

KENWOOD

REGULATED DC POWER SUPPLY

PS series

INSTRUCTION MANUAL

KENWOOD CORPORATION

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This manual describes the handling and operation procedures of 13 types of PS Power Supply Units. Most descriptions, except the rating unique to each type, are common. Descriptions unique to the types are specified with types. Read the corresponding descriptions.

1. OUTLINE

The PS Series are switching type small-sized and light-weight regulated DC power supplies. With outstanding reliability and a variety of protective functions as power supply units, they are ideal industrial power supply units suitable for reliability tests, endurance tests, aging, etc. of various electronic parts and assemblies.

2. FEATURES

- Compact design with half the size and weight of typical models currently in use due to the switching system
- Simultaneous digital output voltage and current display on 7-segment LED's. Easy set voltage and current confirmation.
- A variety of fail-safe functions and rush current protector circuit remarkably improve the operation safety and load protection.
- Enhanced rack mounting density due to the front air intake type forced air cooling system
An air filter built in the front grill keeps out dust and other foreign matters.
- Control through the GP-IB by using an optional GP-IB adapter GP-600
- Controls the output voltage and current by using external voltage or an external resistor. Has many other control functions.
- Expandable current supply capacity
If the current supply capacity of the PS Series you are using is insufficient, it may be expanded by our factory at your option by connecting additional PS Series power supply unit(s).

3. SPECIFICATIONS

PS model names		6-60	6-120	10-35	10-70	20-18	20-36	20-54	36-10	36-20	36-30	60-6	60-12	60-18
Items														
Output														
Output voltage range		0 to 6V		0 to 10V		0 to 20V			0 to 36V			0 to 60V		
Set voltage resolution (Theoretical value)		10 turns, 0.017% of rated voltage												
Output current range		0 to 60A	0 to 120A	0 to 35A	0 to 70A	0 to 18A	0 to 36A	0 to 54A	0 to 10A	0 to 20A	0 to 30A	0 to 6A	0 to 12A	0 to 18A
Set current resolution (Theoretical value)		10 turns, 0.017% of rated current												
Constant-voltage characteristics														
Line regulation		0.05% of full scale + 5 mV for $\pm 10\%$ variation of supply voltage												
Load regulation		0.1% of full scale +5 mV for 0 to 100% variation of output current												
Ripple noises	P-P (Typical; Note 1)	100mV			150mV			100mV						
	Effective value (5 to 1MHz)	10mV rms					15mV rms	10mV rms		15mV rms	10mV rms	15mV rms	20mV rms	
Transient response (Typical)		1 ms			2ms		1ms	2ms		1ms	2ms			
Temperature coefficient (Typical)		$\pm 100\text{ppm}/^\circ\text{C}$												
Rise time		Fully loaded/no load: 80 ms/80 ms												
Fall time		Fully loaded/no load: 150 ms/1000ms												
Remote control		External voltage: 0 to approx. 10 V, external resistor ①: 0 to approx. 10 k Ω , external resistor ②: ∞ to 0 Ω , output voltage: 0 to full scale												
Constant-current characteristics														
Line regulation		125mA	245mA	75mA	150mA	41mA	82mA	123mA	25mA	50mA	75mA	17mA	34mA	51mA
		For $\pm 10\%$ variation of supply voltage												

Note 1: Switching noises measured by the 20 MHz oscilloscope.

PS model names		6-60	6-120	10-35	10-70	20-18	20-36	20-54	36-10	36-20	36-30	60-6	60-12	60-18
Items														
Load regulation		125mA	245mA	75mA	150mA	41mA	82mA	123mA	25mA	50mA	75mA	17mA	34mA	51mA
	For 0 to 100% variation of output current													
Ripple noise (5 to 1MHz)		120mArms	260mArms	70mA rms	160mArms	40mA rms	92mA rms	120mArms	20mA rms	60mA rms	80mA rms	12mA rms	44mA rms	55mA rms
Temperature coefficient	±200ppm/°C													
Remote control	External voltage: 0 to approx. 10 V, external resistor: 0 to approx. 10 kΩ, output voltage: 0 to full scale													
Meters and indicators														
Voltmeter	Indication and accuracy	Three and half digits, red LED, 0.1% rdg ±2 digits (at 23 ± 5°C) *1												
	Minimum reading	10mV												
Ammeter	Indication and accuracy	Three and half digits, red LED, 0.5% rdg ±3 digits (at 23 ± 5°C) *2												
	Minimum reading	100mA	10mA	100mA	10mA	100mA	10mA							
Constant-voltage operation indicator	Green CV LED goes on.													
Constant-current operation indicator	Red CC LED goes on.													
Output ON indicator	Red OUTPUT LED goes on.													
OVP circuit operation indicator	Red OVP LED goes on.													
Alarm indicator	Red ALARM LED goes on.													
Output signals														
Constant-voltage operation	Open collector, active Low													
Constant-current operation	Open collector, active Low													
OVP circuit operation	Open collector, active Low													

*1 When the remote sensing function is used.

*2 When the remote sensing function is not used.

PS model names		6-60	6-120	10-35	10-70	20-18	20-36	20-54	36-10	36-20	36-30	60-6	60-12	60-18
Items														
Alarm		Open collector, active Low												
Main relay operation		Open collector, active Low												
Output voltage monitor		Output voltage is divided by approx. 10, which is output as monitor voltage.												
Output current monitor		Approx. 0 to 10 V is output for 0 to full scale.												
Operation functions														
OUTPUT key		Turns the output on and of. Set to off when the power is turned on.												
LIM key		Displays set voltage and current on the front panel.												
OVP key		Displays OVP circuit voltage on the front panel.												
Output voltage preset		Sets OVP circuit voltage to approx. 10 to 110% of the full scale.												
Output on/off control		Enabled by inputting a contact signal. (Output voltage: 5V)												
Main relay on/off control		Enabled by inputting a contact signal. (Output voltage: 5V)												
Voltage remote sensing (Note 2)		Compensates voltage drop up to 1 V on either side.												
Protector circuits														
Output over-voltage protector		Cuts off the main relay and turns the ALARM LED on if the output voltage exceeds approx. 115% of the full scale.												
Output over-current protector		Cuts off the main relay and turns the ALARM LED on if the output current exceeds approx. 115% of the full scale.												
Internal over-heat		Cuts off the main relay and turns the ALARM LED on if the temperature of the internal heat sink reaches $100 \pm 5^{\circ}\text{C}$.												
Input fuse	90 to 132 VAC	10A	10A×2	10A	10A×2	10A	10A×2	10A×3	10A	10A×2	10A×3	10A	10A×2	10A×3
	180 to 250 VAC	5 A	5 A×2	5 A	5 A×2	5 A	5 A×2	5 A×3	5 A	5 A×2	5 A×3	5 A	5 A×2	5 A×3
Input over-voltage		Cuts off the main relay and turns the ALARM LED on if the input voltage exceeds approx. 145 V for supply voltage setting of 90 to 132 VAC.												

Note 2: Output voltage measured within the rated voltage range

PS model names		6-60	6-120	10-35	10-70	20-18	20-36	20-54	36-10	36-20	36-30	60-6	60-12	60-18
Items														
Environmental conditions														
Operation temp. range	0 to 50°C													
Operation humidity range	30 to 80% RH													
Storage temp. range	-20 to 70°C													
Storage humidity range	20 to 80% RH													
Cooling mechanism	Front air intake type forced air cooling with a fan													
To-ground voltage	±250 VDC													
Insulation resistance (at the room temperature and humidity of 70%)														
Between chassis and mains	500 VDC, 30 MΩ or more													
Between chassis and output terminals	500 VDC, 20 MΩ or more													
Dielectric strength	1500 VAC for 1 minute between the chassis and mains or between the mains and output terminals													
Input voltage														
Voltage, Frequency	90 to 132 VAC/180 to 250 VAC, 50/60 Hz, single-phase													
Power consumption	AC90 to 132V	Approx. 470W	Approx. 940W	Approx. 440W	Approx. 870W	Approx. 450W	Approx. 900W	Approx. 1300W	Approx. 450W	Approx. 900W	Approx. 1300W	Approx. 450W	Approx. 900W	Approx. 1300W
		Approx. 840VA	Approx. 1600VA	Approx. 800VA	Approx. 1500VA	Approx. 800VA	Approx. 1500VA	Approx. 2200VA	Approx. 800VA	Approx. 1500VA	Approx. 2200VA	Approx. 800VA	Approx. 1500VA	Approx. 2200VA
	AC180 to 250V	Approx. 460W	Approx. 910W	Approx. 430W	Approx. 850W	Approx. 430W	Approx. 850W	Approx. 1300W	Approx. 430W	Approx. 850W	Approx. 1300W	Approx. 430W	Approx. 850W	Approx. 1300W
		Approx. 1000VA	Approx. 1900VA	Approx. 950VA	Approx. 1800VA	Approx. 950VA	Approx. 1800VA	Approx. 2600VA	Approx. 950VA	Approx. 1800VA	Approx. 2600VA	Approx. 950VA	Approx. 1800VA	Approx. 2600VA

