⛰TDK

AC Input

Conformity to RoHS Directive

Single Output, Long Life, Three-phase Input High Power Output, UL/C-UL Certified

R Series RAY(750W to 3kW)

These products are three-phase input high power output and high reliability power supplies. They are provided with useful additional functions with three types of outputs 750W, 1.5kW, and 3kW lineup, therefor answering the needs for large current of a large display, an aging device, or the like.

FEATURES

- Three-phase AC.200V input single output.
- Current balance function.
- Various alarm functions.
- Output voltage external variable function.
- Remote ON-OFF function.
- Remote sensing function.
- It is a product conforming to RoHS directive.
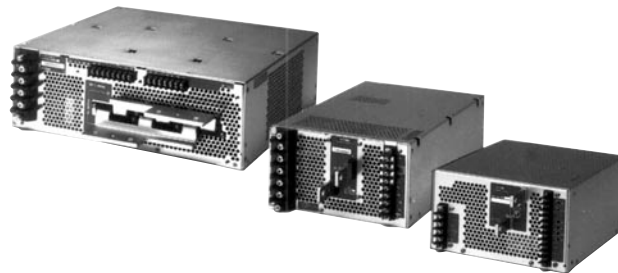
PART NUMBERS AND RATINGS

Output voltage(V)	750W Type			1.5kW Type			3kW Type		
	Current(A)		Part No.	Current(A)		Part No.	Current(A)		Part No.
5				300		RAY05-300	600		RAY05-600
24	31.3		RAY24-31R	65		RAY24-65R	125		RAY24-125
48	15.7		RAY48-15R	30		RAY48-30R	60		RAY48-60R

- The above products are only produced upon receipt of order. Please check a delivery date.

- All specifications are subject to change without notice.

⧉**TDK**

RAY750W Type

SPECIFICATIONS AND STANDARDS

Part No.			RAY24-31R	RAY48-15R
Rated output voltage and current[*1]			24V • 31.3A	48V • 15.7A
Maximum output power		W	751.2	753.6
Input conditions				
Input voltage Eac		V	170 to 264[Rating: 200 to 240](3-phase)	
Input frequency		Hz	47 to 66[Rating: 50 to 60](3-phase)	
Input current		A	3.7max./3max.[AC.200/240V]	
Fuse rating		A	10[Built-in]	
Surge current		A	34max./40max.[AC.200/240V, 1st surge current, reset after 30s minimum.]	
Leakage current		mA	2max.[AC.240V, output rating]	
Power factor			0.93typ.	
Efficiency		%	84[AC.200V]	86[AC.200V]
Output characteristics				
Output voltage Edc		V	24	48
Voltage variable range Edc		V	16.8 to 26.4	32.6 to 52.8
Maximum output current		A	31.3	15.7
Minimum output current		A	0	0
Overvoltage threshold Edc		V	27 to 30.5	55 to 59
Overcurrent threshold		A	32.8 to 36	16.4 to 18.1
Voltage stability	Source effect	%	1max.(0.5typ.)[Within the input voltage range]	Total effect ±2max.(±1typ.)
	Load effect	%	1max.(0.5typ.)[10 to 100% load]	
	Temperature effect	%	1max.(0.5typ.)[Ambient temperature: –10 to +50°C]	
	Drift(Time effect)	%	0.5max.[25°C, input and output ratings, after input voltage ON for 30min to 8h]	
	Recovery	%/ms	±4max./5max.[50 to 100% sudden load change, tr, tf $\geqq$ 0.2ms]	
Ripple Ep-p		mV	190max.	200max.
Ripple noise Ep-p		mV	300max.	500max.
Start up time		ms	900max.(500typ.)[AC.200V, output rating]	
Hold up time		ms	20min.[AC.200V, output rating]	
Auxiliary functions				
Indicator display			LED(Green) indicates when voltage output is ON.	
Overvoltage protection[*2]			Output voltage shut-down type, LED(Red) indicates when AL output signal goes to OV LED.	
Under voltage protection[*2]			Output voltage shut-down type, LED(Red) indicates when AL output signal goes to UV LED.	
Overcurrent protection[*2]			Rectangular type (output limited when low voltage detected)	
Fan alarm[*2]			Output voltage shut-down type, LED(Red) indicates when AL output signal goes to FAN LED.	
Overheat protection[*2]			Output voltage shut-down type, LED(Red) indicates when AL output signal goes to OV LED.	
Open phase detector [*2]			Output voltage shut-down type, LED(Red) indicates when AL output signal goes to OP LED.	
Remote ON-OFF			Yes(Floating)	
Remote sensing			Yes	
Current balance			Yes	
Output voltage external variable function			Yes	
Alarm signal			Yes	
Standards				
Safety standards			UL1950, CSA C22.2 No.950-95(C-UL) approved.	
Noise terminal voltage			FCC class A, VCCI class A(500kHz to 30MHz) meet.	
Constructions				
External dimensions		mm	110×200×240[H×W×L]	
Weight		kg	5max.	
Mounting method			Can be attached to 3 sides.	
Case material			Frame: Iron / Cover: Aluminum	

[*1] Current rating(maximum output current) is determined for –10 to +50°C. Derating is required when used outside this temperature range.
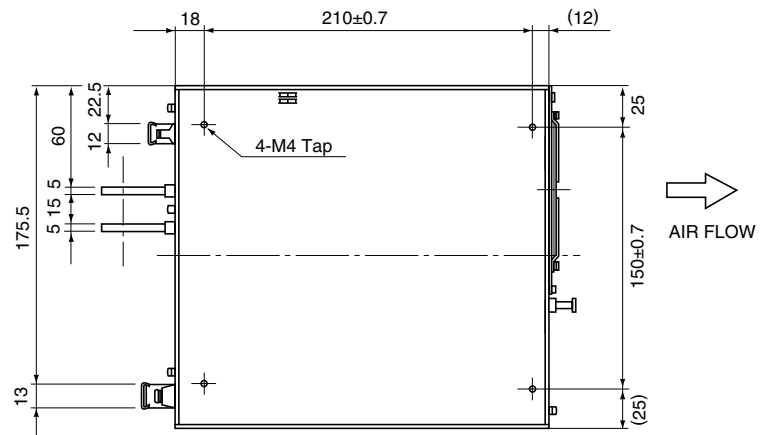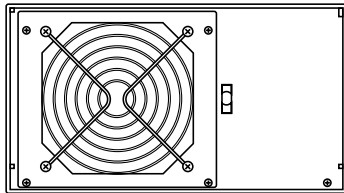
[*2] Recovers upon reset(interval approx. 40s).

• All specifications are subject to change without notice.

RAY750W Type

SHAPES AND DIMENSIONS
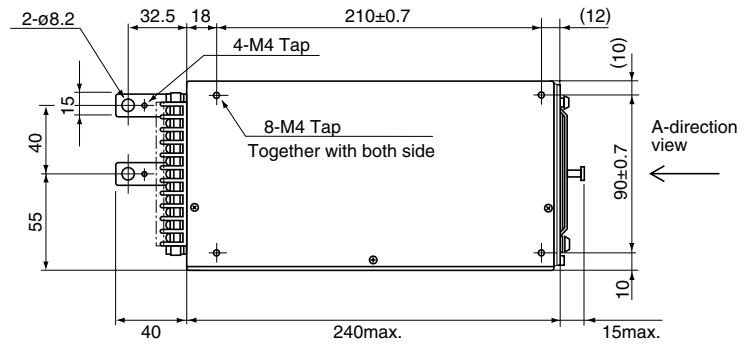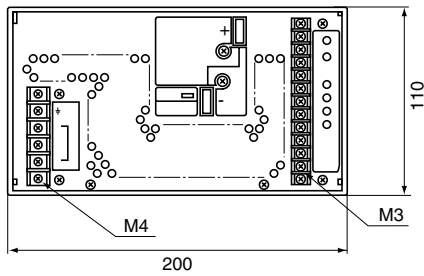
2-ø8.2

32.5 · 18 · 210±0.7 · (12)

4-M4 Tap

8-M4 Tap
Together with both side

A-direction view

A-direction view

15 · 40 · 55

110

200

M4 · M3

40 · 240max. · 15max.

