

Mechatronics Power Supply [No.1]

- Selection Points for motor, solenoid and actuator
- Measure against vibration, shock and environmental problem

12V, 24V, 30V, 36V, 42V, 48V

Wide variations for each motor type!

The drive unit such as motors or solenoids is popularly used for the automatic machine devices, the automatic measurement system, the cutting machine, the robot tool and carrier system.

The motor type and its control system is changed to the direct current motor, the AC servomotor and the stepping motor depend on the use or its combination of the case that driving force is top priority, the case that speed and response is demanded and the case of positioning precision are demanded.

As for the switching power supply, various functions become necessary. The needed functions are not only the variation of the output voltage but also the function that is needed by the various drive devices for example of the large peak current. Otherwise, we have a look at a lot of contradiction and mismatch that it is chosen a power supply by severe cost priority, but it is chosen big power supplies more than required by peak electric current correspondence in the customers that make the design and fabrication of an automatic machine.

Taking advantage of this time that GPSA series is improved to the 3 times peak current for the motor load use, we NIPRON studied the most suitable choice method and produced this mechatronics power supply as a special feature.

Mechatronics Power Supply, Selection for the various motor

Peak current ; 1.5 - 1.8 times available for 10 sec.

Peak current ; 2.3 - 2.7 times available for 5 sec.

24V limited edition available for the UPS functions

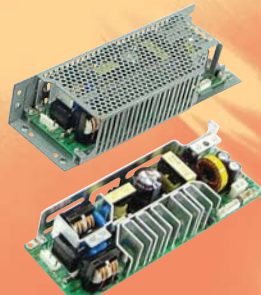
120W class

170W class

360W class

750W class

Battery pack



OZP-120 series

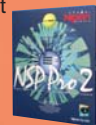
OZP-170 series

GPSA-360 series

GPSA-750 series

software

NSP Pro2



Series type	Output voltage	+12V	+24V	+30V	+36V	+42V	+48V	+12VSB
OZP-120-*** 120W	Rated output current	10A	5A	4A	3.4A		2.5A	
	Peak output current	AC100V 15A	AC200V 9A	7.2A	6A		4.5A	
OZP-170-*** 170W	Rated output current	14A	7A	5.6A	4.7A		3.5A	
	Peak output current	AC100V 22.5A	AC200V 12.5A	10A	8.4A		6.3A	
GPSA-360-*** 360W	Rated output current	30A	15A	12A	10A	8.5A	7.5A	0.3A
	Peak output current	AC100V 40A	AC200V 20.8A	16.6A	13.8A	11.9A	10.4A	
GPSA-750-*** 750W	Rated output current	56A	30A	24A	20A	17.1A	15A	0.3A
	Peak output current	AC100V 70A	AC200V 37.5A	30A	25A	21.4A	18.7A	
		80A	50A	40A	33.3A	28.5A	25A	

We recommend the Nipron. Nipron Web Sales

<http://www.nipron.com>

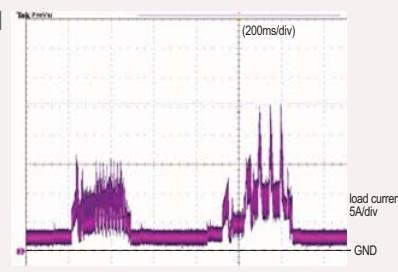
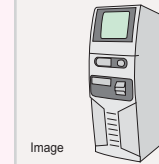
Selection points for the mechatronics power supply

