



DIN-Rail Mount SMPS

SPB-A Series

PRODUCT MANUAL

For your safety, read and follow the considerations written in the instruction manual, other manuals and Autonics website.

The specifications, dimensions, etc. are subject to change without notice for product improvement. Some models may be discontinued without notice.

Safety Precautions

- 'Safety Precautions' are provided to ensure safe and proper use of the product and to prevent accidents or hazards. Please make sure to follow them carefully.
- ⚠ symbol indicates a caution, warning of potential hazards under certain conditions.

⚠ Warning Failure to follow instructions may result in serious injury or death.

- 01. Fail-safe device must be installed when using the unit with machinery that may cause serious injury or substantial economic loss.** (e.g. nuclear power control, medical equipment, ships, vehicles, railways, aircraft, combustion apparatus, safety equipment, crime / disaster prevention devices, etc.)
Failure to follow this instruction may result in personal injury, economic loss or fire.
- 02. Do not use or store the unit in the place where flammable / explosive / corrosive gas, high humidity, direct sunlight, radiant heat, vibration, impact, or salinity may be present.**
Failure to follow this instruction may result in explosion or fire.
- 03. Connect the ground completely to the PE terminal.**
Failure to follow this instruction may result in electric shock or malfunction.
- 04. Do not connect, repair, or inspect the unit while connected to a power source.**
Failure to follow this instruction may result in fire or electric shock.
- 05. Check 'Wiring Diagram' before wiring.**
Failure to follow this instruction may result in fire, electric shock or product damage.
- 06. Do not disassemble or modify the unit.**
Failure to follow this instruction may result in fire, electric shock or product damage.

⚠ Caution Failure to follow instructions may result in injury or product damage.

- 01. When connecting the terminal, tighten the terminal screw with a tightening torque of 0.3 to 0.5 N m.**
Failure to follow this instruction may result in fire or malfunction due to contact failure.
- 02. Use the unit within the rated specifications.**
Failure to follow this instruction may result in fire, product damage or shortening the life cycle of the product.
- 03. Use the device within the output derating curve according to ambient temperature.**
Failure to follow this instruction may result in product damage or shortening the life cycle of the product.
- 04. Use a dry cloth to clean the unit, and do not use water or organic solvent.**
Failure to follow this instruction may result in fire or electric shock.
- 05. Keep the product away from metal chip, dust, and wire residue which flows into the unit.**
Failure to follow this instruction may result in fire or product damage.
- 06. Do not touch the product during operation or immediately after disconnection until the product has cooled.**
Failure to follow this instruction may result in burns.
- 07. Upon occurrence of an error, disconnect the power source.**
Failure to follow this instruction may result in fire or product damage.
- 08. All strands of multi-strand wire should be inserted / secured into the terminal block and / or wire ferrules should be used.**
Failure to follow this instruction may result in fire or product damage.
- 09. Do not use the inverter output as the voltage input.**
Failure to follow this instruction may result in fire due to rapid switching.
- 10. Do not use the device in conditions where inrush current or overload occurs frequently.**
If short circuit or overcurrent condition is continued, it may result in fire or product damage.
- 11. Use an external diode when using it to operate a motor, etc.**
If the voltage output exceeds the rated output voltage range, it may result in malfunction or product damage.
- 12. Use an external diode for series / parallel operation.**
Failure to follow this instruction may result in fire or product damage due to the reverse voltage generated inside the SMPS when the load is short-circuited.
- 13. In case of series / parallel operation, make sure that the current over the rated current does not flow to the SMPS.**
Failure to follow this instruction may result in product damage.

Cautions During Use

- Follow instructions in 'Cautions during Use'. Otherwise, it may cause unexpected accidents.
- In the case of models with 120 / 240 / 480 W output, noise may occur when power is applied until the internal circuit stabilizes.

