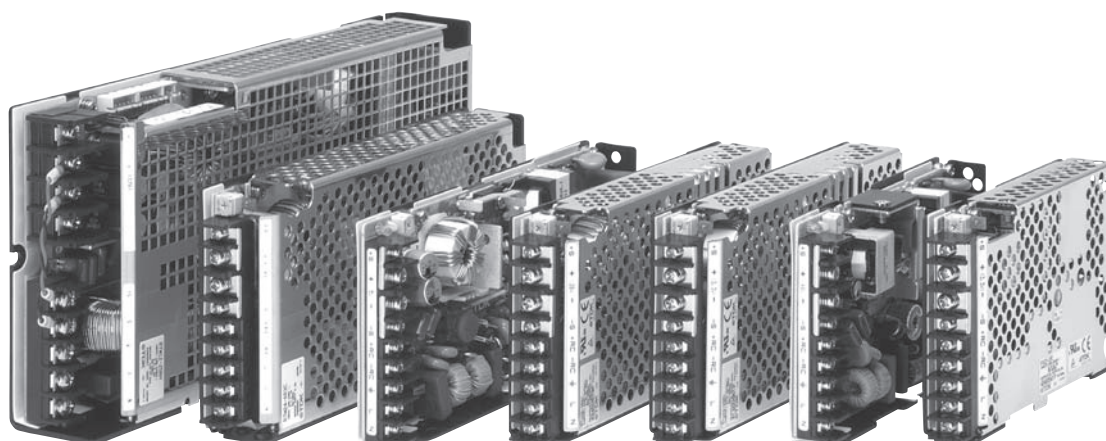


RTW SERIES

Ultra-thin
Enclosed / Unit type



Features

- Worldwide-applicable input, super-slim type (1U/2U rack size)
- Meeting the standard of the harmonics current limiter EN61000-3-2
- Approved by safety standards, CE marking applicable
- EMS standard complying with EN61000-4-2/3/4/5/6/8/11
- Complying with radiation noise and conduction noise regulations FCC-B and VCCI-B
- Remote On/Off function incorporated (use and nonuse can be switched by the internal switch)
- Electrolytic capacitor lifetime: 60,000H or over

Model-naming method

RTW 05-60R

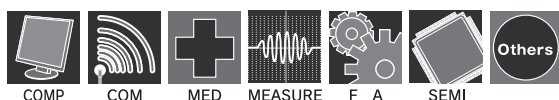
Symbol of shape/variation
50W, 100W, 150W
None: without cover
C: with cover
L: type L (terminal block facing upward, without cover)
300W
H: with cover (terminal block facing upward)
L: type L (terminal block facing upward, without cover)

Maximum output current (examples)
60R: 60A
4R3: 4.3A
2R1: 2.1A

Nominal output voltage
03: 3.3V 15: 15V
05: 5V 24: 24V
12: 12V 48: 48V

Series name

Applications



Conformity to RoHS Directive

Product Line up

		50W			100W			
Output voltage	Output current	Without cover	With cover	Type L	Output current	Without cover	With cover	Type L
3.3VDC	12.5A	RTW03-12R	RTW03-12RC	RTW03-12RL	25A	RTW03-25R	RTW03-25RC	RTW03-25RL
5VDC	10A	RTW03-12R	RTW03-12RC	RTW03-12RL	20A	RTW03-25R	RTW03-25RC	RTW03-25RL
12VDC	4.3A	RTW12-4R3	RTW12-4R3C	RTW12-4R3L	8.4A	RTW12-8R4	RTW12-8R4C	RTW12-8R4L
15VDC	3.5A	RTW15-3R5	RTW15-3R5C	RTW15-3R5L	6.7A	RTW15-6R7	RTW15-6R7C	RTW15-6R7L
24VDC	2.2A	RTW24-2R2	RTW24-2R2C	RTW24-2R2L	4.2A	RTW24-4R2	RTW24-4R2C	RTW24-4R2L
28VDC	1.8A	RTW28-1R8	RTW28-1R8C	RTW28-1R8L	3.6A	RTW28-3R6	RTW28-3R6C	RTW28-3R6L
48VDC	1.1A	RTW48-1R1	RTW48-1R1C	RTW48-1R1L	2.1A	RTW48-2R1	RTW48-2R1C	RTW48-2R1L

		150W			300W		
Output voltage	Output current	Without cover	With cover	Type L	Output current	With cover	Type L
3.3VDC	35A	RTW03-35R	RTW03-35RC	RTW03-35RL	70A	RTW03-70RH	RTW03-70RL
5VDC	30A	RTW05-30R	RTW05-30RC	RTW05-30RL	60A	RTW05-60RH	RTW05-60RL
12VDC	12.5A	RTW12-12R	RTW12-12RC	RTW12-12RL	25A	RTW12-25RH	RTW12-25RL
15VDC	10A	RTW15-10R	RTW15-10RC	RTW15-10RL	20A	RTW15-20RH	RTW15-20RL
24VDC	6.3A	RTW24-6R3	RTW24-6R3C	RTW24-6R3L	13A	RTW24-13RH	RTW24-13RL
28VDC	5.4A	RTW28-5R4	RTW28-5R4C	RTW28-5R4L	11A	RTW28-11RH	RTW28-11RL
48VDC	3.2A	RTW48-3R2	RTW48-3R2C	RTW48-3R2L	6.5A	RTW48-6R5H	RTW48-6R5L

RTW50W Specifications

ITEMS/UNITS			MODEL		RTW03-12R	RTW05-10R	RTW12-4R3	RTW15-3R5	RTW24-2R2	RTW28-1R8	RTW48-1R1
Input	Voltage Range (Nominal: 100-240VAC)	V	AC85-265								
	Frequency (Nominal: 50-60 single phase)	Hz	47-66								
	Power Factor (100/240VAC)(typ)		0.99/0.94								
	Efficiency (100VAC)(typ)	%	75	80	81	82					
	Efficiency (200VAC)(typ)	%	77	82	83	85					
	Current (100-120/200-240VAC) (max)	A	0.7/0.4 (3.3V: 0.6/0.3)								
	Inrush Current (100/200VAC)(typ) (*1)	A	14/28								
	Leakage Current (100/240VAC) (max)	mA	0.45/0.6								
Output	Nominal Voltage	VDC	3.3	5	12	15	24	28	48		
	Maximum Current (*2)	A	12.5	10	4.3	3.5	2.2	1.8	1.1		
	Maximum Power	W	41.2	50	51.6	52.5	52.8	50.4	52.8		
	Maximum Line Regulation (Within input voltage range) (max/typ)		0.2%/0.1%								
	Maximum Load Regulation (0-100% load) (max/typ)		0.4%/0.2%								
	Temperature Coefficient (Ambient temperature -10℃ to +71℃) (max/typ)	%	1.0/0.5								
	Warm Up Drift (max/typ) (*3)	%	0.5/0.2								
	Max Power Total Regulation (max/typ)	%	± 1.8/ ± 0.9								
	Maximum Ripple Voltage (max) (*4)	mVp-p	80			100		150		200	
	Maximum Ripple & Noise (max) (*4)	mVp-p	120			150		200		300	
	Start Up Time (100/240VAC)(typ) (*5)	ms	400/200								
	Hold-up Time (100/240VAC)(typ)	ms	55	30				35		30	
	Voltage Adjustable Range	VDC	2.6-4.0	4.0-5.8	9.6-13.2	12.0-16.5	19.2-26.4	22.4-30.8	38.4-52.8		
Function	Over Current Protection (*6)	A	13.2-15.6	10.5-12.5	4.5-5.4	3.68-4.38	2.3-2.75	1.9-2.25	1.15-1.38		
	Over Voltage Protection (*7)	VDC	4.2-5.2	6.0-6.9	13.7-15.7	17.0-19.0	27.0-30.5	32.0-35.0	55.0-60.0		
	Over Temperature Protection		Not available								
	Remote Sensing		Available								
	Remote ON/OFF Control (*8)		Available								
	Parallel Operation		Not available								
	Series Operation		Applicable								
	Operation Indicator		Available (green LED)								
	Variable Output Voltage		Not available								
	Monitoring Signal		Not available								
Environment	Operating Temperature	℃	-10 to +71								
	Storage Temperature	℃	-30 to +75								
	Operating Humidity	% RH	10-95 (the conditions of maximum 35℃ in wet bulb temperature and non-condensation should be ensured.)								
	Storage Humidity	% RH	10-95 (the conditions of maximum 35℃ in wet bulb temperature and non-condensation should be ensured.)								
	Vibration		5-10Hz, 10 minutes sweep, 10mmp-p total amplitude, 3 directions, 1h for each, in non-operation 10-200Hz, 10 minutes sweep, 19.6m/s ² (2G) acceleration, 3 directions, 1h for each, in non-operation								
	Shock		Mounting A: 196m/s ² (20G), Mounting B/C: 588m/s ² (60G), 11 ± 5ms, 3 directions, 3 times for each, in non-operation								
Isolation	Withstand Voltage		For 1 minute at ordinary temperature and humidity Between input terminal and ground terminal: 2.0kVAC, 10mA cutout current Between input terminal and output terminal: 3.0kVAC, 10mA cutout current Between output terminal and ground terminal: 500VAC, 20mA cutout current								
	Isolation Resistance		In 500VDC and 100MΩ or over at ordinary temperature and humidity Between input terminal and ground terminal, between input terminal and output terminal, and between output terminal and ground terminal								
Standards	Safety Standards		Approved by UL62368-1, CSA62368-1, EN62368-1, UL60950-1, CSA60950-1, EN60950-1. (Expire date of 60950-1: 20/12/2020) Designed to meet Den-an Appendix 8 at 100VAC only.								
	PFHC		Complying with EN61000-3-2								
	EMI		Complying with FCC-Class B / VCCI-Class B / EN55011-B / EN55032-B								
Mechanical	Immunity		Complying with EN61000-4-2 Level2, 3, -3 Level3, -4 Level3, -5 Level3, 4, -6 Level3, -8 Level4, -11								
	Weight without cover / with cover / type L (max)	g	250/290/250								
	Size (W x H x D) without cover / with cover / type L	mm	22 x 82 x 124/22 x 82 x 124/22 x 82 x 134.5								
Models of different	Detailed product name1 with cover		RTW03-12RC	RTW05-10RC	RTW12-4R3C	RTW15-3R5C	RTW24-2R2C	RTW28-1R8C	RTW48-1R1C		
	Detailed product name2 type L		RTW03-12RL	RTW05-10RL	RTW12-4R3L	RTW15-3R5L	RTW24-2R2L	RTW28-1R8L	RTW48-1R1L		

With nominal input/output voltage, maximum output current, and Ta=25°C, if not specified separately.

(*1) In primary surge current, 25°C, and cold starting.

(*2) The maximum output current value is between -10°C and +40°C. For use in outside this temperature range, derating is needed.

(*3) 30min to 8h after the start of input voltage application.

(*4) 1.5 times the value in 100MHz and at between -10°C and 0°C.

(*5) In cold starting at between -20°C and 0°C, lowering of output voltage can occur. It may take 3 seconds or so until the voltage becomes stable.