Items		PS model names													
		6-60	6-120	10-35	10-70	20-18	20-36	20-54	36-10	36-20	36-30	60-6	60-12	60-18	
Dimensions [mm]															
Frame dimensions	Width	70	140	70	140	70	140	210	70	140	210	70	140	210	
	Height	124													
	Depth	350.5													
Max. dimensions	Width	70	140	70	140	70	140	210	70	140	210	70	140	210	
	Height	132.5	141	132.5	141	132.5	141	132.5	141	132.5	141	132.5	141		
	Depth	411													
Weight [kg]		Approx. 3.0	Approx. 5.5	Approx. 3.0	Approx. 5.5	Approx. 3.0	Approx. 5.5	Approx. 7.5	Approx. 3.0	Approx. 5.5	Approx. 7.5	Approx. 3.0	Approx. 5.5	Approx. 7.0	
Accessories															
Instruction manual		1 copy													
Power cord		1 (3-core AC cable; 2 meters)													
Adapter plug		1				0		1		0		1		0	
Power input terminal protectors		Cover: 1, cord fixture: 1, cover fixing screws: 2, cord fixing screws: 2													
Main output terminal protector		Cover: 1													
Control connectors		20-pin connector: 1, 8-pin connector: 1													
GND cable		1 (3 mm dia. with a crimp terminal)													
Ring type terminal lug		1 (3 mm dia. lug: Use this terminal lug for grounding with another measuring instrument.)													

4. PRECAUTIONS FOR USE

WARNING

1) Checking the supply voltage

*Use the PS Series within the rated supply voltage range.

The power rating of the PS Series is 90 to 132/180 to 250 VAC, single-phase, 50/60 Hz.

*The rated voltage is indicated on the rating plate beside the power input terminals on the rear panel.

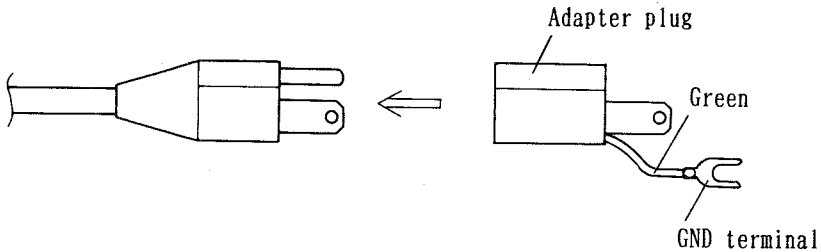
*The supply voltage rating (100 VAC range or 200 VAC range) is set in the factory. If you want to change the factory-set rating, please contact your dealer or our distributor.

2) Connecting the power cord

Use the power cord included in the accessories. Screw it onto the power input terminals, then be sure to put the protection cover onto the terminal block.

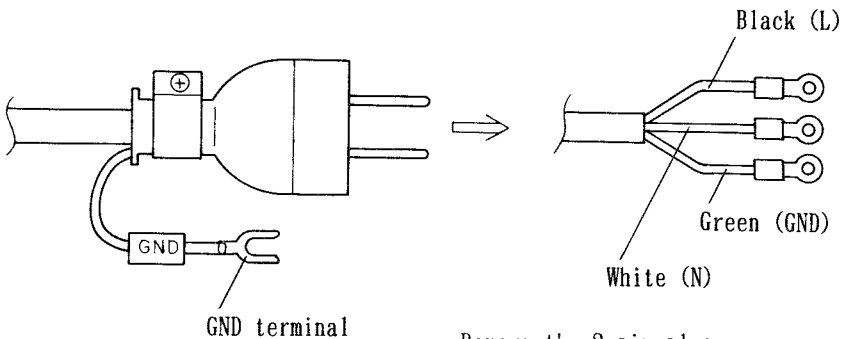
3) Power cord

*The power cord supplied with the PS6-60, 6-120, 10-35, 10-70, 20-18, 20-36, 36-10, 36-20, 60-6, or 60-12 has a rating of 125 V, 10 A. It may be connected with a wall socket of a commercial AC power line. If an available wall socket is of a parallel 2-pin type, use the adapter plug included in the accessories.



This power cord may not be used for a 200 VAC power line. (125 VAC max.)

*The power cords supplied with three models other than the ten shown above have a rating of 125 V, 15 A. If the PS Series is to be used for a load over the power cord rating, remove the 2-pin plug from the power cord, fit the wire tips with crimp terminals or the like, then connect the terminals to the power distribution board of the available commercial power line.



Remove the 2-pin plug,
then fit the wires with terminal lugs.

4) Precautions for application in floating condition

If the PS Series power supply unit is used in the floating condition, a high potential difference may be produced between the frame GND and output terminals. If they are short-circuited in such a condition, a measuring instrument or an electric load connected to the PS Series may be broken.

If you touch the frame GND and output terminals simultaneously by mistake, you may get an electric shock. Use the greatest care. If high potential difference is produced between the frame GND and output terminals, it may remain charged in the noise reducing capacitor even after use. In such a case, connect a resistor of 500k Ω or so between the frame GND and the positive and negative output terminals to discharge the capacitor. (The capacitor is discharged for a second or so when a 500k Ω resistor is connected.)

5) Notes on the output terminals

*The PS Series is a floating type power supply unit. If its output should be grounded, connect any output terminal on the rear panel to the frame GND terminal with the GND cable included in the accessories.

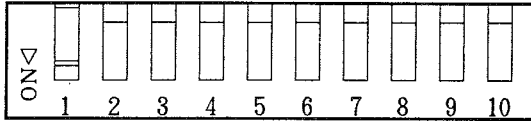
*A maximum of 20 A is output through the output terminals on the front panel. If output current exceeding 20 A is required, be sure to use the output terminals on the rear panel.

CAUTION

1) Checking the control terminals and switches on the rear panel and notes on them

*A part of the remote control terminals is connected with the positive terminal (+S terminal). Power supply or resistor used for remote control should be floated. For details, read through the operation instructions given below.

*The switches on the rear panel are used to select an remote control method and to change over the voltage remote sensing function. They are set as shown below in the factory:



Only switch 1 is set ON.

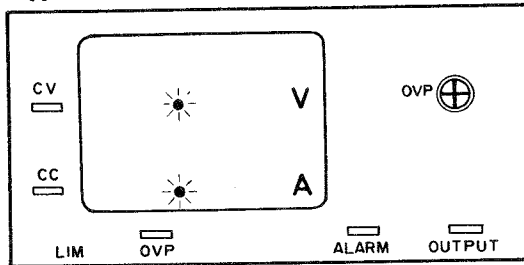
2) Notes on the installation conditions and load applications

- *The rated operation temperature of the PS Series is between 0 and 50°C. If it is used at an extremely high ambient temperature, a built-in thermal protector circuit functions and turns the power relay off.
- *Do not use the PS Series with the air intake in the front panel and fan port in the rear panel blocked. Keep a clearance of 30 cm or more between either port and an object next to it. Do not allow hot air to enter into the unit through the air intake in the front panel.
- *Do not use the PS Series in a place subject to dust, corrosive gas, etc.
- *The PS Series is a switching type power supply unit. Note that it may have bad influences upon highly sensitive measuring instruments placed on or beside it or connected with the same AC power line that the PS Series is connected with.
- *The PS Series is a switching type power supply unit. Do not use it in the places or for applications shown below:
 1. Use in an EMI measuring site or a shielded room
 2. Use in an adjustment and inspection line of receivers, tuners, etc.
 3. Use for loads affected by switching noises or ripples in the AC line

3) Notes on power on procedure

*When approx. a second has passed since the PS Series is powered on, decimal points are displayed on the voltage and current indicator LED's. In approx. three seconds since then, all digits and segments of these LED's go on. Then, the OUTPUT switch becomes functional in approx. a second. In principle, the OUTPUT switch is inactive when the power is turned on.

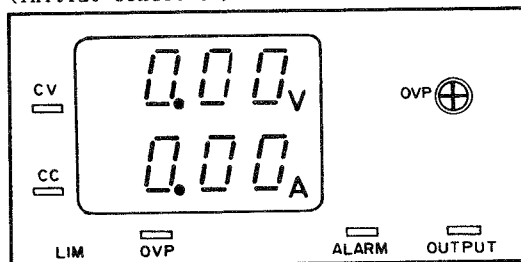
(Approx. a second after power on)



Only decimal points go on.

Approx. three seconds

(Initial condition)

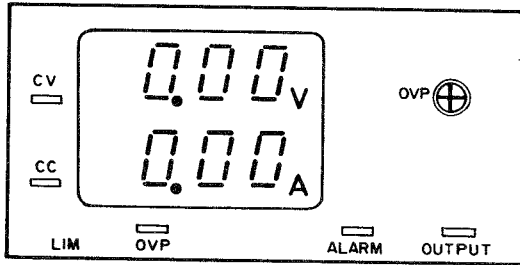


Voltage and current indicator LED's go on.
OUTPUT switch is inactive.

