EMA

Redundant Power System
Manual
(4U / mini-redundant 1+1)

EMA2V4550 / EMA2V4550F
EMA2V4500 / EMA2V4500F
EMA2V4460 / EMA2V4460F
EMA2V4400 / EMA2V4400F

Precaution Notice

Only a technician, authorized by ENERMAX, is allowed to perform maintenance service! Warranty is subject to void under unauthorized attempt to open the power case or modification of any kinds, even attempted only, of the power supply or its components!

ENERMAX will not be responsible for damages caused by following situations:

- Opening of the PSU case and/or modification of any component or cable without ENERMAX's written authorization.
- Ignoring connector's wrong insertion prevention design by attaching a connector to a device in wrong orientation.
- Connecting too many devices to one cable unit by using additional adaptor.
- Usage of non-genuine ENERMAX modular cables.
- The serial number label or warranty seal is defaced, modified, or removed.
- Damage caused by natural phenomena or uncontrollable forces, such as lightning, flooding, fire, earthquake, etc.

This ENERMAX Technology Corporation product is warranted to be free from defects in material and workmanship for a period of three (3) years from the date of purchase. ENERMAX Technology Corporation agrees to repair or replace the product, at its own option and at no charge, if, during the warranty period, it is returned to nearest ENERMAX Technology Corporation subsidiary/agent with all shipping charges prepaid and bearing a return merchandize authorization (RMA) number, and if inspection reveals that the product is defective. Charges for removing or installing the product are excluded under the terms of this warranty agreement. This warranty shall not apply to any product, which has been subject to connection to a faulty power source, alteration, negligence, or accident, or to any product, which has been installed other than in accordance with these instructions. In no event shall ENERMAX Technology Corporation, or its subsidiaries, or agents be liable for damages for a breach of warranty in an amount exceeding the purchase price of this product!

If you are uncertain whether or not your ENERMAX PSU is defective, please contact your dealer/reseller for support!

Web Site: http://www.enermax.com
E-mail: enermax@enermax.com.tw
Forum: forum.enermax.com

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User's Manual

Dear customer,

Thank you for choosing ENERMAX EMA redundant power supply system. The EMA series is a 1+1 hot-swappable / hot-pluggable redundant power supply system. It consists of:

1. Housing with backplane to accommodate EMA redundant power module
2. 2 x EMA redundant power modules

The power system has warming design with LED and buzzer. When any power module or power module's fan is abnormal, the LED will turn red and buzzer will be activated to indicate the failed unit, and guide the operator to replace it.

Please read this manual carefully and follow its instructions before installation.

To avoid failures and to increase lifetime of the system, we suggest that:

- The system is NOT located near a radiator or any other heat producing device
- The system is NOT located near a magnetic device
- The system is NOT located in a moist and/or dusty and/or vibrating environment
- The system is NOT exposed to direct sunshine
- The system is sufficiently cooled by additional fans
- If you use AC extension cables, please make sure it can support all connected appliances' peak power draw, or redistribute high power consumption equipment, such as laser printers to other AC wall outlets. Exceeding the extension cable's loading capacity could trigger its circuit breaker and cut off the power.
- If you want to add the UPS (Uninterruptible Power Supply) for your system, please choose adequate Watts/VA capacity UPS. Ex.

PSU Model	Suggested minimum UPS capacity	Suggested UPS capacity for cold start event in battery mode
EMA2V4550(F)	700W	1400W
EMA2V4500(F)	700W	1300W
EMA2V4460(F)	700W	1200W
EMA2V4400(F)	600W	1000W

  - ∗ If you intend to add other appliance powered by the same UPS, such as monitor or printer, please use higher capacity UPS according to all connected devices' rated power draw.
  - ∗ Most UPS use "VA" capacity on model name, and its actual "Wattage" capacity is lower than "VA" value. Please do not mistake VA capacity as Watts, or use insufficient power UPS. This would result in less UPS battery runtime or the inability to power the system in battery mode.