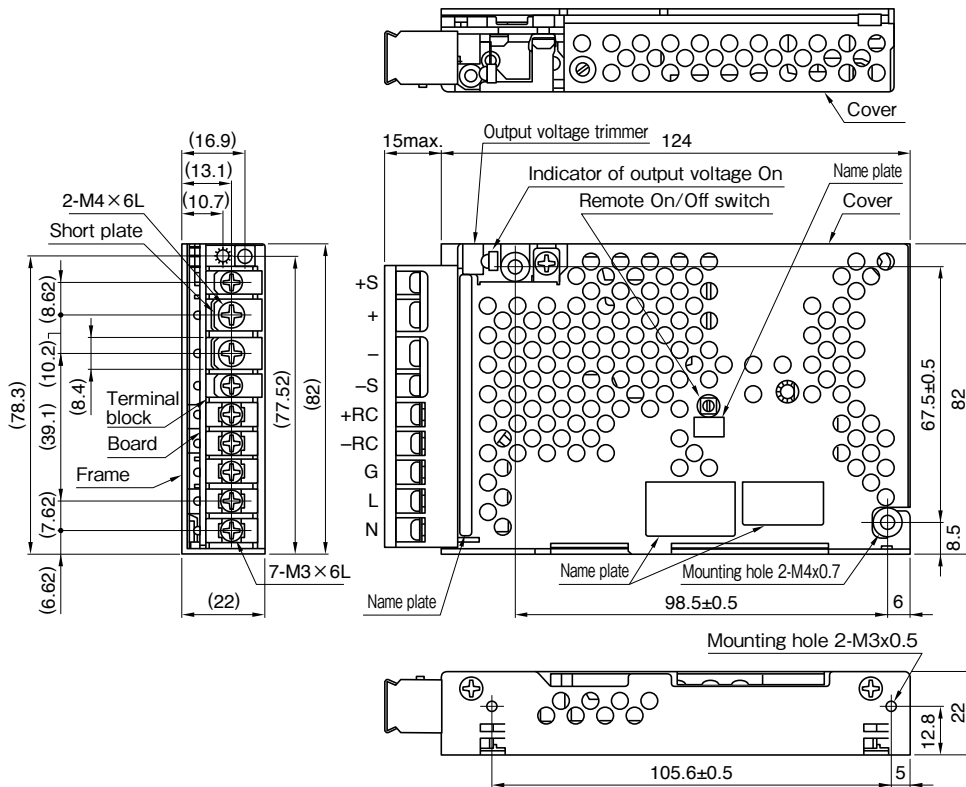
(*6) Fixed current reduction system and automatically resumes when the causes are removed.

(*7) Output voltage shutdown system and resumes by restarting input (approximately 30s interval).

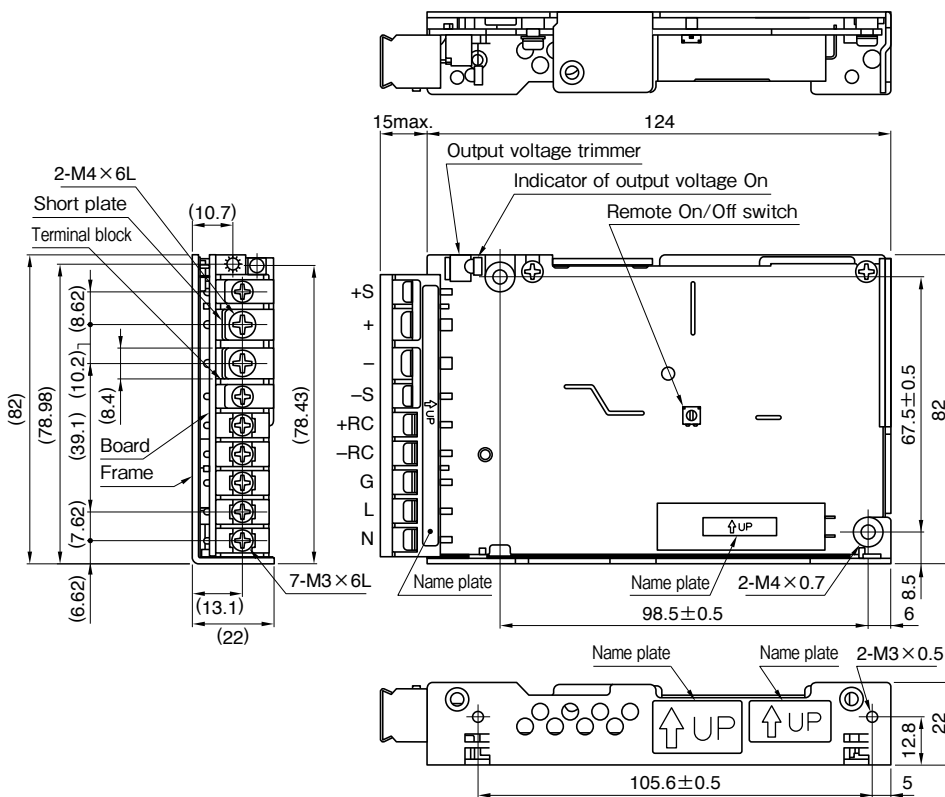
(*8) Use and nonuse can be switched by the internal switch.

Outline Drawing

Type with cover



Type without cover

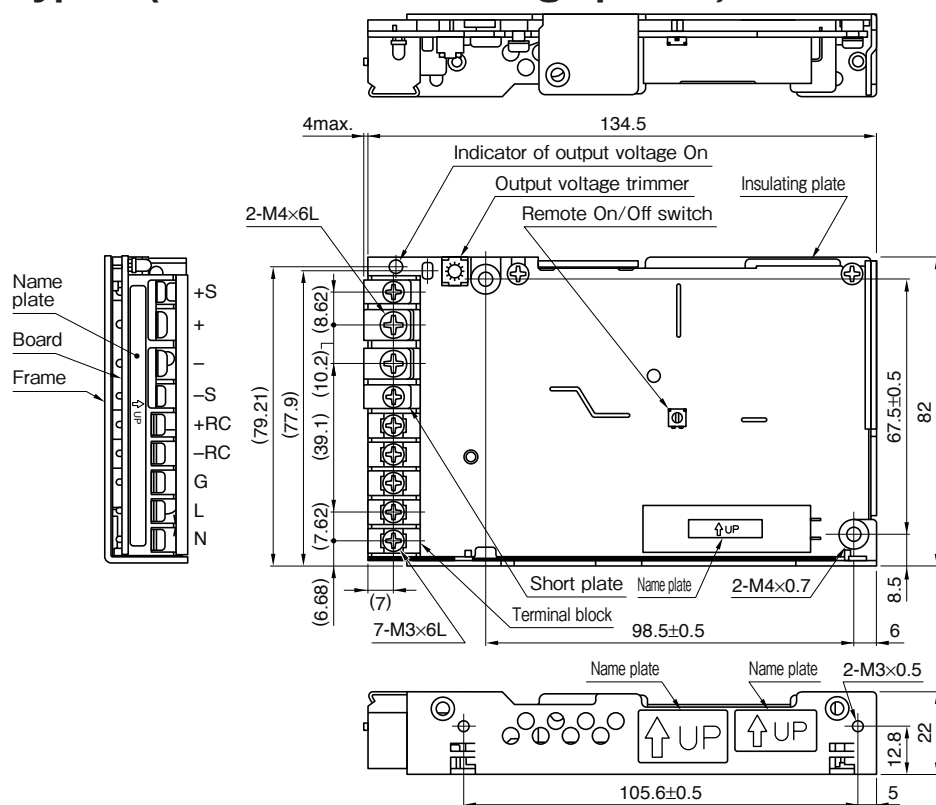


Unit: mm

* The insertion length of screws used for mounting the power supply should be within 6mm from the product surface.

Allowable tolerance is ± 1 mm if not specified separately.

Type L (terminal block facing upward, without cover)



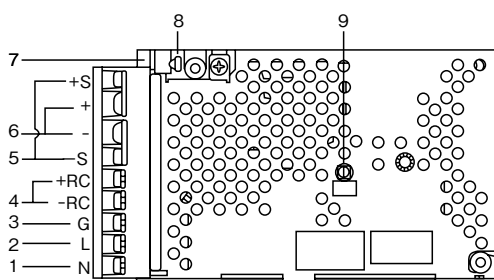
Unit: mm

* The insertion length of screws used for mounting the power supply should be within 6mm from the product surface.

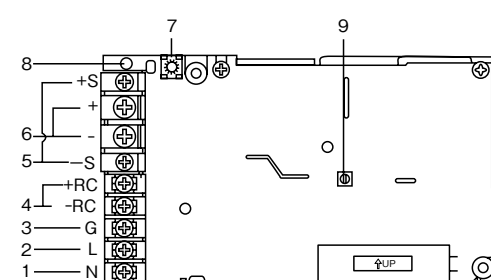
Allowable tolerance is ± 1 mm if not specified separately.

Terminals

Type with cover/without cover



Type L



Terminal No.	Name and function	
1	AC input terminal (N)	Connects to AC.100-120V or AC.200-240V input line.
2	AC input terminal (L)	Connects to AC.100-120V or AC.200-240V input line.
3	Ground terminal (G)	Connects to the ground line. This is connected to the case.
4	Remote On/Off terminal (+RC, -RC)	By inputting external signals between terminals, the output voltage can be switched on and off from outside the power supply. Output is not generated if voltage is not applied to RC terminal. The RC terminal is floated.
5	Remote sensing terminal (+S, -S)	Used to compensate for a voltage drop to load. The line between the remote sensing terminal and DC output terminal is short-circuited with a short piece.
6	DC output terminal (+, -)	Connects to the load line.
7	Output voltage trimmer (V _{ADJ})	Output voltage can be varied. Voltage increases by turning the trimmer in a clockwise direction.
8	LED output indicator (green)	The LED is lit green when output voltage is generated.
9	Switch for use/nonuse of Remote On/Off function	Remote On/Off function is activated by setting the switch for use/nonuse of Remote On/Off function, located in the center of the power supply, to Y (turning in a clockwise direction).

RTW100W Specifications

ITEMS/UNITS			MODEL	RTW03-25R	RTW05-20R	RTW12-8R4	RTW15-6R7	RTW24-4R2	RTW28-3R6	RTW48-2R1
Input	Voltage Range (Nominal: 100-240VAC)	V	AC85-265 (90% load derating in 90VAC or lower)							
	Frequency (Nominal: 50-60 single phase)	Hz	47-66							
	Power Factor (100/240VAC)(typ)		0.99/0.93							
	Efficiency (100VAC)(typ)	%	79	83	84	85				
	Efficiency (200VAC)(typ)	%	81	85	86	87			88	
	Current (100-120/200-240VAC) (max)	A	1.5/0.75 (3.3V: 1.2/0.6)							
	Inrush Current (100/200VAC)(typ) (*1)	A	14/28							
	Leakage Current (100/240VAC) (max)	mA	0.45/0.6 (100VAC (Electrical Appliance and Material Safety Law) / 240VAC (UL, IEC))							
Output	Nominal Voltage	VDC	3.3	5	12	15	24	28	48	
	Maximum Current (*2)	A	25	20	8.4	6.7	4.2	3.6	2.1	
	Maximum Power	W	82.5	100	100.8	100.5	100.8			
	Maximum Line Regulation (Within input voltage range) (max/typ)		0.2%/0.1% (3.3V: 10mV/5mV)							
	Maximum Load Regulation (0-100% load) (max/typ)		0.4%/0.2% (3.3V: 20mV/10mV)							
	Temperature Coefficient (Ambient temperature -10℃ to +71℃) (max/typ)	%	1.0/0.5							
	Warm Up Drift (max/typ) (*3)	%	0.5/0.2							
	Max Power Total Regulation (max/typ)	%	± 1.8/ ± 0.9							
	Maximum Ripple Voltage (max) (*4)	mVp-p	80		100		150		200	
	Maximum Ripple & Noise (max) (*4)	mVp-p	120		150		200		300	
	Start Up Time (100/240VAC)(typ) (*5)	ms	400/200							
	Hold-up Time (100/240VAC)(typ)	ms	35							
	Voltage Adjustable Range	VDC	2.6-4.0	4.0-5.8	9.6-13.2	12.0-16.5	19.2-26.4	22.4-30.8	38.4-52.8	
	Function	Over Current Protection (*6)	A	26.2-33.7	21-25	8.82-10.5	7.03-9.04	4.41-5.25	3.78-4.86	2.2-2.62
Over Voltage Protection (*7)		VDC	4.2-5.2	6.0-6.9	13.7-15.7	17.0-19.0	27.0-30.5	32.0-35.0	55.0-60.0	
Over Temperature Protection			Not available							
Remote Sensing			Available							
Remote ON/OFF Control (*8)			Available							
Parallel Operation			Not available							
Series Operation			Applicable							
Operation Indicator			Available (green LED)							
Variable Output Voltage			Not available							
Monitoring Signal			Not available							
Environment	Operating Temperature	℃	-10 to +71							
	Storage Temperature	℃	-30 to +75							
	Operating Humidity	% RH	10-95 (the conditions of maximum 35℃ in wet bulb temperature and non-condensation should be ensured.)							
	Storage Humidity	% RH	10-95 (the conditions of maximum 35℃ in wet bulb temperature and non-condensation should be ensured.)							
	Vibration		5-10Hz, 10 minutes sweep, 10mmp-p total amplitude, 3 directions, 1h for each, in non-operation 10-200Hz, 10 minutes sweep, 19.6m/s ² (2G) acceleration, 3 directions, 1h for each, in non-operation							
	Shock		Mounting A: 196m/s ² (20G), Mounting B/C: 588m/s ² (60G), 11 ± 5ms, 3 directions, 3 times for each, in non-operation							
Isolation	Withstand Voltage		For 1 minute at ordinary temperature and humidity Between input terminal and ground terminal: 2.0kVAC, 10mA cutout current Between input terminal and output terminal: 3.0kVAC, 10mA cutout current Between output terminal and ground terminal: 500VAC, 20mA cutout current							
	Isolation Resistance		In 500VDC and 100MΩ or over at ordinary temperature and humidity Between input terminal and ground terminal, between input terminal and output terminal, and between output terminal and ground terminal							
Standards	Safety Standards		Approved by UL62368-1, CSA62368-1, EN62368-1, UL60950-1, CSA60950-1, EN60950-1. (Expire date of 60950-1: 20/12/2020) Designed to meet Den-an Appendix 8 at 100VAC only.							
	PFHC		Complying with EN61000-3-2							
	EMI		Complying with FCC-Class B / VCCI-Class B / EN55011-B / EN55032-B							
Mechanical	Immunity		Complying with EN61000-4-2 Level2, 3, -3 Level3, -4 Level3, -5 Level3, 4, -6 Level3, -8 Level4, -11							
	Weight without cover / with cover / type L (max)	g	380/450/380							
	Size (W x H x D) without cover / with cover / type L	mm	25 x 82 x 160/25 x 82 x 160/25 x 82 x 171.5							
Models of different	Detailed product name1 with cover		RTW03-25RC	RTW05-20RC	RTW12-8R4C	RTW15-6R7C	RTW24-4R2C	RTW28-3R6C	RTW48-2R1C	
	Detailed product name2 type L		RTW03-25RL	RTW05-20RL	RTW12-8R4L	RTW15-6R7L	RTW24-4R2L	RTW28-3R6L	RTW48-2R1L	