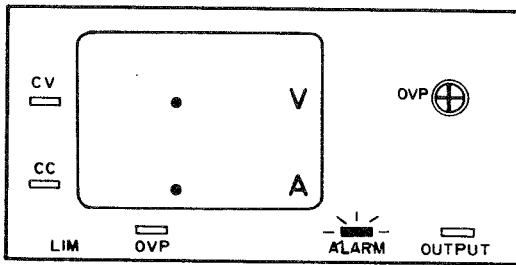
*When the PS Series is powered on, the AC line voltage may drop temporarily, since large rush current flows through the PS Series. Thus, be careful to use other measuring instruments on the same AC power line that the PS Series is connected with.

4) Notes on power off procedure

When the power of the PS Series is turned off with the POWER switch on it, the ALARM LED on the front panel goes on, which does not mean a trouble or abnormality of the PS Series. If the power is turned on again with the ALARM LED lighting, the ALARM LED keeps lighting and operation of the PS Series is disabled. Before turning on the power again, be sure to confirm that the ALARM LED is off.



Trun the power off with the POWER switch.



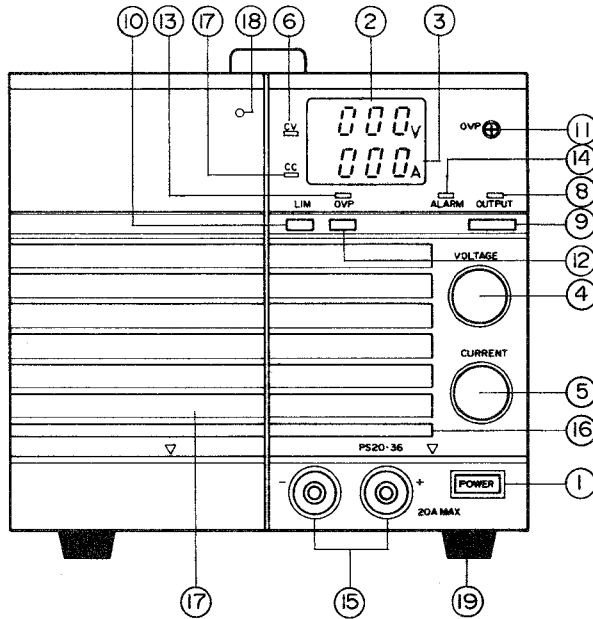
The ALARM LED goes on.

Before turning on the power again,

be sure to confirm that the ALARM LED is off.

5. PANEL EXPLANATION

5-1 Front Panel



①POWER switch

Press this switch, and the internal sub-power supply is turned on and the main AC relay is activated in approx. a second (switch depressed). Press it again, and the internal sub-power supply is turned off and the main AC relay is deactivated (switch released).

②Voltmeter

Displays output voltage and set voltage. Also displays the polarity.

③Ammeter

Displays output current and set current. No polarity display.

④VOLTAGE control

Controls voltage of constat-voltage operation. Clockwise rotation increases set voltage.

⑤CURRENT control

Controls current of constant-current operation. Clockwise rotation increases set current.

⑥CV LED (Green)

The LED keeps lighting in process of constant-voltage operation. It goes off when the output is turned off.

⑦CC LED (Red)

This LED keeps lighting in process of constant-current operation. It goes off when the output is turned off.

⑧OUTPUT LED (Red)

This LED keeps lighting while preset power is being output through the output terminals.

⑨OUTPUT key

Turns the output on and off. When the output is turned on, the OUTPUT LED ⑧ goes on, and the voltmeter ② and ammeter ③ display the voltage and current being output through the output terminals.

⑩LIM key

Allows to check voltage and current set with the VOLTAGE control ④ and CURRENT control ⑤. While the LIM key is being pressed, the voltmeter ② and ammeter ③ display preset voltage and current.

⑪OVP control

A semi-fixed control for setting OVP (over-voltage protection) operation voltage. Clockwise rotation increases set voltage.

⑫OVP key

Allows to check OVP operation voltage set with the OVP control ⑪. While the OVP key is being pressed, the voltmeter ② displays preset voltage.

⑬OVP LED (Red)

This LED indicates OVP operation condition. It goes on if voltage output through the output terminals exceeds OVP operation voltage set with the OVP key ⑫ while the output is on (and the OUTPUT LED ⑧ is lighting).

If this LED goes on, the output is turned off (and the OUTPUT LED ⑧ goes off).

⑭ALARM LED (Red)

If an error occurs in the PS Series, this LED goes on, the OUTPUT LED ⑧ goes off, the output is turned off, and the main AC relay turns off. While this LED is on, all digits of the voltmeter ② and ammeter ③, except the decimal points, are off, and the output may not be turned on with the OUTPUT key ⑨. By the way, this LED goes on when the POWER switch ① is deactivated (switch released). This does not mean an error in the PS Series.

⑮ Auxiliary output terminals (Positive: red, negative: white)

These terminals output the power of the PS Series, which is set while the OUTPUT LED ⑧ is on. The maximum output current is 20 A. Note that the power output through these terminals has worse electrical characteristics.

⑯ Master grill

Air is let in through this grill for cooling the inside of the PS Series. They have dust-proof filters inside. Wash the filters with water periodically to avoid clogging up.

⑰ Slave grill (Only models other than the PS6-60, 10-35, 20-18, 36-10 or 60-6)

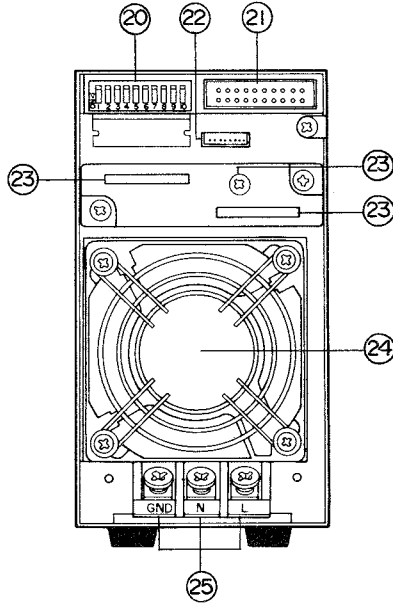
Same as above explanation.

⑱ Slave power LED (Red; Only models other than the PS6-60, 10-35, 20-18, 36-10 or 60-6)

Goes on when the internal main AC relay functions and the slave power unit is turned on.

⑲ Rubber shoes

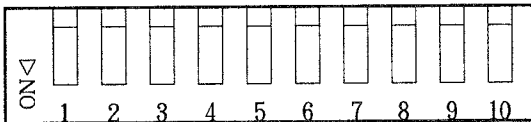
5-2 Rear Panel



Figure

⑳ Rear control switches S₁

Use these switches to select various remote controls.



*1: POWER SELECT switch

1	
ON	The main relay is turned on when the POWER switch ① on the front panel is activated (switch depressed). It is turned off when the POWER switch is deactivated (switch released).
OFF	The main relay is controlled externally through the control terminal block J ₁ ② on the rear panel.

*2 and 3: OUTPUT SELECT switches

2	3	
OFF	OFF	The output of the PS Series may be turned on and off with the OUTPUT key ⑨ on the front panel.
ON	OFF	
OFF	ON	The output of the PS Series may be turned on and off externally through the control terminal block J ₁ ② on the rear panel.
ON	ON	The output of the PS Series is turned on automatically when the main AC relay is activated.

NOTE: If the OUTPUT SELECT switches 2 and 3 are set ON, the output of the PS Series may not be turned on or off with the OUTPUT key ⑨ or through the remote control terminal block J₁ ②.

*5 and 6: V CONTROL SELECT switches

5	6	
OFF	OFF	The voltage of the PS Series may be controlled with the VOLTAGE control ④ on the front panel.
ON	OFF	The voltage of the PS Series may be controlled by inputting voltage from outside through the control terminal block J ₁ ② on the rear panel. (Output voltage between 0 V to F.S. corresponds to input voltage between approx. 0 to 10 V.)
OFF	ON	The voltage of the PS Series may be controlled with an external resistor connected to the control terminal block J ₁ ② on the rear panel. (Output voltage between 0 V to F.S. corresponds to resistance between approx. 0 Ω to 10 kΩ.)
ON	ON	The voltage of the PS Series may be controlled with an external resistor connected to the control terminal block J ₁ ② on the rear panel. (Output voltage between 0 V to F.S. corresponds to resistance between approx. infinite to 0 Ω.)

(F.S. is an abbreviation of full scale and denotes the rated value.)

*7 and 8: C CONTROL SELECT switches

7	8	
OFF	OFF	The current of the PS Series may be controlled with the CURRENT control ⑤ on the front panel.
ON	OFF	The current of the PS Series may be controlled by inputting voltage from outside through the control terminal block J ₁ ② on the rear panel. (Output current between 0 A to F.S. corresponds to input voltage between approx. 0 to 10 V.)
OFF	ON	The current of the PS Series may be controlled with an external resistor connected to the control terminal block J ₁ ② on the rear panel. (Output current between 0 A to F.S. corresponds to resistance between approx. 0 Ω to 10 kΩ.)
ON	ON	The current of the PS Series may not be controlled. (It is approx. 0 A.)

