- Redundancy operation for PBA series -

As for the PBA series (PBA300F ~ 1500F and 1500T), parallel redundancy operation is available to improve a system reliability (Back-up operation). Also N+1 redundancy operation is available to build a reliable system with minimum required units.

⬛ Feature of each method

In PBA300F ~ 1500F and 1500T series, three different kinds of way are available as following.

Method ① : Redundancy operation with external diode
Method ② : Redundancy operation with current sharing
   (N+1 redundancy)
Method ③ : Redundancy operation with optional harness (H-PA-3)
   (N+1 redundancy)

Table1. Redundancy availability

A way of redundancy	Failure happened at;		
	Primary side	Secondary power block	Secondary Control part
Method ①	available	available	available
Method ② (N+1)	available	available	N/A
Method ③ (N+1)	available	N/A	N/A

* N+1 redundancy
   If you add one extra power supply in parallel operation, even if one of the power supplies in your system fails, the remaining non-failed power supplies continue to sustain the system.

* Hot-swap or Hot-plug is not available.

①Redundancy operation with external diode

■ Circuit

PBA300F ~ 1500F and 1500T, example circuit for redundancy operation is shown below.
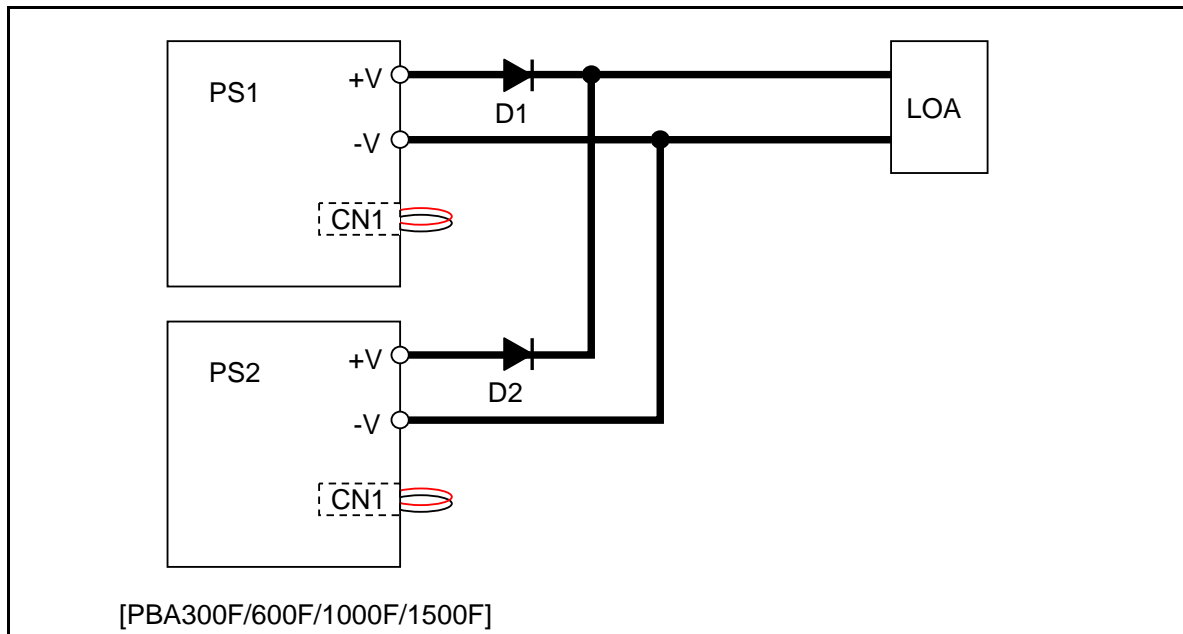

[PBA300F/600F/1000F/1500F]

Fig1. Redundancy operation circuit with external diode

■ Explanation of Operation

In this method, output power is provided by one back-up unit if the failure happened at one of power supply. And this method is effective to be recovered from all failure modes, such as failure at primary / secondary circuit.

The external diode is required to prevent influence from failure unit.

This method is the most reliable connection in redundancy connection.

■ Note

The power that load requires must be rated power or less of one unit.

Load < Rated power of one unit

Since there is no current sharing, output current is not balanced between PS1 and PS2. Therefore, this method can not be used for increasing power.

A Reference value for D1 and D2.
*D1 and D2 are same value.
Rated current :
    Double of power supply's rated current
Rated voltage :
    Double of power supply's rated voltage

D1 and D2 dissipate heat by output current. Therefore, heat-sink would be required for cooling.

