

# PH-SERIES Parallel Operation

## 1. INTRODUCTION

PH series (F type only) equally shares current by connecting each PC terminal of power module in parallel.

There are 2 different parallel operations as follows.

### (1) Parallel Operation

When load current can not be supplied by only a unit of power module, the output can be enhanced. Also, the reliability of the system can be improved to derate the output power.

### (2) N+1 parallel Redundant Operation

For power supply system required high reliability, it is possible to improve the reliability of the system by using N+1 units for load of N units.

In parallel operation with N+1 units, even though one of the power modules is failed, performance of the system can be maintained for the other units cover for the failure power module and share the load current.

## 2. PRECAUTION IN

### PARALLEL OPERATION

Basic cautions and warnings in parallel operation are as follows.

- Only F type power modules are applicable. Inhibit parallel operation on S type power modules.
- Available to use 11 units maximum in identical model (same output power and voltage.)
- Attach a common mode choke coil at input of each power module.
- Accuracy of output voltage adjustment shall be within  $\pm 1\%$ .
- The maximum load current shall be less than 95% of nominal output current.
- Ground of PC terminal (signal ground) is - S terminal. Inhibit to use as power line.
- Use same length and size of output load wire between power modules in parallel operation and loads.
- If IOG and AUX terminals are used, read its explanation in the manual.

# PH-SERIES Parallel Operation

## 3. PARALLEL OPERATION

(a) Parallel connection to enhance the output and to improve the reliability

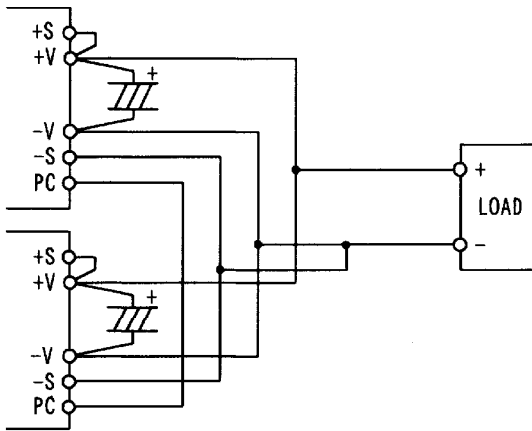


Figure3-1 : Parallel Operation

(b) Parallel Operation programmed output voltage

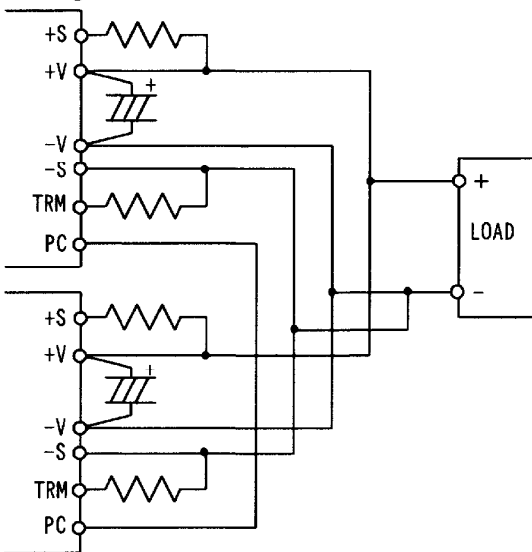


Figure3-2 : Programmed Output Voltage

(c) Parallel Operation with adjustable output voltage

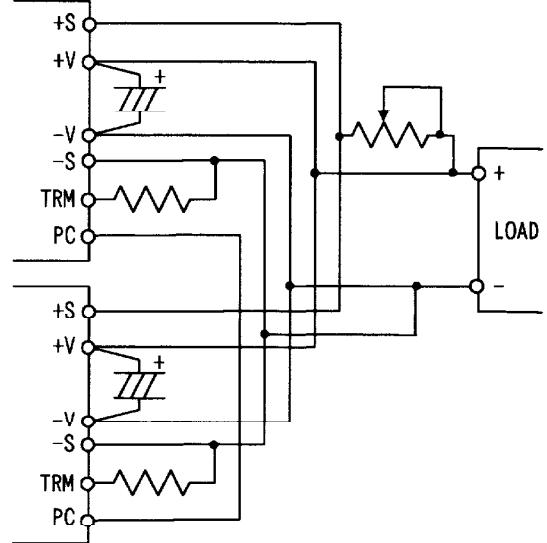


Figure3-3 : Parallel Operation

with adjustable voltage

(d) Parallel operation when the output voltage is adjusted by applying voltage externally