Point 1

Study of the voltage vs the peak current at the actual or worst condition

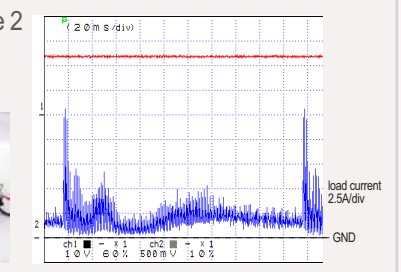
Actual condition example 1

P/S: GPSA-360-24
Load: bill counter

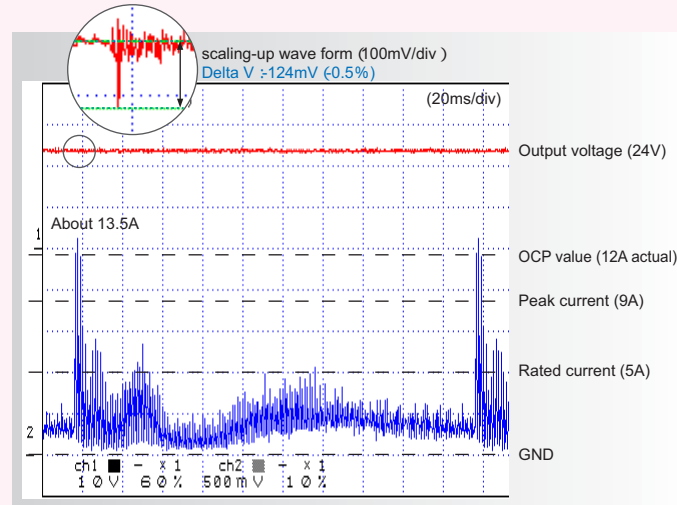


Actual condition example 2

P/S: OZP-120-24
Load: motor roller



We show our study about the waveform of the actual condition example 2.



This is the measured waveform of the load by the motor roller and OZP-120-24 above.

The actual peak currents exceed the peak value and the OCP value at the peak output timing of OZP-120-24 as can be seen the wave pattern. It is apt to be judged that OZP-120-24 cannot be used in this case, but;

- (1) Check the voltage dip
- (2) Check the average current

The possibility of OZP-120-24 comes out by those checking.

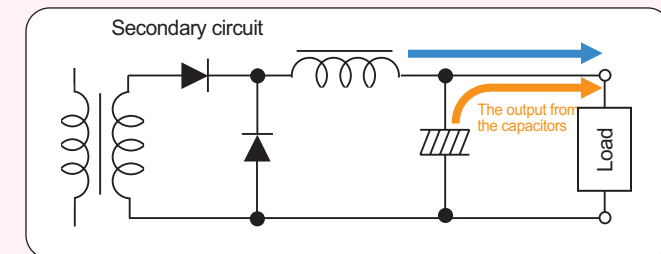
(1) Checking the voltage dip

When the peak currents at the motor start-up exceed the OCP value, that is cause of the big dip delta V by the OCP characteristic of the power supply.

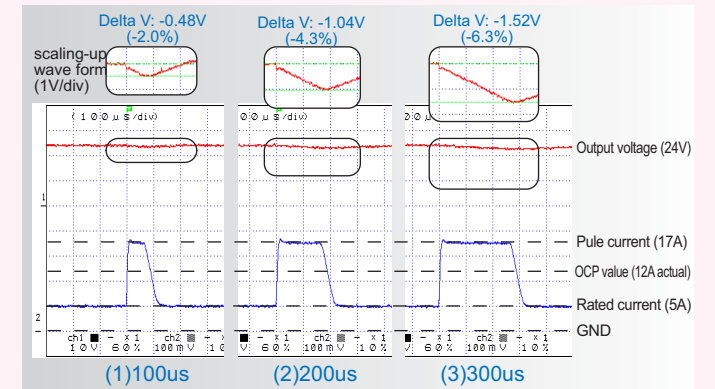
We can judge that it is in the OCP protect condition when the delta V is more than 10%. But when it is within 5%, it is no problem because it is a transient voltage drop by the impedance of the power supply and its load line.

As the delta V is 92mV and 0.4% in this case, it can be judged as no problem.

Even if the peak current more than OCP value happened, the output charged capacitors of the power-supply can supply the energy to the output and can make the stable voltage without the large voltage dip for a certain period of time.



Well, I show below the result using OZP-120-24. We can find how long and how much the voltage dip is at the peak current.



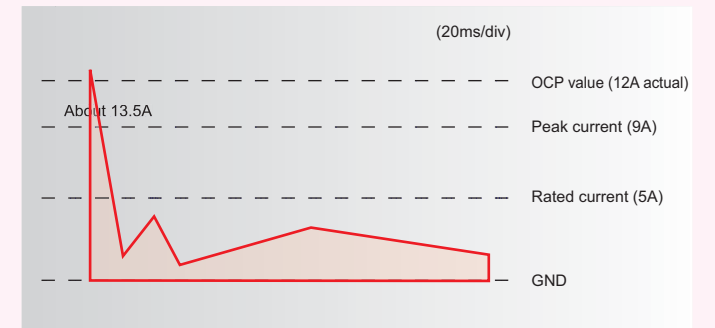
It is the waveform of the peak pulse current of 17A bringing from rated 5A during time of (1)100us, (2)200us, (3)300us. The each voltage dip is as follows: (1)-0.48V(-2.0%), (2)-1.04V(-4.3%), (3)-1.52V(-6.3%) If there is it during 200us period of (2), We can obtain the stable output within load change -5%.*

As for this, even in the case of a different wattage power supply of NIPRON, we can refer the result because the output capacity and the filter value can act to be in a proportion tendency.