Output voltage will be dropped by D1, D2. Adjust each output voltage higher by internal potentiometer if required, and also adjust them to be the same value.

②Redundancy operation with current sharing

■ Circuit

PBA300F ~ 1500F and 1500T, example circuit for redundancy (N+1) operation is shown below.
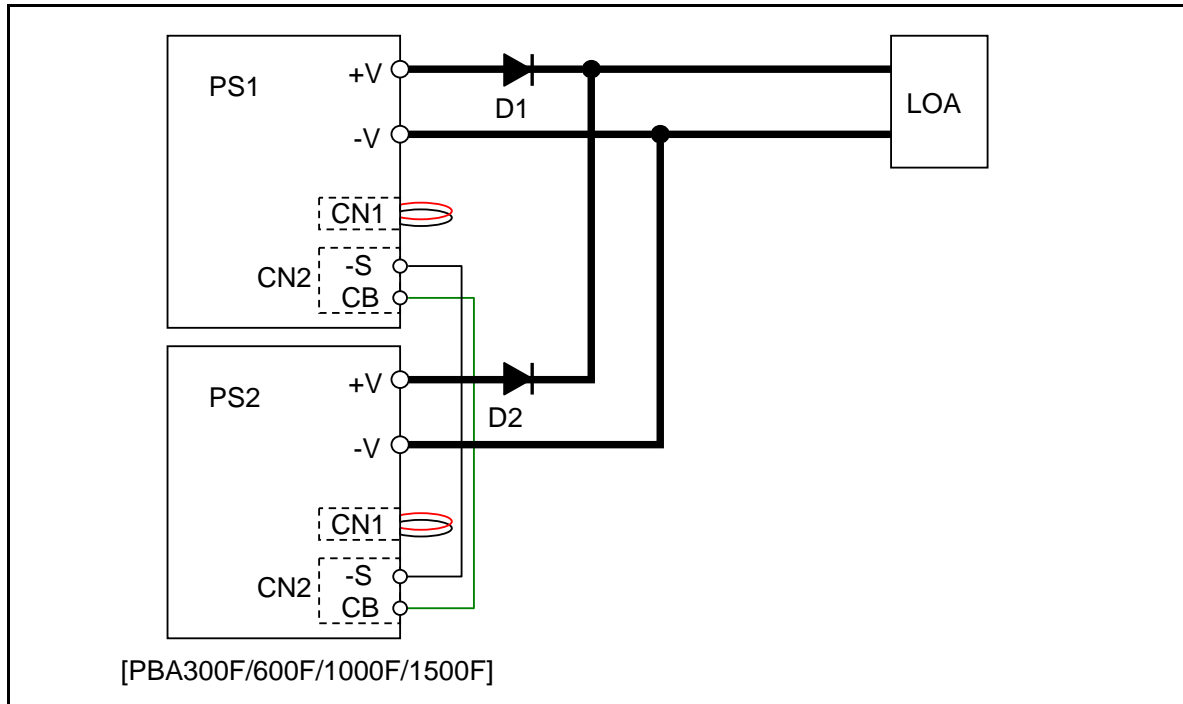

[PBA300F/600F/1000F/1500F]

Fig2. Redundancy operation with current sharing

■ Explanation of Operation

In this method, output power is provided by one back-up unit if the failure happened at one of power supply. And this method will recover from all failure modes except CB circuit failure. CB terminal is used for current sharing.

The external diode is required to prevent influence from failure unit.

The advantage of this method is that output current of each power supplies can be balanced in this method.

■ Note

Differences in the output current values among the power supplies in parallel connection are 10% at most. Please make sure that the sum of the output current values does not exceed a value obtained from the right side of the following equation.

(Output current in parallel operation) = (Rated current per unit)x(Number of units)x0.9

A Reference value for D1 and D2.
*D1 and D2 are same value.
Rated current :
    Double of power supply's rated current
Rated voltage :
    Double of power supply's rated voltage

D1 and D2 dissipate heat by output current. Therefore, heat-sink would be required for cooling.

Output voltage will be dropped by D1, D2. Adjust each output voltage higher by internal potentiometer if required, and also adjust them to be the same value.

If one of the power supplies stops operating, the output voltage may change about 5% appx.