90±0.7 · 10 · (10)

[Rear view] A - direction view

18 · 210±0.7 · (12)

22.5 · 12 · 60 · 5 15 5 · 175.5 · 13

4-M4 Tap

AIR FLOW

25 · 150±0.7 · (25)

Dimensions in mm
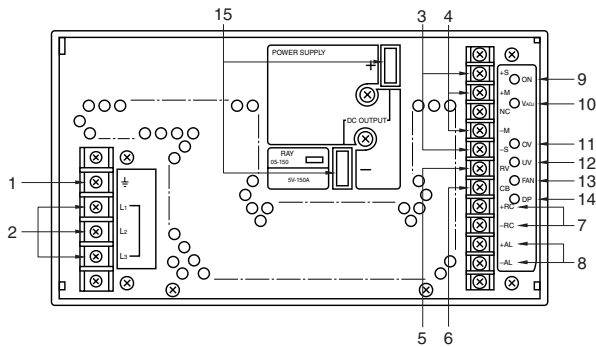±1mm : without specified dimensions

• Do not insert M4 tap installation screws more than 7mm from surface of housing.
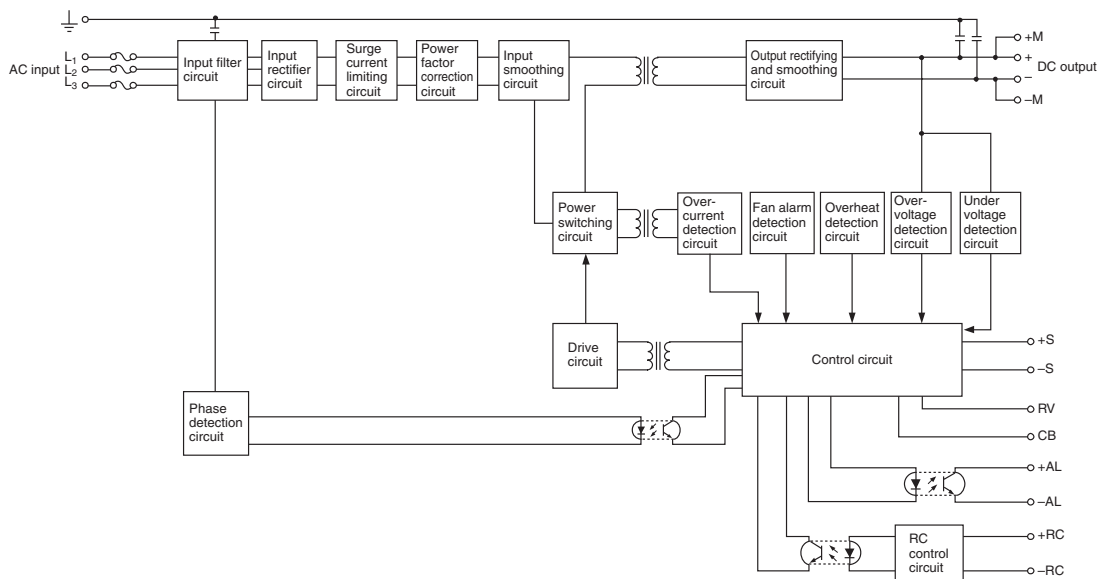
Characteristics, Functions, and Applications

RAY750W TYPE
TERMINAL DESIGNATIONS AND FUNCTIONS

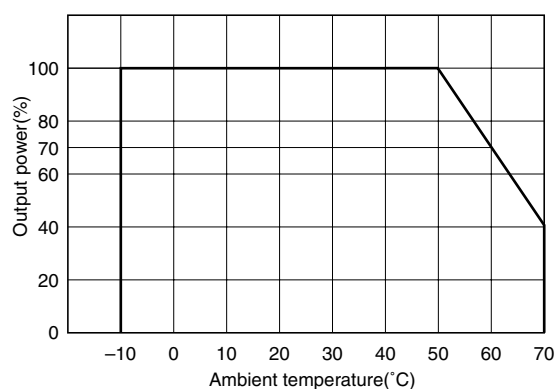| Terminal No.	Designations and functions	
1	Frame ground terminal(G)	Connect to earth ground. This is connected to the case.
2	AC input terminals(L_1, L_2, L_3)	Connect to AC.200 to 240V three-phase input line.
3	Remote sensing terminals(+S, –S)	These terminals are used to compensate voltage loss from the output terminal to load. Normally they are shorted with a metal bar.
4	DC output monitor terminals(+M, –M)	This terminal is used to monitor DC current output. Load lines should not be connected to these monitor terminals. These monitor terminals should be jumpered when the remote monitoring feature is not in use.
5	Output voltage adjustment terminal(RV)	This terminal is used for controlling output voltage from outside.
6	Current balance terminal(CB)	This terminal is used when several power supplies are connected in parallel to connect the respective CB and –S terminals in parallel.
7	Remote ON-OFF terminals(+RC, –RC)	Output is turned ON-OFF by disconnecting-connecting the RC terminals(output ON when open). RC terminals are floating.
8	Alarm terminal(AL+, –)	Transmits the AL signal to stop the output upon on operation of the abnormal detection circuit for output overvoltage protection, output low voltage protection, and overheat protection.
9	Operation indicator LED(Green)	This Green LED becomes indicated when voltage is output.
10	Output voltage adjustment trim($V_{.ADJ}$)	Adjusts output voltage.
11	Output overvoltage indicator LED(Red)	This LED(Red) indicates with the output shutdown and the fan stop when the output voltage drops or the internal temperature of the power supply rises up abnormally.
12	Output under voltage indicator LED(Red)	This LED(Red) indicates with the output shutdown and the fan stop when the output voltage drops or the internal temperature of the power supply rises up abnormally.
13	Fan alarm indicator LED(Red)	This LED(Red) indicates when the fan speed is down or the fan movement is restricted. The output is not shut down.
14	AC input trouble indicator LED(Red)	If a phase is lost in a three-phase AC input, the output is shut down and the fan is stopped with this LED(Red) indicating.
15	DC output terminals(+, –)	Connect to load.

BLOCK DIAGRAM

• All specifications are subject to change without notice.

Characteristics, Functions, and Applications

RAY750W TYPE
COMMON SPECIFICATIONS

| Temperature and humidity		
Temperature range	Operating(°C)	−10 to +70 Derating is necessary when operating environment temperature exceed 50°C.
	Storage(°C)	−25 to +75
Humidity range	Operating(%)RH	20 to 95[Maximum wet-bulb temperature: 35°C, without dewing]
	Storage(%)RH	
Vibration and shock		
Vibration	5 to 10Hz	All amplitude 10mm[3 directions, each 1h]
	10 to 55Hz	Acceleration 19.6m/s^2(2G)[3 directions, each 1h]
Shock	Acceleration	294m/s^2(30G)[3 directions, each 3 times]
	Pulse duration	11±5ms
Withstand voltage and insulation resistance		
Withstand voltage	Input terminal to case(G)	Eac: 2kV, 1min[Normal temperature, normal humidity, cutout current 20mA]
	Input terminal to output terminal	
Insulation resistance	Input terminal to case(G)	Edc: 500V, 100MΩ min. [Normal temperature, normal humidity]
	Input terminal to output terminal	
	Output terminal to case(G)	

OUTPUT POWER-AMBIENT TEMPERATURE(DERATINGS)

REMOTE SENSING

Remote Sensing compensates to provide stability at the load terminal when voltage drop in the line between the power supply and the load causes instability. Remote sensing is possible if the voltage drop per wire between the output and load terminals is 0.4V max. for 48 to 24V models.

If the overvoltage protection operations too easily, install an external electrolytic capacitor, rated 1μF min. between the +S, +M and −S, −M terminals in the diagram shown below.
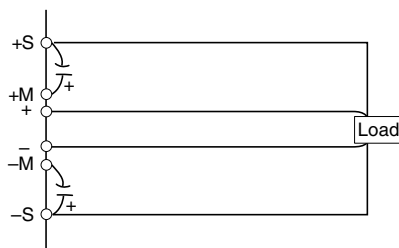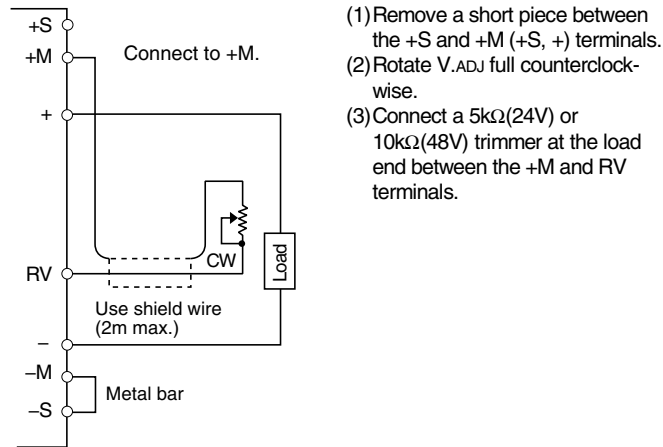

• Load lines or sensing lines should be bundled or stranded.

Characteristics, Functions, and Applications

RAY750W TYPE
OUTPUT VOLTAGE EXTERNAL VARIABLE FUNCTION (RV)

The output voltage settings can be adjusted by attaching an external trimmer to the RV terminal. In this case, make the following wiring (Note that, however, a rise time has a delay). When using this function, care must be taken to make sure that the wires are not disconnected or miswired.

(1) Remove a short piece between the +S and +M (+S, +) terminals.
(2) Rotate V.ADJ full counterclockwise.
(3) Connect a 5kΩ(24V) or 10kΩ(48V) trimmer at the load end between the +M and RV terminals.

CURRENT BALANCE (CB TERMINAL)

This terminal has a monitoring function to control and equalize the output current of power supplies connected in parallel by mutually connecting the respective CB terminals and the –S terminals of each power supply. (Use eight power supplies connected in parallel.)

(1) Conditions for current balance
The variation in output voltage between the respective power supplies cannot exceed 5%.
(Highest voltage–lowest voltage) ÷ rated voltage=5% max.
The output current is 20 to 90% of the total output rated current.

(2) Uniform performance (for two power supplies)
The variation in output current between the respective power supplies does not exceed 10%
(Highest current–lowest current) ÷ (rated voltage×the number of power supplies in parallel)=10% max.

