(GB) Power supply for top hat rail mounting NZT80086

Notes On Operation for Mean Well-Power Supplies

1. Input Fuse

Each S.P.S. has a built-in fuse inside for protection. Once the fuse is blown, it means that something wrong inside the power supply. If the power supply still can not operate properly after replacing the same rating and type of fuse, please send back to the supplier for repairing. If you want to add an external fuse, be sure that the rating of this fuse should be less than or equal to the internal fuse.

2. Safety

Inside the S.P.S., there is high working voltage between 200 and 800 V in the circuit. Therefore don't touch the components directly when it is working or you may get shock and endanger your life. When the S.P.S. is abnormal, please sent it back to the supplier and "Please don't try to fix it yourself.".

3. Grounding

Using short and thick wiring connects the frame ground (FG) of the S.P.S. and earth ground on the case of the equipment to assure safety and prevent noise and leakage current.

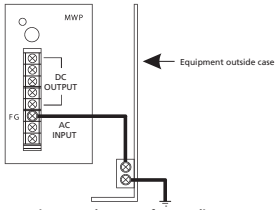

Figure 1: The way of grounding

4. Input and output wiring

a) Input and output should be wired in separate location to prevent the input surge and output ripple noise interfering with each other.

b) Output wiring should use short and thick wires and should meet the output current rating. Besides, adding a small capacitor at the load can effectively reduce the noise.

c) The terminal connector of the S.P.S. should use suitable terminal screws, wires and tools.

d) The FG (Frame Ground) of the AC input is different from the ground (-V/COM) of the DC output. There may be some capacitors between them or they may be short together sometimes.

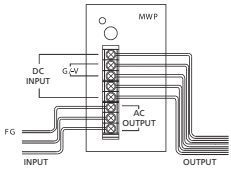

Figure 2: Wiring and connection

5. Heat dissipation

a) Each power supply should be installed in places with proper ventilation.

b) Correct installation direction and location. (Example: put ventilation holes upward)

c) Each power supply should have proper heat sink. (Example: if the S.P.S. uses case as its heat sink, be sure to connect the case tightly and smoothly to the system's metal surface.)

d) When more than one power supply operate at the same time, be sure that there are enough spaces between each power supply. (Keep 5 to 15 cm of space depending on the magnitude of the power.)
e) Using forced airflow can effectively improve heat dispersion. (Example: add a fan and deploy it at the bottom of the system if using inhaling airflow. In contrast, deploy it at the top of the system if using exhaling airflow.

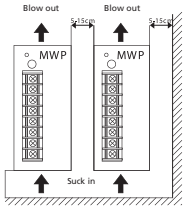

Figure 3: More than one power supply working at the same time should consider the space for airflow

6. Output derating (please refer to the spec. of each machine)

a) Output-temperature: We need to reduce the output power depending on the operating temperature and the direction that the S.P.S. is allocated.
Example: If the S.P.S. is vertical installed, output power can be 100 % between 0 and 50 °C. Between 50 and 60 °C the output power should be derating. At 60 °C we need to reduce the output power to 60 % of load, and above 60 °C, we can not guarantee that the function and lifetime are still in the normal condition.
b) Output power to input voltage: When the input voltage is low, S.P.S. will have higher power loss because of the PFC circuit, therefore we need to reduce the output power. Refer to figure 5, between 110 V and 264 V the S.P.S. can fully output, but between 90 V and 110 V we need to reduce the output power. At 90 V, the output power will be derating to 80 % of full load.

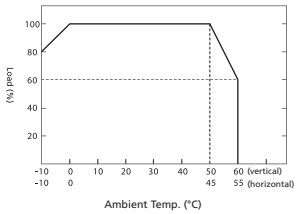

Figure 4: Relation between output power and temperature (derating curve)

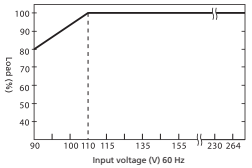

Figure 5: Relation between output power and input voltage

7. Remote ON/OFF switch and remote sensing wiring

a) Remote ON/OFF switch: Using a TTL control signal connecting to the +RC, -RC terminals of the S.P.S. can control the output of the power supply. When +RC and -RC is short (0 V), the S.P.S. will be on; when it is open (the voltage between the two terminals > 4 V), the S.P.S. is OFF. However, some models use different control signals.