*10: V SENS SELECT switch

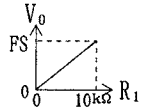
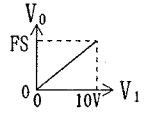
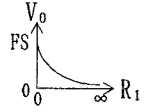
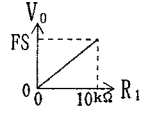
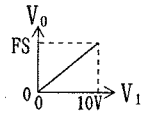
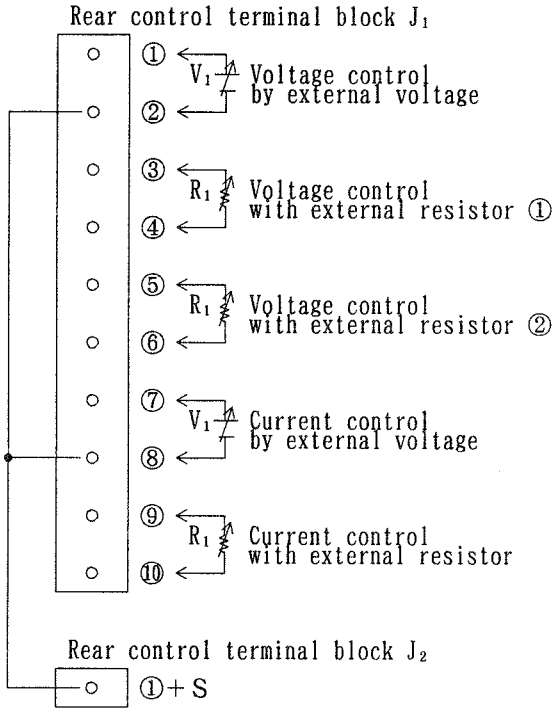
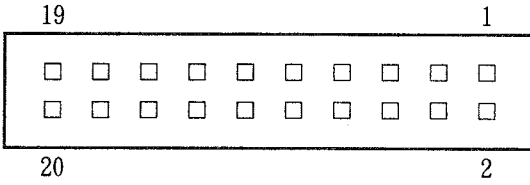
10	
OFF	The positive and negative output terminals on the rear panel serve as the remote voltage sensing point.
ON	The voltage sensing point may be apart from the PS Series by using the control terminal block J ₂ ② on the rear panel.

*4 and 9: Not used.

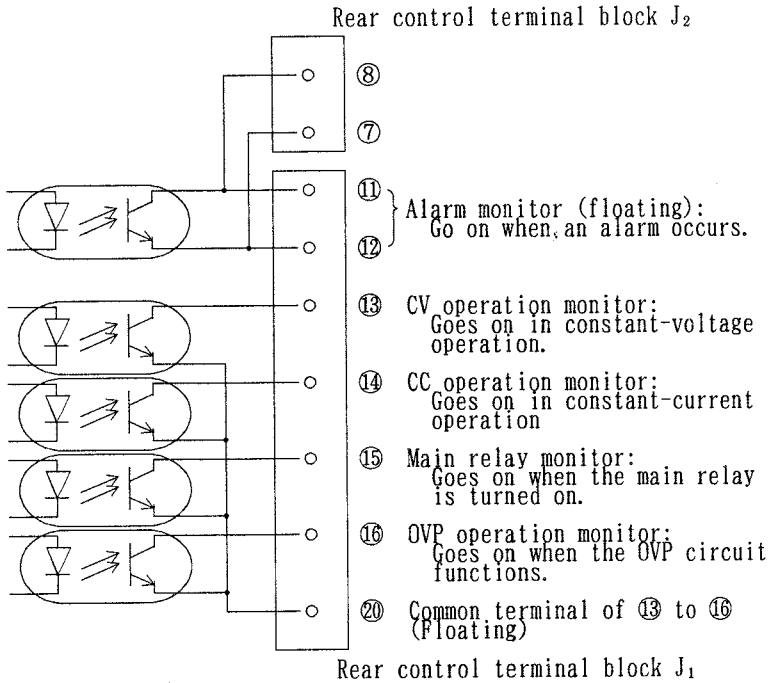
NOTE: Be sure to deactivate the POWER switch ① on the front panel (to the released position) before changing setting of the control switches S₁ on the rear panel.

② Rear control terminal block J₁

Use this terminal block for various remote controls.



Pin Nos.	Functions	S ₁ settings			
		5	6	7	8
1, 2	Terminals for controlling set voltage by applying voltage from outside Voltage to be applied: -0.6 V min. to +11 V max., input impedance: approx. 10 kΩ	ON	OFF	—	—
3, 4	Terminals for controlling set voltage with an external resistor Flowing current with resistor connected: Approx. 1 mA	OFF	ON	—	—
5, 6	Terminals for controlling set voltage with an external resistor Flowing current with short-circuited terminals: Approx. 1 mA	ON	ON	—	—
7, 8	Terminals for controlling set current by applying voltage from outside Voltage to be applied: -0.6 V min. to +11 V max., input impedance: approx. 10 kΩ	—	—	ON	OFF
9, 10	Terminals for controlling set current with an external resistor Flowing current with resistor connected: Approx. 1 mA	—	—	OFF	ON



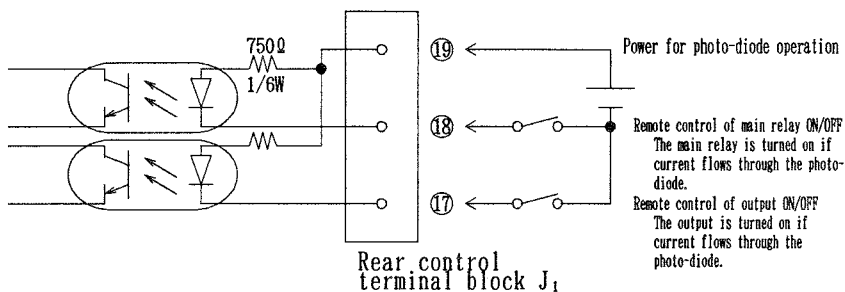
Pin Nos.	Functions
11, 12	Terminals for monitoring alarms. They go on when an alarm occurs.
13	A terminal for monitoring constant-voltage operation. It goes on when constant-voltage operation starts.
14	terminal for monitoring constant-current operation. It goes on when constant-current operation starts.
15	A terminal for monitoring the state of the main relay. It goes on when the main relay is turned on.
16	A terminal for monitoring OVP operation. It goes on when the OVP circuit functions.
20	A common terminal of the terminals ⑬ to ⑯

The monitor terminals shown above are connected to the transistors at the light receiving points of photo-couplers (PC817(A) made by SHARP). Refer to the photo-coupler rating table on the following page.

■ Absolute Maximum Ratings ($T_a = 25^\circ\text{C}$)

Parameter		Symbol	Rating	Unit
Output	Voltage between collector and emitter	V_{CE0}	35	V
	Voltage between emitter and collector	V_{EC0}	6	V
	Collector current	I_c	50	mA
	Collector loss	P_c	150	mW
Total allowable loss		P_{tot}	200	mW
Dielectric strength *1		V_{iso}	5,000	V _{rms}

*1 RH = 40 ~ 60 %, AC for 1 minute

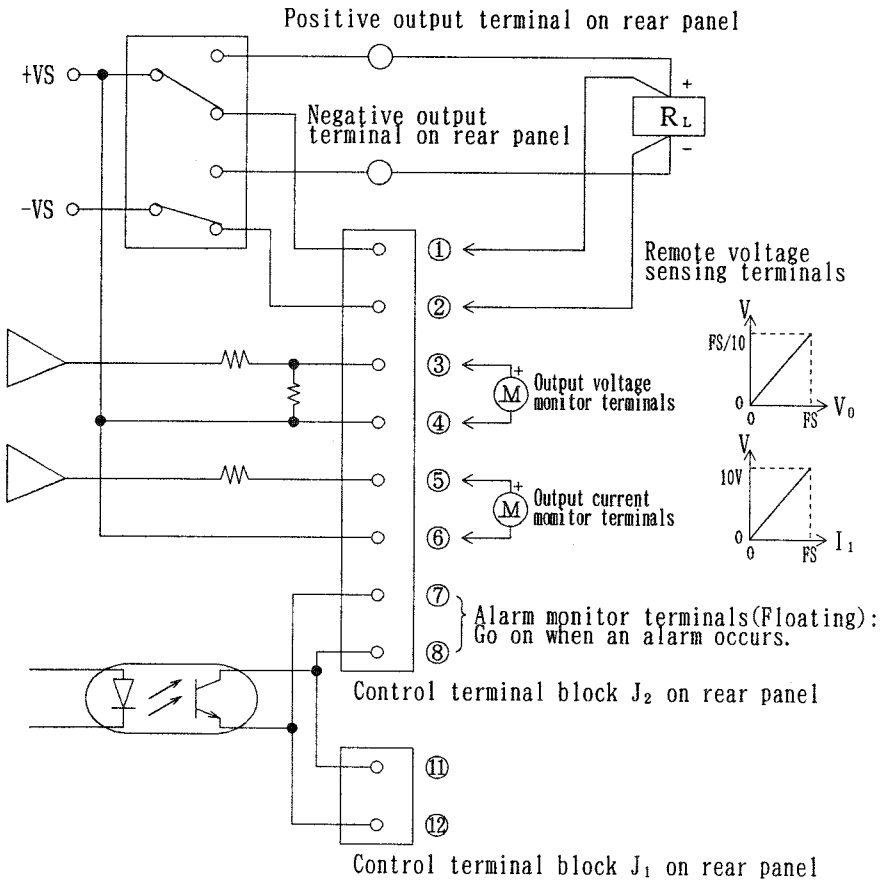
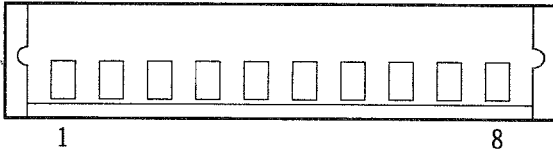