(3) Connection diagram
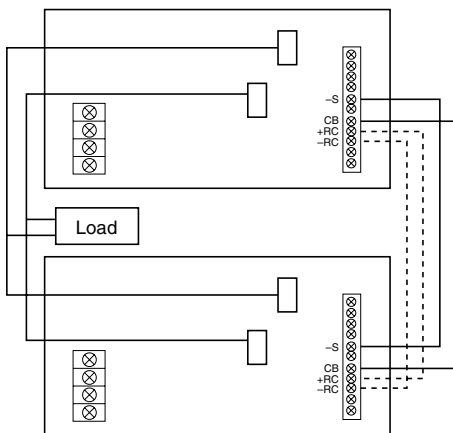
• When using the CB and Remote ON-OFF concurrently, connect the respective RC terminals of each power supply in parallel.

REMOTE ON-OFF

The output voltage can be turned on or off at a TTL level externally.
Between +RC and –RC: Turned on upon setting to high level (2.4 to 24V) or being open.
Between +RC and –RC: Turned off upon setting to low level (0 to 0.4V) (Outgoing current 1.6mA max.). The fan stops, too. The ±RC terminals are at a floating level to the DC output terminals. Keep the +RC terminal open when not in use since it is internally pulled up. Insulation between the RC terminals and the output conforms to the common specifications (Insulation resistance; output to case) and withstand voltage between AC input terminals and RC terminals conforms to the common specifications (Withstand voltage; input to output, input to case, output to case).
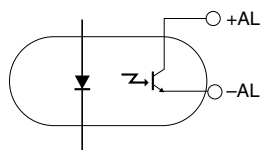
POWER SUPPLY PROTECTIONS

In readiness for abnormal occurrences, the power supplies are equipped with fault detection circuit. Operation upon detection is as follows:

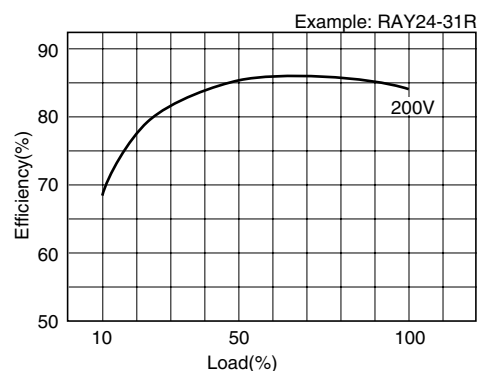| Protective function	Operation	LED indicator	External alarm
OV Output overvoltage protection (Overheat)	Output is shut down and the fan stops upon detection of an abnormal output voltage rise or an abnormal internal temperature rise (See the item 4 for the information of the detection point). The output recovers after functional operation upon input shutdown and a reset after a 40s minimum interval. Note that, however, reset only after the internal temperature drops sufficiently in case of the abnormal internal temperature rise.	Yes (Red)	Yes(in all cases) Normal: Photo-coupler closed; output between collector and emitter. Abnormal: Photo-coupler opens.
UV Output under voltage protection	Output is shut down and the fan stops when the output voltage drops to 60% or lower of the rated output voltage (3V: approx. 45%) and the condition continues for approx. 40s on over current protection and others. The output recovers after functional operation upon input shutdown and a reset after a 40s minimum interval.	Yes (Red)	
FAN Fan alarm	Output is shut down and the fan stops if the fan movement is restricted. The output recovers after functional operation upon input shutdown and a reset after a 40s minimum interval.	Yes (Red)	
OP (Open-phase detection)	Output is shut down and the fan stops if a phase is lost in a three-phase AC input. The output recovers upon input shutdown and reset after removing the cause. Note that, however, reset after 40s minimum interval.	Yes (Red)	

• If input is turned off when the output is shut down with an OV, UV, or FAN alarm, the OP alarm lamp may indicate after an interval of several tens of seconds in some cases.
• For external alarm, use photo-coupler having max. 8mA collector current and max. 40V emitter voltage.

• All specifications are subject to change without notice.

Characteristics, Functions, and Applications

RAY750W TYPE
OUTPUT FORM

+AL
−AL

EFFICIENCY

Example: RAY24-31R

Efficiency(%) vs Load(%), 200V
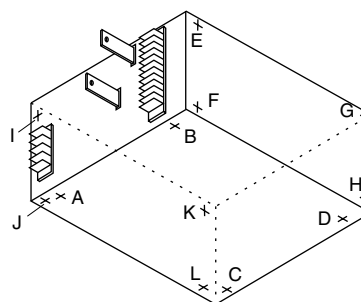
POWER FACTOR(TYPICAL)

Example: RAY24-31R

Power factor vs Load(%), 200V
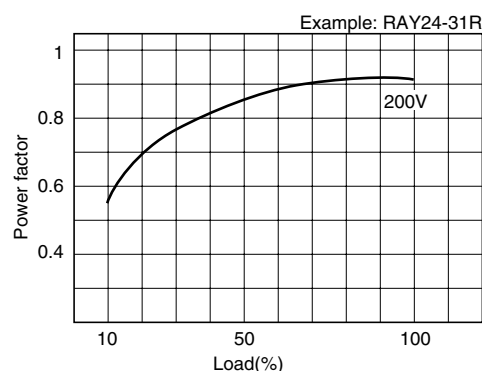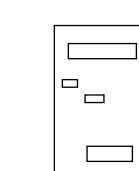
INSTALLATIONS

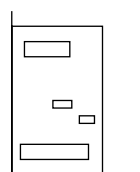Install the product as shown below.
(1)

Use installation holes A, B, C, and D for securing the power supply.

(2)

Use installation holes A, B, C, D, I, J, K, and L for securing the power supply.

(3)

Use installation holes A, B, C, D, E, F, G, and H for securing the power supply. Maintain a 20mm min. distance between the ventilation holes, fan surface and surrounding equipment, etc. and install so as to provide heat-outside air exchange.

FAN REPLACEMENT

Contact TDK for fan replacement. Consult with us if customer fan replacement is inevitable. In this case, however, the responsibility for quality assurance on the replacement lies on the customer.
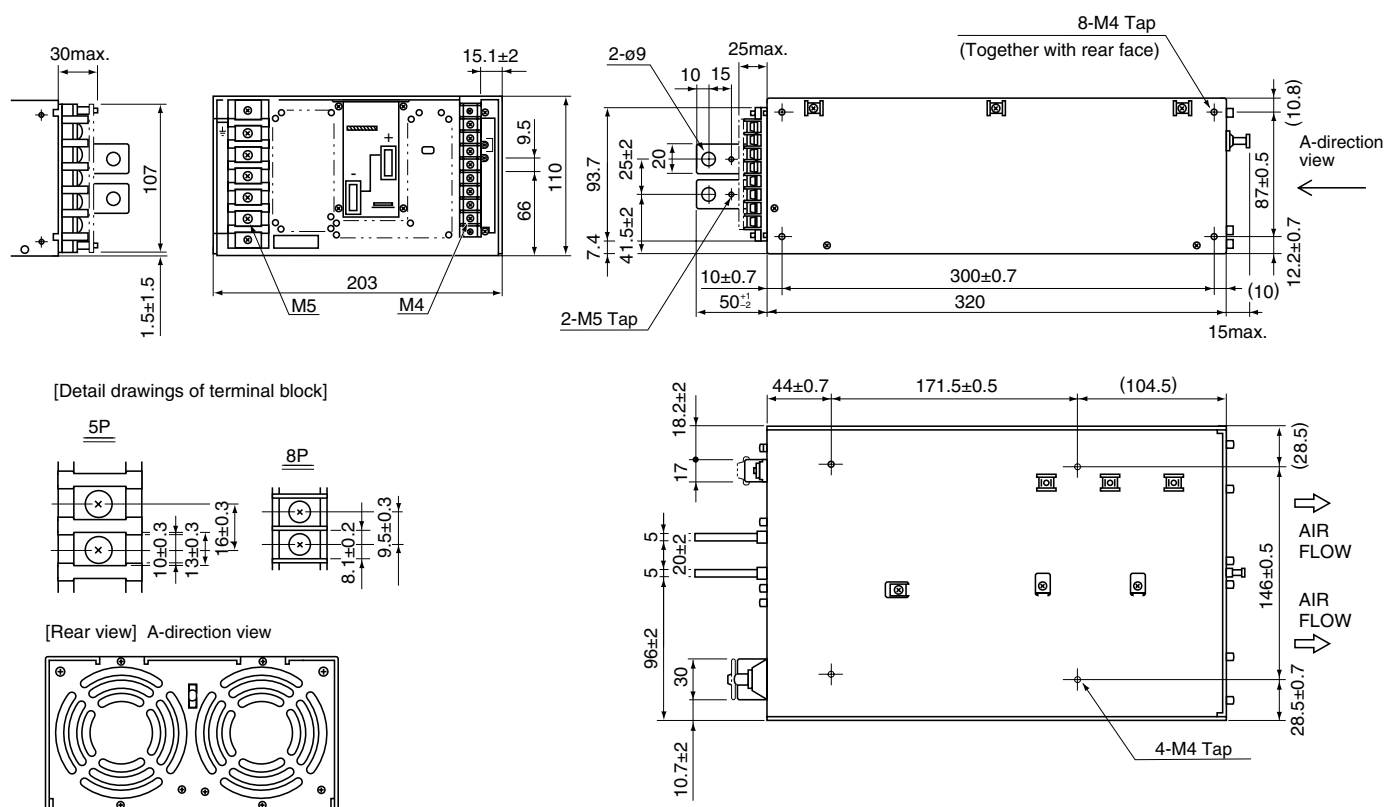
• All specifications are subject to change without notice.