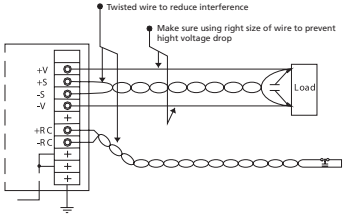

Figure 6: Remote ON/OFF and sensing wiring

b) Remote sensing: We can compensate the line voltage drop of the wire by connecting +S and -S terminals to the load, but it still needs to use wires with enough diameter. In general this can compensate the voltage drop up to 0.3 to 0.5 V. (About wire voltage drop/current, please refer to the appendix.)

8. Operation in parallel

When power supplies are connected in parallel, we can increase the output current or use them as the redundant (back-up) function. Be careful that the tolerance of output voltage and wiring impedance should be very small when wiring in parallel.

a) S.P.S. with built-in parallel function: Connecting "P" terminals together such as the PSP models ("G" terminal also need to be connected together). Input/output should be connected in parallel first and then connect to the AC source/load just as figure 7 (some S.P.S. need a minimum load after paralleling).

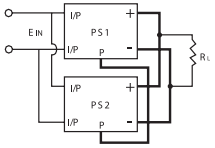

Figure 7: Wiring of S.P.S. with built-in parallel function

Notes on parallel operation:

1. Output voltage tolerance should be as small as possible (tolerance < 2 %).
2. Each power supply should be wired with short and large diameter of wiring first and then connects to the load.
3. After paralleling, the output power would be around 90 % of the total power.
4. To make sure that the load current is effectively shared in parallel operation, in general we limit 4 to 6 power supplies to be paralleled at one time.
5. Some models also need to parallel the +S, -S terminals of the control connector to reduce the unstable pulsation of the output voltage.

b) S.P.S. without built-in parallel function (general models):

1. Add a diode at the positive output side on each power supply (as figure 8), the current rating of the diode should be larger than the maximum output current rating and attached it to a heat sink. This is only for the redundant use (increase the reliability of the system) and users have to check the suitability of the circuit by themselves.
2. Add a small series resistor about 0.1 ohms on the positive-output side of each power supply. This is only good for small-output-current models and need to consider about the power loss and heat problem of the resistor. Users have to check the suitability of the circuit by themselves.

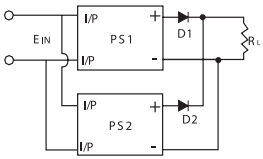

Figure 8: Paralleling with adding diodes in series connection

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3. When using S.P.S. in parallel connection, the leakage current will be increased at the same time. There might be some danger that the user would get shock if touching them when they are working. So please contact the supplier if you need this kind of application.

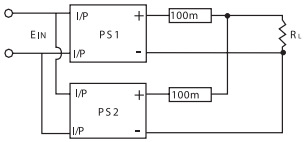

Figure 9: Paralleling with adding small resistors in series connection

9. Operation in series

Power supplies can be operated in series. Here are the methods to make it:

a) Positive and negative terminals are connected as figure 10.

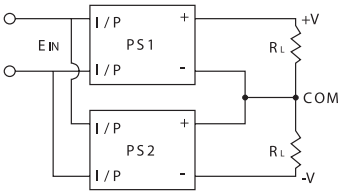

Figure 10: Positive and negative terminals connect in series

b) Increase the output voltage (current does not change). If there is no reverse blocking diode in the power supply, we should add an external blocking diode to prevent the damage of power supply while starting up. The voltage rating of the external diode should be larger than V1+V2 (as figure 11).