With nominal input/output voltage, maximum output current, and Ta=25°C, if not specified separately.

(*1) In primary surge current, 25°C, and cold starting.

(*2) The maximum output current value is between -10°C and +40°C. For use in outside this temperature range, Derating is needed.

(*3) 30min to 8h after the start of input voltage application.

(*4) 1.5 times the value in 100MHz and at between -10°C and 0°C.

(*5) In cold starting at between -20°C and 0°C, lowering of output voltage can occur. It may take 3 seconds or so until the voltage becomes stable.

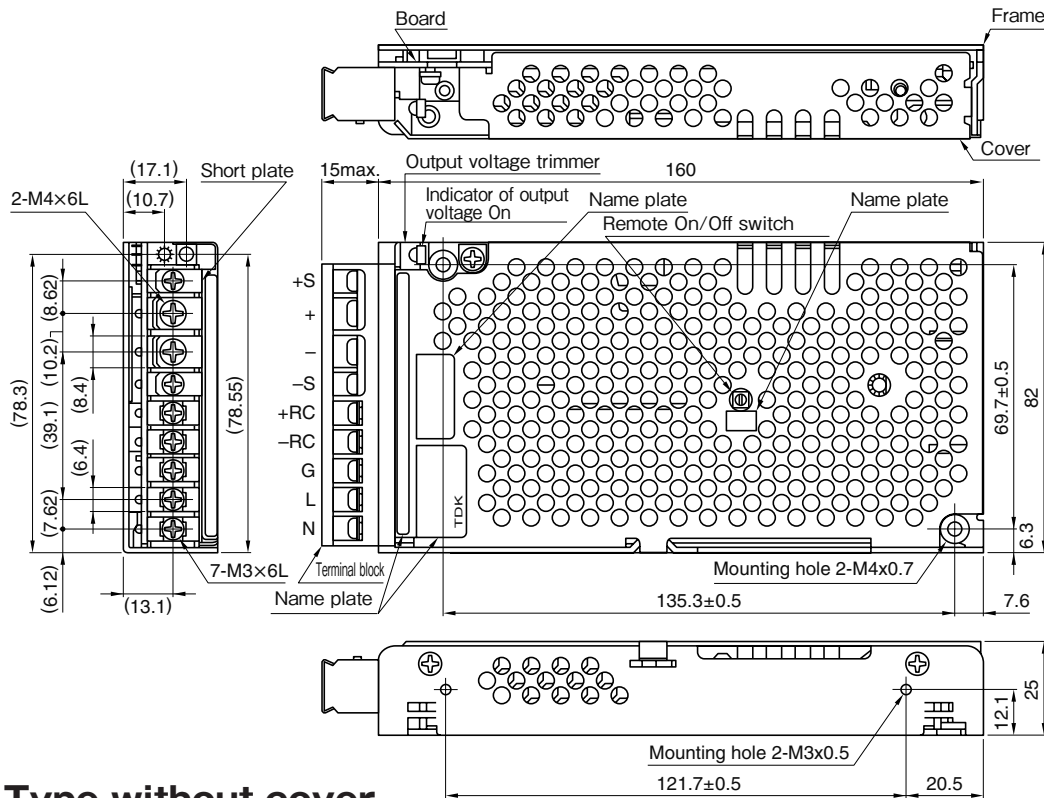
(*6) Intermittent operation system and automatically resumes when the causes are removed.

(*7) Output voltage shutdown system and resumes by restarting input (approximately 30s interval).

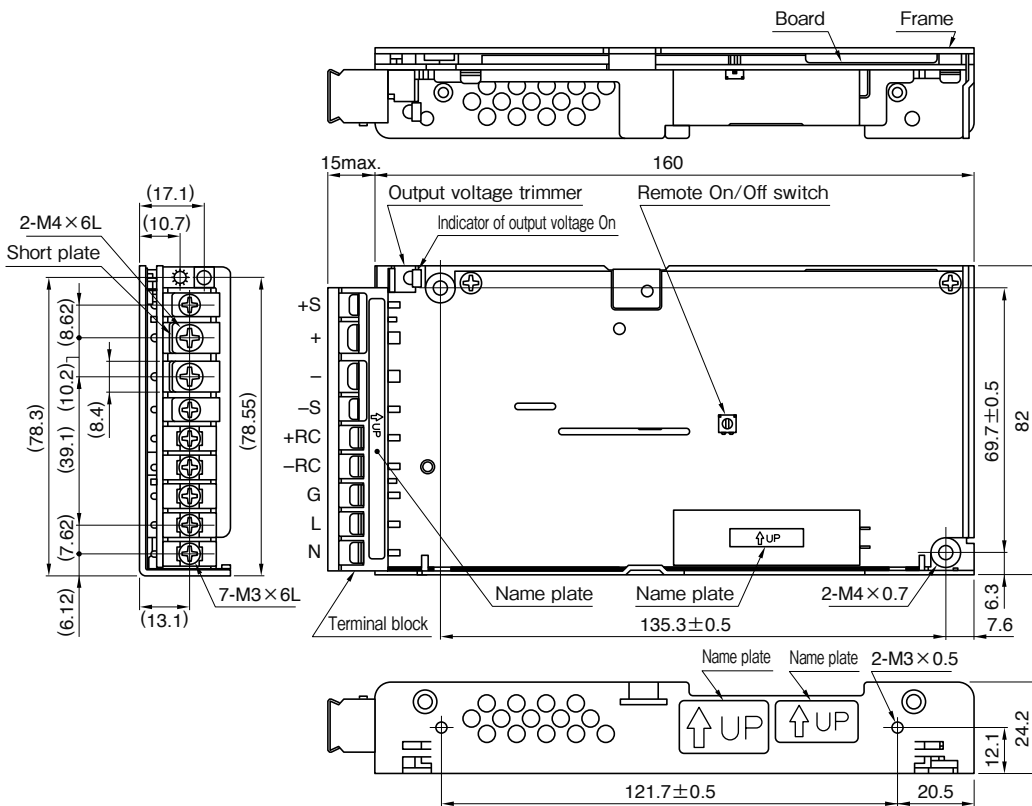
(*8) Use and nonuse can be switched by the internal switch.

Outline Drawing

Type with cover



Type without cover



Unit: mm

* The insertion length of screws used for mounting the power supply should be within 6mm from the product surface.

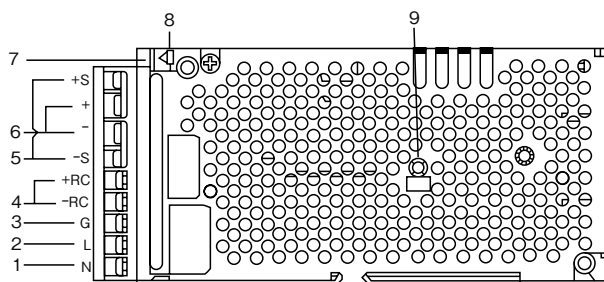
Allowable tolerance is ±1mm if not specified separately.

Technical drawing showing the front view of the control panel for the SPS-0600 series. Key components and dimensions are labeled:

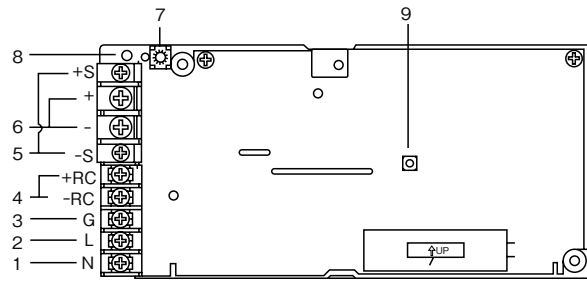
- Terminal Block Labels:** +S, +, -, -S, +RC, -RC, G, L, N.
- Dimensions:**
 - Overall Width: 171.5
 - Overall Height: 82
 - Terminal Block Height: (78.75)
 - Terminal Block Spacing: (78.15), (39.1), (10.2), (8.62), (7.62), (6.16)
 - Terminal Block Width: (7)
 - Short Plate Width: 7-M3 × 6L
 - Remote On/Off Switch Mounting Hole Diameter: $\phi 10$
 - Name Plate Mounting Hole Diameter: $\phi 10$
 - Insulation Plate Thickness: 69.7 ± 0.5
 - Bottom Panel Thickness: 6.3
 - Bottom Panel Width: 7.6
 - Bottom Panel Height: 24.2
 - Bottom Panel Spacing: 12.1
 - Bottom Panel Width (excluding mounting holes): 121.7 ± 0.5
 - Bottom Panel Mounting Hole Diameter: $\phi 10$
 - Bottom Panel Mounting Hole Spacing: 20.5
 - Bottom Panel Mounting Hole Diameter: $\phi 10$
 - Bottom Panel Mounting Hole Spacing: 2-M3 × 0.5
- Other Labels:** Indicator of output voltage On, Output voltage trimmer, Remote On/Off switch, Insulation plate, Name plate, Board, Frame, Short plate, 2-M4 × 6L, Name plate 2-M4 × 0.7, UP, UP.

* The insertion length of screws used for mounting the power supply should be within 6mm from the product surface. Allowable tolerance is $\pm 1\text{mm}$ if not specified separately.

Type with cover/without cover



Type L



Terminal No.	Name and function	
1	AC input terminal (N)	Connects to AC.100-120V or AC.200-240V input line.
2	AC input terminal (L)	Connects to AC.100-120V or AC.200-240V input line.
3	Ground terminal (G)	Connects to the ground line. This is connected to the case.
4	Remote On/Off terminal (+RC, -RC)	By inputting external signals between terminals, the output voltage can be switched on and off from outside the power supply. Output is not generated if voltage is not applied to RC terminal. The RC terminal is floated.
5	Remote sensing terminal (+S, -S)	Used to compensate for a voltage drop to load. The line between the remote sensing terminal and DC output terminal is short-circuited with a short piece.
6	DC output terminal (+, -)	Connects to the load line.
7	Output voltage trimmer (V _{ADJ})	Output voltage can be varied. Voltage increases by turning the trimmer in a clockwise direction.
8	LED output indicator (green)	The LED is lit green when output voltage is generated.
9	Switch for use/nonuse of Remote On/Off function	Remote On/Off function is activated by setting the switch for use/nonuse of Remote On/Off function, located in the center of the power supply, to Y (turning in a clockwise direction).