EMA Redundant Power System Specification

EMA Redundant Power System									
Power System Model		EMA2V4550 EMA2V4550F		EMA2V4500 EMA2V4500F		EMA2V4460 EMA2V4460F		EMA2V4400 EMA2V4400F	
Power Module Inside		EMA550 x 2		EMA500 x 2		EMA460 x 2		EMA400 x 2	
Input Power		100-240VAC, 47-63Hz, (Active PFC auto-switching) (Maximum range: 90-264VAC)							
Input Current		10-5A		8-4A		8-4A		6-3A	
DC Output	Rail	Rated	Combined	Rated	Combined	Rated	Combined	Rated	Combined
	+3.3V	0-24A	180W	0-24A	180W	0-22A	220W	0-24A	150W
	+5V	0-30A		0-30A		0-35A		0-24A	
	+12V	0-41A	492W	0-36A	432W	0-30A	360W	0-30A	360W
	-5V	0-0.5A		0-0.5A		0-0.5A		0-0.5A	
	-12V	0-1A		0-1A		0-1A		0-1A	
	+5Vsb	0.1-2A		0.1-2A		0.1-2A		0.1-2A	
	Total Output	550W (1+1)		500W (1+1)		460W (1+1)		400W (1+1)	

EMA Redundant Power Module									
Power Module Model		EMA550		EMA500		EMA460		EMA400	
Input Power		100-240VAC, 47-63Hz, (Active PFC auto-switching) (Maximum range: 90-264VAC)							
Input Current		10-5A		8-4A		8-4A		6-3A	
Inrush Current (max at cold start)		25A @ 115VAC 50A @ 230VAC		25A @ 115VAC 50A @ 230VAC		25A @ 115VAC 50A @ 230VAC		25A @ 115VAC 45A @ 230VAC	
DC Output	Rail	Rated	Combined	Rated	Combined	Rated	Combined	Rated	Combined
	+3.3V	0-24A	180W	0-24A	180W	0-22A	220W	0-24A	150W
	+5V	0-30A		0-30A		0-35A		0-24A	
	+12V	0-41A	492W	0-36A	432W	0-30A	360W	0-30A	360W
	-5V	0-0.5A		0-0.5A		0-0.5A		0-0.5A	
	-12V	0-1A		0-1A		0-1A		0-1A	
	+5Vsb	0.1-2A		0.1-2A		0.1-2A		0.1-2A	
	Total Output	550W		500W		460W		400W	

DC Output Quality		
Output Voltage	Regulation*1	Ripple and Noise*2
+3.3V	+5% ~ -5%	<50mVp-p
+5V	+5% ~ -5%	<50mVp-p
+12V	+5% ~ -5%	<120mVp-p
-5V	+10% ~ -10%	<100mVp-p
-12V	+5% ~ -5%	<120mVp-p
+5Vsb	+5% ~ -5%	<50mVp-p

*1 All DC output cable shall connect to load when testing regulation.
*2 A 10uF tantalum capacitor in parallel with a 0.1uF ceramic capacitor are placed at the point of measurement.

Protection Circuit			
DC Over Current Protection	DC Rail		DC OCP Trigger Range
	+3.3V		26.4~38.4A
	+5V		33.0~48.0A
	+12V	EMA2V4550	45.1~65.6A
		EMA2V4500	39.6~57.6A
		EMA2V4460	33.0~48.0A
		EMA2V4400	33.0~48.0A
DC Over Voltage Protection	DC Rail		DC OVP Trigger Range
	+3.3V		3.9~4.5V
	+5V		5.7~6.5V
	12V		13.3~14.5V
	5Vsb		5.7~6.5V
Over Power Protection	130%~270% (all power modules enabled) 110%~160% (only one power module enabled)		
AC Under Voltage Protection	Activated if input power < 75-80VAC @ > 75% of the rated load.		
Surge Protection	Line to Neutral: 1KV max. Line to Ground or Neutral to Ground: 2KV max.		
Others			
Temperature	OPERATING: 0~40 ^{o}C for 100% load STORAGE: -40 ~70 ^{o}C		
Humidity	OPERATING: 20~90% relative humidity, non-condensing at 25^{o}C STORAGE: 5~95% relative humidity, non-condensing at 40^{o}C		
Hold Up Time	> 18ms at 75% of maximum load		
Cooling	2 x 4020 DC Fans per power module		
Power Sharing	Each active power modules share the loading with ±20% tolerance.		
Safety & EMI	UL, TUV, CB, CCC, FCC CLASS B, CISPR22 CLASS B		
Power Factor	PF > 0.98 at full load.		
Efficiency	> 70% at full load, 115VAC/60Hz (Power System)		
MTBF	>100K hours at 100% load, 120VAC/60Hz, 25^{o}C (MIL-HDBK-217F standard)		