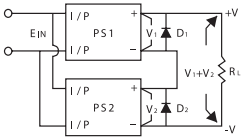

Figure 11: Series connection by adding external reverse blocking diodes

10. Output wiring for smaller loads

When using one S.P.S. to supply two different loads, the wiring of the smaller load should be added a fuse for protection. Once a short-circuit situation happened, this fuse can protect the wiring from being burned out.

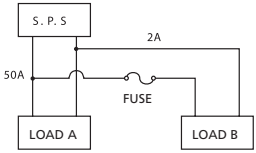

Figure 12: Output wiring

11. Minimum load requirement

To assure the regulation and stability of the auxiliary output (CH2 to CH4) of a multi-output S.P.S., we need to add a minimum load on the main output (CH1). For example: spec. of D-120 is 5 V/6 A, 24 V/4 A, when the input is 5 V/0 A, 24 V/4 A, the 24 V output voltage will be lower than the spec. In this condition, if we add a minimum load of 1 A (by paralleling a 5 ohms /10 W resistor) at the 5 V channel, then the output voltage of the 24 V channel would increase to the range of the spec. Users also need to add a minimum load at the 24 V channel to keep the output voltage within the spec. if only using the 5 V channel.

12. Operation in low temperature

If S.P.S. uses thermistor to suppress the inrush current and some components are affected by temperature, then it will cause the situation that fail to start up at low temperature (such as -10 °C). Following are some methods to solve this problem:

a) Keep the power supply at standby status (Let AC source on and then switch the output ON/OFF).
b) Use heater to increase the environmental temperature of S.P.S.
c) Reduce output load.

If the label specifies that the working temperature is between -10 °C and 50 °C and we want to operate it at -20 °C, we should be careful about the following issues:

a) Relative humidity should be low to prevent vapor from solidifying.
b) The output ripple current will be higher.
c) Since we usually use the thermistor as the inrush current suppresser and the thermistor will increase its resistance when the temperature goes down, it is possible to take a long time to start up the power supply or even can not start it up.
d) Can not guarantee the extent of reduction of its function when the S.P.S. is working out of the range of its specification.

13. Working in high temperature or in the environment with huge temperature difference

There are high voltage and high impedance circuits in the S.P.S.. So before turning on the power supply, be sure that there is no water condensed in the power supply. If the S.P.S. is working at low temperature and then stored at high temperature environment, or outdoor application under environment of moist and high temperature differences between day and night, some water may condense in the power supply and damage it. So, please contact the supplier to provide the anti-moisture treatment if it is necessary.

14. Special load

a) Capacitive load
   If the S.P.S is connected to a large capacitive load such as large capacitors or lighting load, the set up time of the S.P.S. will increase or even can not start up the S.P.S. Users should use power supplies with the function of constant current limiting, constant power limiting or ask the supplier for help.
b) Inductive Load
   If the S.P.S is connected in parallel with coil loads, such as motors, solenoid valves etc., there will be a huge peak current or a reverse voltage when the load is activated. It is recommended to use suitable capacitors and add a blocking diode to protect the S.P.S. We also can use S.P.S. with the function of constant current limiting to deal with it.
c) Dynamic Load
   If the S.P.S. is connected to a dynamic load such as LED monitor, the output load current will be changed abruptly and will cause high ripple current and audio noise. We can add suitable capacitors at the load side to improve these problems (but be careful about the delay problem while turning it on).

15. Charger operation (To assure the charging efficiency and the lifetime, please use models with the charging function.)

When the S.P.S. is used as a charger, be sure to add a series blocking diode at the output terminal (with suitable heat sink). This arrangement is to prevent the battery voltage higher than the output voltage of the S.P.S. and damage it. This operation is very easy to damage the S.P.S. or batteries, please contact the supplier before working on this application.

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16. Inrush current suppressing circuit

When using many S.P.S. at one time, the huge inrush current may exceed the rating of external wiring. The following delay circuit can suppress the inrush current caused by multi S.P.S. operation.