*Please consider it as one aim because it changes by the load current levels.

(2) Checking the average current

After we could judge that there was no problem in the voltage dip caused by the peak current, we next need to calculate an approximate average current of the output and to confirm it whether continuous output is possibility thermally.



We calculate the average current of the waveform above assuming that it is the red line waveform.

If the average current that we demanded is lower than 70% of power supply output capacity, we can judge it no problem. In this waveform, the average current of the red part is approximately 3A and is lower than 70% of the output capacity of OZP-120-24 and then we can judge it no problem even if the continuous use.

Hereon even if a peak load current is more than the OCP value, the power supply is not needed to change to a larger one of the capacity more than required and can have usable possibility just as it is. So we recommend you to talk with us Nipron when you face to this kind of the problems.

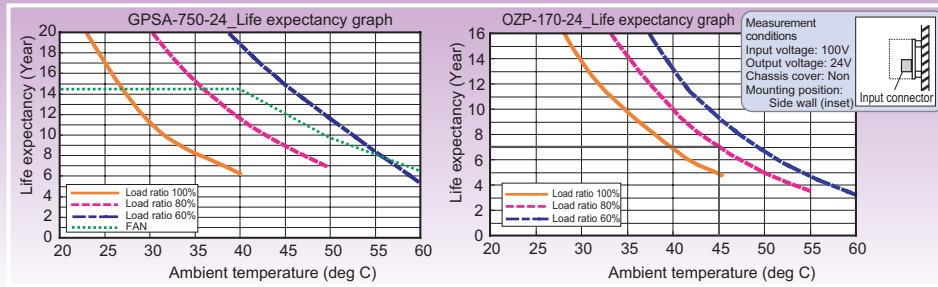
Well, the mean current is measured by the function of the measuring instrument to confirm a average current (2) and it can be judged even to confirm that the mean current is lower than the rated current of the power supply.

In the case of a small quantity, You can buy it by immediate delivery.

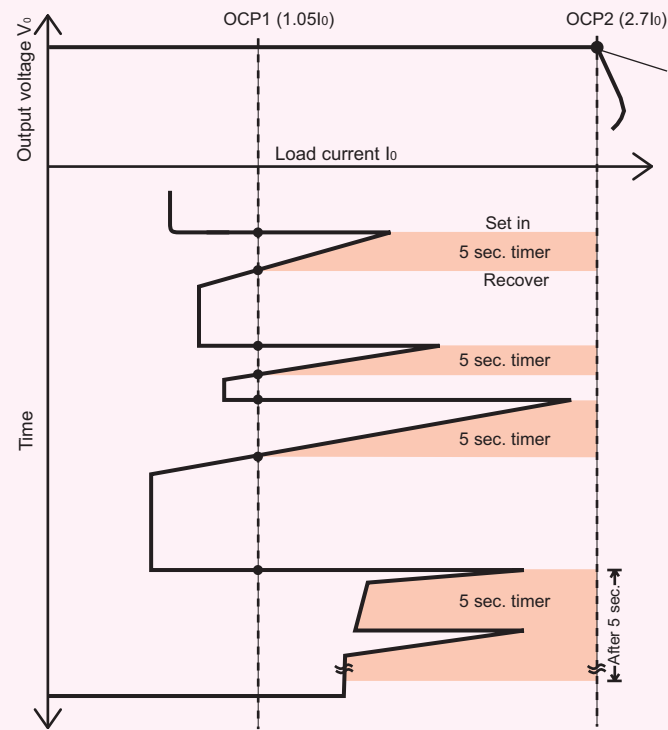
<http://www.nipron.com>

Point 2 How to calculate actual load current vs. required life, based on life

In case of OZP-170-24 (right side graph), assuming that peak current is less than 12.5A and 7 years life is required at 45 deg C ambient, the load current loms necessary for 7 years life will be obtained at a cross point of 80% derating curve at 45 deg C, therefore, loms=7A x 0.8=5.6A.



GPSA series has two sets of over current protection (OCP1, OCP2) best for induction motor load.