RTW150W Specifications

ITEMS/UNITS		MODEL	RTW03-35R	RTW05-30R	RTW12-12R	RTW15-10R	RTW24-6R3	RTW28-5R4	RTW48-3R2
Input	Voltage Range (Nominal: 100-240VAC)	V	AC85-265						
	Frequency (Nominal: 50-60 single phase)	Hz	47-66						
	Power Factor (100/240VAC)(typ)		0.99/0.96						
	Efficiency (100VAC)(typ)	%	80	83	84	86			
	Efficiency (200VAC)(typ)	%	83	86	87	88		89	
	Current (100-120/200-240VAC) (max)	A	1.9/1.0 (3.3V: 1.6/0.85)						
	Inrush Current (100/200VAC)(typ) (*1)	A	14/28						
	Leakage Current (100/240VAC) (max)	mA	0.45/0.65						
Output	Nominal Voltage	VDC	3.3	5	12	15	24	28	48
	Maximum Current (*2)	A	35	30	12.5	10	6.3 (peak 10)	5.4	3.2
	Maximum Power	W	115.5	150			151.2		153.6
	Maximum Line Regulation (Within input voltage range) (max/typ)		0.2%/0.1%						
	Maximum Load Regulation (0-100% load) (max/typ)		0.4%/0.2%						
	Temperature Coefficient (Ambient temperature -10℃ to +71℃) (max/typ)	%	1.0/0.5						
	Warm Up Drift (max/typ) (*3)	%	0.5/0.2						
	Max Power Total Regulation (max/typ)	%	± 1.8/ ± 0.9						
	Maximum Ripple Voltage (max) (*4)	mVp-p	80		100		150		200
	Maximum Ripple & Noise (max) (*4)	mVp-p	120		150		200		300
	Start Up Time (100/240VAC)(typ) (*5)	ms	220/120						
	Hold-up Time (100/240VAC)(typ)	ms	50/55	35/40					
	Voltage Adjustable Range	VDC	2.85-4.0	4.0-5.8	9.6-13.2	12.0-16.5	19.2-26.4	22.4-30.8	38.4-52.8
	Function	Over Current Protection (*6)	A	38.5-45.5	33-39	13.7-16.3	11-13	10.5-13.5	5.94-7.02
Over Voltage Protection (*7)		VDC	4.2-5.2	6.0-6.9	13.7-15.7	17.0-19.0	27.0-30.5	32.0-35.0	55.0-60.0
Over Temperature Protection			Not available						
Remote Sensing			Available						
Remote ON/OFF Control (*8)			Available						
Parallel Operation			Not available						
Series Operation			Applicable						
Operation Indicator			Available (green LED)						
Variable Output Voltage			Not available						
Monitoring Signal			Not available						
Environment	Operating Temperature	℃	-10 to +71						
	Storage Temperature	℃	-30 to +75						
	Operating Humidity	% RH	10-95 (the conditions of maximum 35℃ in wet bulb temperature and non-condensation should be ensured.)						
	Storage Humidity	% RH	10-95 (the conditions of maximum 35℃ in wet bulb temperature and non-condensation should be ensured.)						
	Vibration		5-10Hz, 10 minutes sweep, 10mmp-p total amplitude, 3 directions, 1h for each, in non-operation						
	Shock		10-200Hz, 10 minutes sweep, 19.6m/s² (2G) acceleration, 3 directions, 1h for each, in non-operation						
Isolation		588m/s² (60G), 11 ± 5ms, 3 directions, 3 times for each, in non-operation							
	Withstand Voltage		For 1 minute at ordinary temperature and humidity Between input terminal and ground terminal: 2.0kVAC, 10mA cutout current Between input terminal and output terminal: 3.0kVAC, 10mA cutout current Between output terminal and ground terminal: 500VAC, 20mA cutout current						
	Isolation Resistance		In 500VDC and 100MΩ or over at ordinary temperature andhumidity Between input terminal and ground terminal, between input terminal and output terminal, and between output terminal and ground terminal						
Standards	Safety Standards		Approved by UL62368-1, CSA62368-1, EN62368-1, UL60950-1, CSA60950-1, EN60950-1. (Expire date of 60950-1: 20/12/2020) Designed to meet Den-an Appendix 8 at 100VAC only.						
	PFHC		Complying with EN61000-3-2						
	EMI		Complying with FCC-Class B / VCCI-Class B / EN55011-B / EN55032-B						
	Immunity		Complying with EN61000-4-2 Level2, 3, -3 Level3, -4 Level3, -5 Level3, 4, -6 Level3, -8 Level4, -11						
Mechanical	Weight without cover / with cover / type L (max)	g	520/600/520						
	Size (W x H x D) without cover / with cover / type L	mm	30 x 92 x 180/30 x 92 x 180/30 x 92 x 191.5						
Models of different	Detailed product name1 with cover		RTW03-35RC	RTW05-30RC	RTW12-12RC	RTW15-10RC	RTW24-6R3C	RTW28-5R4C	RTW48-3R2C
	Detailed product name2 type L		RTW03-35RL	RTW05-30RL	RTW12-12RL	RTW15-10RL	RTW24-6R3L	RTW28-5R4L	RTW48-3R2L

With nominal input/output voltage, maximum output current, and Ta=25°C, if not specified separately.

(*1) In primary surge current, 25°C, and cold starting.

(*2) The maximum output current value is between -10°C and +30°C. For use in outside this temperature range, Derating is needed.

(*3) 30min to 8h after the start of input voltage application.

(*4) 1.5 times the value in 100MHz and at between -10°C and 0°C.

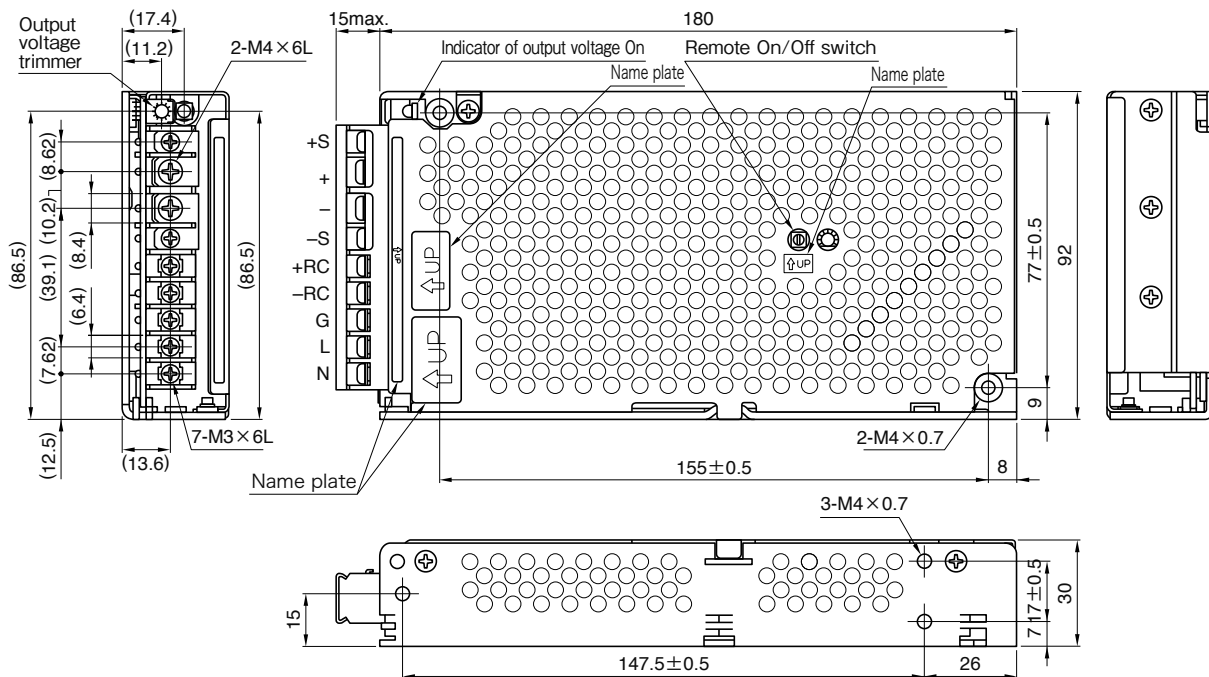
(*5) Fixed current reduction system and automatically resumes when the causes are removed.

(*6) Output voltage shutdown system and resumes by restarting input (approximately 30s interval).

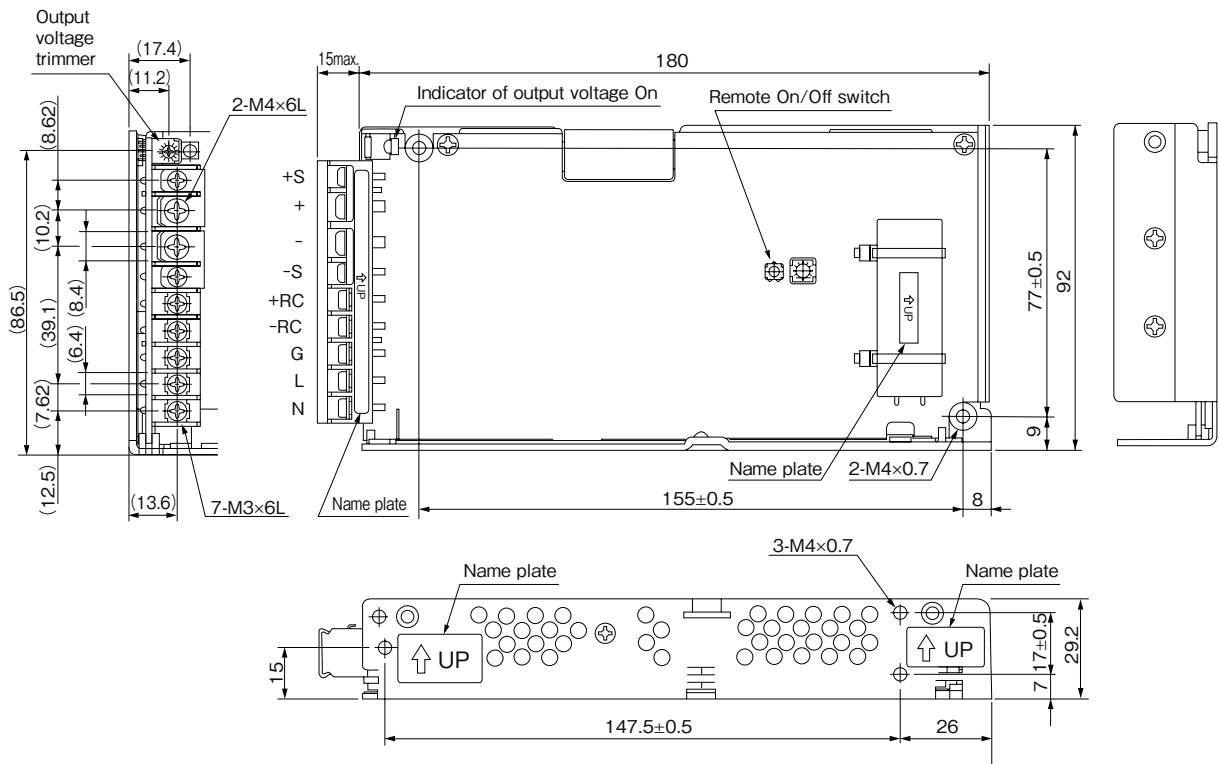
(*7) Use and non-use can be switched by the internal switch.