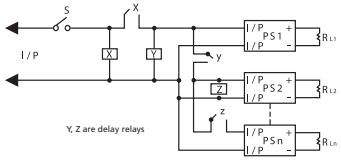


Figure 13: Delay circuit

17. Input surge and shock suppression

a) Input surge: The ON/OFF of heavy industrial machine will cause the variance of nearby power line voltage. Sometimes the variance is so huge that may exceed the specification of the S.P.S. and damage it, so there is a "surge absorber" between AC/L and AC/N in the S.P.S. to absorb this abrupt high voltage.

b) Shock Suppression: Shock is one kind of short-time high voltage and high energy. To prevent the shock, we should add surge absorbers between AC/L - AC/N, AC/L - FG, and AC/N - FG, which are shown as figure 14.

Figure 14: The connection of the Surge Absorber

18. Output ripple noise suppression

a) Differential-mode noise suppression:
As in figure 15, adding C1 to C4 can reduce the noise. C1 and C3 are electrolytic capacitors (reference value: 47 uF to 100 uF), while C2 and C4 are high frequency capacitors (reference value: 0.01 uF to 0.1 uF). In general, adding C3 and C4 is good enough to reduce this noise.

b) Common-mode noise suppression:
As in figure 15, adding L1, C5, and C6 can reduce the common mode noise, which C5 and C6 are high frequency capacitors.

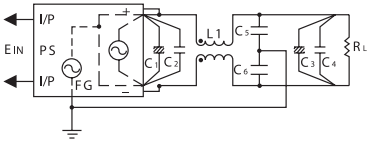


Figure 15: Ripple noise suppression

GB 60W single output industrial DIN rail power supply

Features:

- UniversalAC input / Full range
- Protections:Short circuit / overload / over voltage
- Coolingby free air convection
- Canbe installed on DIN rail TS-35/7.5 or 15
- LEDindicator for power on
- DCOK relay contact
- Noload power consumption < 0.75 W
- 100% full load burn-in test
- 3years warranty

Modell MDR-60-12

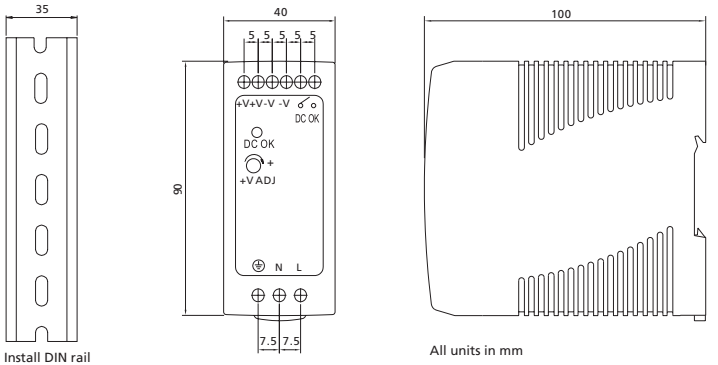
Output	DC Voltage	12 V
	Rated current	5 A
	Current range	0 ~ 5 A
	Rated power	60 W
	Ripple and noise (max.), see note 2	120 mVp-p
	Voltage adj. range	12 ~ 15 V
	Voltage tolerance, see note 3	±1,0 %
	Line regulation	±1,0 %
	Load regulation	±1,0 %
	Set up, rise time, see note 5	500 ms, 30 ms/230 VAC; 500 ms, 30 ms/115 VAC at full load
	Hold up time (typ.)	50 ms/230 VAC; 20 ms/115 VAC at full load
Input	Voltage range	85 ~ 264 VAC; 120 ~ 370 VDC
	Frequency range	47 ~ 63 Hz
	Efficiency (typ.)	86 %
	AC current (typ.)	1,8 A/115 VAC; 1 A/230 VAC
	Inrush current (typ.)	Cold start 30 A/115 VAC; 60 A/230 VAC
	Leakage current	<1 mA/ 240 VAC
Protection	Overload	105 ~ 150 % rated output power Protection type : Constant current limiting, recovers automatically after fault condition is removed
	Over voltage	15,6 ~ 18 V Protection type : Shut down o/p voltage. Re-power on to recover.
Function	DC OK signal	Relay contact rating (max.): 30 V/1 A resistive
Enviroment	Working temperature	-20 ~ +70 °C (refer to output load derating curve)
	Working humidity	90 % bis 95 % RH non-condensing
	Storage temperature, storage humidity	-40 ~ +85 °C, 10 ~ 95 % RH
	Temperature coefficient	±0,03 % / (0 ~ 50 °C)
	Vibration	Component: 10 ~ 500 Hz, 2G 10 min./1 period for 60 min. each along X, Y, Z axes, Mounting: Compliance to IEC60068-2-6
Safety and EMC (see note 4)	Safety standards	UL508, TUV EN60950-1approved
	Withstand voltage	I/P-O/P:3 KVAC; I/P-FG:1.5 KVAC; O/P-FG:0.5 KVAC
	Isolation resistance	I/P-O/P, I/P-FG, O/P-FG: > 100 M Ohm/500 VDC 25 °C 70 % RH
	EMI conduction and radiation	Compliance to EN55011, EN55022 (CISPR22), EN61204-3 class B
	Harmonic current	Compliance to EN61000-3-2,-3
	EMS immunity	Compliance to EN61000-4-2, 3, 4, 5, 6, 8, 11, ENV50204, EN55024, EN61000-6-2, EN61204-3 heavy industry level, criteria A
Others	MTBF	299.2 K hrs. min.; MIL-HDBK-217F (25 °C)
	Dimension	40*90*100 mm (W*H*D)
	Packing	0.33 Kg; 42 pcs./14.8 Kg/ 0.82 CUFT