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RAY1.5kW Type

SPECIFICATIONS AND STANDARDS

Part No.		RAY05-300	RAY24-65R	RAY48-30R
Rated output voltage and current*1		5V • 300A	24V • 65A	48V • 30A
Maximum output power	W	1500	1560	1440
Input conditions				
Input voltage Eac	V	170 to 264[Rating: 200 to 240](3-phase)		
Input frequency	Hz	47 to 66[Rating: 50 to 60](3-phase)		
Input current	A	7.3max.(6.6typ.)/6.1max.(5.5typ.)[AC.200/240V]		
Fuse rating	A	10[Built-in]		
Surge current	A	50max./60max.[AC.200/240V, 1st surge current, reset after 30s minimum.]		
Leakage current	mA	3.5max.[AC.240V, output rating]		
Power factor		0.93typ.		
Efficiency	%	80typ.[AC.200V]	80typ.[AC.200V]	80typ.[AC.200V]
Output characteristics				
Output voltage Edc	V	5	24	48
Voltage variable range Edc	V	4 to 5.5	16.8 to 26.4	32.6 to 52.8
Maximum output current	A	300	65	30
Minimum output current	A	0	0	0
Overvoltage threshold Edc	V	6 to 6.9	27 to 30.5	55 to 59
Overcurrent threshold	A	315 to 350	68 to 72	32 to 35
Voltage stability	Source effect	%	1max.(0.5typ.)[Within the input voltage range]	Total effect ±3max.(±1.2typ.)
	Load effect	%	1max.(0.5typ.)[10 to 100% load]	
	Temperature effect	%	1max.(0.2typ.)[Ambient temperature: 0 to +60°C]	
	Drift(Time effect)	%	0.5max.[25°C, input and output ratings, after input voltage ON for 30min to 8h]	
	Recovery	%/ms	±4max./1max.[50 to 100% sudden load change, tr, tf ≧ 50µs]	
Ripple Ep-p	mV	140max.	190max.	240max.
Ripple noise Ep-p	mV	200max.	300max.	500max.
Start up time	ms	300max.(150typ.)[AC.200V, output rating]		
Hold up time	ms	20min.(30typ.)[AC.200V, output rating]		
Auxiliary functions				
Indicator display		LED(Green) indicates when voltage output is ON.		
Overvoltage protection*2		Output voltage shut-down type		
Overcurrent protection*2		Rectangular type (output limited when low voltage detected)		
Open phase detector*2		Output voltage shut-down type		
Remote ON-OFF		Yes(Floating)		
Remote sensing		Yes		
Current balance		Yes		
Output voltage external variable function		Yes		
Standards				
Safety standards		UL1950, CSA C22.2 No.950-95(C-UL) approved.		
Noise terminal voltage		FCC class A meet.		
Constructions				
External dimensions	mm	110×203×320[H×W×L]		
Weight	kg	8.5max.		
Mounting method		Can be attached to 3 sides.		
Case material		Frame: Iron / Cover: Aluminum		

*1 Current rating(maximum output current) is determined for 0 to +50°C. Derating is required when used outside this temperature range.

*2 Recovers upon reset(interval approx. 30s).

• All specifications are subject to change without notice.

RAY1.5kW Type

SHAPES AND DIMENSIONS

[Detail drawings of terminal block]

5P

8P

[Rear view] A-direction view

A-direction view

AIR FLOW

AIR FLOW

4-M4 Tap

8-M4 Tap
(Together with rear face)

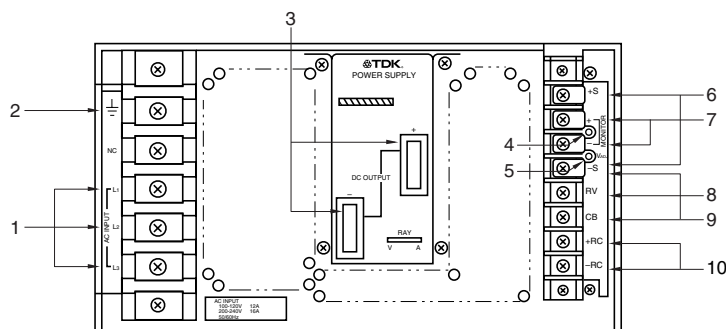2-M5 Tap

Dimensions in mm
±1mm : without specified dimensions

• Do not insert M4 tap installation screws more than 6mm from surface of housing.
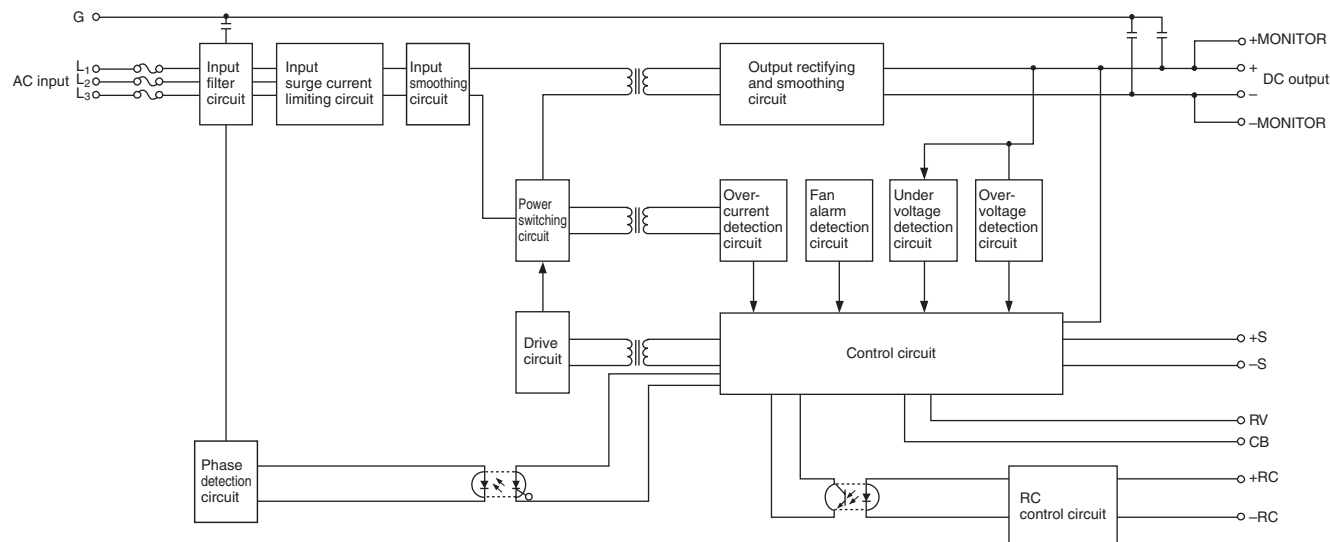
Characteristics, Functions, and Applications

RAY1.5kW TYPE

TERMINAL DESIGNATIONS AND FUNCTIONS

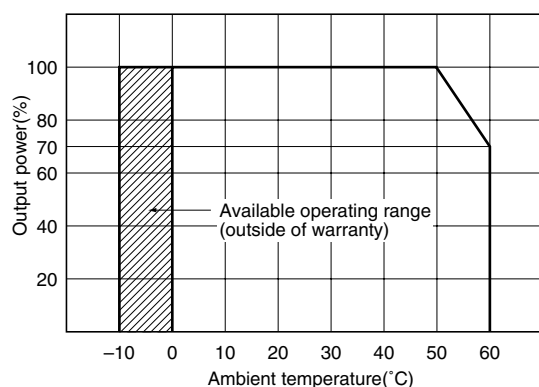| Terminal No.	Designations and functions	
1	AC input terminals(L₁, L₂, L₃)	Connect to AC.200 to 240V three-phase input line.
2	Frame ground terminal(G)	Connect to earth ground. This is connected to the case.
3	DC output terminals(+, −)	Connect to load.
4	Operation indicator LED(Green)	This Green LED becomes indicated when voltage is output.
5	Output voltage adjustment trim(V.ADJ)	Adjusts output voltage.
6	Remote sensing terminals(+S, −S)	These terminals are used to compensate voltage loss from the output terminal to load. Normally they are shorted with a metal bar.
7	Monitor terminal(MONITOR, +, −)	Monitor terminal for direct current. Do not connect a load line to this terminal. Unless the Remote Sensing is used, short with the Remote Sensing terminal.
8	Output voltage external variable terminal (RV)	The output voltage can be controlled by connecting a resistance between the RV terminal and the output +. In this case, remove a short piece between the +S and the output +.
9	Current balance terminal(CB)	This terminal is used when several power supplies are connected in parallel to connect the respective CB and −S terminals in parallel.
10	Remote ON-OFF terminals(+RC, −RC)	Output is turned ON-OFF by disconnecting-connecting the RC terminals(output ON when open). RC terminals are floating.