Outline Drawing

Type with cover



Type without cover

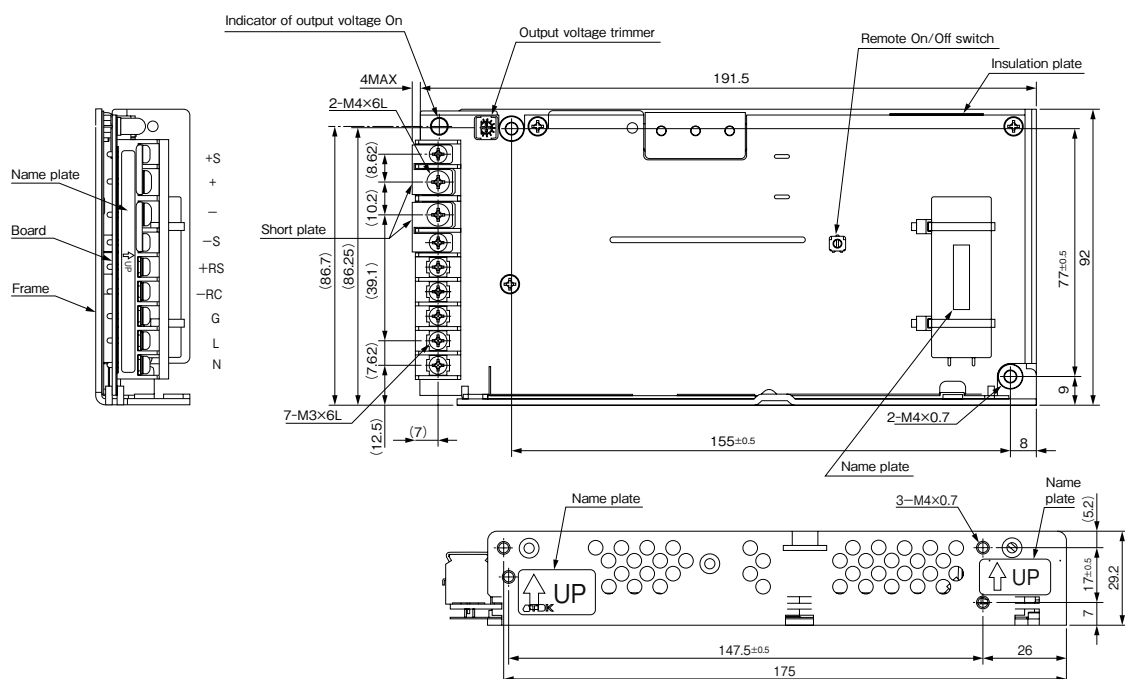


Unit: mm

* The insertion length of screws used for mounting the power supply should be within 6mm from the product surface. Allowable tolerance is ±1mm if not specified separately.

Outline Drawing

Type L (terminal block facing upward, without cover)



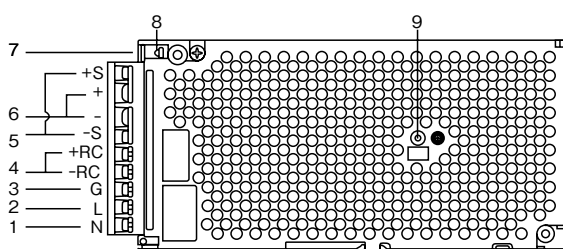
Unit: mm

* The insertion length of screws used for mounting the power supply should be within 6mm from the product surface.

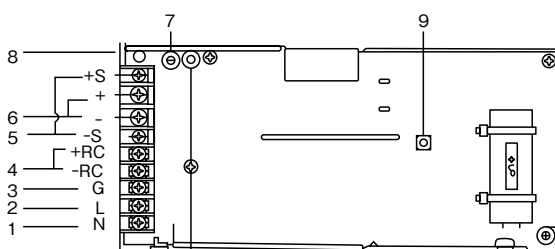
Allowable tolerance is ± 1 mm if not specified separately.

Terminals

Type with cover/without cover



Type L



Terminal No.	Name and function	
1	AC input terminal (N)	Connects to AC.100-120V or AC.200-240V input line.
2	AC input terminal (L)	Connects to AC.100-120V or AC.200-240V input line.
3	Ground terminal (G)	Connects to the ground line. This is connected to the case.
4	Remote On/Off terminal (+RC, -RC)	By inputting external signals between terminals, the output voltage can be switched on and off from outside the power supply. Output is not generated if voltage is not applied to RC terminal. The RC terminal is floated.
5	Remote sensing terminal (+S, -S)	Used for compensating for voltage drop to load. The line between the remote sensing terminal and DC output terminal is short-circuited with a short piece.
6	DC output terminal (+, -)	Connects the load line.
7	Output voltage trimmer (V _{ADJ})	Output voltage can be varied. Voltage increases by turning the trimmer in a clockwise direction.
8	LED output indicator (green)	The LED is lit green when output voltage is generated.
9	Switch for use/nonuse of Remote On/Off function	Remote On/Off function is activated by setting the switch for use/nonuse of Remote On/Off function, located in the center of the power supply, to Y (turning in a clockwise direction).

RTW300W Specifications

ITEMS/UNITS		MODEL	RTW03-70RH	RTW05-60RH	RTW12-25RH	RTW15-20RH	RTW24-13RH	RTW28-11RH	RTW48-6R5H
Input	Voltage Range (Nominal: 100-240VAC)	V	AC85 - 265						
	Frequency (Nominal: 50-60 single phase)	Hz	47 - 66						
	Power Factor (100/240VAC)(typ)		0.99/0.93						
	Efficiency (100VAC)(typ)	%	38	48	38	58		68	
	Efficiency (200VAC)(typ)	%	68	78	68	88		98	
	Current (100/200VAC) (max)	A	4.0/2.0(3.3V:3.6/1.8) max						
	Inrush Current (100/200VAC)(typ) (*1)	A	15/30						
	Leakage Current (100/240VAC) (max)	mA	0.5/0.7						
Output	Nominal Voltage	VDC	3.3	5	12	15	24	28	48
	Maximum Current (*2)	A	70	60	25	20	13 (peak 20)	11	6.5
	Maximum Power	W	231	300			312	308	312
	Maximum Line Regulation (Within input voltage range) (max/typ)		0.2%/0.1%						
	Maximum Load Regulation (0-100% load) (max/typ)		0.4%/0.2%						
	Temperature Coefficient (Ambient temperature -10℃ to +71℃) (max/typ)	%	1.0/0.5						
	Warm Up Drift (max/typ) (*3)	%	0.5/0.2						
	Max Power Total Regulation (max/typ)	%	± 1.8/ ± 0.9						
	Maximum Ripple Voltage (max) (*4)	mVp-p	80		100		150		200
	Maximum Ripple & Noise (max) (*4)	mVp-p	120		150		200		300
	Start Up Time (100/240VAC)(typ) (*5)	ms	220/120						
	Hold-up Time (100/240VAC)(typ)	ms	30/40	25/30	30/40	25/30	30/40		
Voltage Adjustable Range	VDC	1.8 - 3.6	3.5 - 5.6	7.2 - 14.4	10.5 - 18.0	16.8 - 26.4	19.6 - 33.6	33.6 - 55.0	
Function	Over Current Protection (*6)	A	73.5 - 84.0	63.0 - 72.0	26.3 - 30.0	21.0 - 24.0		11.5 - 13.2	6.8 - 7.8
	Over Voltage Protection (*7)	VDC	Vo+0.66 - 1.32	Vo+1.0 - 2.0	Vo+2.4 - 4.8	Vo+3.0 - 6.0	Vo+4.8 - 9.6	Vo+5.6 - 10.4	Vo+1.0 - 10
	Over Temperature Protection		Not available						
	Remote Sensing		Available						
	Remote ON/OFF Control (*8)		Available						
	Parallel Operation		Applicable (current balance function and master/slave operation are supported; synchronized operation is not supported)						
	Series Operation		Available (green LED)						
	Operation Indicator		Available						
	Variable Output Voltage		Available (power fail signal)						
	Low Output Voltage Dection (*7)		Available						
Environment	Operating Temperature	℃	-10 to +71						
	Storage Temperature	℃	-30 to +75						
	Operating Humidity	% RH	10-95 (the conditions of maximum 35℃ in wet bulb temperature and non-condensation should be ensured.)						
	Storage Humidity	% RH	10-95 (the conditions of maximum 35℃ in wet bulb temperature and non-condensation should be ensured.)						
	Vibration		5-10Hz, 10 minutes sweep, 10mmp-p total amplitude, 3 directions, 1h for each, in non-operation 10-200Hz, 10 minutes sweep, 19.6m/s² (2G) acceleration, 3 directions, 1h for each, in non-operation						
	Shock		588m/s² (60G), 11 5ms, 3 directions, 3 times for each, in non-operation						
Isolation	Withstand Voltage		For 1 minute at ordinary temperature and humidity Between input terminal and ground terminal: 2.0kVAC, 10mA cutout current Between input terminal and output terminal: 3.0kVAC, 10mA cutout current Between output terminal and ground terminal: 500VAC, 40mA cutout current						
	Isolation Resistance		In 500VDC and 100MΩ or over at ordinary temperature and humidity Between input terminal and ground terminal, between input terminal and output terminal, and between output terminal and ground terminal						
Standards	Safety Standards		Approved by UL62368-1, CSA62368-1, EN62368-1, UL60950-1, CSA60950-1, EN60950-1. (Expire date of 60950-1: 20/12/2020) Designed to meet Den-an Appendix 8 at 100VAC only.						
	PFHC		Complying with EN61000-3-2						
	EMI		Complying with FCC-Class B / VCCI-Class B / EN55011-B / EN55032-B						
	Immunity		Complying with EN61000-4-2 Level2, 3, -3 Level3, -4 Level3, -5 Level3, 4, -6 Level3, -8 Level4, -11						
Mechanical	Weight without cover / with cover / type L (max)	g	1300/1200						
	Size (W x H x D) without cover / with cover / type L	mm	40 x 120 x 250/40 x 120 x 250						
Models of different	Detailed product name1 with cover		RTW03-70RL	RTW05-60RL	RTW12-25RL	RTW15-20RL	RTW24-13RL	RTW28-11RL	RTW48-6R5L

With nominal input/output voltage, maximum output current, and Ta=25°C, if not specified separately.

(*1) In primary surge current, 25°C.

(*2) The maximum output current value is between -10°C and +40°C. For use in outside this temperature range, Derating is needed.

(*3) 30min to 8h after the start of input voltage application.

(*4) 1.5 times the value in 100MHz and at between -10°C and 0°C.