PROTECTION, SAFETY & SECURITY

This redundant power system features multiple protections. In case of most abnormal situations, the power supply will automatically turn off to avoid potential danger.

- PSU STATUS INDICATION AND BUZZER FUNCTION:

Power Module				Power System		Information
AC	PSU Status	Fan Status	LED	LED	Buzzer*3	
OFF	OFF	OFF	No Light	No light	Silent	No AC Input
ON	OFF	OFF	All modules: Orange/Red	Orange/Red	Silent	Standby mode or System abnormal *1
ON	ON	ON	Green	Green	Silent	PSU-on & normal
ON	ON	OFF	Any module: Red	Red	Buzzing*2	PSU fan abnormal
ON	OFF	OFF	Any module: Red	Red	Buzzing*2	Power module fail

*1 If you turn on the system and it shoot-off right away, with all LED lights turn to orange or red color, and buzzer starts alarming, this means there is short-circuiting issue or abnormal contact in your system. Please check if all system/power connectors are correctly connected, and no foreign objects shorting any terminals.

*2 Make sure the power source is well connected and supplied, and the power module is firmly inserted into the power housing. If this cannot deactivate the buzzer or let LED turn green. This means the power module might be failed. Please check next session and swap the power module.

*3 Pressing the reset button, or replace a new redundant power module will deactivate the buzzer.

SWAPPING THE POWER MODULE

If buzzer keeps alarming or LED indicates the power module failure, please locate which power module is defective and perform hot-swap process:

1. If the power module has I/O switch, turn the I/O switch to “O” position, and remove the AC cord. Press the latch to release the safety lock, and extract the module from the power system.
2. Examine the new module’s connector and terminal to be inserted. If they are intact, replace another module. If the power module has the I/O switch, make sure it is in “O” position.
   * The new module’s wattage/module should be the same as original module. Higher wattage power module is also accepted for temporary alternative solution.
3. Fully insert the new module into the power system and fimly plug in the AC cord into the AC socket. If the power module has I/O switch, turn it to “I” position. The power system will automatically turn on the new inserted module.

If you have any question or need support, please contact your reseller or nearest ENERMAX subsidiary/agent or ENERMAX headquarter service center.

CABLE AND CONNECTOR

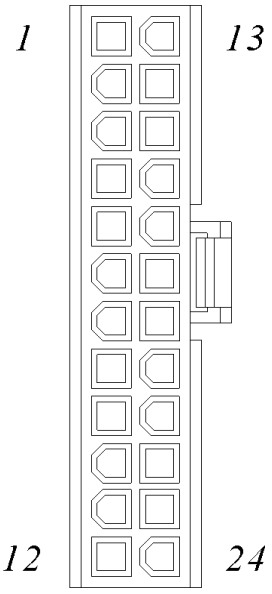
The standard version's cables and connectors setting are described below. Cabling customization service is available for SI/SB. Please contact your nearest ENERMAX sales representative for more detail or mail to enermax@enermax.com.tw .