Model		SPB-A240-12	SPB-A240-24	SPB-A240-48	SPB-A480-24	SPB-A480-48
Input						
Voltage ⁽⁰¹⁾		100 - 240 VAC ~ / 90 - 350 VDC = (allowable voltage: 85 - 264 VAC ~)				
Current ⁽⁰²⁾ (Typical)	115 VAC ~	2.5 A			4.8 A	
	230 VAC ~	1.3 A			2.4 A	
Frequency		50 / 60 Hz (allowable frequency: 47 - 63 Hz)				
Efficiency ⁽⁰²⁾ (Typical)	115 VAC ~	0.86	0.89	0.90	0.88	0.89
	230 VAC ~	0.89	0.92	0.93	0.91	0.92
Power factor ⁽⁰²⁾ (Typical)	115 VAC ~	0.99			0.99	
	230 VAC ~	0.9			0.97	
Power factor correction circuit (PFC)		Available				
Inrush current ⁽⁰³⁾ (Typical)	115 VAC ~	16 A			40 A	
	230 VAC ~	32 A			55 A	
Leakage current (Typical)	115 VAC ~	0.14 mA			0.13 mA	
	230 VAC ~	0.25 mA			0.24 mA	
Output						
Voltage		12 VDC =	24 VDC =	48 VDC =	24 VDC =	48 VDC =
Current		20 A	10 A	5 A	20 A	10 A
Power		240 W			480 W	
Power boost ⁽⁰⁴⁾		120 % of rated current				
Voltage adjustment range		-10 to 15 % (with VAdjust)				
Ripple ^{(02) (05)}		290 mV _{P-P}	250 mV _{P-P}	270 mV _{P-P}	180 mV _{P-P}	200 mV _{P-P}
Input variation ⁽⁰⁶⁾		≤ 0.5 %				
Load variation ⁽⁰⁷⁾		≤ 2.0 %	≤ 1.5 %		≤ 1.5 %	
Temperature variation		≤ 0.05 % / °C				
Start-up time ⁽⁰²⁾ (Typical)	115 VAC ~	290 ms	310 ms	390 ms	430 ms	290 ms
	230 VAC ~	250 ms	250 ms	290 ms	300 ms	260 ms
Hold time ⁽⁰²⁾ (Typical)	115 VAC ~	36 ms	40 ms	36 ms	31 ms	22 ms
	230 VAC ~	39 ms	38 ms	36 ms	30 ms	21 ms
Output low voltage indication		9.6 V (± 10 %)	20.0 V (± 10 %)	43.0 V (± 10 %)	20.0 V (± 10 %)	43.0 V (± 10 %)
Unit weight (Package)		≈ 850 g (≈ 1,050 g)			≈ 1,350 g (≈ 1,570 g)	

01) For DC voltage input, install an external fuse to ensure safety.

Model	Fuse specification
SPB-A015 / 030-□	≥ 350 VDC=, 4 A
SPB-A060 / 120-□	≥ 350 VDC=, 6 A
SPB-A240 / 480-□	≥ 350 VDC=, 12 A

02) Based on 100 % load

03) When cold start operation at 25 °C.

04) For more information, refer the product manuals.

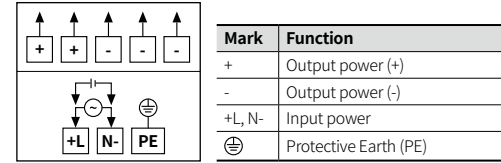
05) Based on 20 MHz (Typ).

Data measured by connecting capacitors of 22 µF (Aluminum electrolytic capacitor) and 0.1 µF (Film capacitor) to 150 mm from the output terminal. Ripple specifications change when operating in Burst mode.

06) Based on 85 - 264 VAC~ input, 100 % load

07) Based on 0 to 100 % load

Connection



Model	Wire specification			Terminal	Torque
	Output	Input	PE		
SPB-A015-05 ⁽⁰¹⁾	AWG 20 to 12	AWG 24 to 12	AWG 14 to 12	M2,5	0.3 to 0.5 N m
SPB-A015-12 ⁽⁰¹⁾	AWG 22 to 12				
SPB-A015-24 ⁽⁰¹⁾	AWG 24 to 12				
SPB-A030-05	AWG 18 to 12	AWG 24 to 12		M2,5	
SPB-A030-12	AWG 20 to 12				
SPB-A030-24	AWG 22 to 12				
SPB-A060-12	AWG 18 to 12	AWG 22 to 12			
SPB-A060-24	AWG 20 to 12				
SPB-A120-12	AWG 14 to 10	AWG 22 to 10	AWG 14 to 10	M3	
SPB-A120-24	AWG 18 to 10				
SPB-A240-12	AWG 12 to 10	AWG 20 to 10			
SPB-A240-24	AWG 14 to 10				
SPB-A240-48	AWG 18 to 10				
SPB-A480-24	AWG 12 to 10	AWG 16 to 10			
SPB-A480-48	AWG 14 to 10				

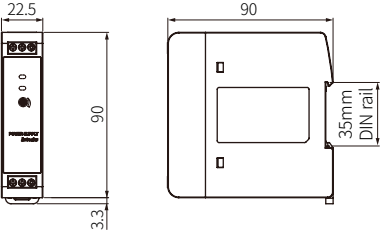
01) There are one + terminal and two - terminals.

The rated current is 10 A per output terminal. If the rated current is exceeded, use multiple terminals at the same time.