(*5) Fixed current reduction system; current is shut down if overload condition continues 15 seconds or over. Restarting input
Resumes after (approximately 30s interval) or resetting remote control. (Shutdown by low output voltage detection in 3/5/28V models)

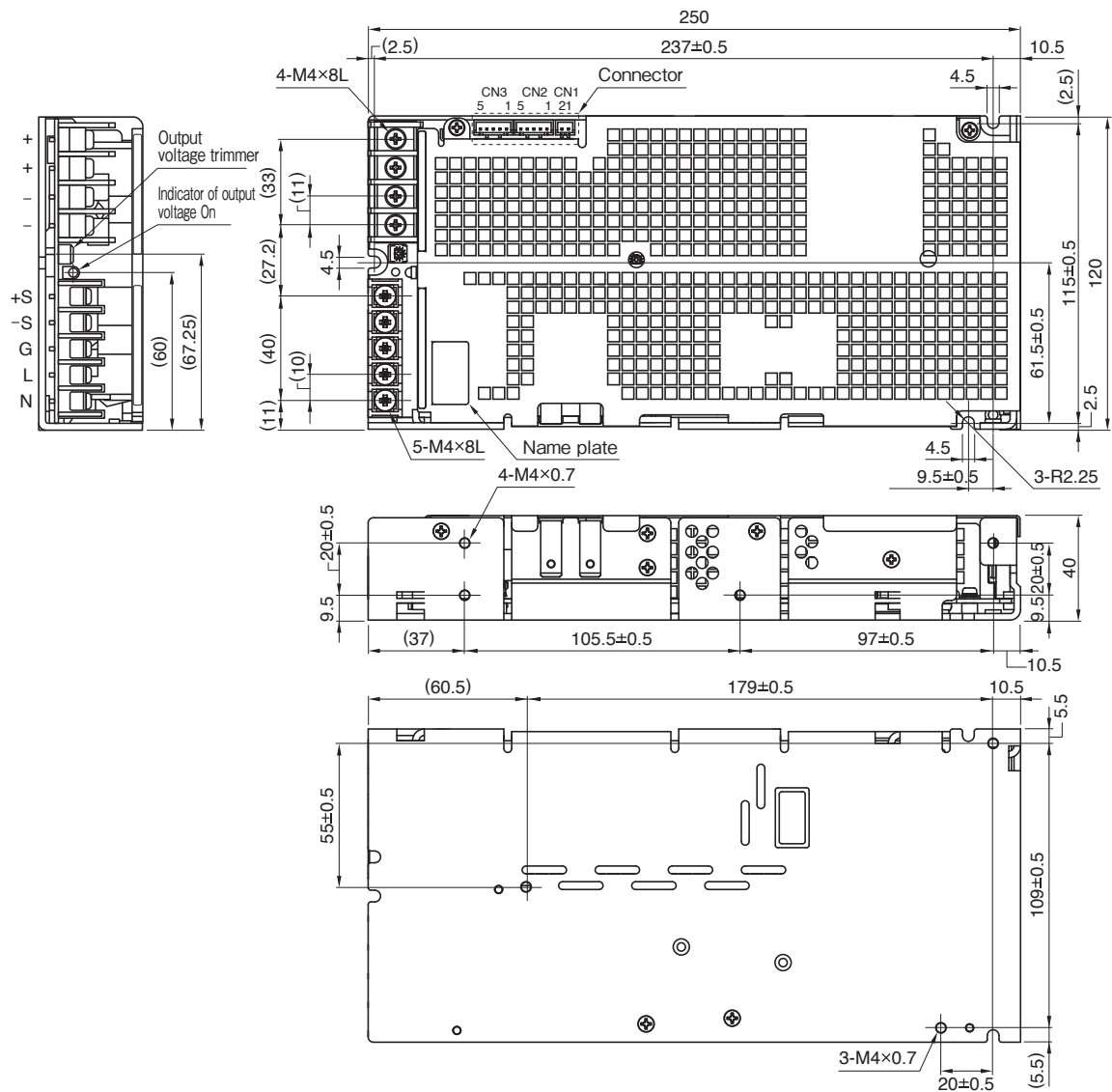
(*6) The detection value tracks the set output voltage (Vo). Output voltage shutdown system,
Resumes by restarting input (approximately 30s interval) or resetting remote control.

(*7) Output is shut down in the condition of 60% or lower of the nominal voltage for 3.3V and 5V models. For 28V models, Output
is shut down in the when the nominal voltage is 20% or lower. Other models do not have this function.

• All specifications are subject to change without notice.

Outline Drawing

Type with cover

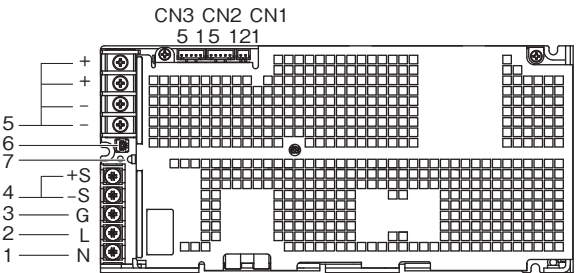


Unit: mm

* The insertion length of screws used for mounting the power supply should be within 6mm from the product surface. Allowable tolerance is ±1mm if not specified separately.

Terminals

Type with cover/Type L

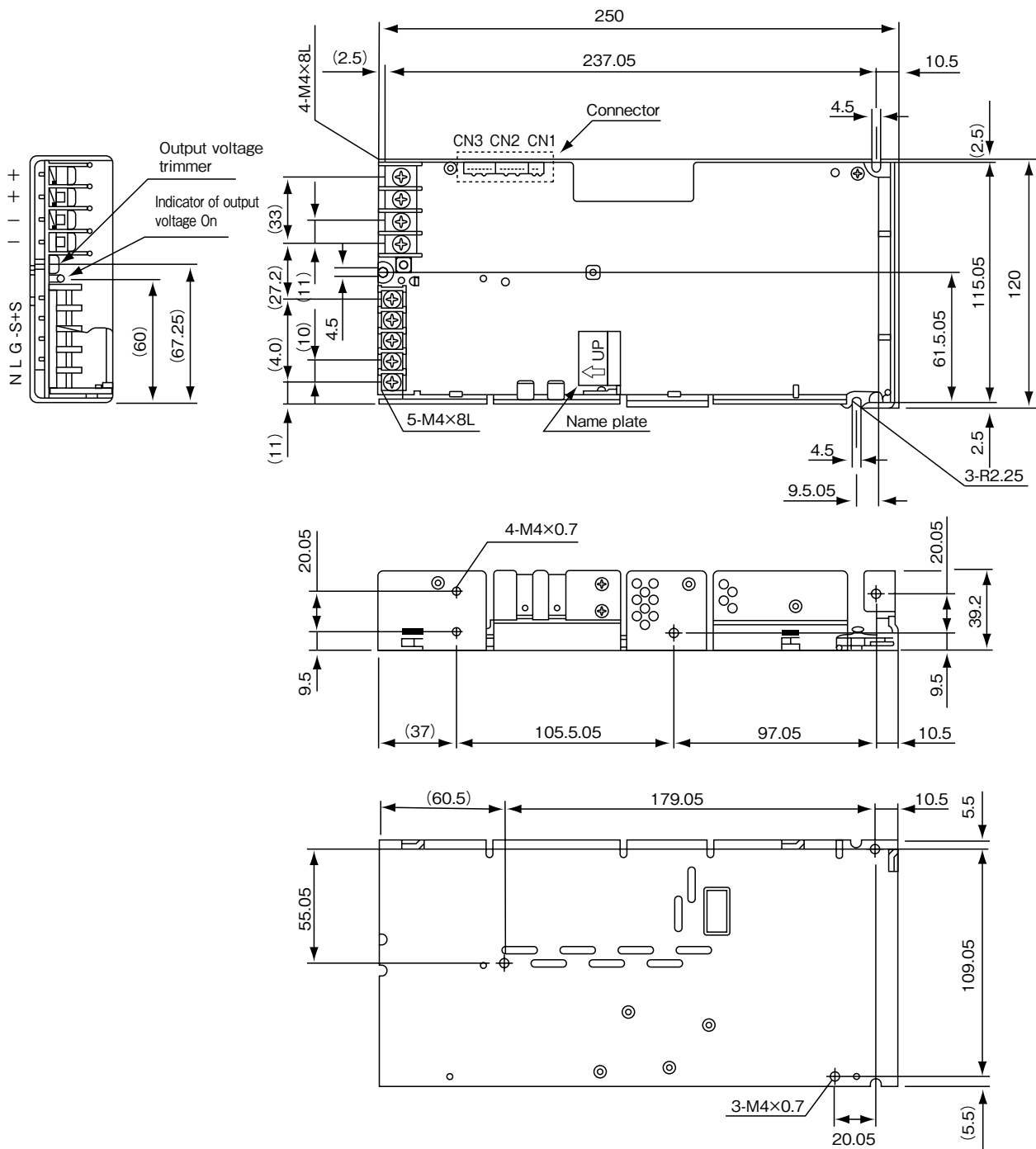


CN1	CN2	CN3
1 -PF	1 -RC	1 -RC
2 +PF	2 +RC	2 +RC
3 CB	3 CB	3 CB
4 RV	4 RV	4 RV
5 -S	5 -S	5 -S

Terminal No.	Name and function
1	AC input terminal (N)
2	AC input terminal (L)
3	Ground terminal (G)
4	Remote sensing terminal (+S, -S)
5	DC output terminal (+, -)
6	Output voltage trimmer (V _{ADJ})
7	LED output indicator (green)

Outline Drawing

Type L (terminal block facing upward, without cover)



Unit: mm

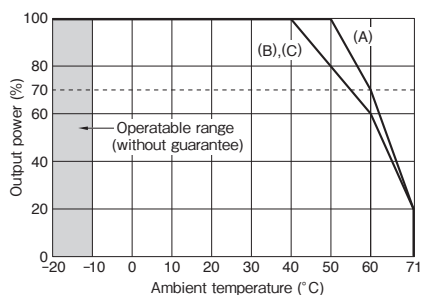
* The insertion length of screws used for mounting the power supply should be within 6mm from the product surface.

Allowable tolerance is ± 1 mm if not specified separately.

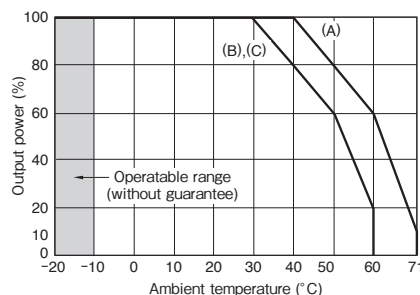
Derating Curve

50W

Type without cover/Type L

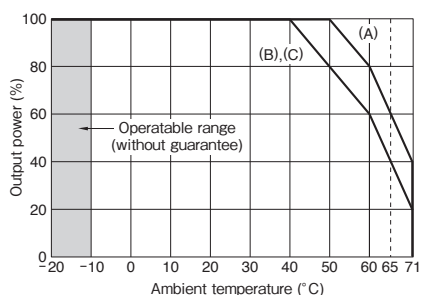


Type with cover

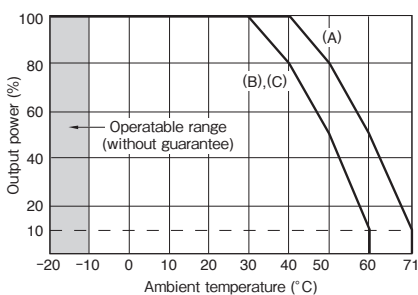


100W

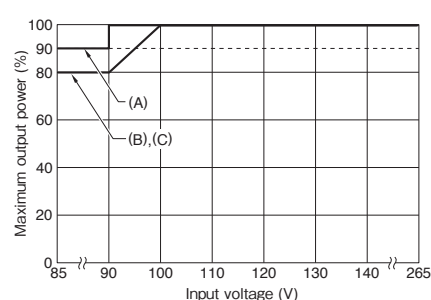
Type without cover/Type L



Type with cover

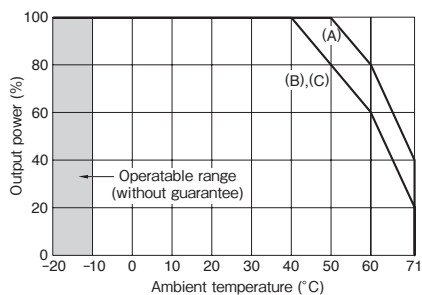


Input voltage derating (for type with cover)

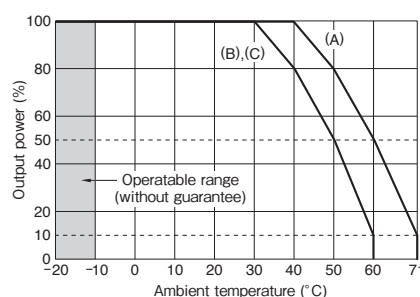


150W

Type without cover/Type L

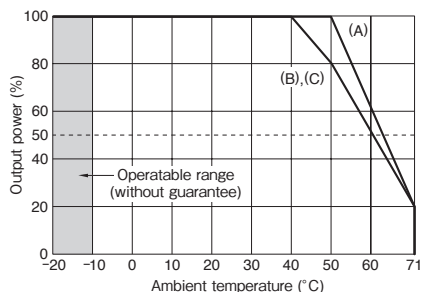


Type with cover

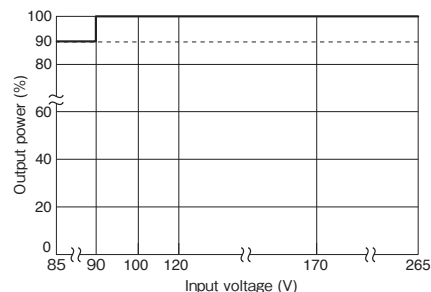


300W

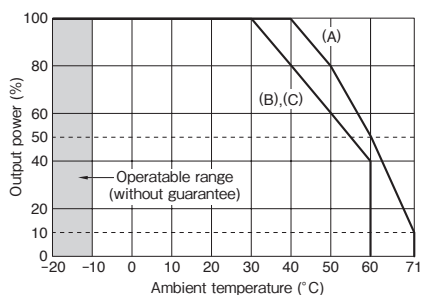
Type L



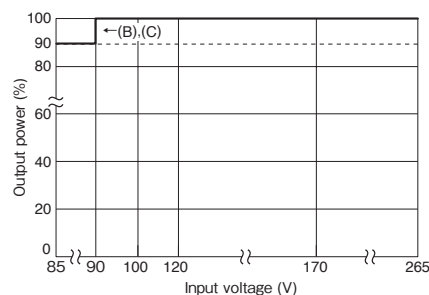
Input voltage derating (Type L)