Pin Nos.	Functions	S ₁ settings		
		1	2	3
17	A remote control terminal for turning on and off the output, which goes on if current flows through the photo-diode. Photo-diode current: Approx. 2 mA min. to 10 mA max.	—	OFF	ON
18	A remote control terminal for turning on and off the main relay, which is turned on if current flows through the photo-diode. Photo-diode current: Approx. 2 mA min. to 10 mA max.	OFF	—	—
19	A power terminal for the photo-diode. Apply voltage through this terminal from outside. Voltage to be applied: 7.5 V max.	—	—	—

NOTE: Be sure to deactivate the POWER switch ① on the front panel (to the released position) before connecting wires to the control terminal block J₁ on the rear panel.

⑫Rear control terminal block J₂

Use these control terminal block to monitor various status signals output by the PS Series.



Pin Nos.	Functions
1, 2	Use these terminals if the remote voltage sensing function is required. Set the remote switch S ₁ ⑳ (No. 10: V SENS SELECT switch) ON to use the remote voltage sensing function.
3, 4	Output voltage monitor terminals. Approx. 1/10 of the output voltage is output through these terminals. Output impedance: Approx. 114Ω (6 V model), approx. 750Ω (10 V model), approx. 255 Ω (20 V model), approx. 455 Ω (36 V model), or approx. 1 k Ω (60 V model)
5, 6	Output current monitor terminals. Approx. 10 V is output for the full scale output. Output impedance: Approx. 1 kΩ
7, 8	Alarm monitor terminals, which go on when an alarm occurs

NOTE: Be sure to deactivate the POWER switch ① on the front panel (to the released position) before connecting wires to the control terminal block J₂ on the rear panel.

㉓Main output terminal block (with positive, negative and GND terminals)

This terminal block outputs the power of the PS Series which is set while the OUTPUT LED ⑧ is on. The upper left is the positive output terminal, the lower right one is the negative output terminal, and the screw above the negative output terminal is the frame GND terminal. Use the bolts and nuts included in the accessories to connect a load. For the frame GND terminal, never use any other screw than fitted on the terminal. Use of any other screw may cause short circuit in the internal circuit, resulting in malfunction or troubles.

㉔Fan motor

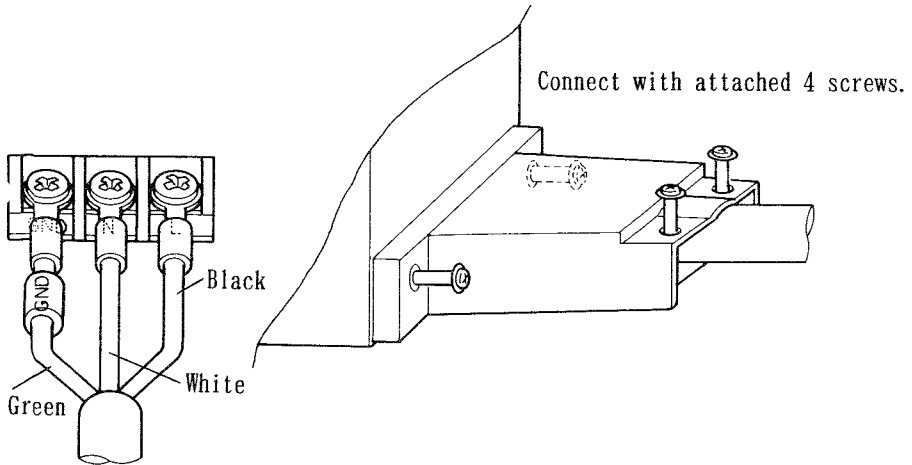
A thermal sensing type fan cools the inside of the PS Series. When the exhaust temperature is high, the revolution of the fan motor increases.

㉕Power input terminal block

Check the supply voltage indicated on the left of this terminal block, then connect the AC cord included in the accessories to the terminal block.

6. OPERATIONS

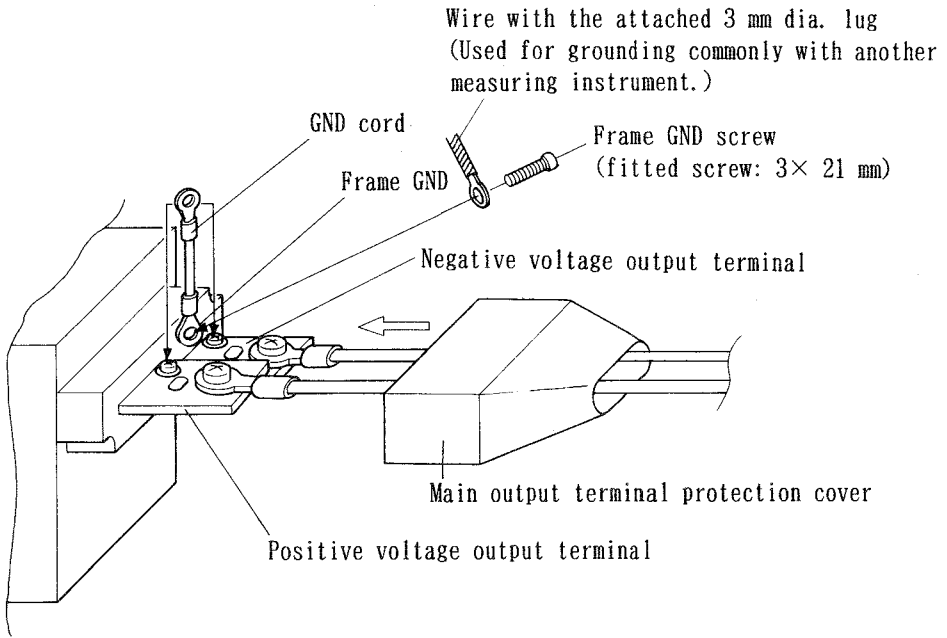
6-1 Connecting Power Cord



- 1) Connect the power cord included in the accessories to the power input terminal block ⑤ securely with screws.
- 2) Attach the protection cover to the power input terminal block with attached screws. Secure the power cord fixture with the attached screws.

NOTE: Before connecting the power cord to the wall socket of the commercial power line or power distribution board, check the supply voltage indicated on the right of the power input terminals. Be sure to deactivate the POWER switch ① (to the released position).

6-2 Connecting Load with Main Output Terminal

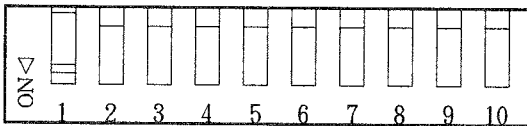


- 1) Turn off the OUTPUT LED ⑧ on the front panel.
- 2) Connect a load securely with the positive and negative output terminals on the rear panel using wires with crimp terminals and the nuts included in the accessories.
- 3) Connect the GND terminal with the positive or negative output terminal with the GND cord included in the accessories as necessary.
- 4) If another measuring instrument should be connected to the GND terminal, fit a wire with the terminal lug (3 mm dia.) included in the accessories and use the wire for grounding.
- 5) Attach the main output terminal protection cover included in the accessories to the terminal block ㉓ on the rear panel.

NOTE: If the auxiliary output terminals ⑮ on the front panel is used but the main output terminal block ⑳ on the rear panel is not used, attach the protection cover included in the accessories to the main output terminal block ㉑. Do not use other parts than the GND cord and terminal lug (3 mm dia.) for the GND terminal of the PS Series. For the frame GND terminal, be sure to use the screw fitted on the terminal. Use of any other screw may cause short circuit in the internal circuit, resulting in malfunction or troubles.

6-3 Setting Voltage and Current on Front Panel

1) Press the POWER switch ① on the front panel to deactivate it (switch released). Set control switch 1 of S₁ ㉒ on the rear panel ON. Set all other switches OFF.



Set only switch 1 ON.

- 2) Press the POWER switch to activate it (switch depressed). The voltmeter ② and ammeter ③ go on after approx. four seconds.
- 3) Rotate the VOLTAGE control ④ and CURRENT control ⑤ while pressing the LIM key ⑩ to set intended voltage and current.
When the LIM key is pressed, set voltage and current are displayed on the voltmeter and ammeter, respectively. When it is released, output voltage and current are displayed on the voltmeter and ammeter, respectively.

