

Nipron Co., Ltd.

Revolution changing the medical world

Special topics about medical power supply

For PC system of colorful diagnostic imaging, speedy dynamic picture image, and ATX power supply which provides DC power to speedy& high capacity video card using more and more evolving GPU, 800W-1000W class products are required. Also, other medical equipment has DC power source.

This time, Nipron has developed various kinds of medical standards complied power supply, and we feature requirements and specifications that are specially needed as medical electric systems.

Medical Standards

"UL, CSA, IEC60601-1" compliant "m Series"

Battery Pack



Battery Backup available
● mNSP3-450P-S20-H1V

ATX	
NSP (Nonstop PSU)	
Continuous Max.	300W
Peak Power	450W



● mPCSA-500P-X2S

ATX	
Continuous Max.	300W
Peak Power	500W

Battery Pack



● mGPSA-360 Series

Single output	
Continuous Max.	360W
Peak Power	600W

* mGPSA-750 series during preparation



● mGPSA-750 Series

Single output	
Continuous Max.	720W
Peak Power	1200W

Battery Backup available for 24V output

What is Medical Standards Management Board?

Standard which intend to medical electrical system

Requirements about electric systems used in clinical practice are contained. Also contained is technical requirement which exceed general information processing system about basic requirement of safety such as electrification, insulation.

International Standard

Based on IEC60601-1, there are various specifications.

Classification	IEC specification NO. (Establishment date)	IEC specification NO. (Establishment date)
Safety	Basic Standard	IEC60601-1 (1988)
		IEC60601-1
		IEC60601-1
		IEC60601-1-1 (1992)
		IEC60601-1-1
		IEC60601-1-2 (1993)
		IEC60601-1-3 (1994)
		IEC60601-1-4 (1996)
		IEC60601-1-5 (200X)
	Particular Standard	IEC60601-2-28 (1993)
Quality Management	Basic Standard	IEC61223-1 (1993)
		IEC61223-2-10 (1999)
		IEC61223-3-2 (1996)
		IEC61223-3-2/Ed. 2(200X)
	Particular Standard	IEC61223-3-2/Ed. 2(200X)

What's different from present power supply specification?

Medical Standards (IEC60601-1) will be hard to comply than Information equipment Standards (IEC60950-1). Designing requirements are shown below.

- Fuse is without a tip
- 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)

Advantages of medical standards complied power supply

Applying standards for power supply installed system

- Power supply NOT complied

When power supply does not comply with the standards, customers are required to prepare for input fuses and insulating transformer etc. Because fuses and transformer will be installed separately, system will be large and expensive.

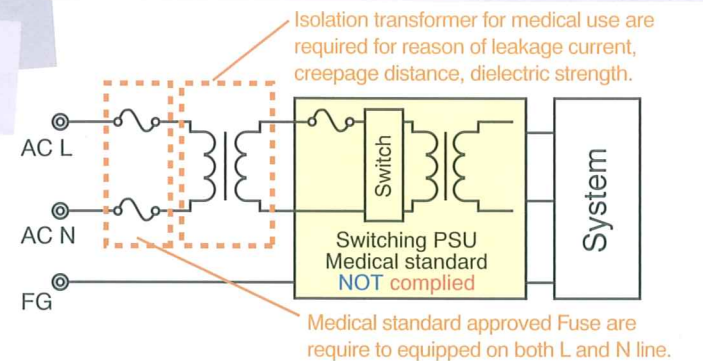
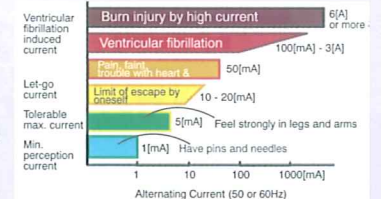
Macro shock

Graph is the reaction of human body when alternating current (50 or 60Hz) flow in through surface of skin. These show the current value when the current flowed 1 sec. in adult male's body. 2/3 of its value is said for female, and 1/2 for children. It starts feeling pins-and-needles sensations at approx. 1 [mA] (1/1000[A]) and it is called minimum perception current. When the current is large, it flows not only through the surface but also inner part of the body, which causes various symptoms.

If a certain level of the current flowed through the heart, muscle of the heart starts excitation contraction and stops pumping out the blood. This kind of heart condition is called "ventricular fibrillation". It is also said that ventricular fibrillation will happen when the amount of the current flowed through the surface of the skin goes up to 100[mA] or more.

Micro shock

It is said that human body can cause "ventricular fibrillation" with approx. 100[μA] (=0.1[mA]) when the current directly flowed into the body especially near heart. This current value is called "micro shock ventricular fibrillation induced current". Therefore, medical system that its electrode is used near heart is regulated to reduce especially "the leakage current" by JIS standards.



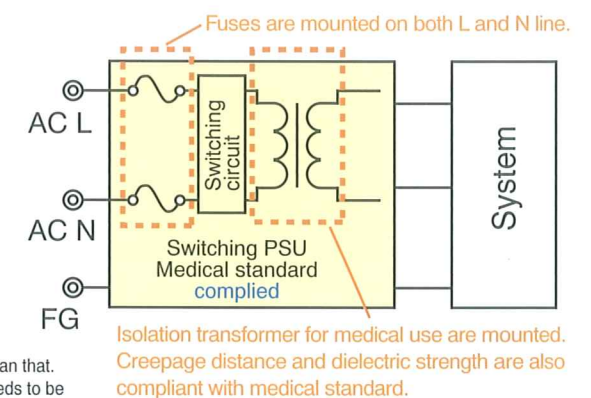
- mNSP3/mPCSA, mGPSA series (complied)

These series are all done to be double and reinforced insulation. That is why we are able to satisfy this requirement. You will not need to prepare for extra fuses or transformer. Also, it is compact and inexpensive rather than using power supplies those are not complying with the standards.

ATTN:

Please be careful with specifications/cautions for competitors' medical power supply as shown below.

- Certified as basic insulation, extra insulation circuit is required outside the power supply.
- Insulating material must be used in system chassis when it is used near the patient or other than that.
- When applying for medical systems standards, safety standards certified fuses or breaker needs to be connected to input terminal.
- Conducted emissions are FCC-A, VCC-A, ripple will be 1.5 times of standard.



Four fields of the standard

Medical system are one of the international fields, and are classified into 4 different fields considering the effects on human body.

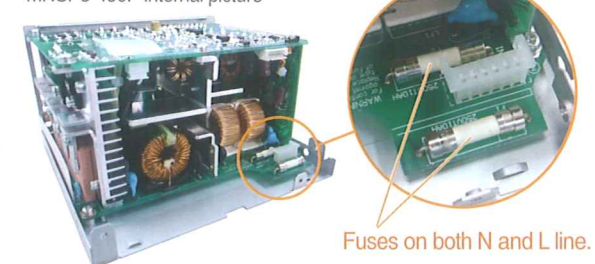
For production and distribution of relatively low risk (class II) system and external diagnostic medicines, private third party certification authority began to certify on behalf of the country.

Below is the comparison of classification on acceptance & necessity by the country and certification division of revised law.

International division	Medical equipment division based on risk	Past	After constricton 2005
Class I	Effects on human body in case of failure is considered very low. (Ex. extrasomatic diagnostic instrument, X-ray film)	Need no certification	Self-certification
Class II	Effects on human body in case of failure is considered lower. (Ex. MRI, electronic blood pressure, digestive catheter, ultrasonograph)	Government certification	Certification by third party
Class III	Effects on human body in case of failure is considered higher. (Ex. dialyzer, artificial ventilator)	Government certification	Government certification
Class IV	Effects on human body in case of failure is considered loss of life. (Ex. pace maker, artificial heart valve)	Government certification	Government certification

mNSP/mPCSA series and mGPSA series matches class I, II. Please consult about matching systems for class III, IV.

mNSP3-450P internal picture

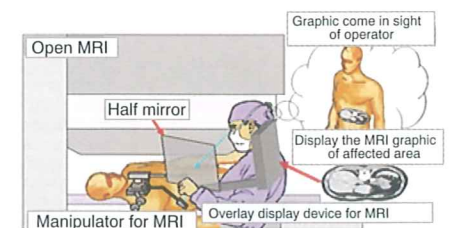


Transition of Medical Standards

- At present, IEC60601-1 3rd is issued. From this standard, risk management is required. Because it was not enough to manage the quality of medical systems only by ISO9001, ISO14971 is issued and we will have to satisfy the requirements based on it. (Certification authority such as UL etc. are not ready to deal with it. It will be applied some time later.)
- Medical Standards are hard to complied, contains various kinds, and is keep changing many times. It is risky for us NIPRON, but we will investigate and handle it with full efforts.

Realizing minimally invasive surgery by image information

Precision surgery
by image-guidance



Reference website: Graduate school of information science and technology,
the University of Tokyo



Highly-reliable/highly-functional medical computers Had been waited eagerly for
Medical Standard "UL, CSA, IEC60601-1" Complied PSU

mNSP3/mPCSA Series

Input/output specification

Output voltage	+3.3V	+5V	+12V	-12V	+5VSB
Max. current/ power (continuous)	20A	22A	22A	0.5A	2A
	Total 285 W		Total 301 W		
Peak current/ power (within 5s)	30A	33A	30A	0.5A	2.5A
	Total 432 W [482 W]		Total 450.5 W [500.5 W]		
Min. current	0A	0A	0A	0A	0A
Input voltage	AC85~264V				

Low leakage current specification

Satisfy 0.3mA or less leakage current (AC264V input) to comply Medical standard IEC60601-1 and class I (3P input plug with earthing).

Load condition: Rated
Leakage current measured value (example)

Rated input V	mNSP3-450P-S20-H1V	mPCSA-500P-X2S
AC100V	0.09 mA	0.09 mA
AC264V	0.25 mA	0.25 mA

Conducted emission class B compliant

Generally, conducted emission is tend to be sacrificed to specify low leakage current (generate more noise), but we satisfy conducted emission class B for low leakage current spec. (installed in computer chassis, measured at load factor 70%)

Backup operation available

Nonstop power supply
mNSP3-450P-S20-H1V



Continuous max. 300W
Peak 450W

Without Backup operation

mPCSA-500P-X2S



Continuous max. 300W
Peak 500W

Because it is double and reinforced insulation type,
Medical standards matched commercial insulating
transformer is unnecessary (low cost, downsizing)

New Product Development News

We are under development for 1000W class nonstop type ATX power supply towards release in April 2010. Design to comply with medical standard IEC 60601-1, energy saving 80 Plus compliant.