Type with cover



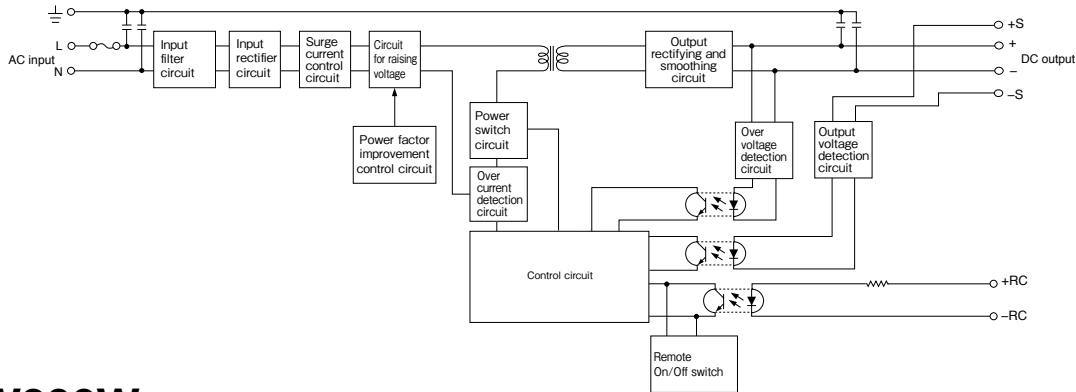
Input voltage derating (Type with cover)



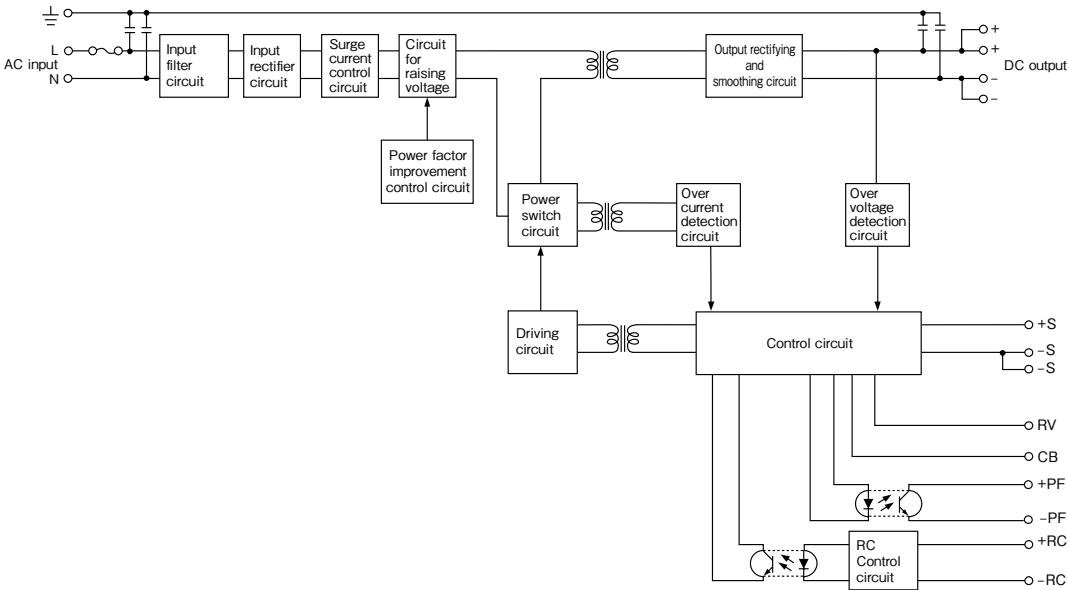
*Refer to the item regarding mounting in the handling instructions for (A), (B), and (C).

Block Diagram

RTW50-150W

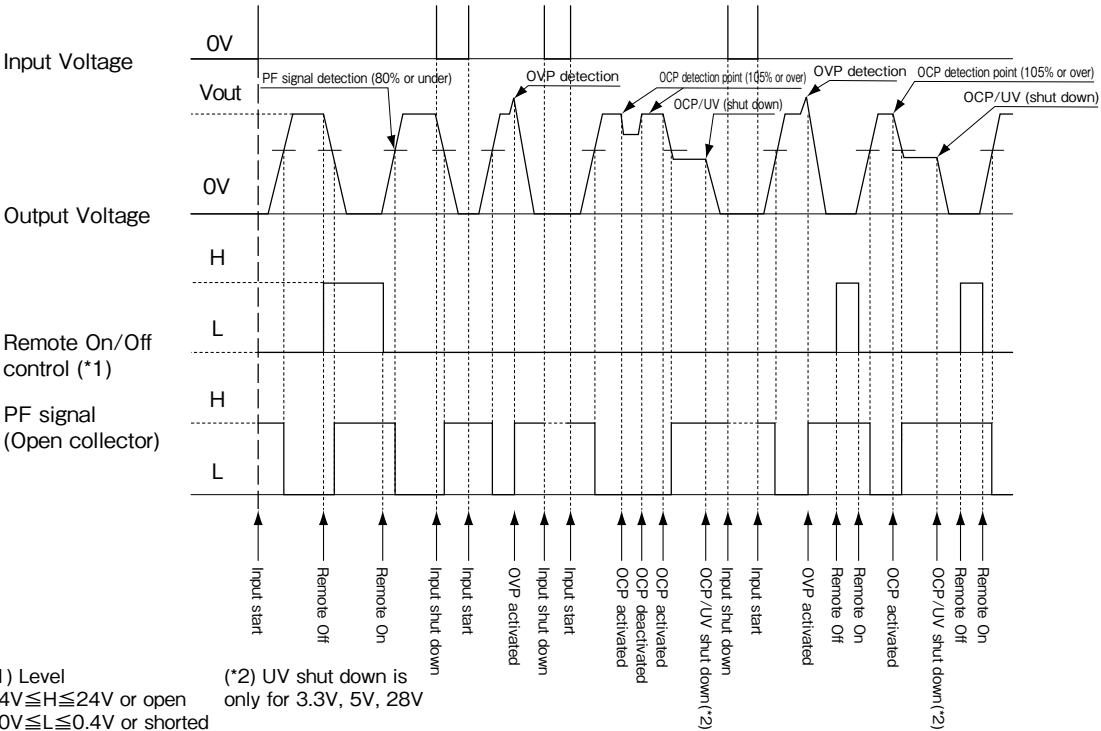


RTW300W



Sequence Time Chart

RTW300W



RTW Instruction Manual

1. Explanation of functions and notes

1 Remote sensing function

When the stability at the load terminal is a problem due to the effect of the line-drop from power supply to load, the stability can be improved by remote sensing.

Between output terminal and load terminal and for one side, up to

3.3V output: 0.15V max.

5V output: 0.25V max.

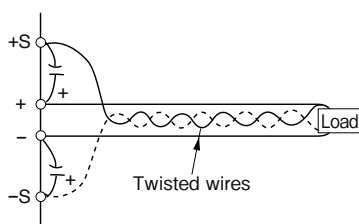
12-48V output: 0.4V max.

remote sensing is possible.

For output voltage and output power of the power supply, use this within the range of output characteristics. When in drastic load changes, specifications for dynamic load change may not be satisfied.

Remove the short plate between +S/+ and -S/- terminals, and make wiring as shown in the figure below. Use shielded wires or twisted wires for sensing line (5m at maximum is recommended).

If the OVP function tends to be activated easily or vibration easily occurs, set an external electrolytic capacitor with 470 μ F or over between +S and +, and between -S and -.



2 Remote On/Off function (50-150W)

Remote On/Off function is activated by setting the switch for use/nonuse of Remote On/Off function, located in the center of the power supply, to Y (turning in a clockwise direction).

By inputting signals described below to the remote On/Off terminals (+RC, -RC), output voltage can be switched on and off from outside the power supply. Output is not generated if voltage is not applied to RC terminal.

Output voltage is switched on in the condition of H level (4.5-24.5V external voltage application)* between +RC and -RC.

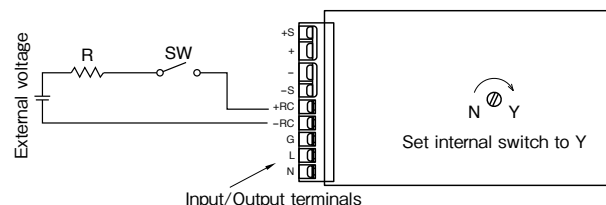
Output voltage is switched off in the condition of L level (shorted or 0-0.8V voltage between terminals) between +RC and -RC.

* When in 12.5-24.5V external voltage application, attach an external resistance (1.5k Ω).

\pm RC terminals are insulated from the AC input terminal and DC output terminal.

The insulation between the \pm RC terminals and the out-

puts conforms to the specification of insulation resistance (between output terminal and ground terminal), and the withstand voltage of the AC input terminal and the \pm RC terminals conforms to the specification (withstand voltage between input terminal and output terminal).



3 Remote On/Off function (300W)

By inputting signals described below to the remote On/Off terminals (+RC, -RC) of the function connector CN2 or CN3, output voltage can be switched on and off from outside the power supply.

\pm RC pins are connected by a cable kit when shipped. Remove the cable kit when using Remote On/Off function.

The output voltage is switched off in the condition of H level (open or 2.4-24V external voltage application (1.0mA max. inflowing current)) between +RC and -RC.

The output voltage is switched on in the condition of L level (shorted or 0-0.4V voltage between terminals (1.6mA max. outflowing current)) between +RC and -RC.

\pm RC terminals are insulated from the AC input terminal and DC output terminal.

The insulation between the \pm RC terminals and the outputs conforms to the specification of insulation resistance (between output terminal and ground terminal), and the withstand voltage of the AC input terminal and the \pm RC terminals conforms to the specification (withstand voltage between input terminal and output terminal).

4 Variable output voltage (RV) (300W)

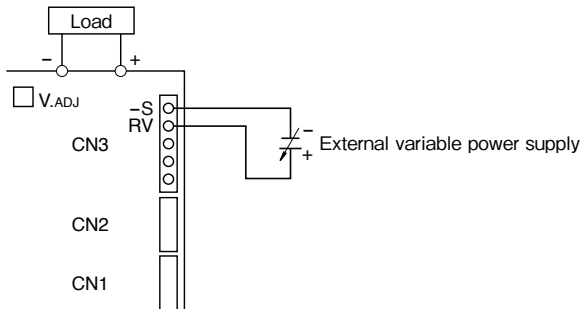
Output voltage can be varied by external voltage using variable output voltage (RV) of the function connector CN2 or CN3. The nominal output voltage can be generated by approximately 5V RV voltage.

When using this function, use twisted or bundled wires (recommended length is 2m max.) for wiring from RV/-S terminals.

- Set the output voltage to the lower limit value to be varied by turning the output voltage trimmer (V.ADJ).
- Output voltage is lowered by turning the trimmer in a

counterclockwise direction.

- Connect "+" of the external variable power supply to RV pin, and its "-" to -S pin.
- Output voltage can be varied by varying the voltage of the external variable power supply.