6-4 Setting of Over-Voltage Protection OVP

- 1) Make sure that the OUTPUT LED ⑧ is off.
- 2) While pressing the OVP key, rotate the OVP control ⑪ with a screwdriver to set OVP operating voltage.
By releasing the OVP key ⑫, the OVP operating voltage is displayed on the voltmeter ②.

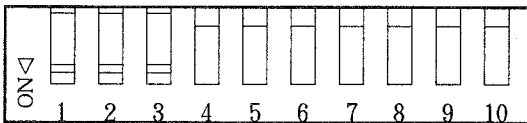
6-5 Turning Output On and Off on Front Panel

- 1) Deactivate the POWER switch ① on the front panel (switch released). Set control switch 1 of S₁ ⑳ on the rear panel ON. Set all other switches OFF.
- 2) Press the LIM key ⑩ and OVP key ⑫ separately to check the set voltage and current and OVP operating voltage. If the OVP operating voltage is lower than the set voltage, the OVP circuit may function when the output is turned on. If the OVP function is not required, maximize the OVP operating voltage.
- 3) Press the OUTPUT key ⑨ on the front panel; the OUTPUT LED ⑧ goes on, and the PS Series outputs power through the auxiliary output terminals ⑮ on the front panel and the main output terminals ㉑ on the rear panel. The CV LED ⑥ or CC LED ⑦ on the front panel goes on, depending on the condition of a load connected.
- 4) If the OUTPUT key is pressed while the output is on (and the OUTPUT LED is lighting), the OUTPUT LED goes off and power output through the output terminals is turned off.

6-6 Turning Output On Automatically

The output of the PS Series is turned off, in principle, when the POWER switch ① is activated (switch depressed). This automatic output on function allows the power to be turned on when the POWER switch ① is activated (switch depressed). To use this function, be sure to check set voltage and current and OVP operating voltage, then set the control switches as shown below. The control switch setting shown below makes it unnecessary to press the OUTPUT key ⑨ on the front panel.

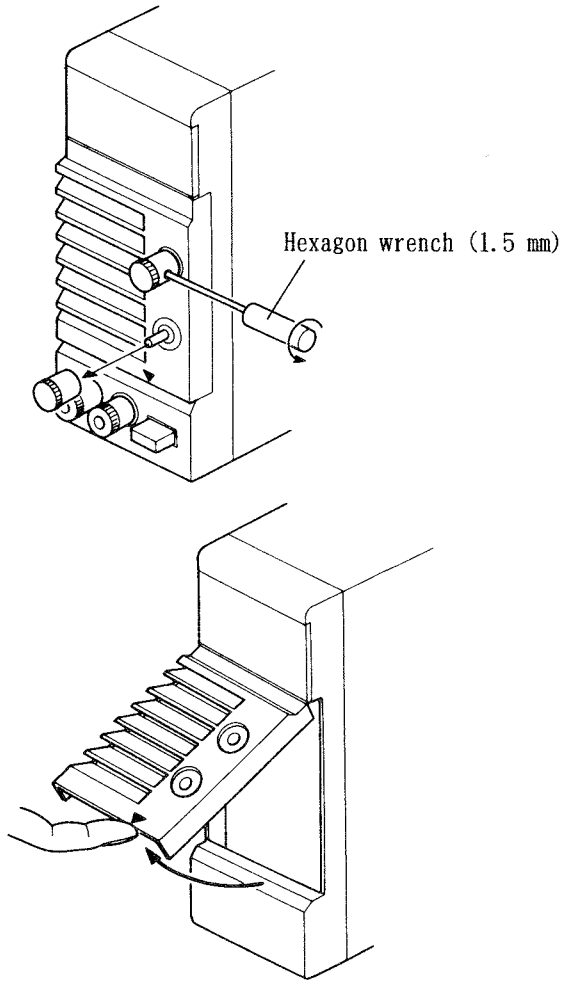
1) Press the POWER switch ① on the front panel to deactivate it (switch released). Set switches 1, 2 and 3 of S₂ ⑩ on the rear panel ON. Set all other switches OFF.



Set switches 1, 2
and 3 ON.

- 2) Press the POWER switch again to activate it (switch depressed). The voltmeter ② and ammeter ③ go on after approx. four seconds. In approx. a second since then, the OUTPUT LED ⑧ goes on, and the PS Series begins to output power through the output terminals.
- 3) To turn on the output, press the POWER switch to deactivate it (switch released).

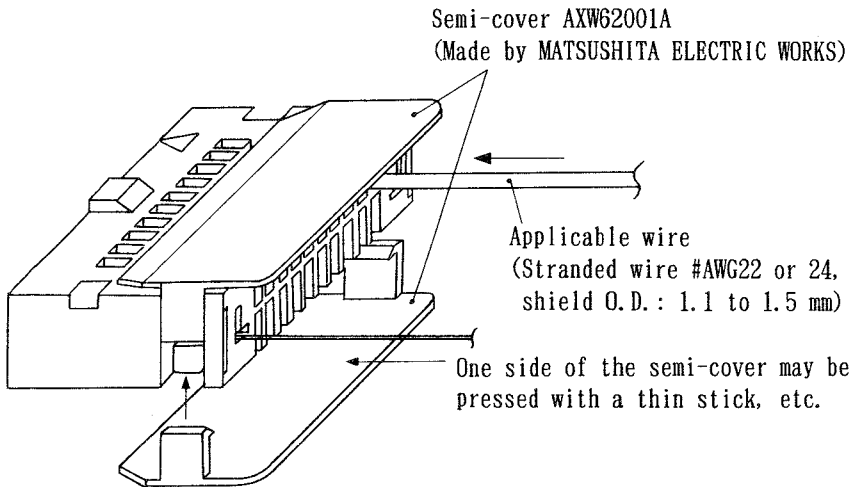
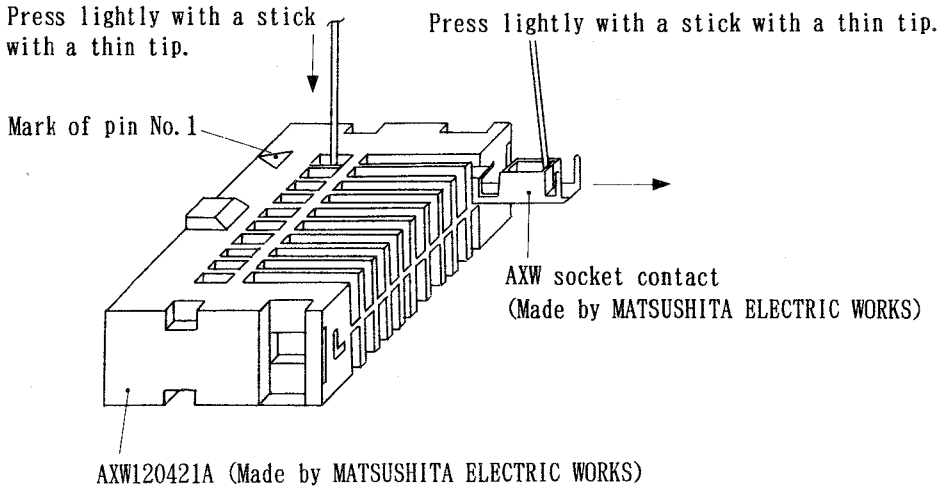
6-7 Detaching Grill



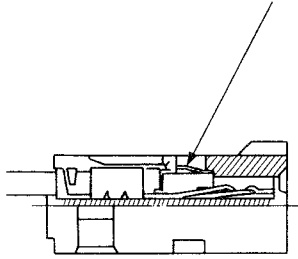
- 1) Remove the knobs from the VOLTAGE control ④ and CURRENT control ⑤ on the front grill with a 1.5 mm hexagon wrench. (The slave grill has no knobs and controls.)
- 2) Put your finger nail below the inverted triangle mark (▼) in the lower right of the grill, and push up and draw out the grill; the grill opens toward the front.

6-8 Assembling Control 20-Pin Connector

Use the control 20-pin connector for the control terminal block J₁ ⑳ on the rear panel.



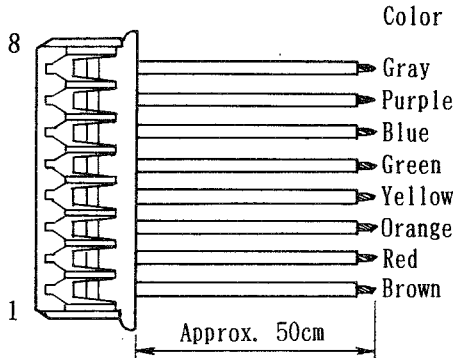
Engage the hook with the square hole.