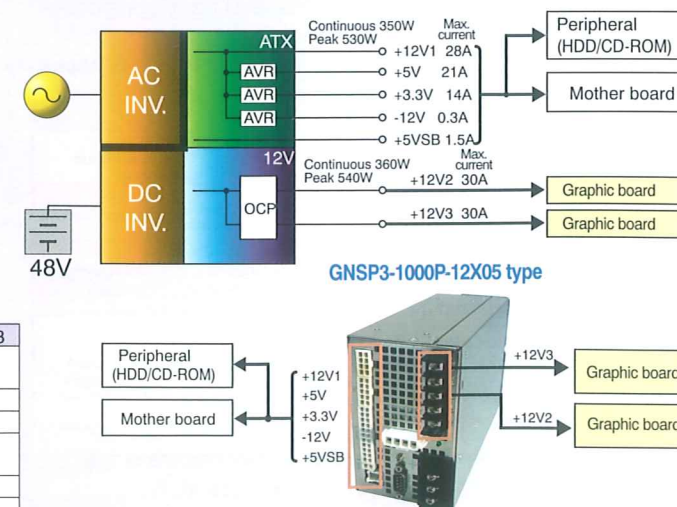
<ATTN> For customers who needs
1000W output ATX PSU (Medical Standard incompliant)

As great capacity ATX power supply

There is a growing need for 1000W output class ATX power supply for the graphic board (VGA) which capacity is becoming greater and greater. As a power supply to satisfy these needs, GNSP2-1000P-12X05 perfectly suits the field that handles with image processing apparatus including systems for medical purpose.

Output specification

	+3.3V	+5V	+12V1	-12V	+5VSB	+12V2	+12V3
Max. output current	14A	21A	28A	0.3A	1.5A	30A	30A
Max. output capacity	348.1W		708.1W		360W		
Peak output current	20A	30A	40A	0.3A	1.5A	45A	45A
Peak output capacity	527.5W		1067.5W		540W		

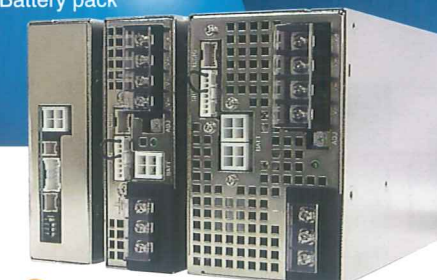


Front PC power supply for medical system

High cost, heavy weight commercial insulating transformer will be **UNNECESSARY.**

mGPSA-360/750 Series

Battery pack



Medical Standard (UL, CSA, IEC60601-1)
mGPSA-750 series: during preparation

mGPSA-360 Series mGPSA-750 Series

Line-up and Input/output specification

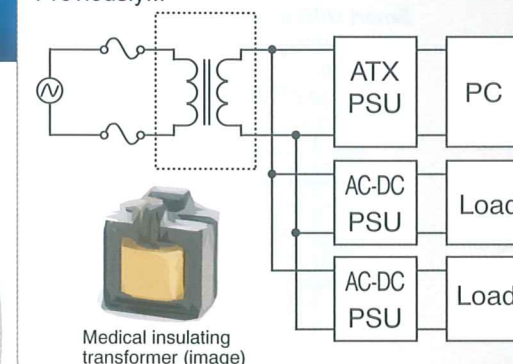
Series	Output voltage	+12V	+24V
mGPSA-360 series	Rated output current	30A	15A
	Peak output current	40A	20.8A
	Rated output current	40A	25A
mGPSA-750 series	Rated output current	56A	30A
	Peak output current	70A	37.5A
	Rated output current	80A	50A
Input voltage	AC85~264V		

Features

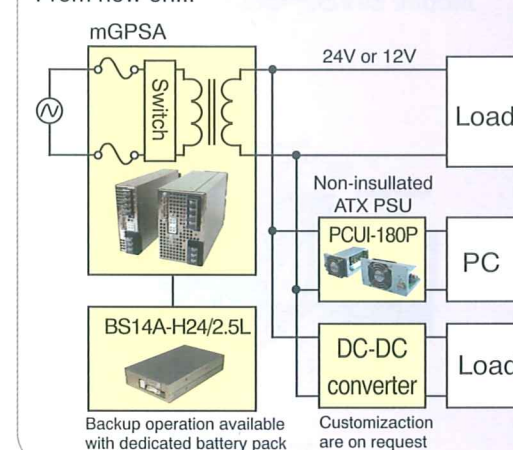
- Conducted emission class B compliant
Low leakage current spec, and satisfies conducted emission class B.
- Convenient size for loading system rack
High 3U, width 1U/2U sized rack embedded size.
- 12V standby power supply output
0.3A output is possible as auxiliary power (standby output).
- Blackout detection signal available
24V output type is available backup operation when connected to dedicated battery pack.

- Low leakage current**
0.3mA or less (at AC 264V input)
- Input huses**
mounted on both L (live) and N (neutral) line
- Double and reinforced insulation**
When applying for medical standard for your equipment, you will not need to connect fuse and breaker, or set up supplementary insulation outside the power supply.

Previously...



From now on...



Applicable examples

Ultrasonograph
ePCSA-650P-E2S
eNSP-300P-S20-11S



Security camera for tensive unit
mPCSA-500P-X2S



Operation microscope
mGPSA-360-24-TP
BS14A-H24/2.5L



PC for MRI/CT
ePCSA-500P-X2S



PC for medical analyzer
PCTF-220P-X2S



Immunoanalytical system
mGPSA-750-12-TP



Ultrasonograph for overseas
mGPSA-360-12-TP



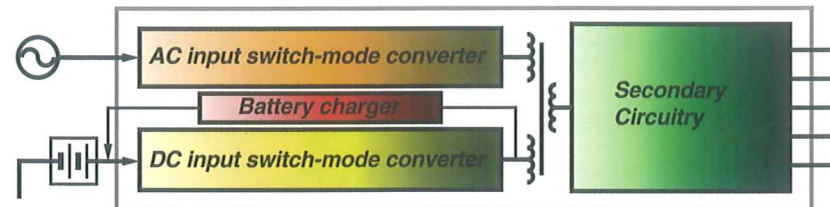
Medical DVR
PCTF-220P-X2S



(images)

Built-in type Nonstop Power Supply surpasses standalone UPS

Smart UPS solution configured with a PS2 size nonstop power supply
and a battery pack
Advanced ATX power supply with removable nonstop function unit
Lead-acid or Ni-MH battery pack installable in 5-inch bay



Nonstop power supply with removal backup function
Model: **eNSP-300P series**

ATX Power Supply

Nonstop unit

Replaceable Fan

Finger guard

Signal unit

12V power connector fitting for Pentium 4

Nonstop function is customer's choice!

Model **RBS01A-P24/2.2L**
Removable lead-acid battery pack

ATX	
NSP (Nonstop PSU)	
Continuous Max.	Peak Power
200W	300W

Output connectors	
eNSP-300P-S20-11S	Main (24Pin), 12V (4Pin), AUX, 5V, 3.3V, 1.5V, S-ATA, X1, X2
eNSP-300P-L20-11S	Main (24Pin), 12V (4Pin), 12V (4Pin), 5V, 3.3V, 1.5V, S-ATA, X1, X2

AC Input	85 to 264V (worldwide range)					
DC Input	24V (5" bay type Lead-acid battery, Ni-MH battery)					
Output voltage	+3.3V	+5V	+12V	-5V	-12V	+5VSB
Max. current/ power (continuous)	14A Total 125W	21A Total 185W	10A Total 203.6W	0.3A	0.8A	1.5A
Peak current/ power (within 5s)	28A Total 180W	30A Total 280W	15A Total 303.6W	0.3A	0.8A	2.5A
Min. current	0A	1A	0A	0A	0A	0A

High-powered Nonstop power supply
Model: **eNSP3-450P-S20-H1V**

Intelligence battery pack "Mi-Pack II" connectable.
Detects battery life span. Schedule function.

ATX	
NSP (Nonstop PSU)	
Continuous Max.	Peak Power
350W	450W

Output connectors (Optional)	
Main (24Pin)	Main (24Pin), 12V (4Pin), 12V (4Pin), 5V, 3.3V, 1.5V, S-ATA, X1, X2, X3, X4, X5, X6, X7, X8, X9, X10, X11, X12, X13, X14, X15, X16, X17, X18, X19, X20, X21, X22, X23, X24, X25, X26, X27, X28, X29, X30, X31, X32, X33, X34, X35, X36, X37, X38, X39, X40, X41, X42, X43, X44, X45, X46, X47, X48, X49, X50, X51, X52, X53, X54, X55, X56, X57, X58, X59, X60, X61, X62, X63, X64, X65, X66, X67, X68, X69, X70, X71, X72, X73, X74, X75, X76, X77, X78, X79, X80, X81, X82, X83, X84, X85, X86, X87, X88, X89, X90, X91, X92, X93, X94, X95, X96, X97, X98, X99, X100

AC Input	85 to 264V (worldwide range)					
DC Input	24V (5" bay type Lead-acid battery, Ni-MH battery)					
Output voltage	+3.3V	+5V	+12V	-12V	+5VSB	
Max. current/ power (continuous)	20A Total 160W	22A Total 334W	22A Total 350W	0.5A	2A	
Peak current/ power (within 5s)	30A Total 200W	33A Total 432W	30A Total 450.5W	0.5A	2.5A	
Min. current	0A	0A	0A	0A	0A	
W x H x D (mm)	150 x 86 x 140					

Small but Powerful!!
Compact size Nonstop power supply
Model: **NSP6F-220P-S10**

New

SFX	
NSP (Nonstop PSU)	
Continuous Max.	Peak Power
160W	220W

Output connectors	
Main (24Pin)	Main (24Pin), 12V (4Pin), 12V (4Pin), 5V, 3.3V, 1.5V, S-ATA, X1, X2, X3, X4, X5, X6, X7, X8, X9, X10, X11, X12, X13, X14, X15, X16, X17, X18, X19, X20, X21, X22, X23, X24, X25, X26, X27, X28, X29, X30, X31, X32, X33, X34, X35, X36, X37, X38, X39, X40, X41, X42, X43, X44, X45, X46, X47, X48, X49, X50, X51, X52, X53, X54, X55, X56, X57, X58, X59, X60, X61, X62, X63, X64, X65, X66, X67, X68, X69, X70, X71, X72, X73, X74, X75, X76, X77, X78, X79, X80, X81, X82, X83, X84, X85, X86, X87, X88, X89, X90, X91, X92, X93, X94, X95, X96, X97, X98, X99, X100