1. DC Connector

1.1 24P Main Power Connector

Connector：Molex 0039012240 or equivalent

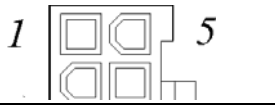
Pin	Signal	Color	AWG	Pin	Signal	Color	AWG
1	+3.3VDC	Orange	18	13 [13]	RS+ +3.3VDC	[Brown] Orange	18 18
2	+3.3VDC	Orange	18	14	-12VDC	Blue	18
3	COM	Black	18	15	COM RS-	Black Black	18 18
4	+5VDC	Red	18	16	PS-ON	Green	18
5	COM	Black	18	17	COM	Black	18
6	+5VDC	Red	18	18	COM +5 RS-	Black Black	18 18
7	COM	Black	18	19	COM	Black	18
8	PWR-OK	Gray	18	20	-5VDC	White	18
9	+5VSB	Purple	18	21	+5VDC	Red	18
10	+12VDC	Yellow	18	22	+5V RS+ +5VDC	Red Red	18 18
11	+12VDC	Yellow	18	23	+5VDC	Red	18
12	+3.3VDC	Orange	18	24	COM	Black	18



1.2 8P (4+4P) Processor Power Connector

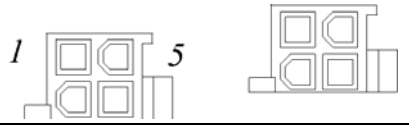
Connector：Molex 0039012080 or equivalent

Pin	Signal	Color	AWG	Pin	Signal	Color	AWG
1	COM	Black	18	5	+12VDC	Yellow	18
2	COM	Black	18	6	+12VDC	Yellow	18
3	COM	Black	18	7	+12VDC	Yellow	18
4	COM	Black	18	8	+12VDC	Yellow	18



or

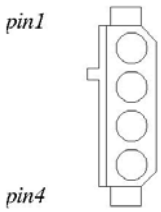
Pin	Signal	Color	AWG	Pin	Signal	Color	AWG
1	COM	Black	18	5	+12VDC	Yellow	18
2	COM	Black	18	6	+12VDC	Yellow	18
3	COM	Black	18	7	+12VDC	Yellow	18
4	COM	Black	18	8	+12VDC	Yellow	18



1.3 Peripheral Connector on modular cables

Connector: Molex 0015244048 or equivalent

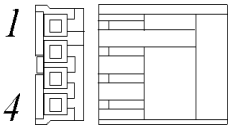
Pin	Signal	Color	AWG
1	+12VDC	Red	18
2	COM	Black	18
3	COM	Black	18
4	+5V DC	Yellow	18



1.4 Floppy Drive Connector on modular cables

Connector: AMP 171822-4 or equivalent

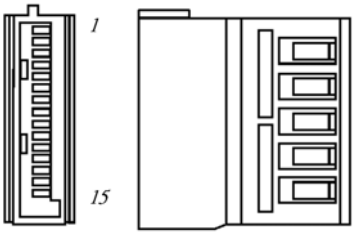
Pin	Signal	Color	AWG
1	+5VDC	Red	18
2	COM	Black	18
3	COM	Black	18
4	+12VDC	Yellow	18