BLOCK DIAGRAM

• All specifications are subject to change without notice.

Characteristics, Functions, and Applications

RAY1.5kW TYPE

COMMON SPECIFICATIONS

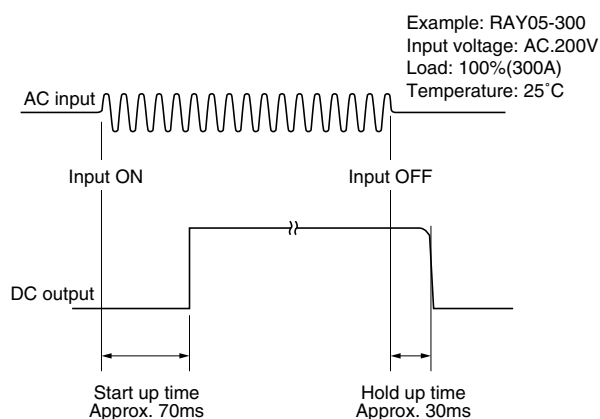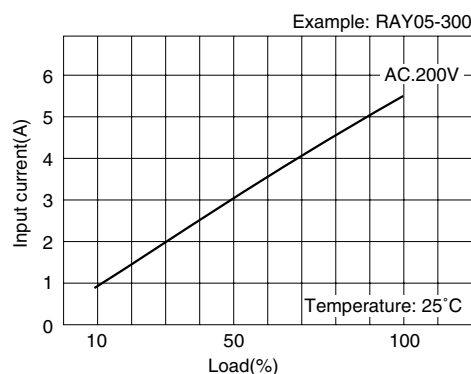| Temperature and humidity		
Temperature range	Operating(°C)	0 to +60[Derating is necessary when operating environment temperature exceed 50°C.]
	Storage(°C)	−25 to +75
Humidity range	Operating(%)RH	20 to 95[Maximum wet-bulb temperature: 35°C, without dewing]
	Storage(%)RH	
Vibration and shock		
Vibration	5 to 10Hz	All amplitude 10mm[3 directions, each 1h]
	10 to 55Hz	Acceleration 19.6m/s^2(2G)[3 directions, each 1h]
Shock	Acceleration	196m/s^2(20G)[3 directions, each 3 times]
	Pulse duration	11±5ms
Withstand voltage and insulation resistance		
Withstand voltage	Input terminal to case(G)	Eac: 2kV, 1min[Normal temperature, normal humidity, cutout current 20mA]
	Input terminal to output terminal	
Insulation resistance	Input terminal to case(G)	Edc: 500V, 100MΩ min. [Normal temperature, normal humidity]
	Input terminal to output terminal	
	Output terminal to case(G)	

OUTPUT POWER-AMBIENT TEMPERATURE(DERATINGS)

EFFICIENCY
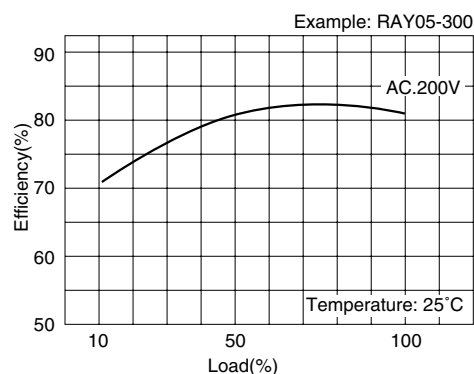
START UP / HOLD UP TIMES

Example: RAY05-300
Input voltage: AC.200V
Load: 100%(300A)
Temperature: 25°C

INPUT CURRENT

• All specifications are subject to change without notice.

⚡TDK

Characteristics, Functions, and Applications

RAY1.5kW TYPE
OUTPUT VOLTAGE EXTERNAL VARIABLE FUNCTION (RV)

The output voltage settings can be adjusted by attaching an external trimmer to the RV terminal. In this case, make the following wiring (Note that, however, a rise time has a delay). When using this function, care must be taken to make sure that the wires are not disconnected or miswired.
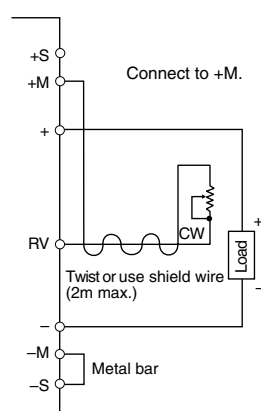
(1) Remove a short piece (metal bar) between the +S and +M terminals.
(2) Rotate V.$_{ADJ}$ full counterclockwise.
(3) Connect a 5kΩ (5V and 24V) or 10kΩ (48V) trimmer at the load end between the + and RV terminals.
(4) Adjust the trimmer to be set to as predetermined output voltage.

REMOTE ON-OFF

Power supply output voltage can be turned on/off by this terminal for a power supply sequence or the like.

Between +RC and –RC: Turned on upon setting to high level (2.4 to 24V) or being open.

Between +RC and –RC: Turned off upon setting to low level (0 to 0.4V) or shorted.

The RC terminals are at a floating level to the AC input terminals and the DC output terminals.

Keep the +RC terminal open when not in use since it is internally pulled up.

REMOTE SENSING

If there is a problem of a voltage drop of a load line up to a load, disconnect short pieces between +M and +S terminals and between –M and –S terminals for sensing the load end.

Then, the voltage loss of the load line can be compensated.
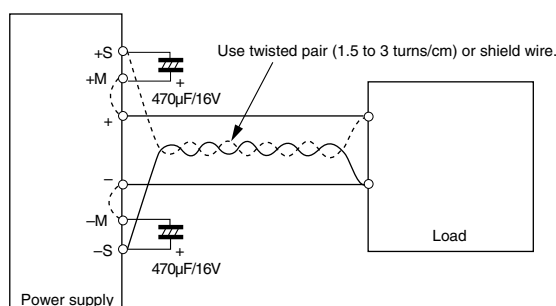
Connections are made internally between the +M and + terminals and between the –M and – terminals. The +M and –M are monitor terminals. Be careful not to flow load current. It may cause a failure.

Compensation of a voltage drop is possible if the voltage drop per wire of the load line is 0.25V max. for 5V models and 0.4V max. for 24 to 48V models.

INSTALLATIONS

Maintain a 20mm min. distance between surfaces having ventilation holes (input-output terminal surface and rear surface) and surrounding equipment because of a forced air-cooling with a built-in fan(If the fan stops, the power supply output stops, too.).
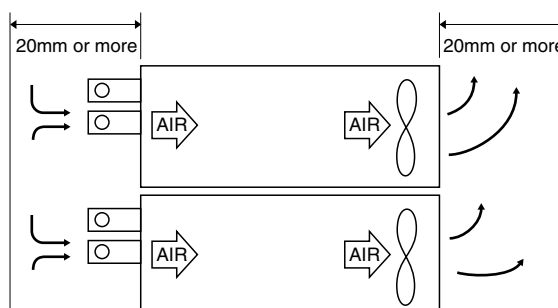
• Secure a 20mm or more space in the upper side of each power supply.

PARALLEL OPERATION

A parallel operation of the same type is enabled by mutual connections between CB terminals and between –S terminals of respective power supplies.

The variation in output current between the respective power supplies is 10% max. (for two power supplies).

Previous to executing the parallel operation, set respective voltages equally with no load.

Current during parallel operation can be used in total within a range of 20 to 90% of the sum of respective rated current.

Part No.	Max. rated current	
	1 unit used	2 units in parallel
RAY05-300	300	540
RAY24-65R	65	117
RAY48-30R	30	54

• Trial calculation

(Max. rated current in parallel operation) = (Rated current) × (Number of power supplies in parallel)×0.9

CURRENT BALANCE (CB TERMINAL)

This terminal controls and equalizes the output current of power supplies connected in parallel by mutually connecting the respective CB terminals and the –S terminals of each power supply.

This terminal has a monitoring function and generates a voltage almost proportional to the output current between the CB and –S terminals.

(1) Conditions for current balance
The variation in output voltage between the respective power supplies cannot exceed 5%.
(Highest voltage–lowest voltage) ÷ rated voltage=5% max.

(2) Uniform performance (for 2 power supplies)
The variation in output current between the respective power supplies does not exceed 10%.
(Highest current–lowest current) ÷ (rated current×the number of power supplies in parallel)=10% max.

The power supplies are shut down if the fan movement is restricted.

• All specifications are subject to change without notice.

Characteristics, Functions, and Applications

RAY1.5kW TYPE

(3)CB Terminal Connection Diagram
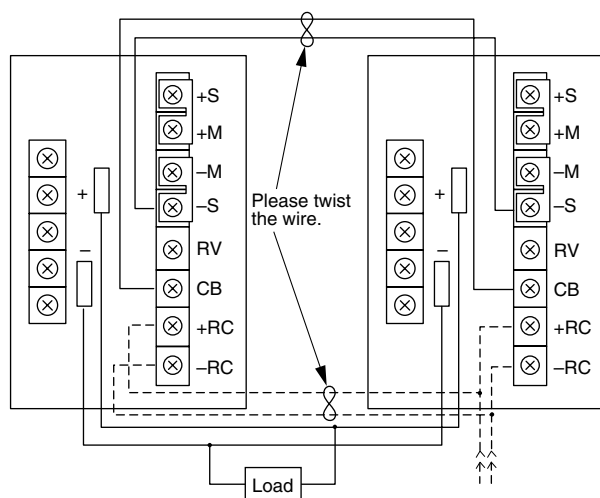
Please twist the wire.