AC Input	85 to 264V (worldwide range)					
DC Input	16.8V (3.5" bay type Ni-MH battery)					
Output voltage	+3.3V	+5V	+12V	-12V	+5VSB	
Max. current/ power (continuous)	10A Total 160W	10A Total 334W	10A Total 350W	0.3A	1.5A	
Peak current/ power (within 5s)	10A Total 200W	10A Total 482W	14A Total 500.5W	0.3A	1.8A	
Min. current	0A	0A	0A	0A	0A	
W x H x D (mm)	100 x 63.5 x 145					

ATX power supplies deliver high power outputs with high efficiency and reliability

excellent series employ ABS resin panel, cooling fan replaceable from front, I/O interface port and power switch safeguard

500W

450W

ATX Nonstop

Model **ePCSA-500P-X2S**
77% efficiency
MTBF 96,000 hours

Model **eNSP3-450P-S20-H1V**
Nonstop Power Supply
77% efficiency
MTBF 83,000 hours

650W

Model **ePCSA-650P-E2S**
80% efficiency
MTBF 70,000 hours

Incomparable 100 ms hold-up time

ATX12V-EPS12V
Long operating life > 10 years
No preload required
Thermal sensing fan control
Removable output cable harness

650W output at 80% efficiency

SSI-EPS12V conformity
Long life with low power loss
No preload required
Thermal sensing fan control
Removable output cable harness

Admirable Hold-up time at momentary blackout,
PC power supply with high power
Model: **ePCSA-500P-X2S**

ATX	
Continuous Max.	Peak Power
350W	500W

Output connectors (Optional)	
Main (24Pin)	Main (24Pin), 12V (4Pin), 12V (4Pin), 5V, 3.3V, 1.5V, S-ATA, X1, X2, X3, X4, X5, X6, X7, X8, X9, X10, X11, X12, X13, X14, X15, X16, X17, X18, X19, X20, X21, X22, X23, X24, X25, X26, X27, X28, X29, X30, X31, X32, X33, X34, X35, X36, X37, X38, X39, X40, X41, X42, X43, X44, X45, X46, X47, X48, X49, X50, X51, X52, X53, X54, X55, X56, X57, X58, X59, X60, X61, X62, X63, X64, X65, X66, X67, X68, X69, X70, X71, X72, X73, X74, X75, X76, X77, X78, X79, X80, X81, X82, X83, X84, X85, X86, X87, X88, X89, X90, X91, X92, X93, X94, X95, X96, X97, X98, X99, X100

AC Input	85 to 264V (worldwide range)					
Output voltage	+3.3V	+5V	+12V	-12V	+5VSB	
Max. current/ power (continuous)	20A Total 160W	22A Total 334W	22A Total 350W	0.5A	2A	
Peak current/ power (within 5s)	30A Total 200W	33A Total 482W	30A Total 500.5W	0.5A	2.5A	
Min. current	0A	0A	0A	0A	0A	
W x H x D (mm)	150 x 86 x 140					

High efficiency, High power PC power supply
Model: **ePCSA-650P-E2S**

ATX/EPS	
Continuous Max.	Peak Power
550W	650W

Output connectors (Optional)	
Main (24Pin)	Main (24Pin), 12V (4Pin), 12V (4Pin), 5V, 3.3V, 1.5V, S-ATA, X1, X2, X3, X4, X5, X6, X7, X8, X9, X10, X11, X12, X13, X14, X15, X16, X17, X18, X19, X20, X21, X22, X23, X24, X25, X26, X27, X28, X29, X30, X31, X32, X33, X34, X35, X36, X37, X38, X39, X40, X41, X42, X43, X44, X45, X46, X47, X48, X49, X50, X51, X52, X53, X54, X55, X56, X57, X58, X59, X60, X61, X62, X63, X64, X65, X66, X67, X68, X69, X70, X71, X72, X73, X74, X75, X76, X77, X78, X79, X80, X81, X82, X83, X84, X85, X86, X87, X88, X89, X90, X91, X92, X93, X94, X95, X96, X97, X98, X99, X100

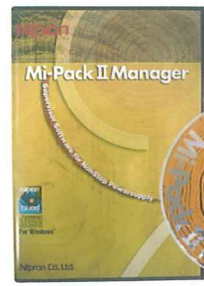
AC Input	85 to 264V (worldwide range)					
Output voltage	+3.3V	+5V	+12V1	+12V2	+12V3	-12V
Max. current/ power (continuous)	24A Total 140W	24A Total 420W	18A Total 550W	12A Total 480W	12A Total 650W	0.5A
Peak current/ power (within 5s)	24A Total 150W	24A Total 480W	16A Total 550W	16A Total 650W	0.5A	3A
Min. current	0A	0A	0A	0A	0A	0A
W x H x D (mm)	150 x 86 x 180					

Intelligence Battery Pack

"Mi-Pack II"

OS specification

- Windows Server 2008(x86/x64)
- Windows Server 2008 Server Core(x86/x64)
- Windows Server 2003 R2(x86/x64)
- Windows Vista(x86)
- Windows XP(x86)
- Windows 2000 SP4(x86)(IE5.01 or later)



Application software
Mi-Pack II Manager



Battery pack
BS22A-H24/2.0L



Display battery Life span & Condition!

Calculation

Life span based on changes of features

- changes of inner resistance
- changes of unbalance voltage when discharging

Life span based on use frequency and total time

- depth of cycle discharge
- total discharge capacity and depth of discharge
- ambient temperature
- total time after the start of using

Judgment

When difference between default value and present value exceeds the fixed value

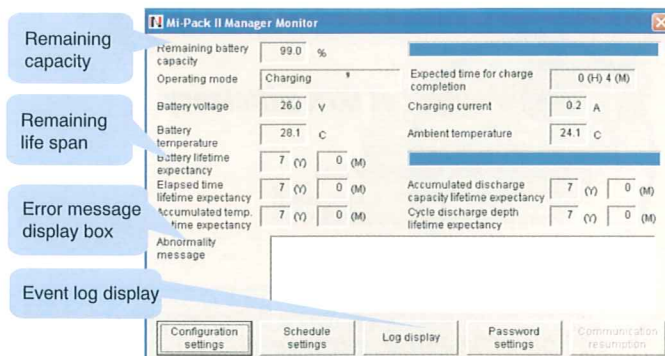
Among the values gained by c through f, the one with the smallest value is mainly used to display the remaining time. When the lifetime expires, an alarm is delivered and can be monitored as event information.

Notice

e-mail is delivered to max. 5 addresses

Gives notice for battery's life span, so periodical replacement of the battery pack will not be needed. It may possibly be used for more than 7 years without battery replacement.

Monitor screen structure and operation (monitor)



PC monitor display function

1. Battery voltage (unit: 0.1V)
2. Discharging current (unit: 0.1A)
3. Battery temperature (unit: 0.1 deg C)
4. Ambient temperature (unit: 0.1 deg C)
5. Life span based on depth of cycle discharge (unit: year/month)
6. Life span based on ambient temperature (unit: year/month)
7. Life span based on total discharge capacity (unit: year/month)
8. Life span based on time after the start of using (unit: year/month)
9. Log data display

- An error information is delivered via email.
- RS-232C is equipped for external communication.

Server's automatic operation is possible.

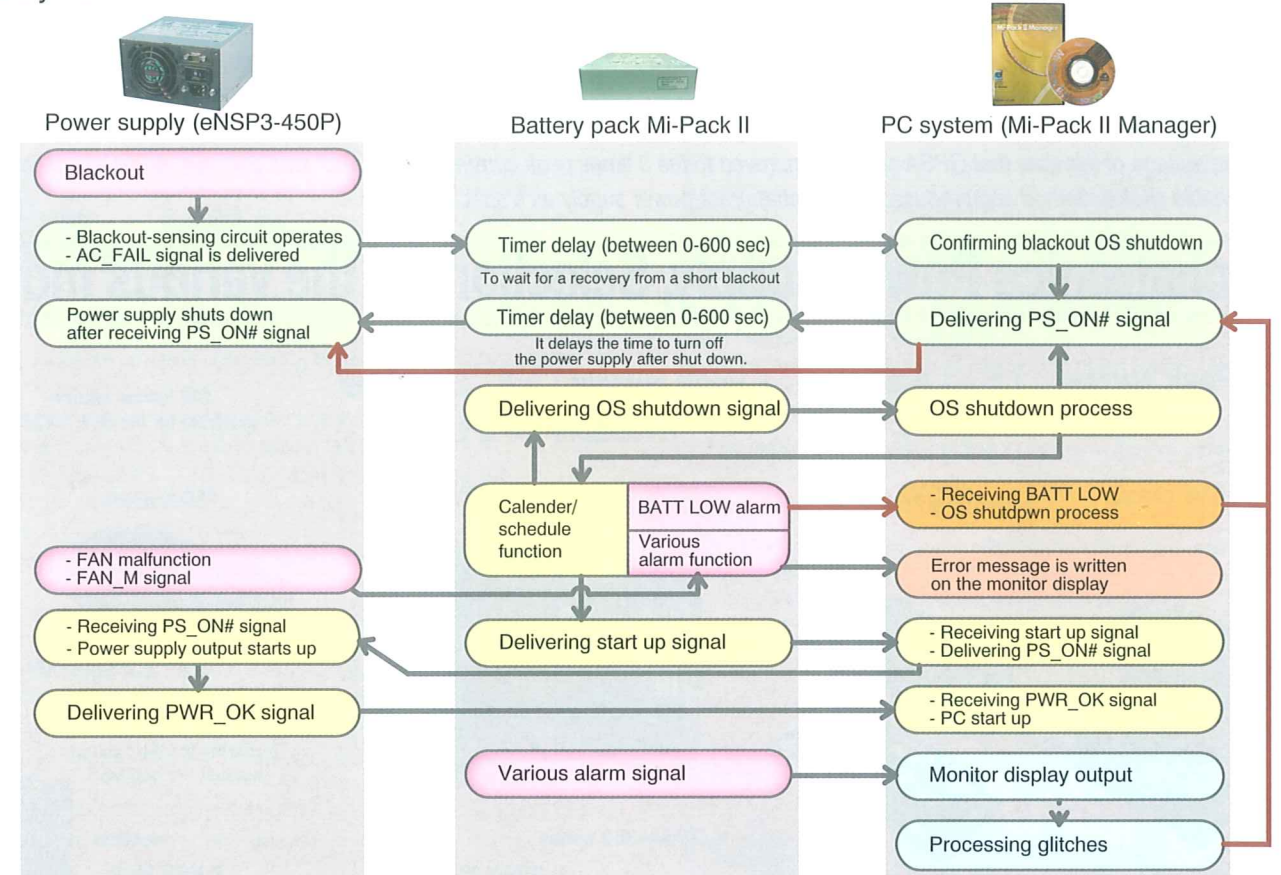
Nonstop power supply
eNSP3-450P-S20-H*V



Adoption example
TOSHIBA server
MAGNIA LITE41SE
URL:www.magnia.toshiba.co.jp

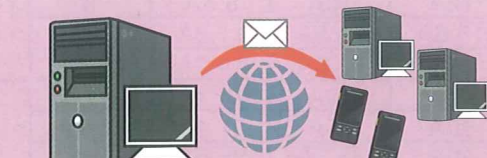
Using dedicated control software (Mi-Pack II Manager) enable to manage schedules in the PC (automatic start-up/shutdown). Not just specific date, you can also setup the schedule per week. That means, for example, daily start-up/shutdown operation at the work place as personal office if setting schedule by fixed day/time. Automatic operation is also available for production line, monitoring system, and others.