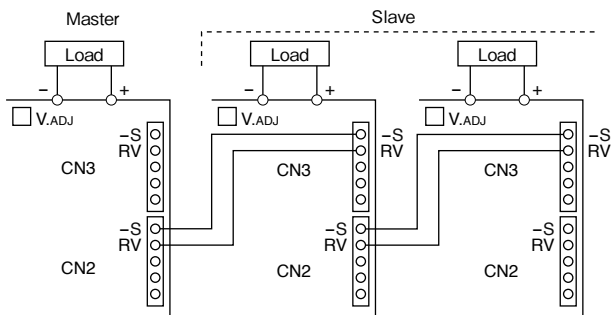


- Over Voltage Protection function may be activated if the output voltage is drastically lowered with less load.

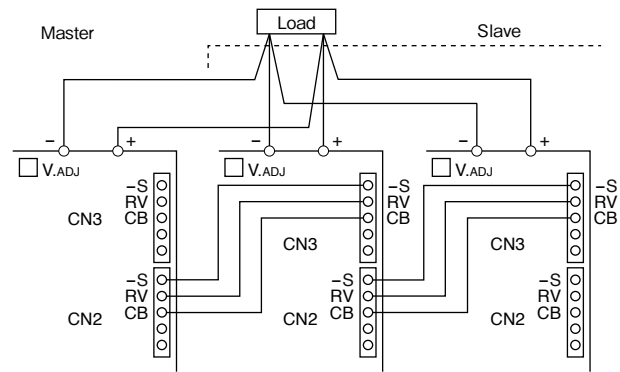
5 Master/slave function (300W)

Master/slave operation is applicable by using RV terminal. Mutually connect RV and -S of each power supply unit using CN2/CN3. Turn the voltage trimmer (V.ADJ) of the slave power supply unit counterclockwise until it stops. Output of all the power supply units can be varied according to V.ADJ of the master power supply unit. Use twisted or bundled wires for wiring from RV/-S terminals.

- In the case of multiple output loads



- In the case of one output load
The impedance of load line from each power supply should, if possible, be the same.



6 Current balance function (CB terminal) (300W)

When multiple power supplies are in parallel operation and their CB terminals and -S terminals are respectively mutually connected, this function controls the output current of the power supplies so that they become equal. Parallel operation should be configured with 4 units at maximum.

(1) Equalization condition

Output voltage fluctuation between power supplies
(Maximum voltage - Minimum voltage)/Nominal voltage = 2% max.

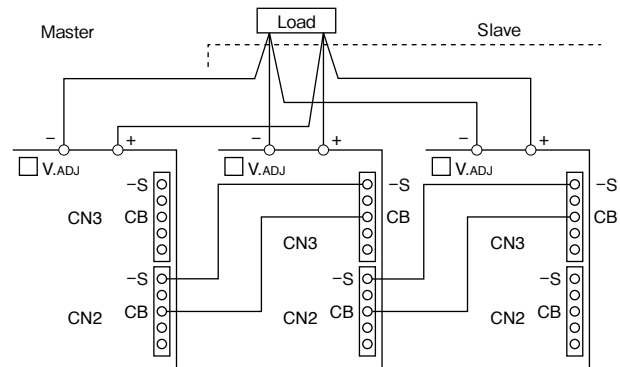
Output current: 20-90% of nominal total output current

(2) Equalization performance

Output current fluctuation between power supplies under the equalization conditions described above is 10% max. of nominal output current.

(3) CB terminal connection diagram

Use twisted or bundled wires for wiring from CB/-S terminals.

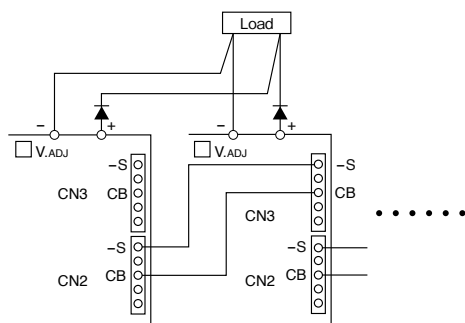


The impedance of load line from each power supply should, if possible, be the same.

7 Redundant operation (N+1) (300W)

When in redundant operation of power supply, connect a diode to the end of the power supply's output. The impedance of load line from each power supply should be possibly the same.

Use twisted or bundled wires for wiring from CB/-S terminals.



- Over Voltage Protection function may be activated if the output voltage is drastically lowered with less load.

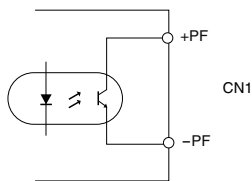
8 Power fail signal (300W)

It will become open when the output voltage drops to 80% or lower than the set voltage.

Sink current: 50mA max. Voltage between collector and emitter: 40V max. $\pm P/F$ terminals are insulated from the AC input terminal and DC output terminal.

The insulation between the $\pm P/F$ terminals and the outputs is the same as the insulation resistance between the output and the ground terminal, and the insulation between the AC input terminal and the $\pm P/F$ terminals is the same as the insulation resistance between the input terminal and the output terminal.

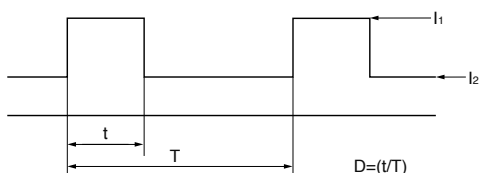
- Output specifications



9 Maximum peak current

24V-output products of 150W/300W accommodate peak power.

Observe the conditions shown below for a peak current over the nominal value.



150W

- (1) Condition of time
 $t \leq 10s$

- (2) Condition of peak current
 $I_1 \leq 10A$

- (3) Condition in effective current
 $\sqrt{DI_1^2 + (1-D)I_2^2} \leq 6.3A$

- (4) Condition of effective power
 $P \leq 151.2W$
(Effective current x output voltage)

300W

- (1) Condition of time
 $t \leq 10s$

- (2) Condition of peak current
 $I_1 \leq 20A$

- (3) Condition in effective current
 $\sqrt{DI_1^2 + (1-D)I_2^2} \leq 13A$

- (4) Condition of effective power
 $P \leq 312W$
(Effective current x output voltage)

10 CE marking

RTW series meets the EN60950-1 and the CE marking

is applicable to this series, based on 73/23/EEC and 93/68/EEC.

The custom-made power supply units (variation models) modified from this DC power supply device are not basically CE-marking applicable, except when "CE-marking applicable" is specifically declared in their specification document.

11 Insulation/withstand voltage test

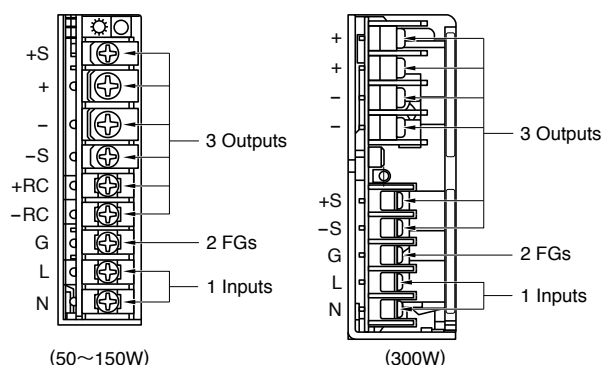
Insulation/withstand voltage test can cause deterioration. Due consideration should be given when implementing a test. It is necessary to keep the electric potential equal within inputs, within outputs, and within FGs (frame grounds), respectively.

As a testing device, if is the type which starts up gradually when in test on and automatically discharges the charged energy when in test off. If discharging after test is conducted manually, it should be conducted via approximately 100k Ω -1M Ω resistance (Note that discharging via low impedance should be avoided because it can cause deterioration).

Due attention should be paid to measures to prevent electric shock in any case.

- Power supply terminal connections for insulation/withstand voltage test

Short-circuit each terminal of outputs and inputs.

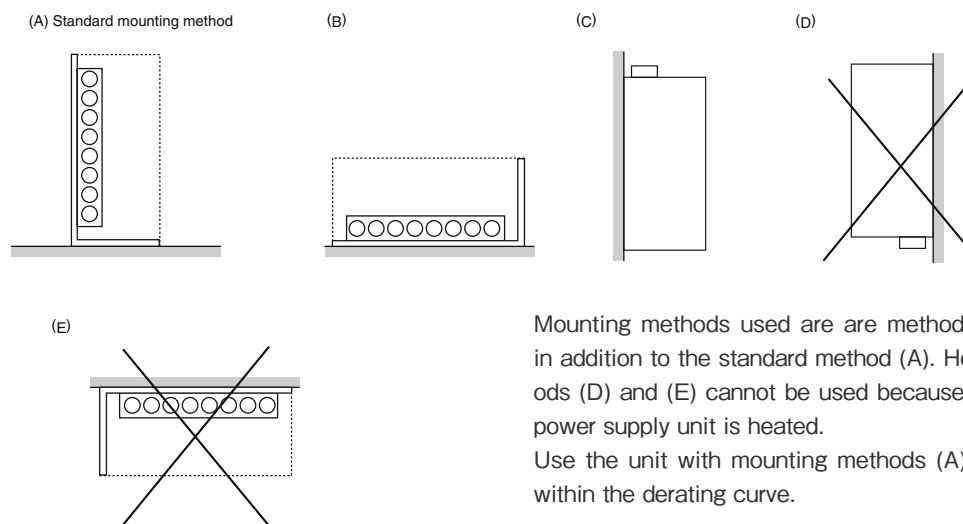


- Connections between testing device and power supply for insulation/withstand voltage test

Make connections between the testing device and power supply unit as shown in the table below. And then conduct a test.

Test conditions	Insulation testing device		Withstand voltage testing device	
	+terminal	-terminal	+terminal	-terminal
Insulation between Input and FG	1	2	—	—
Insulation between Input and Output	1	3	—	—
Insulation between Output and FG	3	2	—	—
Withstand voltage between Input and Output	—	—	1	3
Withstand voltage between Input and FG	—	—	1	2
Withstand voltage between Output and FG	—	—	3	2

2. Mounting



Mounting methods used are methods (B) through (E) in addition to the standard method (A). However, the methods (D) and (E) cannot be used because the inside of the power supply unit is heated.

Use the unit with mounting methods (A), (B), or (C), and within the derating curve.

3. Precautions in use

- When using this product, confirm that the power supply's ambient temperature is within the range of operating temperatures. The power supply's ambient temperature means the temperature around the power supply unit, causing a temperature rise inside the device.
- For use with natural air cooling, locate the unit so as to generate thermal convection. Also keep a distance of 10mm or over from adjacent devices, for each side of the unit.
- Select input/output wire materials and noise filters, etc. which have enough allowance in their respective current capacity.
- If the power supply unit is not in use for a long period of time, it is recommended to apply input voltage for approximately 1 hour, every 2 years, to keep the quality of the electrolytic capacitor.
- When the power supply units are in a series operation, the nominal current is restricted according to the lowest nominal current value of the units in use. In addition, in order to prevent damage to internal elements and other parts due to reverse voltage applied to the unit, connect a diode (reverse withstand voltage: twice or over the value of total output voltage, forward current: twice or over the value of output current, forward voltage drop: possibly minimum) to prevent reverse voltage to the output terminal of the unit.
- Any materials used in this product do not contain the bromine fire retardant (PBDPEs, PBBs).
- Any ODS is not used in production of this product.

4. Troubleshooting

- Is the specified input voltage applied to the input terminal?
- Are the connections of input/output terminals correct?
- Check that the connecting wires are not too thin.
- Check that the output voltage trimmer (V.ADJ) is not turned up too high. If the output voltage trimmer (V.ADJ) is turned up too high, it causes the OVP function to be activated, and the output is shut down.
- Are the logic of of Remote On/Off function and external voltage application set correctly?
- Check that the remote sensing terminal is not open. Applying input voltage in its open status may cause the OVP function to be activated, and the output to be shut down.

5. Variation models of power supplies

We prepare variation models to meet various needs of customers.

Variation symbol	50W/100W/150W				300W		
	Without cover	With cover	Type L	Coating	With cover	Type L	Coating
None	○						
B	○			○			
C		○					
G		○		○			
L	○		○			○	
M			○	○		○	○
H					○	○	
N					○	○	○