+S
+M
−M
−S
RV
CB
+RC
−RC

Load

- When using the CB and Remote ON-OFF concurrently, connect the respective RC terminals of each power supply in parallel.

OTHER CONDITIONS

- Unless conditions are otherwise specified in the specifications or standards, 25°C and rated input-output should be applied.
- Ripple and noise (50MHz or lower) should be specified at a temperature within a range of 0 to +50°C.

⬣TDK

RAY3kW Type

SPECIFICATIONS AND STANDARDS

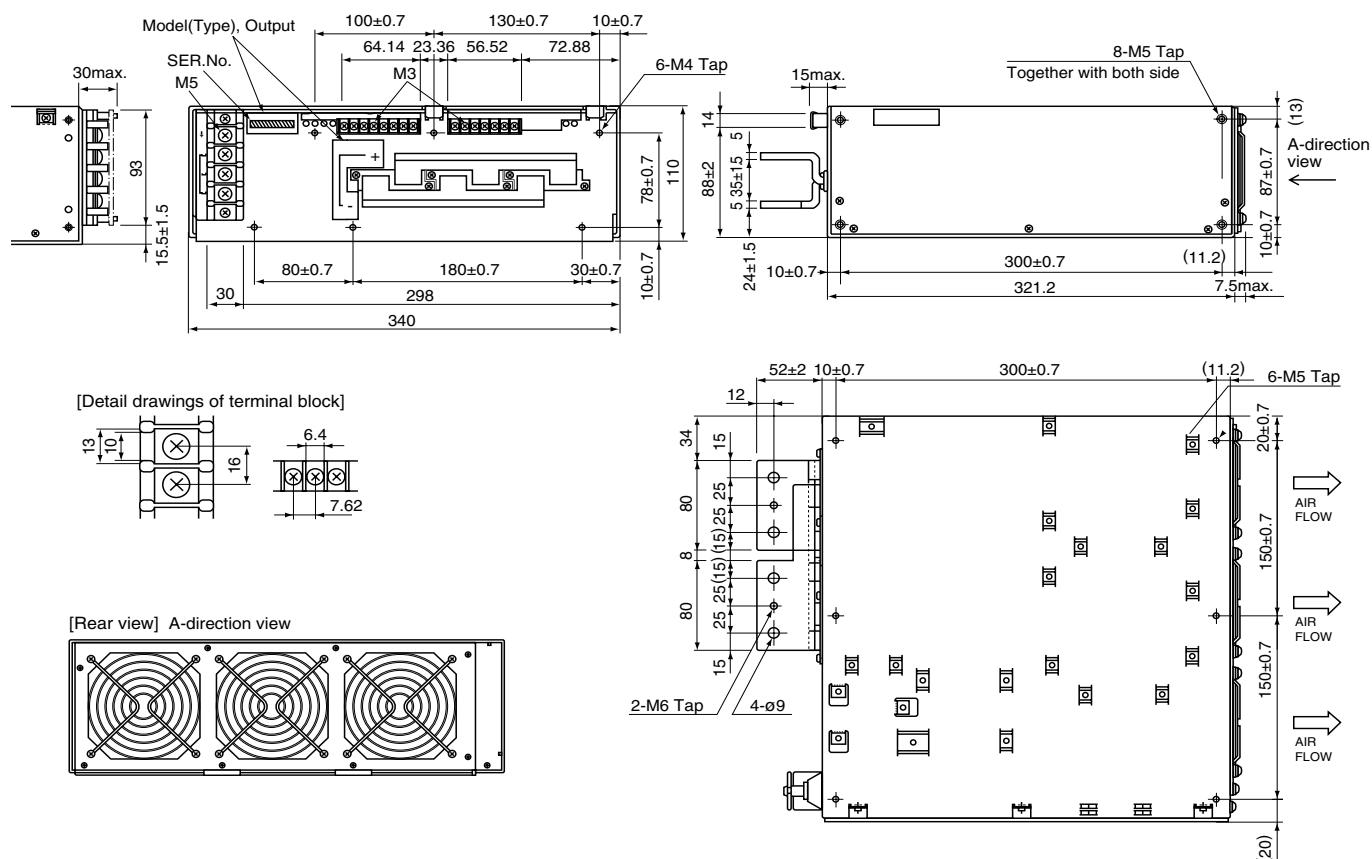| Part No.			RAY05-600	RAY24-125	RAY48-60R
Rated output voltage and current*1			5V • 600A	24V • 125A	48V • 60A
Maximum output power		W	3000	3000	2880
Input conditions					
Input voltage Eac		V	170 to 264[Rating: 200 to 240](3-phase)		
Input frequency		Hz	47 to 66[Rating: 50 to 60](3-phase)		
Input current		A	15max.[AC.200 to 240V, output rating]		
Fuse rating		A	30[Built-in]		
Surge current		A	90max.[AC.200 to 240V, output rating]		
Leakage current		mA	2max.[AC.200 to 240V, output rating]		
Efficiency		%	80typ.	80typ.	80typ.
Output characteristics					
Output voltage Edc		V	5	24	48
Voltage variable range Edc		V	4 to 5.5	16.8 to 26.4	32.6 to 52.8
Maximum output current		A	600	125	60
Minimum output current		A	0	0	0
Overvoltage threshold Edc		V	6 to 6.9	27 to 30.5	55 to 59
Overcurrent threshold		A	630 to 700	130 to 140	64 to 70
Voltage stability	Source effect	%	2max.(1typ.)[Within the input voltage range]		
	Load effect	%	2max.(1typ.)[10 to 100% load]		
	Temperature effect	%	2max.(1typ.)[Ambient temperature: 0 to +50°C]		
	Total effect	%	4max.(2typ.)		
	Drift(Time effect)	%	0.5max.[25°C, input and output ratings, after input voltage ON for 30min to 8h]		
	Recovery	%/ms	±4max./5max.[50 to 100% sudden load change]		
Ripple Ep-p		mV	100max.	190max.	240max.
Ripple noise Ep-p		mV	250max.	400max.	600max.
Start up time		ms	500max.		
Hold up time		ms	20min.[AC.200V, output rating]		
Auxiliary functions					
Indicator display			LED(Green) indicates when voltage output is ON.		
Overvoltage protection*2			Output voltage shut-down type		
Overcurrent protection*2			Rectangular type (output limited when low voltage detected)		
Open phase detector*2			Output voltage shut-down type		
Remote ON-OFF			Yes		
Remote sensing			Yes		
Current balance			Yes		
Output voltage external variable function			Yes		
Alarm signal			Yes		
Standards					
Safety standards*3			UL1950, CSA C22.2 No.950-95(C-UL) approved.		
Noise terminal voltage			FCC class A meet.		
Constructions					
External dimensions		mm	110×340×322[H×W×L]		
Weight		kg	15max.		
Mounting method			Can be attached to 3 sides.		
Case material			Frame: Iron / Cover: Aluminum		

*1 Current rating(maximum output current) is determined for 0 to +50°C. Derating is required when used outside this temperature range.

*2 Recovers upon reset(interval approx. 40s).

*3 UL1950 has a 100% load rate at a 45°C ambient temperature.

• All specifications are subject to change without notice.

RAY3kW Type

SHAPES AND DIMENSIONS

[Detail drawings of terminal block]

[Rear view] A-direction view

A-direction view

AIR FLOW

AIR FLOW

AIR FLOW
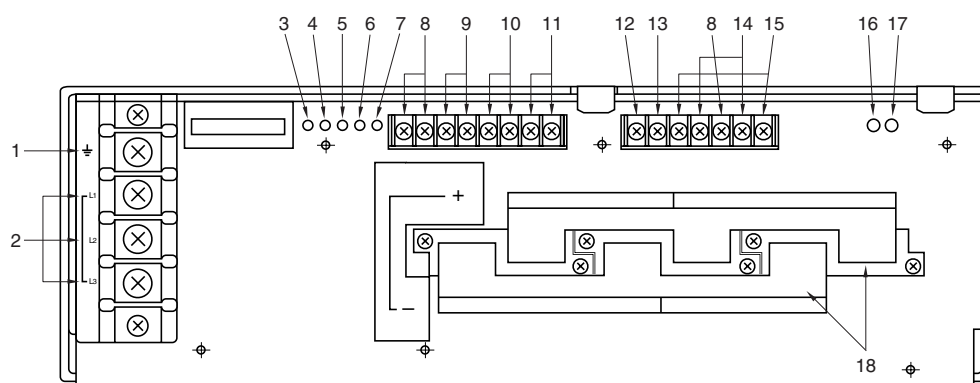
Dimensions in mm
±1mm : without specified dimensions