System flowchart



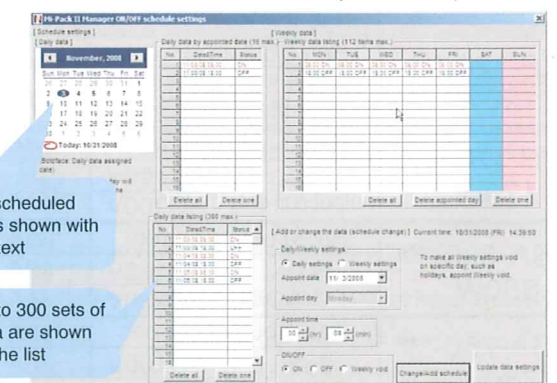
Email information

- Start/stop monitoring
- Blackout/recovery occurred
- Battery voltage decreased
- Operate blackout shutdown
- Application registration
- Application start up failure
- Operate schedule shutdown
- Life span based on time after the start of using
- Life span based on total discharge capacity
- Life span based on ambient temperature
- Life span based on depth of cycle discharge
- Battery voltage difference prediction
- Inner resistance life span prediction
- Power supply fan abnormality/recovery
- Discharging current abnormality/recovery
- Battery pack fan abnormality/recovery
- Battery voltage rise abnormality/recovery
- Battery voltage decline abnormality/recovery
- Battery temperature rise abnormality/recovery
- Charging current abnormality



Announce the blackout via email through the internet

Monitor screen structure and operation (Scheduling)



The scheduled day is shown with bold text

Up to 300 sets of data are shown on the list

For normal settings, use weekly setting. For special day such as public holiday and new year, use daily setting and modify or cancel the set-up time.

Notice

Requests to acquire CCC Standard for export commodity to China has been increasing. Nipron's products shown on the right has certified CCC Standard.

CCC STANDARD

CCC stands for China Compulsory Certification, which new certification is publicized from AQSIQ (State General Administration of the People's Republic of China for Quality Supervision and Inspection and Quarantine) and CNCA (Certification and Accreditation Administration of the People's Republic of China) due to China's reexamination of forced certification by WTO affiliate country.

CCC standard certified products



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

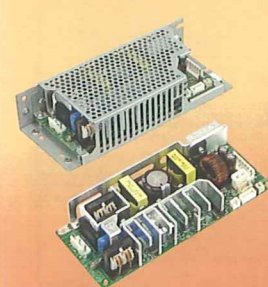
120W class

170W class

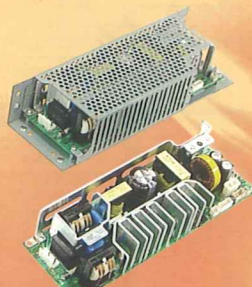
360W class

750W class

Battery pack



OZP-120 series



OZP-170 series



GPSA-360 series

GPSA-750 series



BS14A-H24/2.5L

Available for the backup
against the blackout

software

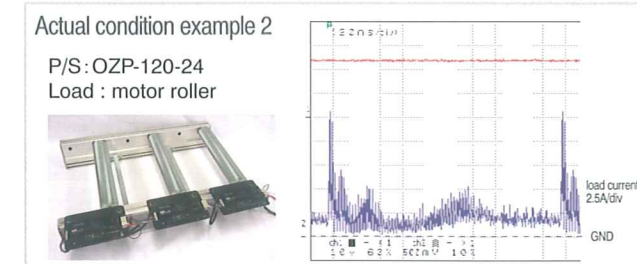
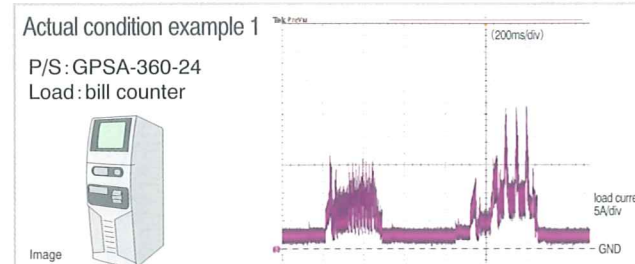
NSP Pro2

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	

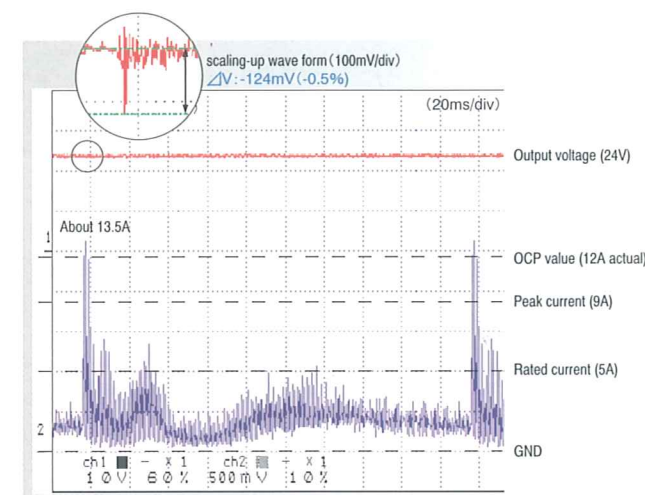
Selection points for the mechatronics power supply

Point 1

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



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

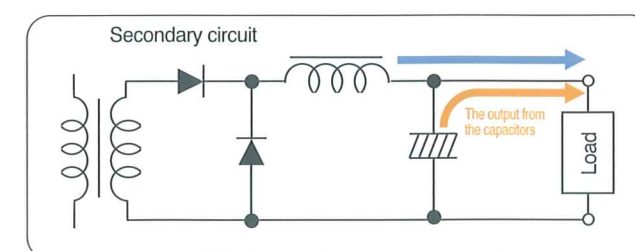
When the peak currents at the motor start-up exceed the OCP value, that is cause of the big dip ΔV by the OCP characteristic of the power supply.

We can judge that it is in the OCP protect condition when the ΔV 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.

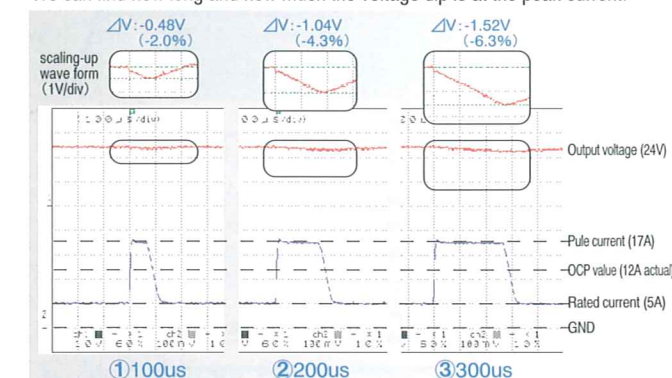
As the ΔV is 92mV and 0.4% in this case, it can be judged as no problem.

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 ①100us, ②200us, ③300us.

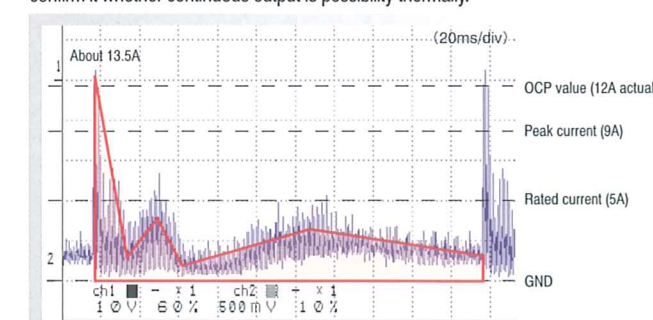
The each voltage dip is as follows; ①-0.48V (-2.0%), ②-1.04V (-4.3%), ③-1.52V (-6.3%). If there is it during 200us period of ②, We can obtain the stable output within load change -5%.*

As for this, even in the case of a different watage 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.

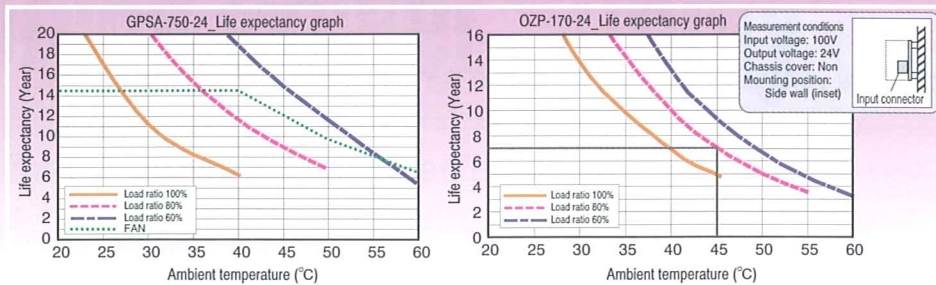
In this waveform, the average current of the red part is approximately 3A and is lower than 70% of the output capacity of OZP-120-24 and then we can judge it no problem even if the continuous use.

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 has usable possibility just as it is. So we recommend you to talk with us Nipron when you face to this kind of the problems.