Dimensions

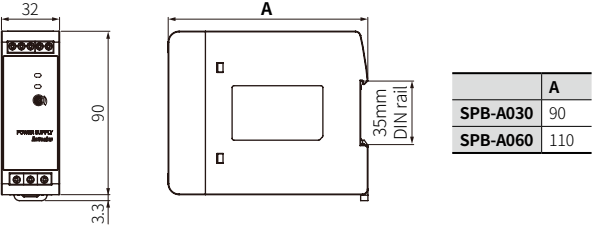
• Unit: mm, For the detailed drawings, follow the Autonics website.

■ SPB-A015-□



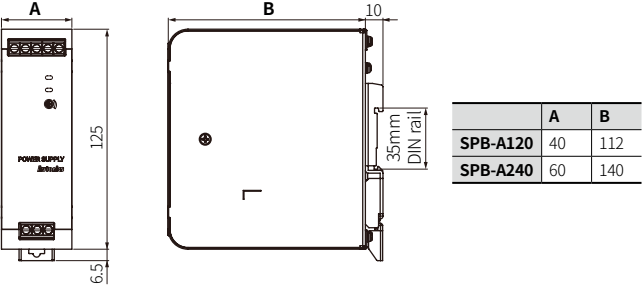
■ SPB-A030 / 060-□

• This is based on SPB-A060 model.

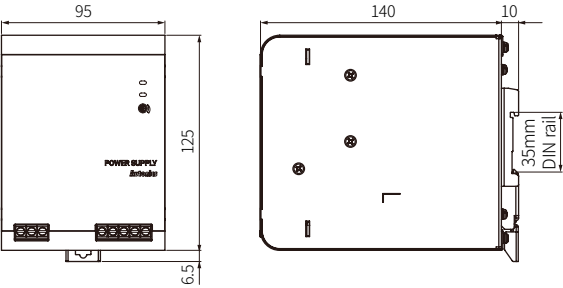


■ SPB-A120 / 240-□

• This is based on SPB-A120 model.



■ SPB-A480-□



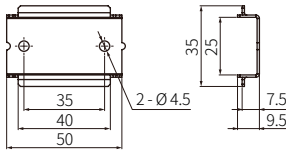
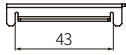
Sold Separately: Bracket

- Unit: mm, For the detailed drawings, follow the Autonics website.

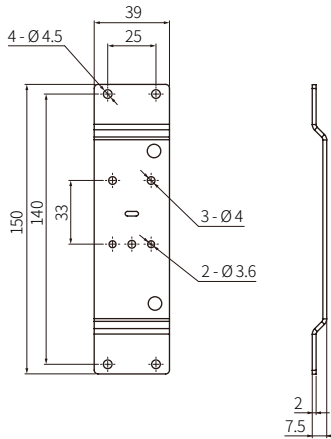
■ BK-SPB-F01 (SPB-A015 / 030 / 060-□)

- Fix the bracket to the wall with Ø 4.5 mm screw.

The device and bracket are fixed in the same way as the DIN rail installation.



■ BK-SPB-F02 (SPB-A120 / 240 / 480-□)

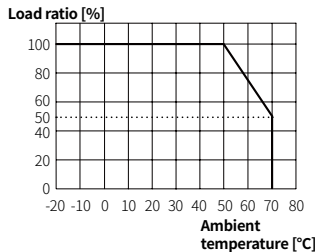


Derating Curve

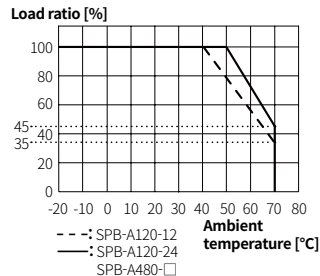
- Based on AC voltage input.
- The product may be damaged if used at a higher load factor than the rated load factor by the ambient temperature and the AC input voltage.

■ Derating curve by ambient temperature

- SPB-A015 / 030 / 060 / 240-□



- SPB-A120 / 480-□



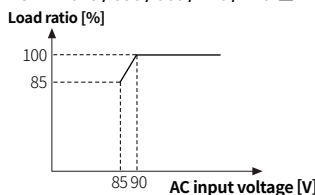
- In case of DC voltage input, The load factor is calculated by multiplying the load factor by the following coefficient when AC voltage is input.

Model	Coefficient	Example (70 °C)
SPB-A015-□	1.0	50 % × 1.0
SPB-A030-□	0.9	50 % × 0.9
SPB-A060-□	0.8	50 % × 0.8

Model	Coefficient	Example (70 °C)
SPB-A120-12	0.9	35 % × 0.9
SPB-A120-24	0.9	45 % × 0.9
SPB-A480-□	0.8	45 % × 0.8

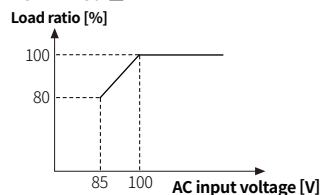
■ Derating curve by input voltage

- SPB-A015 / 030 / 060 / 120 / 240-□



When the input voltage is 90 VAC~ or less, the load ratio is reduced to 3 % / V.