1.5 Serial ATA Power Connector on modular cables

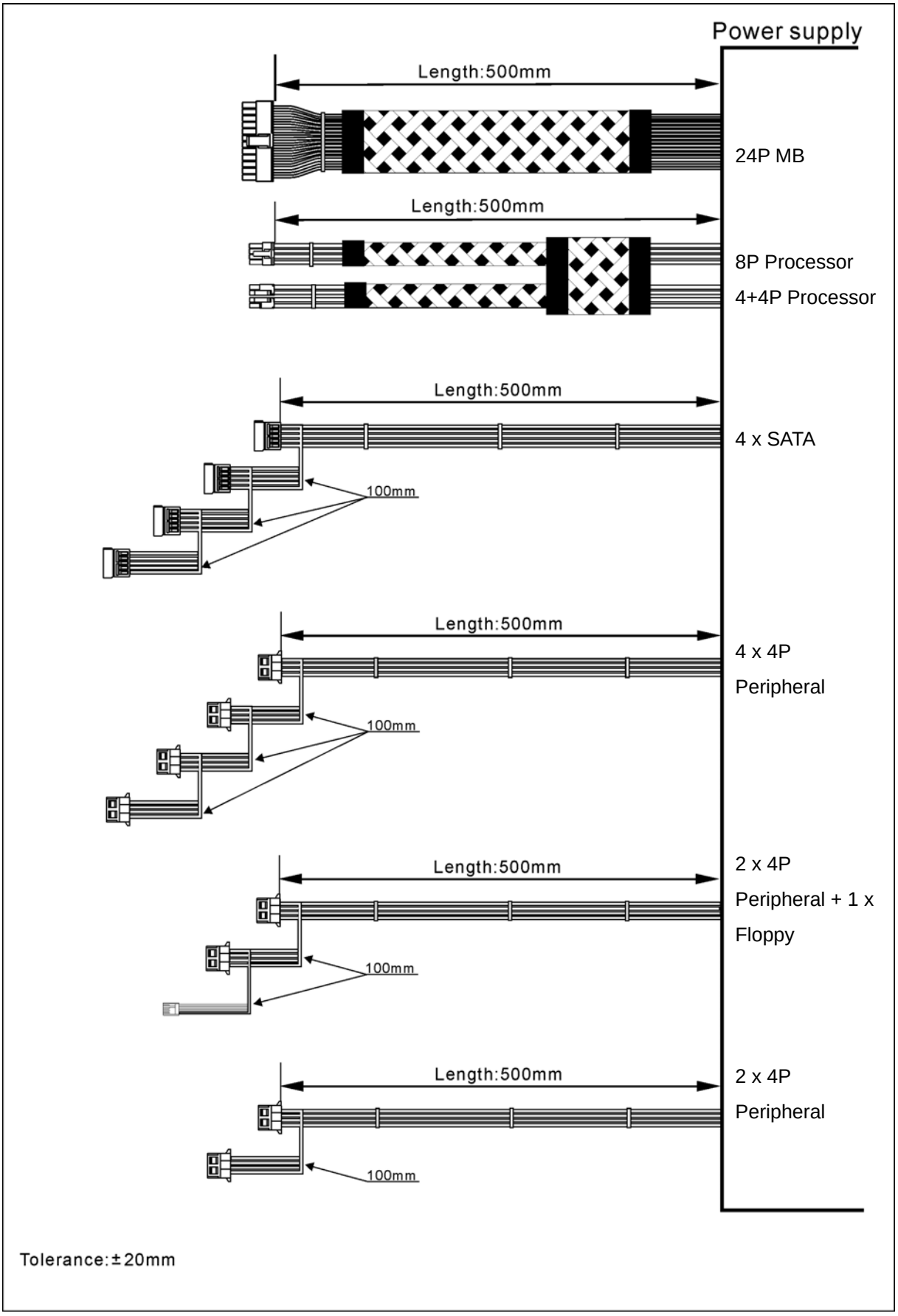
Connector: Molex 0675820000 or equivalent

Pin	Signal	Color	AWG
1-3	+12V DC	Yellow	18
4-6	COM	Black	18
7-9	+5VDC	Red	18
10-12	COM	Black	18
13-15	+3.3VDC	Orange	18