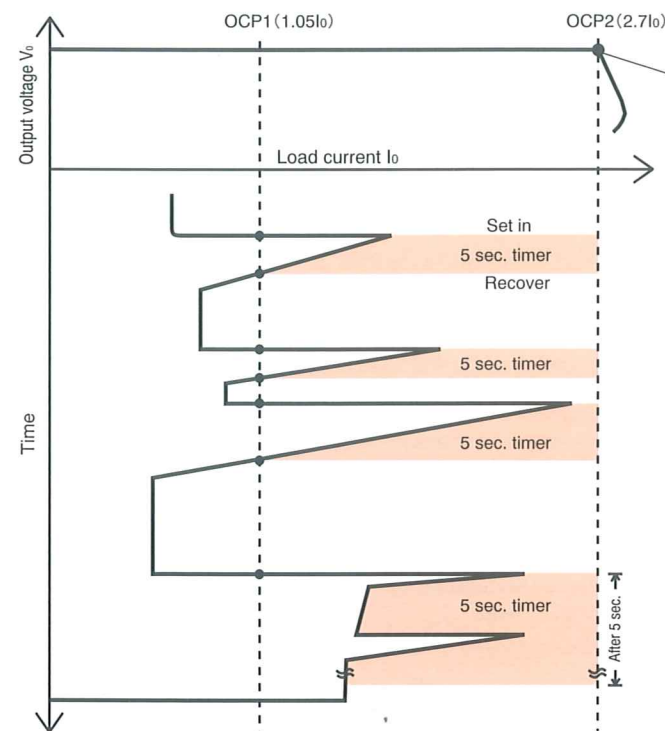
Well, the mean current is measured by the function of the measuring instrument to confirm a average current ② and it can be judged even to confirm that the mean current is lower than the rated current of the power supply.

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

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°C ambient, the load current forms necessary for 7 years life will be obtained at a cross point of 80% derating curve at 45°C, therefore, $I_{rms}=7A \times 0.8=5.6A$.



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.

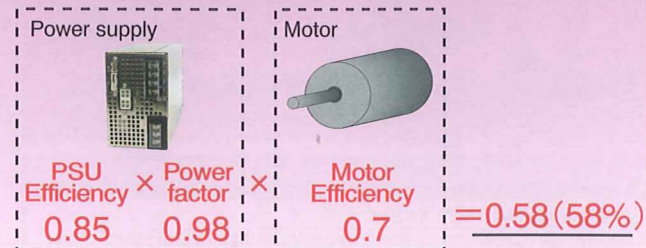
In case of a repetitive pulse load within OCP2 point, the actual output current calculated by root-mean-square value shall be less than 100% of the rated current.

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.

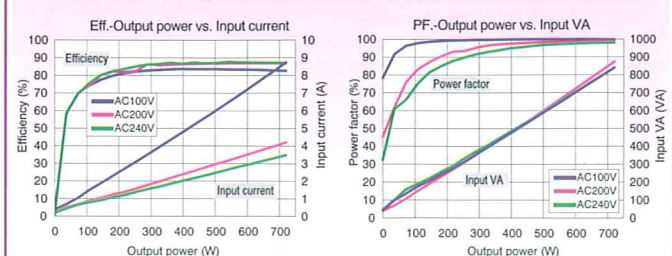
As OZP-120 or OZP-170 series does not equip the 5 second timer that GPSA series has, the actual output current calculated by root-mean-square value shall be within the rated current. It has, however, internal thermal protection.

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;



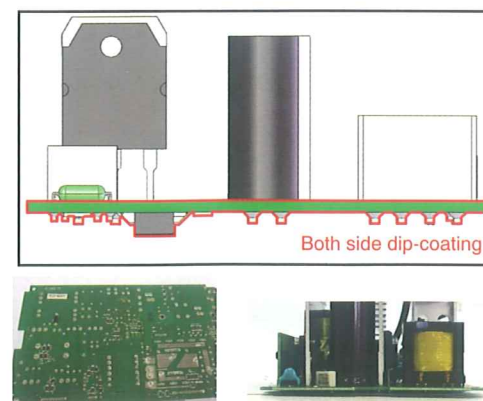
GPSA-750-24-TP (ex. Actual measurement)



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.

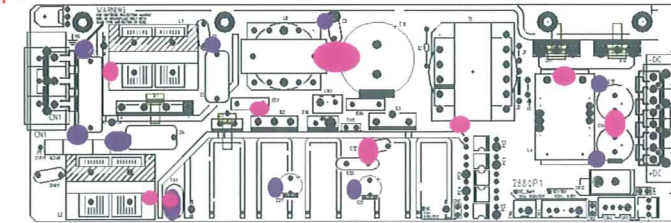
Nipron is reinforcing environmental measures by dip-coating to both side of PC Board and putting insulation tubes to power semiconductor's leads.



Power supply for anti-shock and vibration

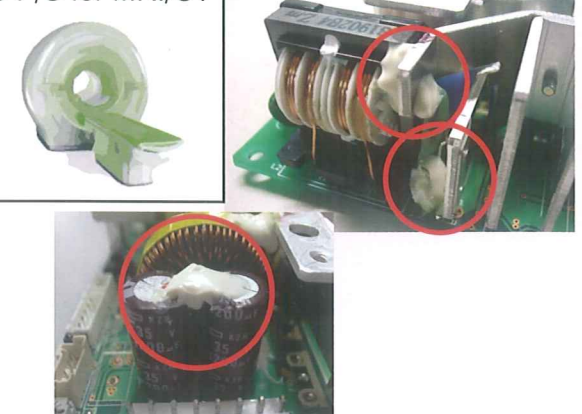
It is a must to buy the power supply that uses both-side through-hole-PC Board for applications such as Medical devices that equip moving arms or vibrators. In addition, large or heavy parts should be reinforced by silicone as anti-shock and vibration. Nipron has anti-shock and vibration products available,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



If solder cracks happen, protection circuits such as OCP and OVP may not work, or induce an abnormal output voltage causing the secondary failures in the system.

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.

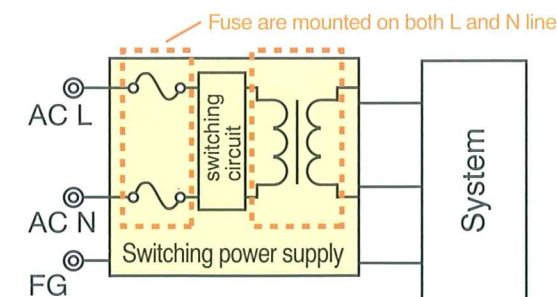
Therefore, a stand-by P/S that is always active must be equipped. Nipron's GPSA series (Mechatronics P/S) has +12VSB@0.3A-0.5A stand-by P/S function.

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.

*We can comply with the departmental regulations 1

<GPSA series>



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

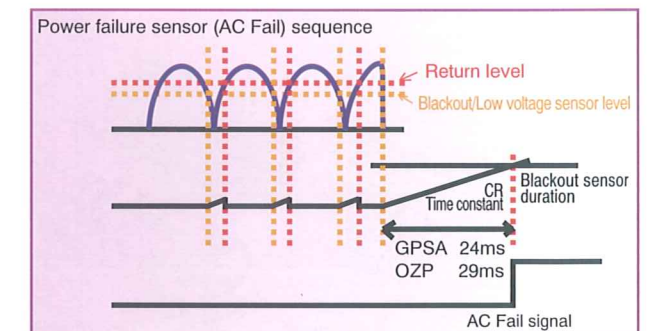
- Leakage current 0.3mA or less necessary at AC264V, 60Hz (patient-care system - class I)
- Dielectric strength: 4kV (between primary and secondary)
- Insulating distance (approx. 1.5 times of IEC60950-1 Standard)

Operation at -20°C conditions

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

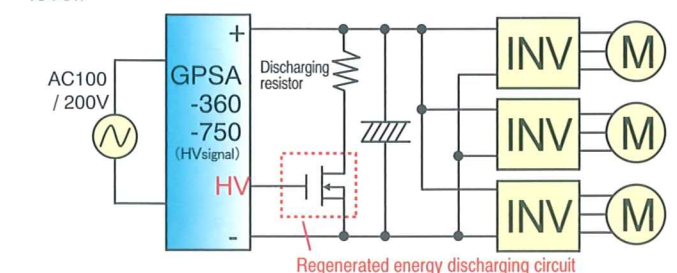
Available for Power failure sensor / Back-up

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)



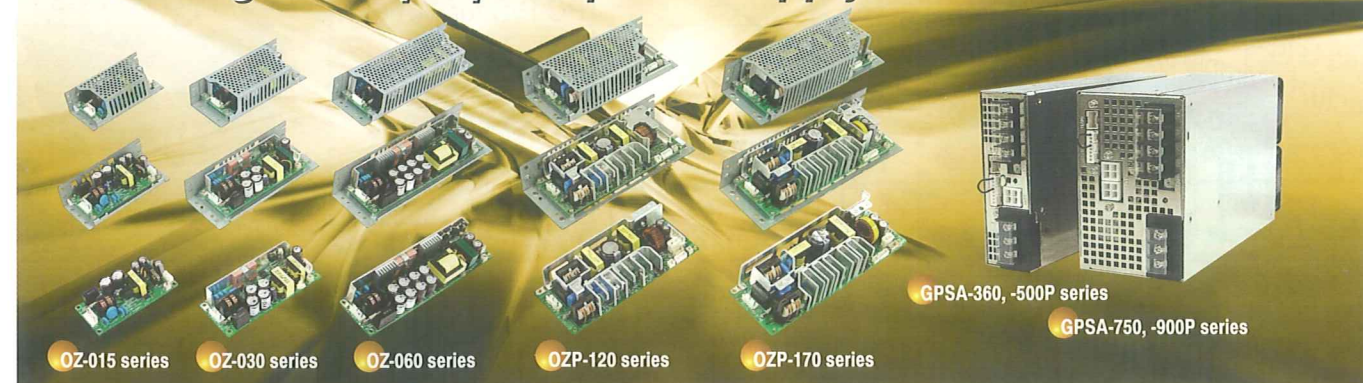
GPSA P/S is ready for a sensor signal (HV signal) of voltage regenerated by servo motor driver.

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.



Wait a minute! Don't jump to outward price gap... Take into account TCO (Total Cost of Ownership)!!

AC to DC general-purpose power supply series



Great Help~1 Low Noise

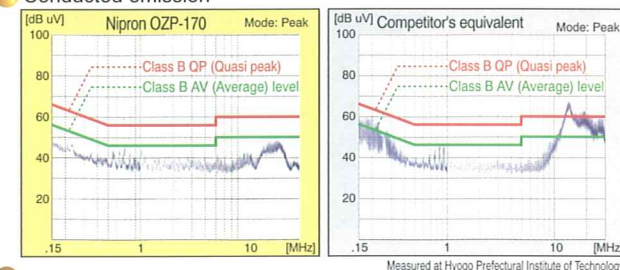
VCCI Class B (Conducted emission/Radiation) easily passes without external noise filters

Here's "Great Help~" response from Customer.

