and workmanship and to conform to the specifications furnished or approved by the Company. Liability under this warranty shall be limited to the repair or replacement of any defective product at Company's option.

If any defect within this warranty appears within the warranty period, the Purchaser shall promptly notify the Company in writing. No material will be accepted for repair or replacement without written authorization of the Company.

Upon such authorization, and in accordance with instructions of the Company, parts or materials for which replacement is requested shall be returned to the Company for examination, with shipping charges prepaid by the Purchaser. Final determination as to whether a product is actually defective rests with the Company.

This warranty does not extend to any product which has been subjected to misuse, neglect, accident, improper installation, or use in violation of instructions furnished by the Company. The warranty does not extend to, or apply to, any unit which has been repaired or altered outside of the Company's factory by persons not expressly approved by the Company.

THE WARRANTY HEREIN CONTAINED IS IN LIEU OF AND EXCLUDES ALL OTHER WARRANTIES, EXPRESS, IMPLIED OR STATUTORY, INCLUDING WITHOUT LIMITATION THE WARRANTY OF MERCHANTABILITY.

THIS KEPCO PRODUCT IS WARRANTED FOR ONE YEAR!

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