③Redundancy operation with optional harness (H-PA-3)

■ Circuit

PBA300F ~ 1500F and 1500T, example circuit for redundancy (N+1) operation with H-PA-3 is shown below.
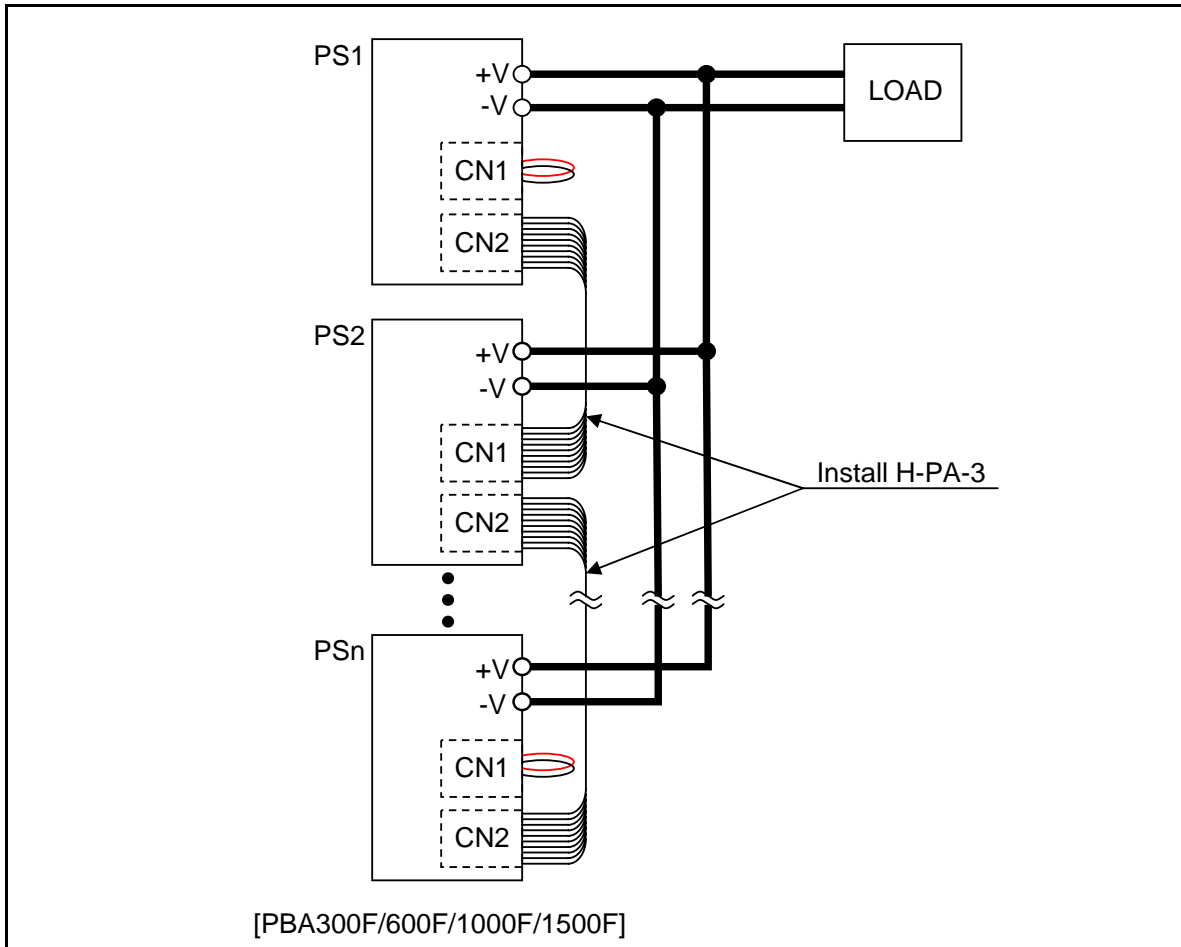

Fig3. Parallel redundancy operation with H-PA-3

■ Explanation of Operation

Option harness H-PA-3 is available for redundancy operation. In this method, the external diode should not be used for stable operation. Therefore, this method will recover from primary circuit failure only. If the failure happened at one of power supply, output power is provided by the rest of unit with current sharing.

■ Note

If one of the power supplies stops operation, the output voltage may change about 5% appx.

When unit replacement is required due to unit failure, input voltage for all units must be cut off. After replaceement, input-line, output-line and H-PA-3 must be connected correctly, before re-applying input voltage.