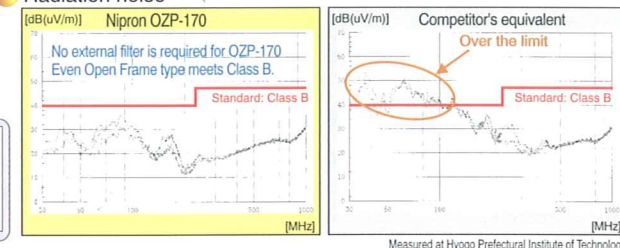
A big customer who implemented OZP-170 says, "We usually get into trouble with noises in developing systems. It would take us 6 months in a worst case spending valuable times of engineers in vain." "However, thanks to OZP-170-24 and -12 power supply, an immediate effect and time saving was brought to us without external noise filters, resulting in cost saving as well."

This encourages us, thank you.

Conducted emission



Radiation noise



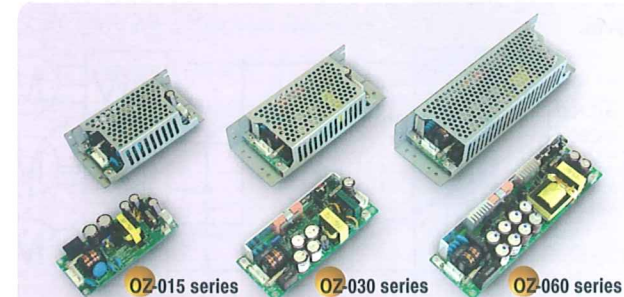
Product lineup

Series name	Output voltage	+12V	+15V	+24V
OZP-120 series	Load current	10A	8A	5A
	Convection	12.5A	10A	6.3A
	Forced cooling	15A	12A	9A
OZP-170 series	Load current	14A	11.2A	7A
	Convection	17.5A	14A	8.8A
	Forced cooling	22.5A	18A	12.5A

Input voltage AC85 to 264V
 ※ Selectable for +12V or +15V output ※ For +24V output model, backup at blackout is available.
 ※ +3.3V and +5V output models are subject to change as they are under development.

Great Help~2 Drastic CO2 Reduction ! Electricity Cost Saving

Designers at customers work hard every year to achieve CO2 reduction target of ISO14000 (Environment) for certificate renewal. End users are happy with Nipron power supplies because they can reduce considerable amount of CO2 and electricity cost in a year even by 5% efficiency improvement.



Product lineup

Series name	Output voltage	+3.3V	+5V	+12V	+15V	+24V
OZ-015 series	Load current	3A	3A	1.3A	1A	0.7A
OZ-030 series	Load current	6A	6A	2.5A	2A	1.3A
OZ-060 series	Load current	12A	12A	5A	4A	2.5A
Input voltage AC85 to 264V						

High efficiency

Efficiency comparison between OZ-030 and Competitor's equivalent (actual data)

	Output voltage	Power	Input voltage	Input VA	Efficiency
Nipron (OZ-030-5)	5.1V	30.6W	AC100V	37.5W	81.6%
			AC200V	37.6W	81.4%
Competitor's equiv.①	5.1V	30.6W	AC100V	39.3W	77.9%
			AC200V	40.7W	75.2%
Competitor's equiv.②	5.1V	30.6W	AC100V	41.3W	74.1%
			AC200V	40.0W	76.5%

Comparison of Electric Bills & CO2 emission (24-hour continuous running)

OZ-030-5 vs Competitor's equivalent ①

Reduction! in a year: Electric bill approx. 306 yen at AC100V/approx. 532 yen at AC200V
 CO2 emission approx. 5.8kg at AC100V/approx. 10.1kg at AC200V

OZ-030-5 vs Competitor's equivalent ②

Reduction! in a year: Electric bill approx. 652 yen at AC100V/approx. 414 yen at AC200V
 CO2 emission approx. 12.3kg at AC100V/approx. 7.8kg at AC200V

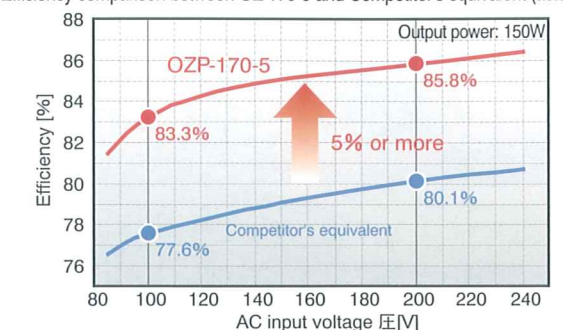
*1 20 yen/kWh conversion *2 0.378kgCO2/kWh conversion

New As power supply for LED Lighting

+5V & +3.3V output type are coming soon in OZP series.

New models in OZP series! +5V & +3.3V output type are lined up. This type has achieved higher efficiency with synchronous rectification equipped resulting in reduction of electric bills, reduction of CO2, and long life. Also it brings lower temp. rise in whole system as it generates less heat.

Efficiency comparison between OZ-170-5 and Competitor's equivalent (actual data)



Comparison of Electric Bills & CO2 emission (24-hour continuous running)

Reduction! in a year: Electric bill approx. 2,317 yen at AC100V/approx. 2,179 yen at AC200V
 CO2 emission approx. 43.8kg at AC100V/approx. 41.2kg at AC200V

*1 20 yen/kWh conversion *2 0.378kgCO2/kWh conversion

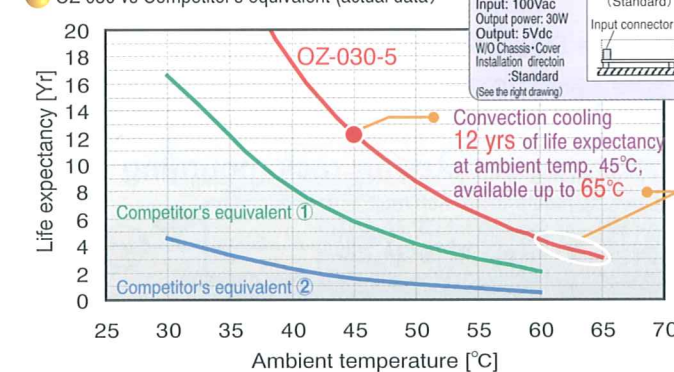
Great Help~3 Long life (3 times as long as Competitor's)

"Friendly to global environment" & "Quality product with lower price" as motto of Nipron's design policy brings energy saving (high efficiency) and resource saving (long life more than 10 years.) In OZ/OZP series, synchronous rectification and innovative circuits contribute to higher efficiency bringing in lower temp. rise. and longer life with long-life electrolytic capacitors (105°C10000H.)

Now used in BOX PC as embedded power supply

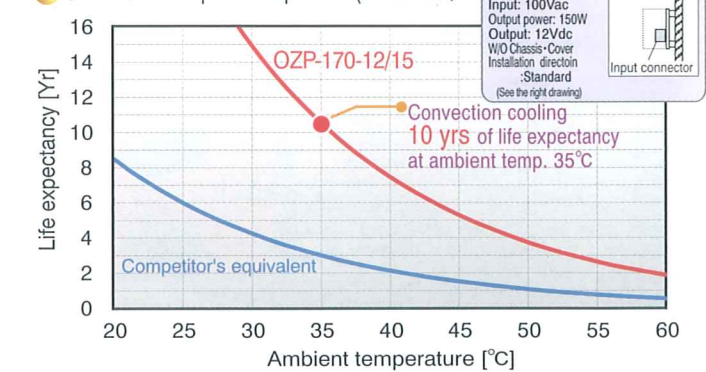
Long life

OZ-030 vs Competitor's equivalent (actual data)



Note 1: Life expectancy of Competitor's equivalent ① and ② is calculated based on the data on their Web site.
 Note 2: The life expectancy is based on continuous load of 30W. (In practice, load derating is required at high temperature.)
 Note 3: The life expectancy is a lifetime in calculation. It shall be 15 years at longest when degradation of materials used for opening of electrolytic capacitors is taken into account.

OZP-170 vs Competitor's equivalent (actual data)



Note 1: The life expectancy is calculated based on our standard.
 Note 2: The life expectancy is based on continuous load of 150W. (In practice, load derating is required at high temperature.)
 Note 3: The life expectancy is a lifetime in calculation. It shall be 15 years at longest when degradation of materials used for opening of electrolytic capacitors is taken into consideration.

Great Help~4 High reliability and various options

Competitor's equivalents to OZ & OZP series are, in many cases, single-sided PCBs to make them cheaper. We, Nipron, use consistently double-sided PCBs with through holes for even small power as we regard power supplies as "Dangerous."

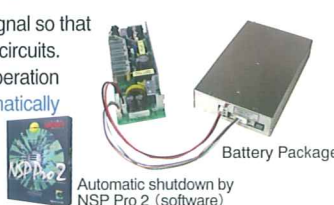
Double-sided PCBs with through holes (Safety-oriented products)

Solder crack at high voltage section is likely to burn. Double-sided PCBs with through holes is the solution for solder crack in industrial use. (Competitor's equivalents are, in many case, single-sided PCBs.)

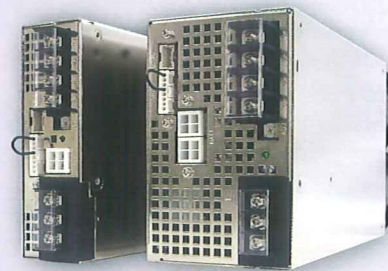


Blackout detection signal equipped/Backup at blackout

All OZP series equips blackout detection signal so that customers can save cost to build detection circuits. Also, 24V output type carries out backup operation with battery package connected, and automatically shut downs by NSP Pro 2. (Harness is optional.)



Fulfilling power supply with cost performance! **GPSA series**
Price gap is only 10 to 20% for the advantage of power and ample function.