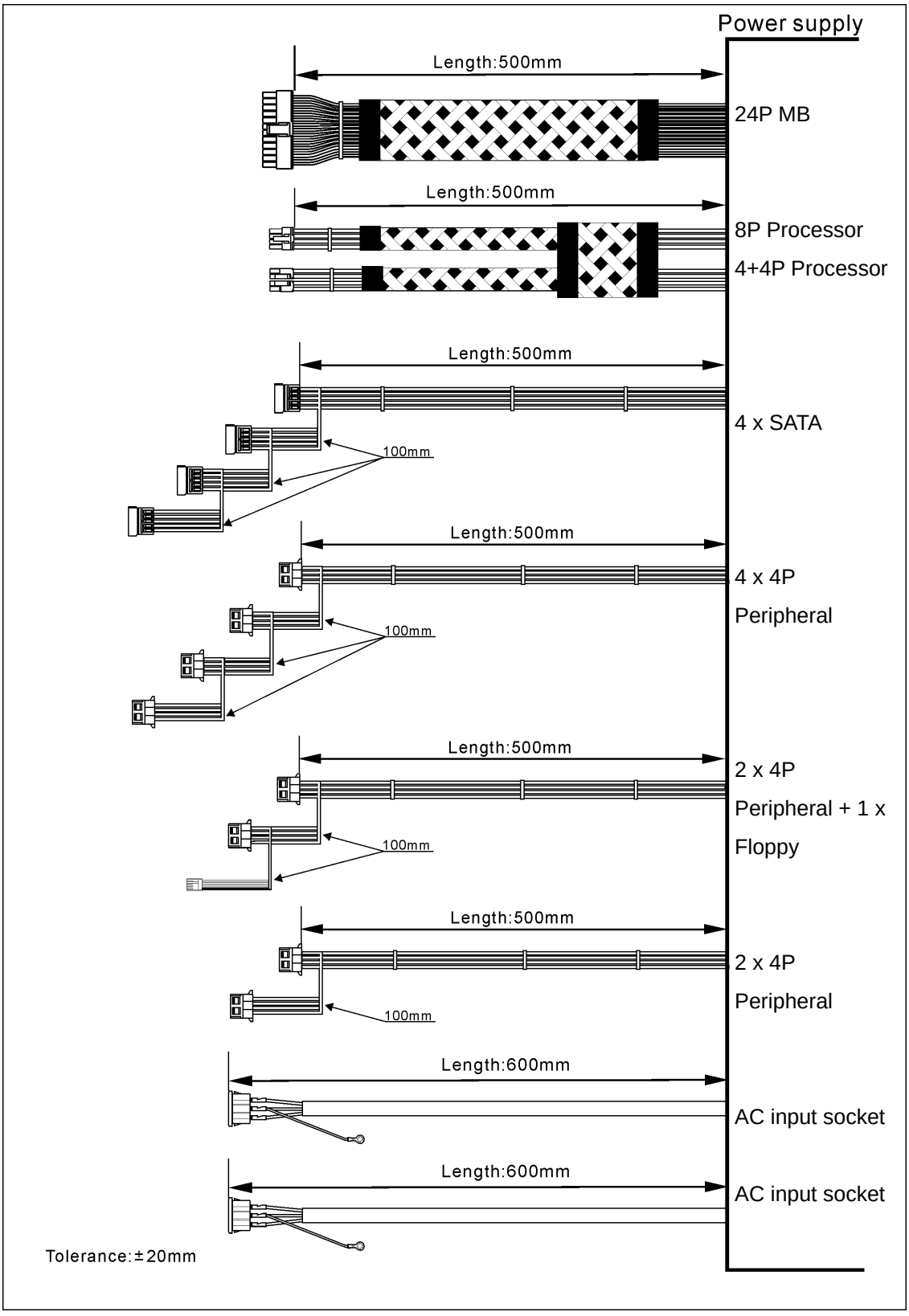


2. Cable setting

2.1 EMA2V4xxx models

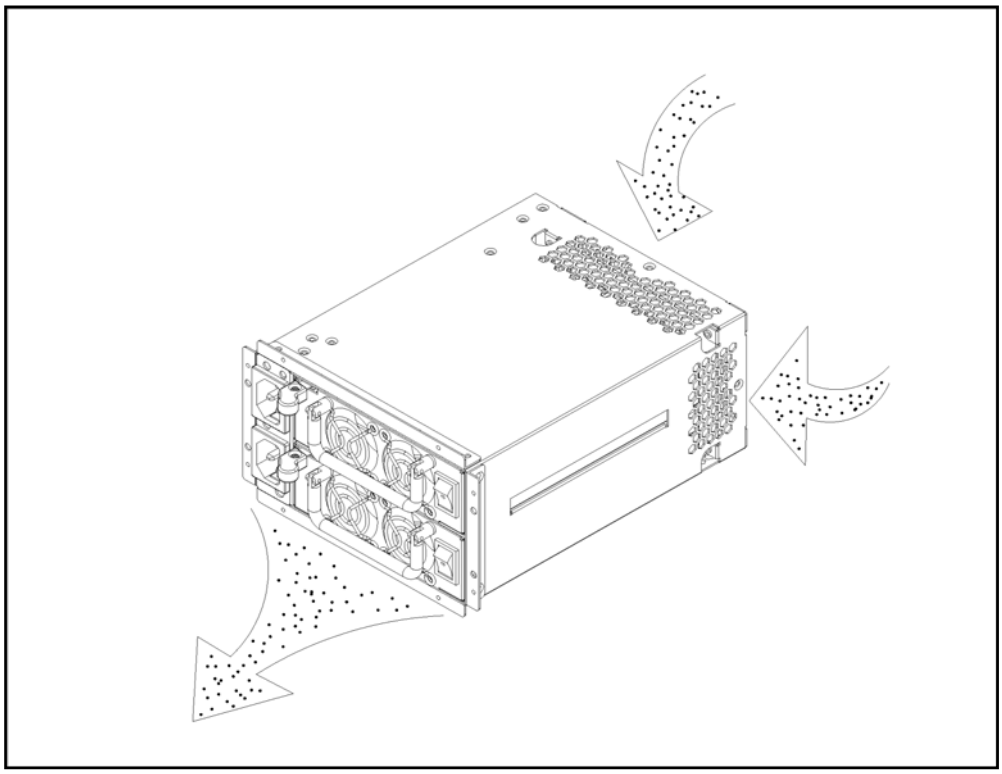