GPSA-360: OCP2 ≥ 830W
GPSA-750: OCP2 ≥ 2000W

If the output current exceeds OCP2, the output voltage will start to go down and then shut off, provided such condition continues more than 300ms.

If the output current exceeds OCP1, the 5 sec. timer will set in and then reset if the load current decrease less than OCP1 within 5 second. If not, the output power will shut off.

In order to reset the power supply after being shut off, remove AC power for 10 second and turn on again. Any factor that causes over current conditions more than 5 sec. must be fixed.

In case of a repetitive pulse load within OCP2 point, the actual output current calculated by root-mean-square value shall be less than 100% of the rated current.

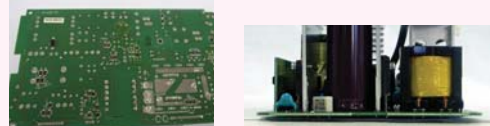
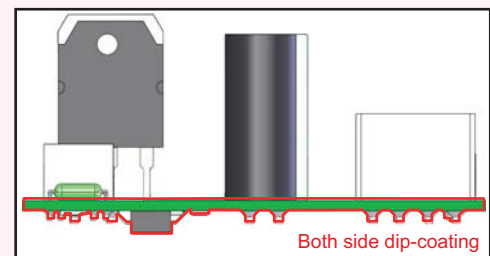
The GPSA series, however, has a safety design feature such as internal over heat protection that prevents its damage from a miss use due to over powered pulse loads.

As OZP-120 or OZP-170 series does not equip the 5 second timer that GPSA series has, the actual output current calculated by root-mean-square value shall be within the rated current. It has, however, internal thermal protection.

Environmental measures for motor equipment under harsh conditions

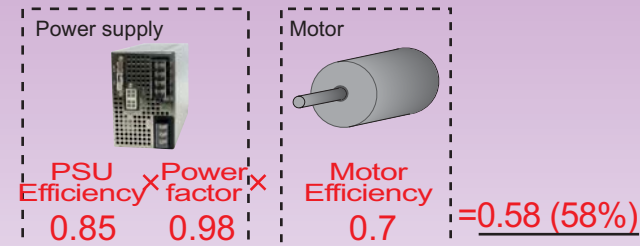
In case of motor roller conveyers in warehouses or plants that are often close to shores, hence, accidents due to accumulated dust and corrosion of saline particles, in case of weave machine application, problems due to conductive thread were observed.

Nipron is reinforcing environmental measures by dip-coating to both side of PC Board and putting insulation tubes to power semiconductor's leads.

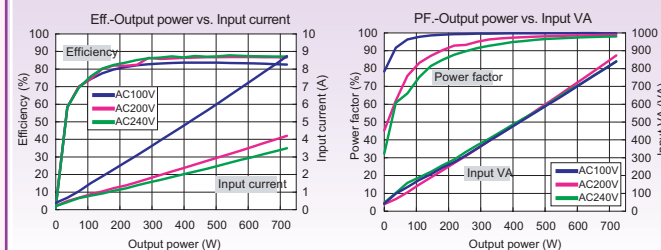


In a green age, total high efficiency power supply for motors to be sought

The total efficiency with the total load including the power transmission line is as below;



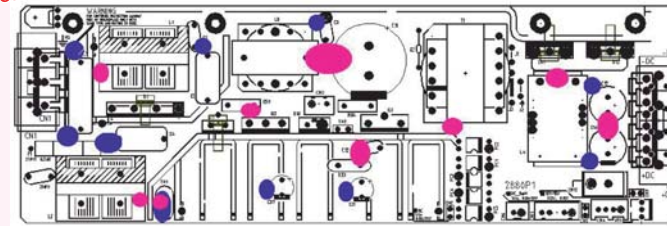
GPSA-750-24-TP (ex. Actual measurement)



Power supply for anti-shock and vibration

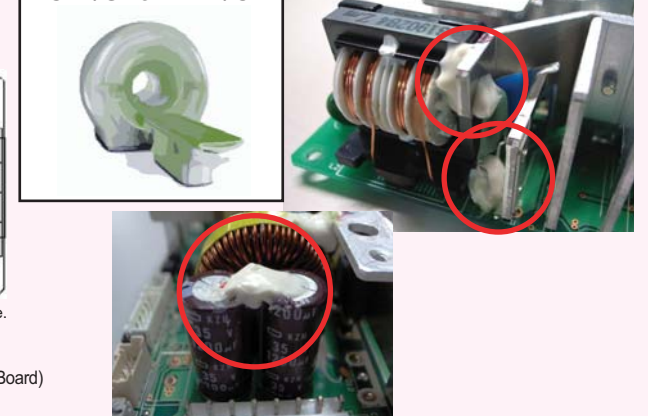
It is a must to buy the power supply that uses both-side through-hole-PC Board for applications such as Medical devices that equip moving arms or vibrators. In addition, large or heavy parts should be reinforced by silicone as anti-shock and vibration. Nipron has anti-shock and vibration products available, and accepts special treatment.