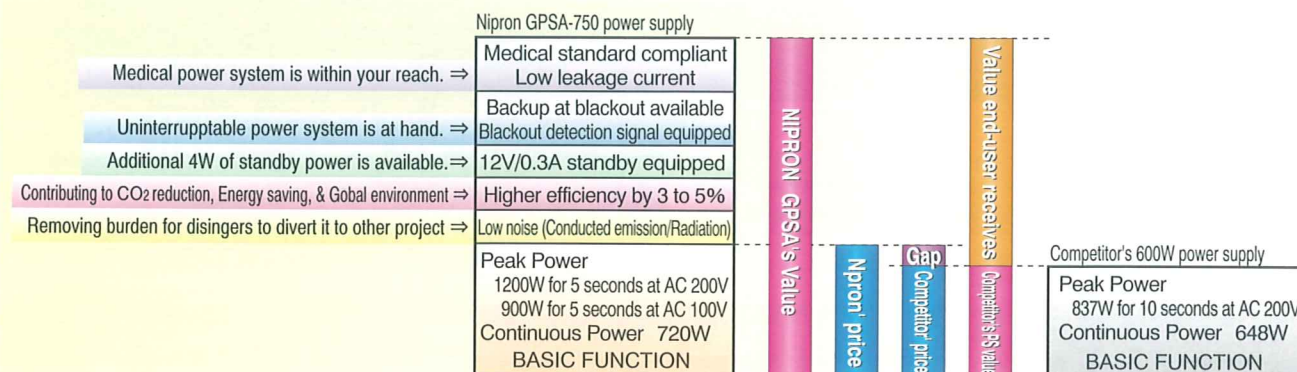
GPSA-360 series

GPSA-750 series

Product lineup

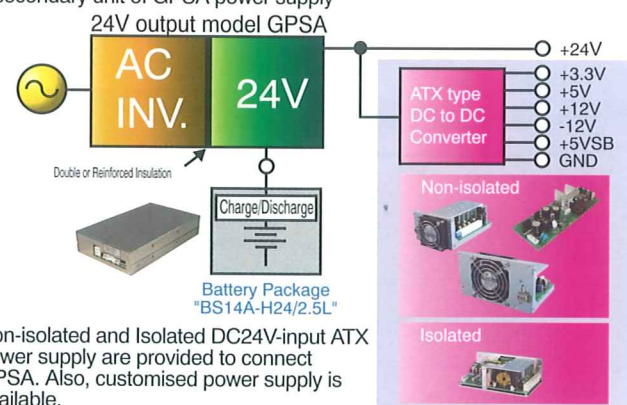
Series name	Output voltage	+12V	+24V
GPSA-360 series	Rated load current	30A	15A
	Peak	40A	20.8A
	Load current	40A	25A
	Rated load current	56A	30A
GPSA-750 series	Peak	70A	37.5A
	Load current	80A	50A
	Rated load current	56A	30A
	Peak	70A	37.5A
Input voltage		AC85 to 264V	

※ +24V output model is backup available at blackout.



As medical-standard power system

- No isolation transformer required in front
- Backup at blackout is available
- Flexible medical power system is here for you simply changing the secondary unit of GPSA power supply



Blackout detection signal equipped/Backup at blackout

Blackout detection signal is equipped to all GPSA series to save customer's cost for building detection block. In addition, 24V output model carries out backup at blackout by connecting to battery package and shuts down automatically by NSP Pro 2.

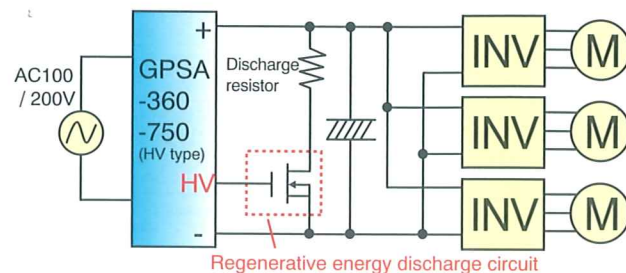
(Harness is optional.)

Battery package "BS14A-H24/2.5L"

NSP Pro 2 (software) for automatic shutdown

New +24 to +48V output models are lined up for motor drive in GPSA series.

New models are here in GPSA series! +24V, +30/36V, and +42/48V output models equipped with regenerative voltage detection signal (HV) lined up. Regenerative energy discharge circuit is easily built by HV signal for the system in which multiple DC inverters (Servo) are used.



Product lineup

Series name	Output voltage	+24V	+30V	+36V	+42V	+48V
GPSA-360 series (HV type)	Rated load current	15A	12A	10A	8.5A	7.5A
	Peak	20.8A	16.6A	13.8A	11.9A	10.4A
	Load current	25A	20A	16.6A	14.2A	12.5A
	Rated load current	30A	24A	20A	17A	15A
GPSA-750 series (HV type)	Peak	37.5A	30A	25A	21.4A	18.7A
	Load current	50A	40A	33.3A	28.5A	25A
	Rated load current	30A	24A	20A	17A	15A
	Peak	37.5A	30A	25A	21.4A	18.7A
Input voltage		AC85 to 264V				

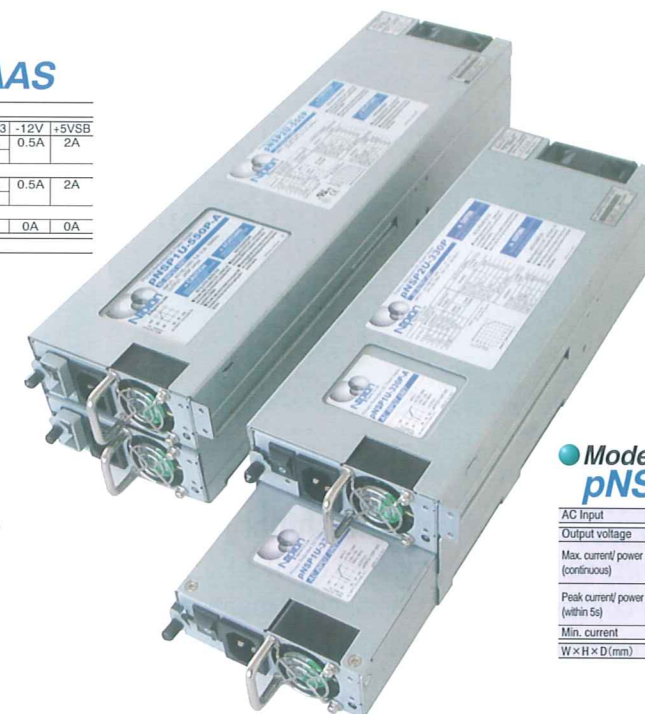
※ +30V and +36V are output voltage adjustable. ※ +42V and +48V are output voltage adjustable.
※ +24V output model is backup available at blackout.

New Redundant Architecture Convertible to Nonstop Power Supply

Primary Redundant Power Supply
SSI-ERP2U conformity, Hot swappable 2U height

Model pNSP2U-550P-AAS

AC Input	85 to 264V (worldwide range)									
Output voltage	+3.3V	+5V	+12V1	+12V2	+12V3	-12V	+5VSB			
Max. current/power (continuous)	20A		18A		12A		10A		0.5A 2A	
	Total 25A				Total 35A				Total 427.6W	
Peak current/power (within 5s)	20A		18A		12A		16A		0.5A 2A	
	Total 25A				Total 44A				Total 550W	
Min. current	0A		0A		0A		0A		0A	
W×H×D(mm)	108×83.8×400									

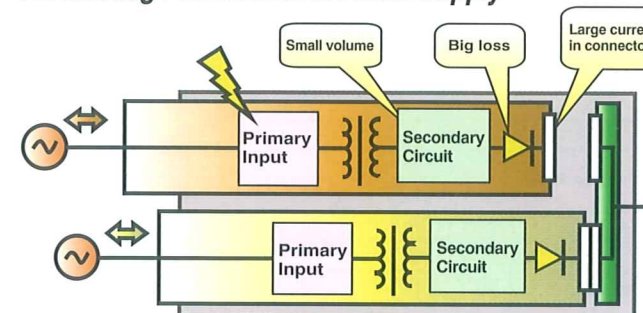


Model pNSP2U-330P-AAS

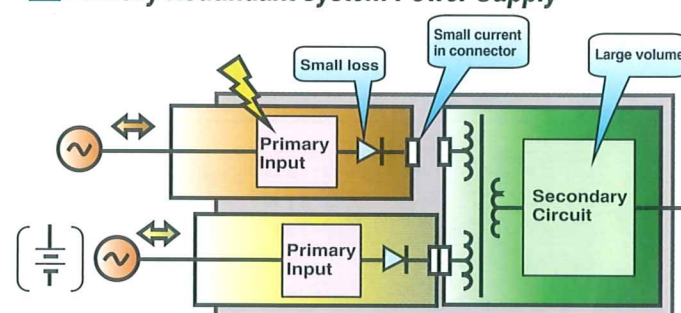
AC Input	85 to 264V (worldwide range)					
Output voltage	+3.3V	+5V	+12V	-12V	+5VSB	
Max. current/ power (continuous)	10A	10A	18A	0.5A	2A	
	Total 260W					
Peak current/ power (within 5s)	15A	15A	25A	0.5A	2A	
	Total 312W					
	Total 328W					
Min. current	0A	0A	0A	0A	0A	
W x H x D (mm)	108 x 83.8 x 300					

2U server case with Primary Redundant PSU (pNSP2U-550P/330P) installed is available. Also, Server with pNSP2U-550P/330P PSU installed is available.