2.2 EMA2V4xxxF models

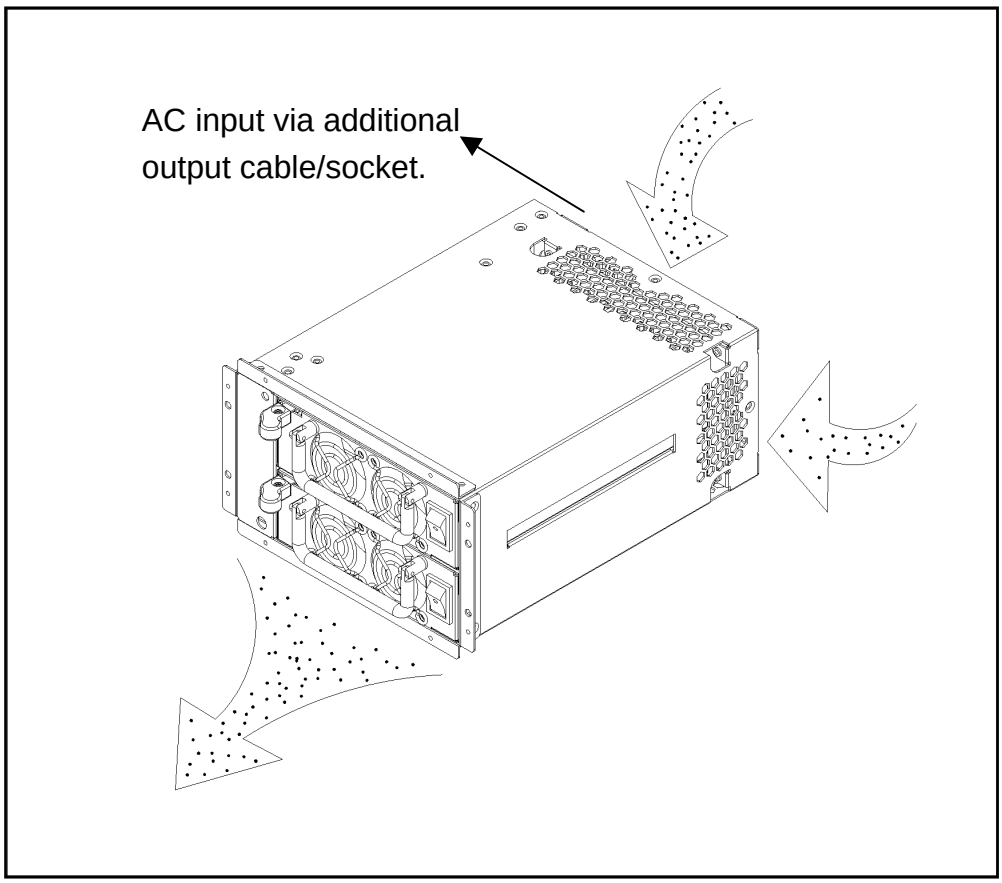


3. Airflow diagram

3.1 EMA2V4xxx models

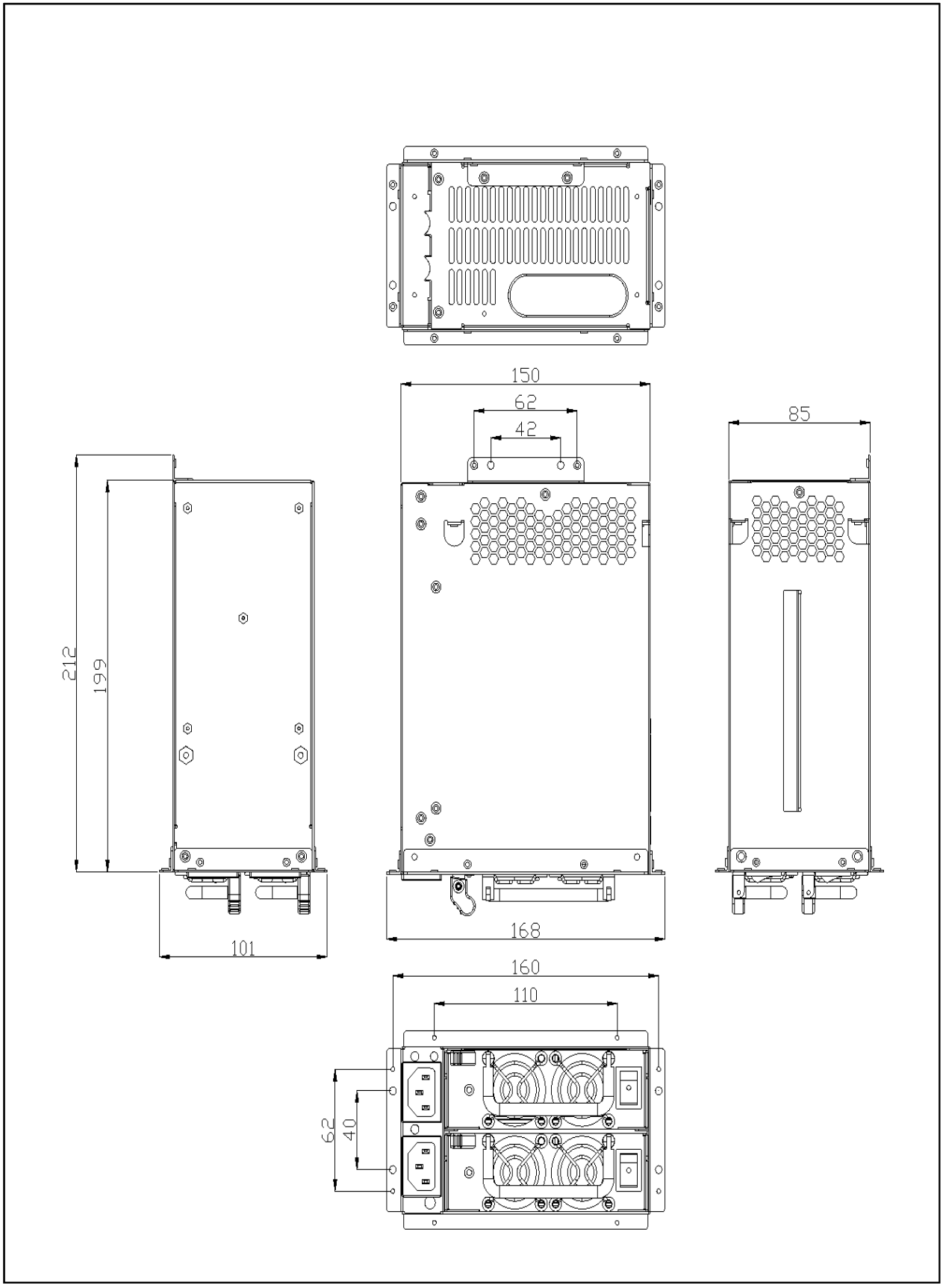


3.2 EMA2V4xxxF models



4. Mechanical diagram

4.1 EMA2V4xxx models



4.2 Mechanical diagram for EMA2V4xxxF models