• Do not insert M4 tap installation screws more than 8mm from surface of housing.
• Do not insert M4 tap installation screws of 6 places more than 6mm from the surface into the front panel of power supply.
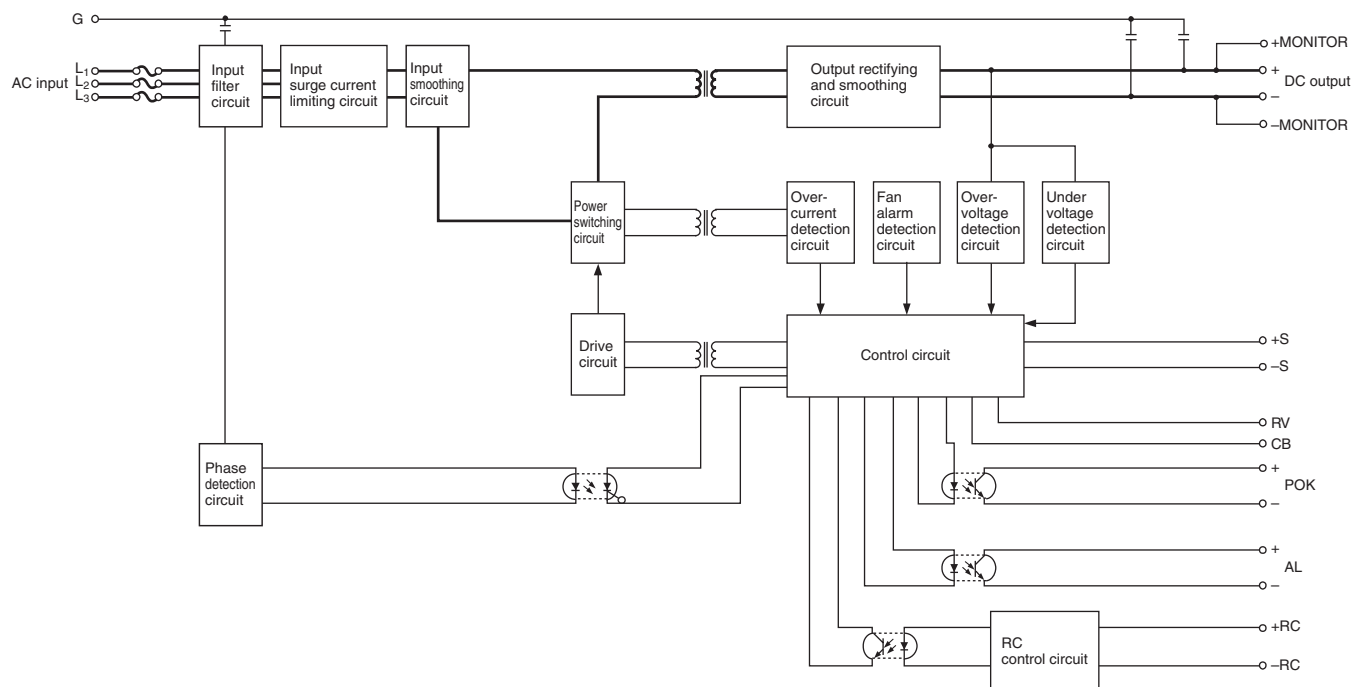
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Characteristics, Functions, and Applications

RAY3kW TYPE
TERMINAL DESIGNATIONS AND FUNCTIONS

Terminal No.	Designations and functions	
1	Frame ground terminal(G)	Connect to earth ground. This is connected to the case.
2	AC input terminals(L1, L2, L3)	Connect to AC.200 to 240V three-phase input line.
3	POK signal adjustment trimmer	Adjustment trimmer for POK signal (output voltage normal signal) detection point. The detection point is adjusted to 90±2% of a rated output voltage at delivery.
4	AC input open-phase indicator LED(Red)	If a phase is lost in a three-phase AC input, the output is shut down and the fan is stopped with this LED(Red) indicating.
5	Fan alarm indicator LED(Red)	This LED(Red) indicates when the fan speed is down or the fan movement is restricted. The output is not shut down.
6	Output overvoltage indicator LED(Red)	This LED(Red) indicates with the output shutdown and the fan stop when the output voltage drops or the internal temperature of the power supply rises up abnormally.
7	Output under-voltage indicator LED(Red)	Output shuts down, the fan stops, and this LED (Red) indicates when the output voltage drops to 60% or lower of the rated voltage value and the condition continues for approx. 40sec.
8	No connection(NC)	Connect none to this terminal.
9	POK signal(POK−, +)	Output terminal for POK signal (output voltage normal signal).
10	External alarm terminal(AL−, +)	Outputs an external alarm upon activation of the output overvoltage protection, the output low voltage protection, the fan alarm, or the failure detection circuit for an open-phase detection.
11	Remote ON-OFF terminals(−RC, +RC)	Output is turned ON-OFF by disconnecting-connecting the RC terminals(output ON when open). RC terminals are floating.
12	Current balance terminal(CB)	This terminal is used when several power supplies are connected in parallel to connect the respective CB and −S terminals in parallel.
13	Output voltage external variable terminal (RV)	The output voltage can be controlled by connecting a resistance between the RV terminal and the output +. In this case, remove a short piece between the +S and the output +.
14	DC output monitor terminals(−M, +M)	This terminal is used to monitor DC current output. Load lines should not be connected to these monitor terminals. These monitor terminals should be jumpered when the remote monitoring function is not in use.
15	Remote sensing terminals(−S, +S)	These terminals are used to compensate voltage loss from the output terminal to a load. Normally they are shorted with a metal bar.
16	Operation indicator LED(Green)	This LED(Green) becomes indicated when voltage is output.
17	Output voltage adjustment trim(V.ADJ)	Adjusts output voltage.
18	DC output terminals(+, −)	Connect to load.

• All specifications are subject to change without notice.

Characteristics, Functions, and Applications

RAY3kW TYPE
BLOCK DIAGRAM

COMMON SPECIFICATIONS

Temperature and humidity		
Temperature range	Operating(°C)	0 to +60[Derating is necessary when operating environment temperature exceed 50°C.]
	Storage(°C)	−25 to +75
Humidity range	Operating(%)RH	20 to 95[Maximum wet-bulb temperature: 35°C, without dewing]
	Storage(%)RH	
Vibration and shock		
Vibration	5 to 10Hz	All amplitude 10mm[3 directions, each 1h]
	10 to 55Hz	Acceleration 19.6m/s^2(2G)[3 directions, each 1h]
Shock	Acceleration	196m/s^2(20G)[3 directions, each 3 times]
	Pulse duration	11±5ms
Withstand voltage and insulation resistance		
Withstand voltage	Input terminal to case(G)	Eac: 2kV, 1min[Normal temperature, normal humidity, cutout current 20mA]
	Input terminal to output terminal	
Insulation resistance	Input terminal to case(G)	Edc: 500V, 100MΩ min. [Normal temperature, normal humidity]
	Input terminal to output terminal	
	Output terminal to case(G)	

OUTPUT POWER-AMBIENT TEMPERATURE(DERATINGS)

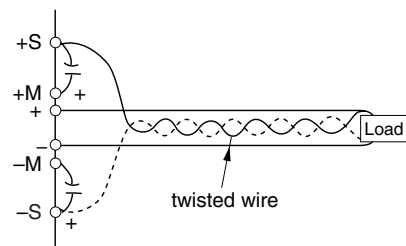• All specifications are subject to change without notice.

Characteristics, Functions, and Applications
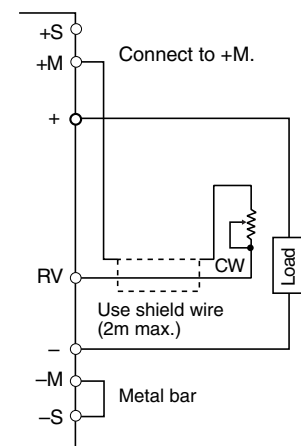
RAY3kW TYPE
REMOTE SENSING

Remote Sensing compensates to provide stability at the load terminal when voltage drop in the line between the power supply and the load causes instability. Remote sensing is possible if the voltage drop per wire between the output and load terminals is 0.25V max. for 5V models and 0.4V max. for 24 to 48V models.
In case of parasitic oscillation or overvoltage protection operations too easily, install an external electrolytic capacitor, rated 470µF min. between the +M, +S and –M, –S terminals in the diagram shown below.

twisted wire

OUTPUT VOLTAGE EXTERNAL VARIABLE FUNCTION (RV)

The output voltage settings can be adjusted by attaching an external trimmer to the RV terminal. In this case, make the following wiring (Note that, however, a rise time has a delay). When using this function, care must be taken to make sure that the wires are not disconnected or miswired.

Connect to +M.

CW

Load

Use shield wire (2m max.)

Metal bar

(1) Remove a short piece (metal bar) between the +S and +M terminals.
(2) Rotate V.ADJ full counterclockwise.
(3) Connect a 5kΩ (5V and 24V) or 10kΩ (48V) trimmer at the load end between the +M and RV terminals.

CURRENT BALANCE (CB TERMINAL)

This terminal controls and equalizes the output current of power supplies connected in parallel by mutually connecting the respective CB terminals and the –S terminals of each power supply.
This terminal has a monitoring function and generates a voltage almost proportional to the output current between the CB and –S terminals.