Existing Full redundant Power Supply



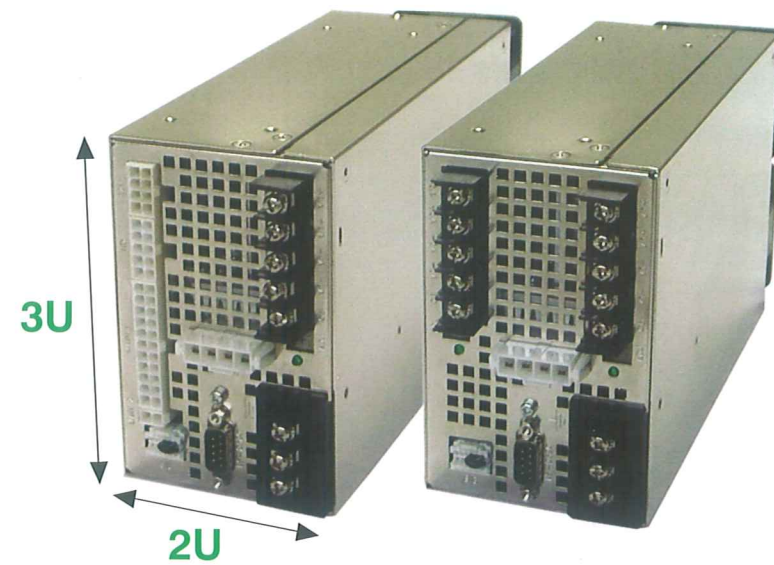
Primary Redundant system Power Supply



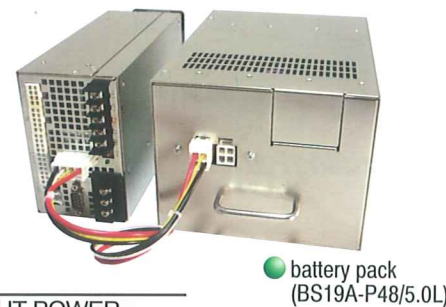
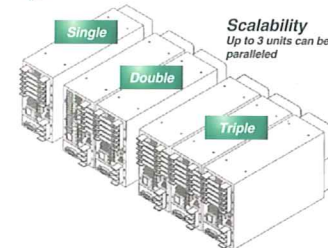
	Existing (full redundant by competitors)	Primary redundant system (Nipron system)
Efficiency	<ul style="list-style-type: none"> As Oring diode or FET for parallel operation is mounted in each main output, power loss is 10W to some 10W to raise temperature of the power supply. With components squashed up in a small space expecting cooling by fan, total power loss caused by chokes, etc is 60 to 67%. 	<ul style="list-style-type: none"> Power loss of mutual interference diode is several wattage or less as it is mounted in primary side. As secondary side is in common, component size is one rank or two larger to contribute to higher efficiency due to lower resistance (77% typical at AC 240V).
Simplicity of circuit and number of components	<ul style="list-style-type: none"> Same secondary circuit is doubled to meet full redundancy to increase components and likely to cause mutual touching of components. 	<ul style="list-style-type: none"> Number of components is fewer as secondary side is in common, and it has margin in component size to keep clearance between them. To raise efficiency, with enough margin in Schottky diode rating for low resistance instead of synchronous rectifying, possibility of defects is decreased due to simple design.
When one unit of redundant unit fails;	<ul style="list-style-type: none"> With load sharing between 2 units, when one unit fails, the other unit has to burden all output power limiting long time operation (one hour or longer) as thermal design has no margin. 	<ul style="list-style-type: none"> By making secondary side in common and having enough margin in components, even one primary unit can afford continuous full power with no problem including primary unit components.

All functions you need are in one unit!

GNSP series



ATX output
Backup function
High power for single output PSU
High power 2-Output PSU
Parallel running function



DC-UPS, as a source of large machinery

1. Nonstop power supply (uninterruptible PSU)
2. Total power control (Integrated monitoring • management)
3. One GNSP is enough for controlling a large machinery

Power supply for important systems • machinery

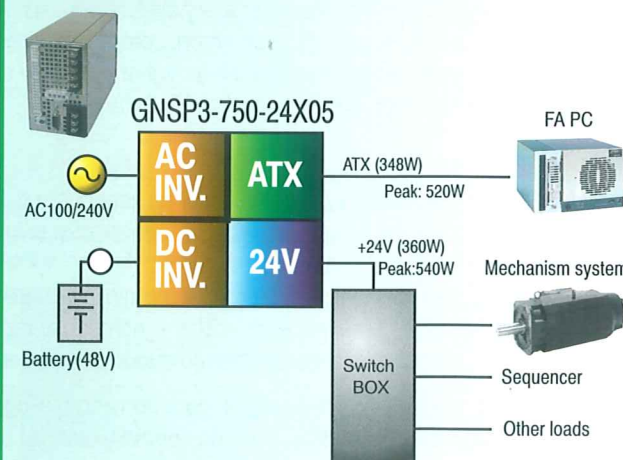
4. Flexible for higher power.
5. No need for a custom order! Flexible multi-output.
6. As a high power ATX power supply

Model Listing

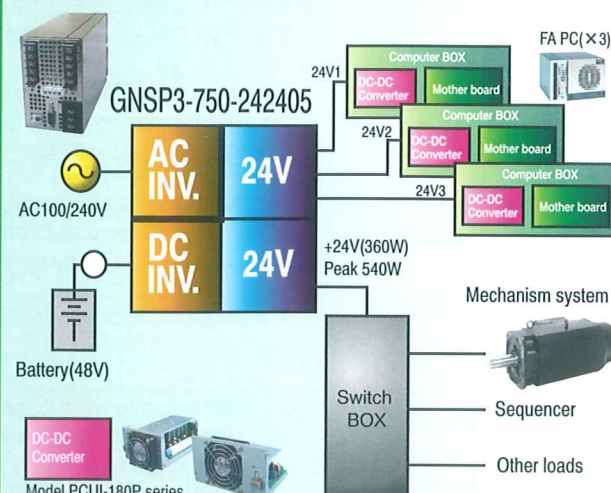
MODEL	OUTPUT	OUTPUT POWER
GNSP3-750-242405-TRP	24V 2 outputs	728W (1080W)
GNSP3-750-121205-TRP	12V 2 outputs	728W (1080W)
GNSP3-750-241205-TRP	24V & 12V power supply	728W (1080W)
GNSP3-750-24X05-TRP	24V & ATX power supply	708W (1067W)
GNSP3-1000P-12X05-TRP	12V & ATX power supply	708W (1067W)

System Structures

Ex. Combination of ATX PSU and 24V DC industrial-use PSU



Ex. Combination of machinery (24V) and 3 PC.



Multiplex Boosters efficiently step up DC drive voltage for powering robot and FA equipment

Tajubu series High Power Boosters

92%-94% efficiency

Product lineup

Model	Input voltage	Output voltage	Dimensions (W×D×H)
TB4S-2000-280	DC37~63V	284V	290×200×80
TB4D-4000-280*	DC37~63V	284V	330×200×175
TB2S-1500-280	DC18~32V	284V	290×200×80
TB2S-1500-140	DC18~32V	140V	290×200×80

* TB4D-4000-280 is composed of two units of TB4S-2000-280 in parallel connection.

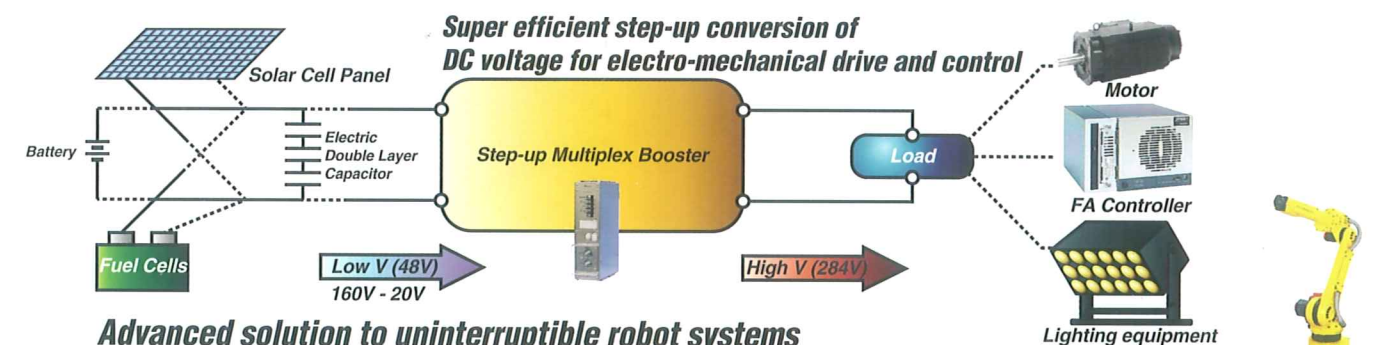
Output specifications

Model	TB4S-2000-280	TB4D-4000-280	TB2S-1500-280	TB2S-1500-140
Output voltage	+284V	+284V	+284V	+140V
Rated current	7A	14A	3.52A	7.4A
Rated power (Continuous)	1988W	3976W	1000W	1000W
Peak current	16A	30A	5.28A	11A
Peak power	4544W	8520W	1500W	1540W
	10 sec. max.	10 sec. max.	5 sec. max.	5 sec. max.

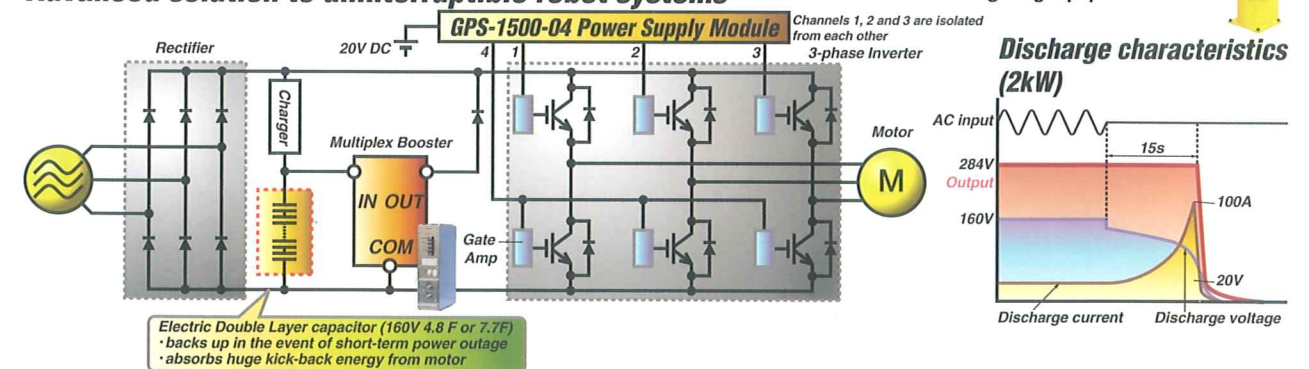
Up to 3 units can be paralleled to scale up system power



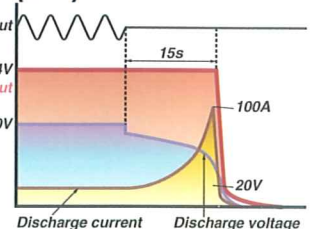
Pump up drive voltage



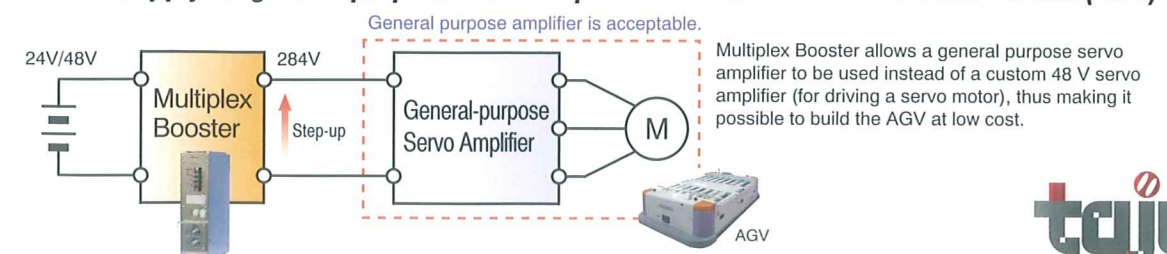
Advanced solution to uninterruptible robot systems



Discharge characteristics (2kW)



Power supply for general-purpose servo amplifier used in Automated Guided Vehicle (AGV)



tajubu