Anti-G treatment!
Actual example for 50G acceleration



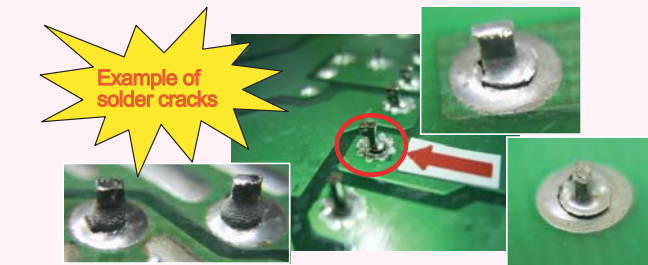
*Silicone treatment points may differ from actual example.

PC P/S for MRI/CT



Both-side through-hole-PC Board used! (Competitors just single-side PC Board)

No more problem of solder cracks especially due to lead free



If solder cracks happen, protection circuits such as OCP and OVP may not work.

Operation at -20 deg C conditions

This is an example of OZP series as an outside gate control P/S. Because of outside operations, customer initially asked -20 deg C special design, however, even standard OZP series has met -20 deg C operations. (Power derating required)

Available for Power failure sensor / Back-up

GPSA and OZP entire series equip a power failure sensor so that customer can save the cost of making a sensor circuit. Also +24V output type can achieve a back-up with batteries during blackout and then automatic shut down can be done with NSP Pro2. (Harness be required)



Functions often asked by customers

So convenient with stand-by P/S (power supply)

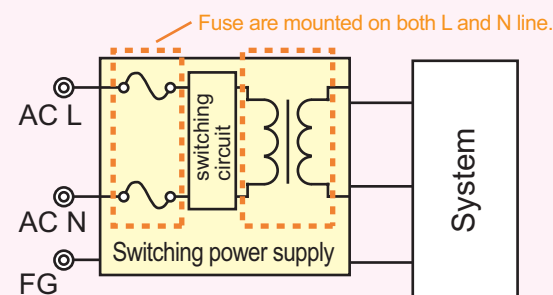
The recent trends show that requests for turning on/off power supplies through command signals in system or large machines are increasing.

Therefore, a stand-by P/S that is always active must be equipped. Nipron's GPSA series (Mechatronics P/S) has +12VSB@0.3A-0.5A stand-by P/S function.

PSE safety standard (Japan Product Safety, Electrical appliance & materials) to be complied

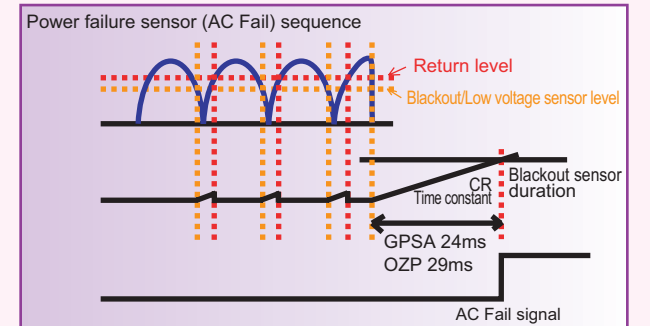
Because of two fuses in both AC lines equipped and low leakage current meeting medical standard, PSE can be easily met.

<GPSA series> *We can comply with the departmental regulations 1



Isolation transformer for medical use are mounted. Creepage distance and dielectric strength are also compliant with medical standard.

- Leakage current 0.3mA or less necessary at AC264V, 60Hz (patient-care system - class I)
- Dielectric strength: 4kV (between primary and secondary)
- Insulating distance (approx. 1.5 times of IEC60950-1 Standard)



GPSA P/S is ready for a sensor signal (HV signal) of voltage regenerated by servo motor driver.

GPSA P/S is ready for a sensor signal (HV signal) of voltage regenerated by servo motor driver. Also output abnormal high voltage can be sensed by this HV signal. OVP has been set much higher than that of HV sensor level.