(1) Conditions for current balance
   The variation in output voltage between the respective power supplies cannot exceed 5%.
   (Highest voltage–lowest voltage) ÷ rated voltage=5% max.
   The output current is 20 to 90% of the total output rated current.

(2) Uniform performance (for 2 power supplies)
   The variation in output current between the respective power supplies does not exceed 10%.
   (Highest current–lowest current) ÷ (rated current×the number of power supplies in parallel)=10% max.

(3) CB Terminal Connection Diagram
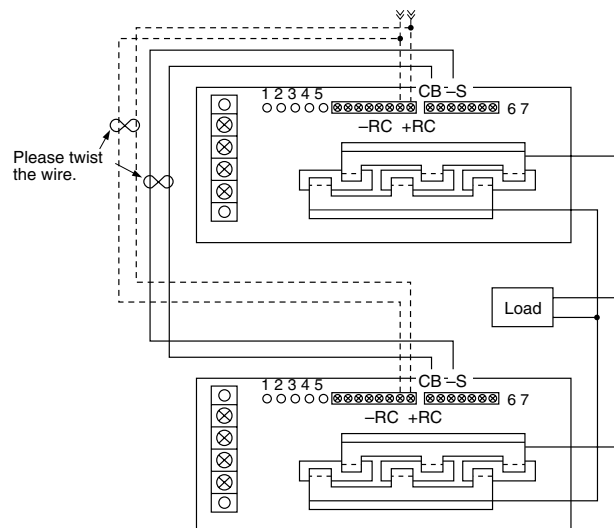
Please twist the wire.

Load

• When using the CB and Remote ON-OFF concurrently, connect the respective RC terminals of each power supply in parallel.

• All specifications are subject to change without notice.

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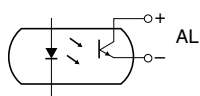# Characteristics, Functions, and Applications

RAY3kW TYPE
POWER SUPPLY PROTECTIONS

In readiness for abnormal occurrences, the power supplies are equipped with fault detection circuit. Operation upon detection is as follows:
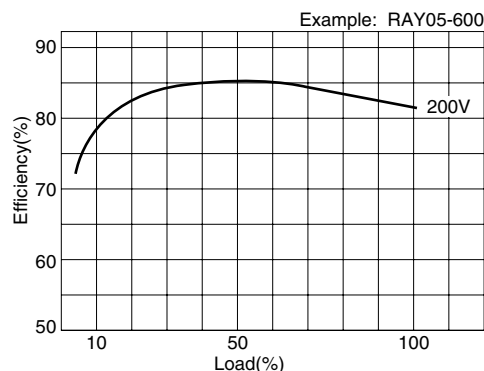
Protective function	Operation	LED indicator	External alarm
OV (Output overvoltage protection)	Output is shut down and the fan stops upon detection of an abnormal output voltage rise (See the specification and standard list for information about the detection point) or an abnormal internal temperature rise. The output recovers after functional operation upon input shutdown and a reset after a 40s minimum interval. Note that, however, reset only after the internal temperature drops sufficiently in case of the abnormal internal temperature rise.	Yes (Red)	Yes(in all cases) Normal: Photo-coupler closed; output between collector and emitter. Abnormal: Photo-coupler opens (OFF).
UV (Output under voltage protection	Output is shut down and the fan stops when the output voltage drops to 60% or lower of the rated output voltage and the condition continues for approx. 40s on overcurrent protection and others. The output recovers after functional operation upon input shutdown and a reset after a 40s minimum interval.	Yes (Red)	
FAN (Fan alarm)	Output is shut down and the fan stops if the fan movement is restricted. The output recovers after functional operation upon input shutdown and a reset after a 40s minimum interval.	Yes (Red)	
OP (Open-phase detection)	Output is shut down and the fan stops if a phase is lost in a three-phase AC input. The output recovers upon input shutdown and reset after removing the cause. Note that, however, reset after 40s minimum interval.	Yes (Red)	
POK (Output voltage normal signal)	This signal is transmitted externally if an output voltage is higher than the detection point. The detection point at delivery is 90±2% of the rated output voltage.	No	Yes Normal: Photo-coupler closed; output between collector and emitter. Abnormal: Photo-coupler opens (OFF).

• If input is turned off when the output is shut down with an OV, UV, or FAN alarm, the OP alarm lamp may indicate after an interval of several tens of seconds in some cases.
• For external alarm, use photo-coupler having max. 8mA collector current and max. 40V emitter voltage.
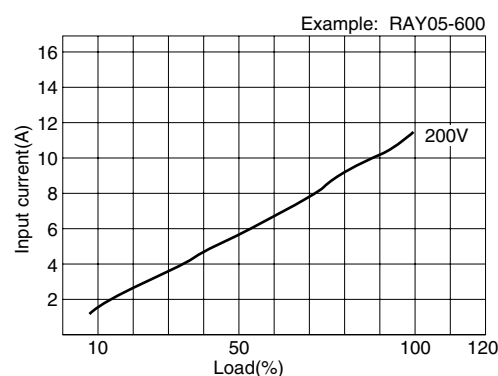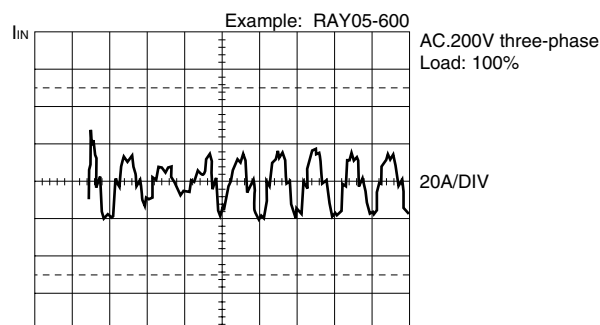
OUTPUT FORM

EFFICIENCY

Example: RAY05-600

INPUT CURRENT

Example: RAY05-600

INPUT SURGE CURRENT

Example: RAY05-600

AC.200V three-phase
Load: 100%

20A/DIV

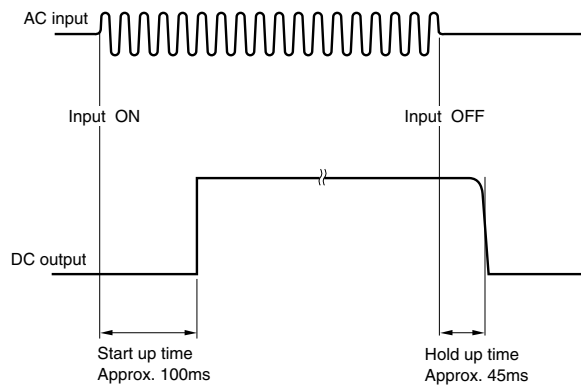• All specifications are subject to change without notice.

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Characteristics, Functions, and Applications

RAY3kW TYPE
START UP / HOLD UP TIMES

Example: RAY05-600
Input voltage:AC.200V, three-phase
Load: 100%(600A)
Temperature: 25°C

AC input

Input ON   Input OFF

DC output

Start up time   Hold up time
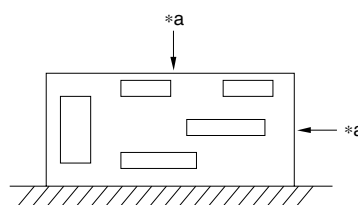Approx. 100ms   Approx. 45ms

FAN REPLACEMENT

Contact TDK for fan replacement. Consult with us if customer fan replacement is inevitable. In this case, however, the responsibility for quality assurance on the replacement lies on the customer.
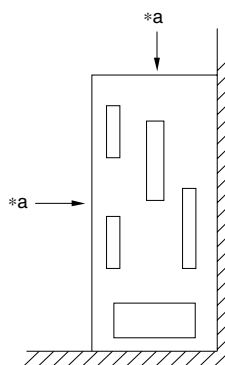
INSTALLATIONS

Ventilation hole

Ventilation hole

K
L
C
M
G
B
N
H
A
F
I
E
*a
D
J

Install the product as shown below.
(1)

*a

*a
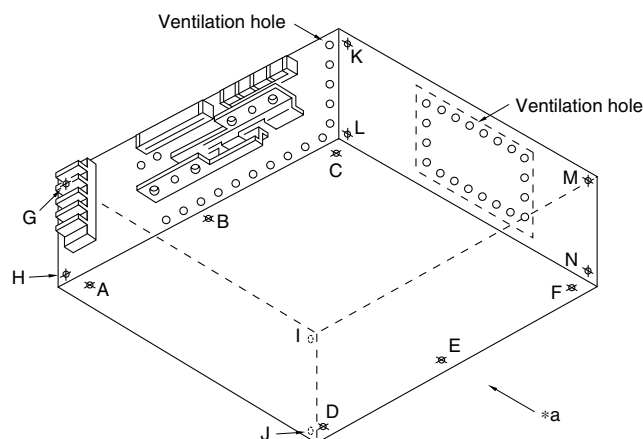
Use installation holes A, B, C, D, E, and F for securing the power supply.

(2)

*a

*a

Use installation holes G, H, I, J, A, B, D, and E, or G, H, I J, A, B, C, D, E, and F for securing the power supply.

*a: Maintain a 50mm min. distance between the ventilation holes, fan surface and surrounding equipment, etc. and install so as to provide heat-outside air exchange.

• All specifications are subject to change without notice.