- SPB-A480-□

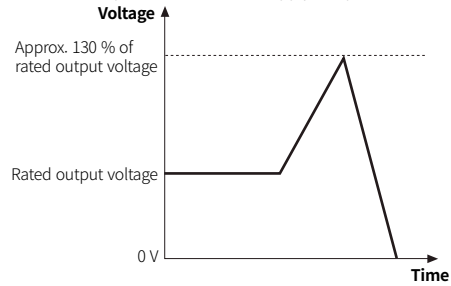


When the input voltage is 100 VAC~ or less, the load ratio is reduced to 1.34 % / V.

Over-voltage Protection

If excessive voltage of about 130% or more of the rated voltage is output, the output is cut off to protect the connected load.

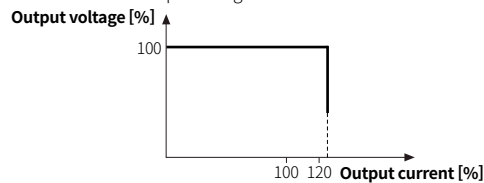
When the output is disconnected, apply the power after waiting at least 5 minutes.



Over-current Protection

When the overcurrent exceeding 121 % of the rated current is flowed, the over-current protection circuit is operated to protect the product by reducing output voltage. The protection circuit is released automatically when the load current is under the rated current.

- It is for the rated input voltage 100 - 240 VAC~.



Overheat Protection

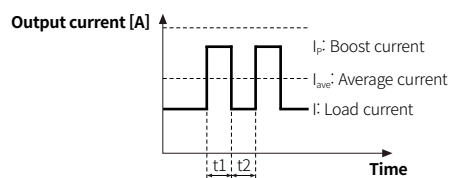
The output voltage is cut off when the device's internal temperature reaches approximately 140 °C due to overheating.

If the product does not operate normally due to the overheat protection function, cool the product sufficiently and reapply the power.

Power Boost

If the environment that satisfies the conditions below, current greater than the rated current is temporarily and repeatedly output.

Adjust the load of the boost load current according to the ambient temperature and installation conditions.



Condition	Description
$t1 \leq 10 \text{ sec}$	The boost current should not last more than 10 seconds.
$\text{Duty} = \frac{t1}{t1 + t2} \times 100 \% \leq 30 \%$	The duty cycle must not exceed the boost current condition.
$I_p \leq \text{Rated boost current}$	The boost current must not exceed the rated boost current.
$I_{\text{ave}} \leq \text{Rated current}$	The average current in one cycle of boost current must not exceed the rated current.

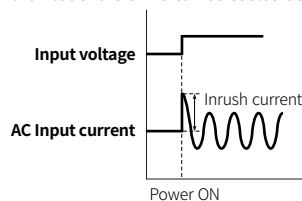
01) Rated boost current = 120 % of the rated current

Inrush Current

Inrush current is the current that flows instantaneously when the power supply voltage is input.

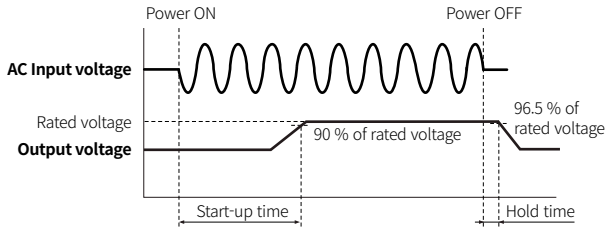
A thermistor is used in the inrush current limiting circuit.

When the power is repeatedly turned on and off, use it at a sufficient interval so that the heat of the SMPS can be cooled down.



Start-up / Hold Time

- Start-up time: Time taken to reach 90 % of the rated voltage
- Hold time: Time to keep the output above 96.5 % after power input is stopped



Series / Parallel Operation

Series operation

During series operation, the output current must be lower than the rated current of the SMPS with the lowest rated current among series connected SMPS.



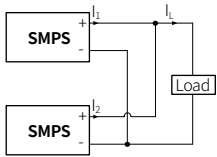
Parallel operation

The same model must be used for parallel operation. Up to 2 SMPS can be used.

In parallel operation, keep the difference between the output voltages of the two SMPS within 25 mVDC.

In parallel operation, EMI, inrush current, etc. are not the same as product specifications.

In order to balance the current, the length and thickness of the wiring connected between the SMPS and the load must be the same.



Block Diagram