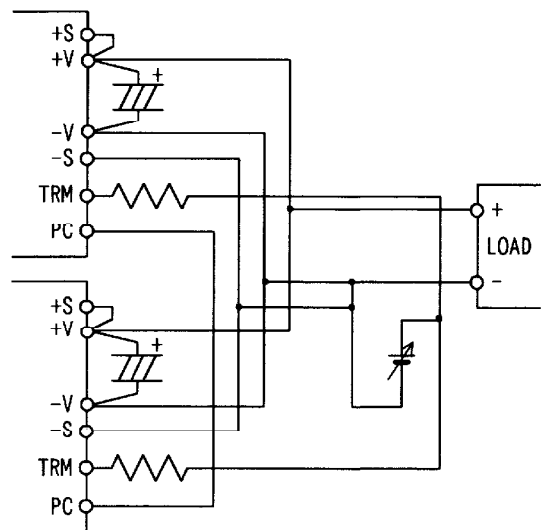


Figure 3-4 : Parallel Operation which is possible to adjust output voltage by external applied voltage

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## 4. N+1 REDUNDANT OPERATION

(a) N+1 Redundant connection

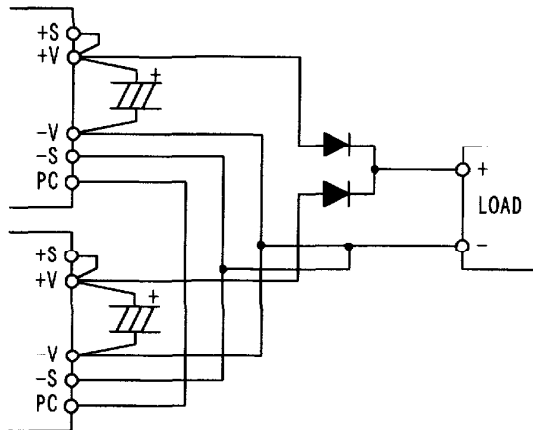


Figure4-1 : N+1 Redundant Operation

(b) Redundant Operation with programmed output voltage

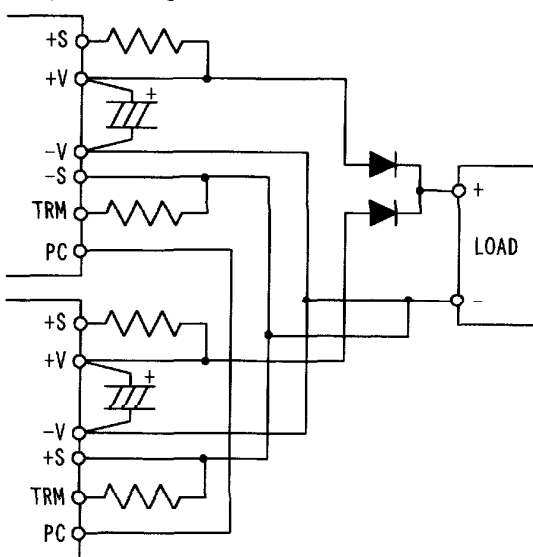


Figure4-2 : N+1 Redundant Operation with programmed output voltage

(c) Redundant operation with adjustable output voltage

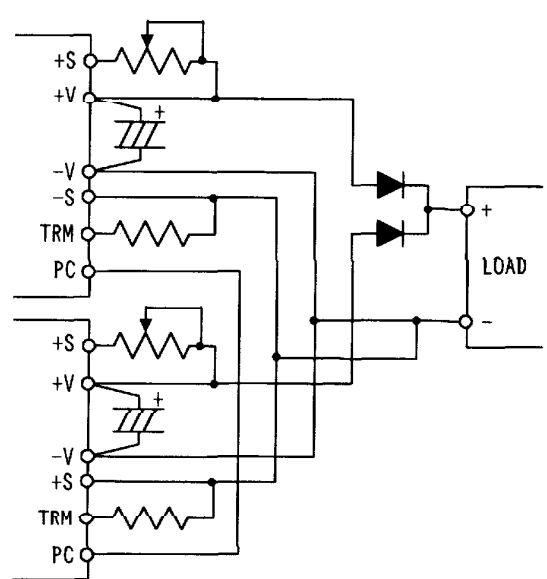


Figure4-3 : N+1 Redundant Operation with adjustable output voltage

(d) Redundant operation when the output voltage is adjusted by applying voltage externally

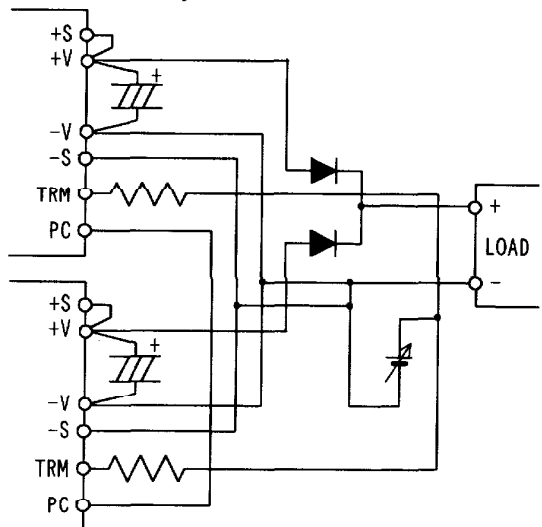


Figure4-4 : N+1 Redundant Operation which is possible to adjust the output voltage by external applied voltage