- 1) Remove the contact from the control 20-pin connector (AXW120421A made by MATSUSHITA ELECTRIC WORKS) included in the accessories. It may be easily drawn out by pressing its hook with a stick with a thin rod lightly.
- 2) Connect a wire to the removed contact. Use the single wire crimping tool AXY51000 (made by MATSUSHITA ELECTRIC WORKS) to connect a wire for enhanced reliability. Applicable wire is an AWG22 or 24 stranded wire having the shield outer diameter of 1.1 to 1.5 mm.
- 3) Fit the contact with a wire to the connector. Make sure that the hook of the contact is engaged with the square hole in the connector when fitting the contact.
- 4) Fit the semi-covers (AXW62001A made by MATSUSHITA ELECTRIC WORKS) to the connector from both sides. Either semi-cover may be detached by inserting a thin stick into an L-shape hole in the connector and pressing the stick. (The connector has two L-shape holes. The above figure shows an example of detaching the lower semi-cover.)

6-9 8-pin Control Connector

Use the 8-pin control connector supplied with the product for the control connector J2 on the rear panel.



NOTE 1: Be sure to cut off unused wires from the connector.

Otherwise, they may short the PS Series Power Supply Unit or other device, resulting in breakdown of the PS Series or other device.

2: Cut off necessary wires or connect additional wires to them properly as necessity requires. Be sure to use them in the condition where they will not short PS Series Power Supply Unit or other device.

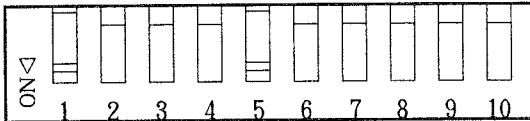
Short circuit will cause breakdown of the PS Series or other device.

6-10 Voltage Control by External Voltage

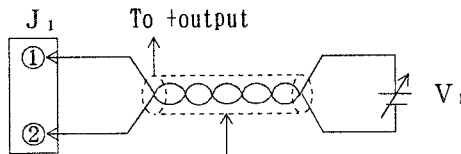
The output voltage of the PS Series may be controlled from outside by applying voltage (between 0 and approx. 10 V).

The description below assumes that only the voltage is controlled by applying external voltage and others are controlled on the front panel.

S_1 setting



Set switches 1 and 5 ON.



Use a shielded cable or a pair of twisted wires.

$$V_o \approx \frac{V_{FS}}{10V} \times V_1 \text{ [V]}$$

V_o : Output voltage of PS Series (V)
 V_1 : Voltage applied externally (V)
 V_{FS} : Rated voltage of PS Series (V)

- 1) Deactivate the POWER switch ① on the front panel (switch released). Set control switches 1 and 5 of S_1 ⑳ on the rear panel ON. Set all other control switches OFF.
- 2) Adjust the voltage to be applied to 0 V. Use pin No. 2 of the control terminal block J_1 ㉑ on the rear panel for GND. Apply the external voltage to pin No. 1.
- 3) Activate the POWER switch ① (switch depressed). The PS Series is ready for operation after approx. four seconds.
- 4) Press the LIM key ㉒ ; set voltage is displayed on the voltmeter ㉓.
Vary the external voltage to adjust the voltage of the PS Series to an intended value.

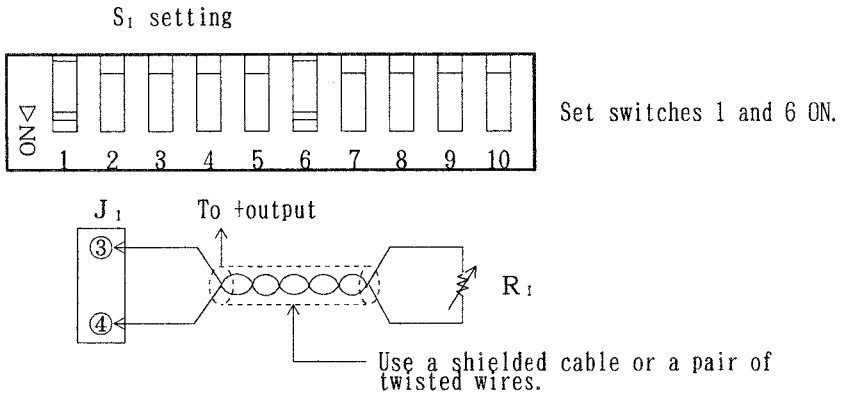
NOTE: The negative side of the external voltage is connected to the +S terminal (GND for analog control) of the PS Series.

Use external voltage in a floating condition to prevent accidents or malfunctioning.

6-11 Voltage Control using External Resistor ①

The output voltage of the PS Series may be controlled from outside by connecting a resistor (of 0 to approx. 10 kΩ).

The description below assumes that only the voltage is controlled using an external resistor and others are controlled on the front panel.



$$V_o \approx \frac{V_{FS}}{10k\Omega} \times R_1 \text{ [V]}$$

$$\left\{ \begin{array}{l} V_o : \text{Output voltage of PS Series (V)} \\ R_1 : \text{External resistor } (\Omega) \\ V_{FS} : \text{Rated voltage of PS Series (V)} \end{array} \right.$$

- 1) Deactivate the POWER switch ① on the front panel (switch released). Set control switches 1 and 6 of S₁ ② on the rear panel ON. Set all other control switches OFF.
- 2) Connect an external resistor between pins No. 3 and No. 4 of the control terminal block J₁ ② on the rear panel.
- 3) Activate the POWER switch ① (switch depressed). The PS Series is ready for operation after approx. four seconds.
- 4) Press the LIM key ⑩ ; set voltage is displayed on the voltmeter ②. Vary resistance to adjust the voltage of the PS Series to an intended value.

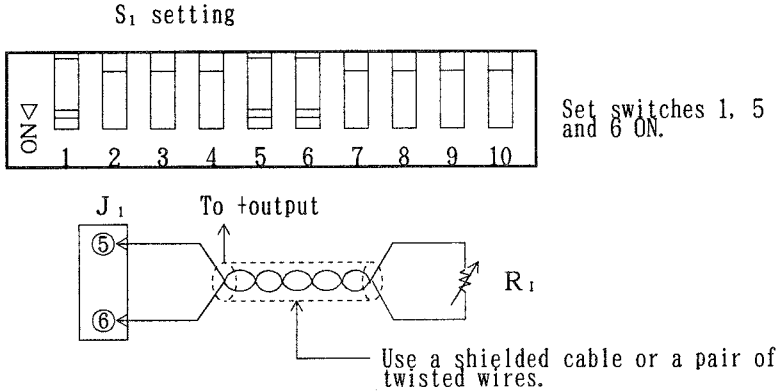
NOTE: Note that set voltage exceeds the rated voltage of the PS Series if pins Nos. 3 and 4 of J₁ are opened with S₁ setting shown above.

Use the external resistor in a floating condition to prevent accidents or malfunctioning. (Pins ③ and ④ are connected with the analog control circuit in the PS Series.)

6-12 Voltage Control using External Resistor ②

The output voltage of the PS Series may be controlled from outside by connecting a resistor (of 0 to approx. 10 kΩ).

The description below assumes that only the voltage is controlled using an external resistor and others are controlled on the front panel.



$$V_o \approx \frac{V_{FS}}{R_I} \times 10k\Omega \text{ [V]}$$

$$\left\{ \begin{array}{l} V_o : \text{Output voltage of PS Series (V)} \\ R_I : \text{External resistor } (\Omega) \\ V_{FS} : \text{Rated voltage of PS Series (V)} \end{array} \right.$$

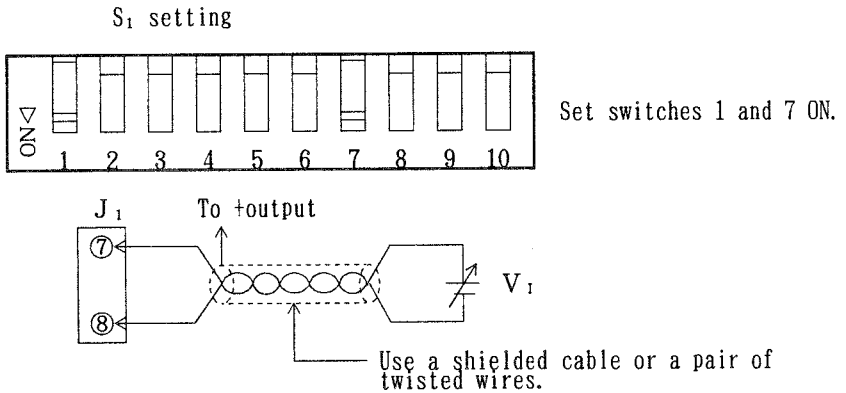
- 1) Deactivate the POWER switch ① on the front panel (switch released). Set control switches 1, 5 and 6 of S₁ ② on the rear panel ON. Set all other control switches OFF.
- 2) Connect an external resistor between pins No. 5 and No. 6 of the control terminal block J₁ ② on the rear panel.
- 3) Activate the POWER switch ① (switch depressed). The PS Series is ready for operation after approx. four seconds.
- 4) Press the LIM key ⑩ ; set voltage is displayed on the voltmeter ②. Vary resistance to adjust the voltage of the PS Series to an intended value.