Note

1. All parameters NOT specially mentioned are measured at 230 VAC input, rated load and 25 °C of ambient temperature.
2. Ripple & noise are measured at 20 MHz of bandwidth by using a 12" twisted pair-wire terminated with a 0.1 uf and 47 uf parallel capacitor.
3. Tolerance: includes set up tolerance, line regulation and load regulation.
4. The power supply is considered a component which will be installed into a final equipment. The final equipment must be re-confirmed that it still meets EMC directives.
5. Length of set up time is measured at first cold start. Turning ON/OFF the power supply may lead to increase of the set up time.

GB Wiring diagram

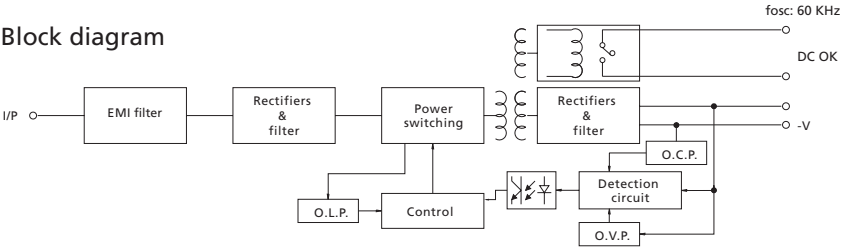
Mechanical specification



Install DIN rail
TS35/7.5 oder TS35/15

All units in mm

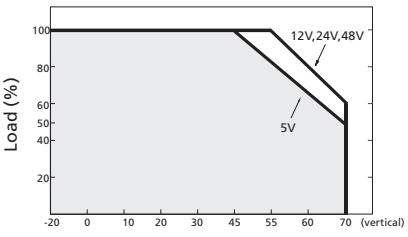
Block diagram



DC OK relay contact

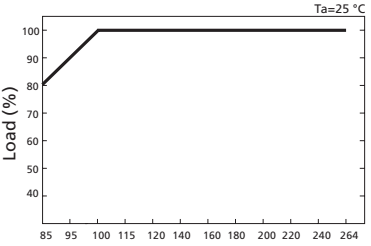
Contact close:	When the output voltage reaches the adjusted output voltage.
Contact open:	When the output voltage drop below 90 % output
Contact ratings (max.):	30 V/1 A resistive load

Derating curve



Ambient temperature (°C)

Output derating VS input voltage



Input voltage (VAC) 60 Hz

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