



## MODIFICATION OF STANDARD

KEPCO MODEL BOP 20-5ML  
KEPCO MODEL BOP 20-5DL

The Kepco Model BOP 20-5ML and BOP 20-5DL have been modified from a standard Kepco Model BOP 20-5M and BOP 20-5D, respectively, to allow the unit to work with inductive loads (up to 1H) in Current mode.

### 1) ELECTRICAL CHANGES (BOP A1 BOARD):

A. At BOP A1 board, interrupt connection between IC11 pin 3 and P4, pin 10, then add R100 (P/N 115-1822, 1K Ohms, 1%, 1/4W) between IC11 pin 3 and P4, pin 10.

B. At BOP A1 board, add series combination of R101 (P/N 115-1857, 49.9K Ohms, 1%, 1/4W) and C37 (P/N 117-0588, 4700pF, 10%, 200V) between IC11, pin 3, and the junction of R71 and RN2.

C. At BOP A1 board, add series combination of R102 (P/N 115-1857, 49.9K Ohms, 1%, 1/4W) and C38 (P/N 117-0588, 4700pF, 10%, 200V) between IC9, pin 3, and the junction of R71 and RN2.

D. At BOP A1 board, change C21 to P/N 117-0377 (22nF, 10%, 200V).

### 2) MECHANICAL CHANGES:

None

### 3) BOP INSTRUCTION MANUAL CORRECTIONS:

A. Unit designed to work with inductive loads (up to 1H) in Current or Current Limit modes. The unit will be stable with any R-L series load combination.

B. To avoid inducing a large distortion of output current It is recommended that the output voltage be kept below the voltage limit setting if the load impedance at the working frequency multiplied by the peak value of current equals the voltage limit setting. If the voltage limit is reached, it is recommended that the unit's bandwidth be reduced by connecting an external film capacitor between pins 16 and 18 of the unit's PC12 connector; refer to Table 1 to change the 3dB bandwidth for resistive, resistive-inductive or inductive loads, with less than 10% tolerance (excluding the capacitor tolerance).

**TABLE 1. 3dB BANDWIDTH CORRECTION IN CURRENT MODE**

C <sub>EXT</sub> (uF)	0.01	0.02	0.05	0.1	0.2	0.5	1
BANDWIDTH (KHz)	4.2	2.4	1.1	0.55	0.28	0.12	0.06

C. Characteristics changed as follows:

Bandwidth (DC to f-3dB)

Current Mode (Nominal Resistive Load): 12.8 KHz  
Current Mode (Inductive Load, 2mH): 7.9 KHz

Rise/Fall time (10%-90%, Nominal Resistive Load)

Current Mode: 30µS

Recovery at Step Load

Current Mode: 270µS (Short-circuit - Nominal Resistive Load)

Load Effect

Current Mode (Nominal Resistive Load):

Increase with frequency from the typical 0.5 mA in DC- full scale (same as the regular unit) with 3.5 ppm/Hz (of the low frequency output current value)