NOTE: Use the external resistor in a floating condition to prevent accidents or malfunctioning. (Pins ⑤ and ⑥ are connected with the analog control circuit in the PS Series.)

6-13 Current Control by External Voltage

The output current of the PS Series may be controlled from outside by applying voltage (between 0 and approx. 10 V).

The description below assumes that only the current is controlled by applying external voltage and others are controlled on the front panel.



$$I_o \approx \frac{I_{FS}}{10V} \times V_1 \text{ [A]}$$

I_o : Output current of PS Series (A)
 V_1 : Voltage applied externally (V)
 I_{FS} : Rated current of PS Series (A)

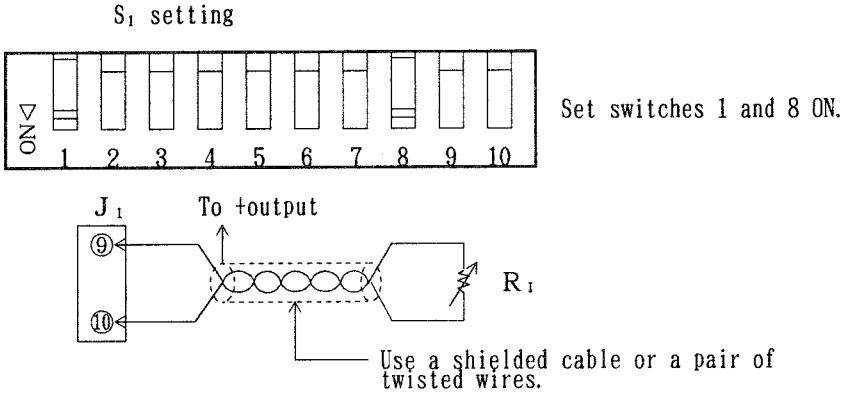
- 1) Deactivate the POWER switch ① on the front panel (switch released). Set control switches 1 and 7 of S_1 ② on the rear panel ON. Set all other control switches OFF.
- 2) Adjust the voltage to be applied to 0 V. Use pin No. 8 of the control terminal block J_1 ② on the rear panel for GND. Apply the external voltage to pin No. 7.
- 3) Activate the POWER switch ① (switch depressed). The PS Series is ready for operation after approx. four seconds.
- 4) Press the LIM key ⑩ ; set current is displayed on the ammeter ③. Vary the external voltage to adjust the current of the PS Series to an intended value.

NOTE: The negative side of the external voltage is connected to the +S terminal (GND for analog control) of the PS Series. Use external voltage in a floating condition to prevent accidents or malfunctioning.

6-14 Current Control using External Resistor

The output current of the PS Series may be controlled from outside by connecting a resistor (of 0 to approx. 10 k Ω).

The description below assumes that only the current is controlled using an external resistor and others are controlled on the front panel.



$$I_o \approx \frac{I_{FS}}{10k\Omega} \times R_1 \text{ [V]}$$

I_o : Output current of PS Series (A)
 R_1 : External resistor (Ω)
 I_{FS} : Rated current of PS Series (A)

- 1) Deactivate the POWER switch ① on the front panel (switch released). Set control switches 1 and 8 of S_1 ② on the rear panel ON. Set all other control switches OFF.
- 2) Connect an external resistor between pins No. 9 and No. 10 of the control terminal block J_1 ③ on the rear panel.
- 3) Activate the POWER switch ① (switch depressed). The PS Series is ready for operation after approx. four seconds.
- 4) Press the LIM key ④ ; set current is displayed on the ammeter ⑤. Vary resistance to adjust the current of the PS Series to an intended value.

NOTE: Note that set current exceeds the rated current of the PS Series if pins Nos. 9 and 10 of J_1 are opened with S_1 setting shown above.

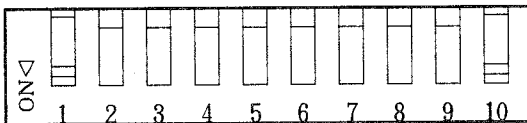
Use the external resistor in a floating condition to prevent accidents or malfunctioning. (These pins are connected with the analog control circuit in the PS Series.)

6-15 Remote Voltage Sensing Function

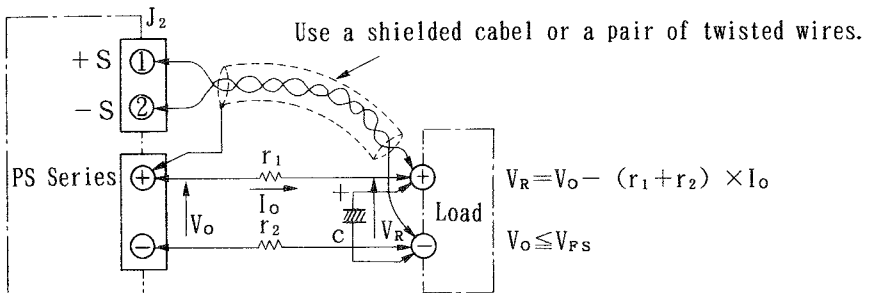
The remote voltage sensing function is designed to eliminate influences of voltage drop, which is caused between the PS Series and a load by the contact resistance and the resistance of the conductors connected to the load. Even though voltage should drop by a maximum of 1 V per line between the PS Series and a load within the rated voltage range, the PS Series outputs the proper voltage through the main output terminal on the rear panel.

The description below assumes that the remote voltage sensing function is used and all other operations are made on the front panel.

S_1 setting



Set switches 1 and 10 ON.



Main power output terminals

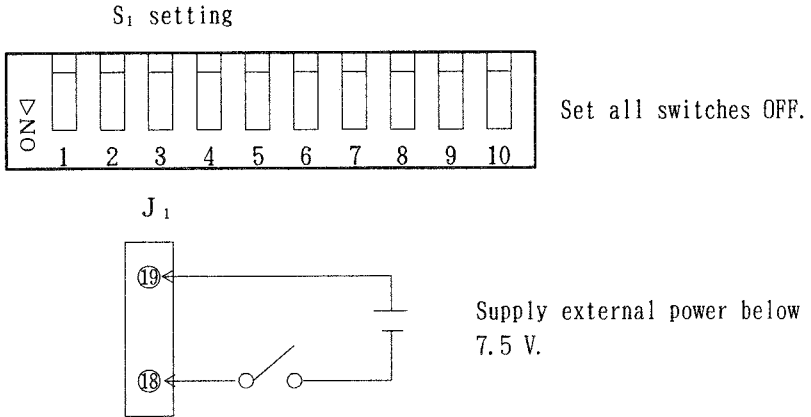
V_O	: Output voltage of PS Series (V)
V_R	: Voltage applied to load (V)
$r_1 = r_2$: Resistance of load connecting cable (Ω)
I_O	: Output current of PS Series (A)
V_{FS}	: Rated voltage of PS Series (V)

- 1) Deactivate the POWER switch ① on the front panel (switch released). Set control switches 1 and 10 of S_1 on the rear panel ON.
- 2) Connect pin No. 1 of the control terminal block J_1 ② on the rear panel to the positive side of a load. Connect pin No. 2 to the negative side. The points of the load to which pins 1 and 2 of the control terminal block J_2 are connected serve as the +S and -S points.
- 3) Connect a capacitor of several thousand μF between the +S and -S points on the load side.
- 4) Press the POWER switch ① on the front panel (switch depressed). The PS Series becomes ready for operation in approx. four seconds.

6-16 Turning Main Relay On and Off through Remote Control

The main relay in the PS Series may be turned on and off using an external switch, etc.

The description below assumes that only the main relay is controlled from outside and all other operations are made on the front panel.



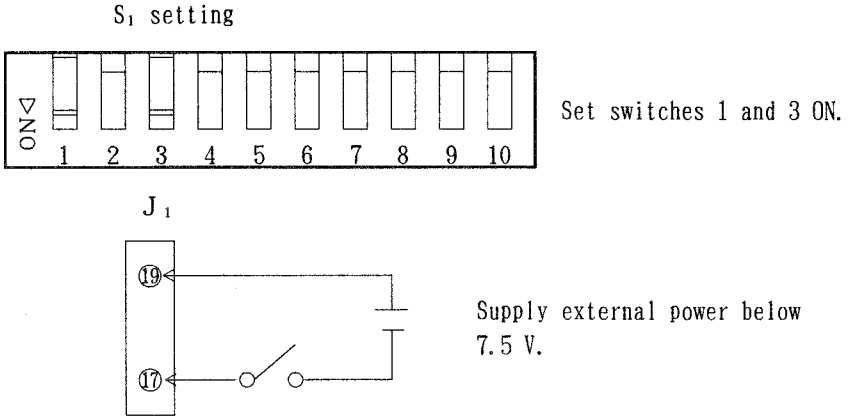
- 1) Deactivate the POWER switch ① on the front panel (switch released). Set all control switches of S_1 on the rear Panel OFF.
- 2) Connect the positive side of external power to pin No. 19 of the control terminal block J_1 ② on the rear panel. Connect the negative side to pin No. 18 by the intermediation of a switch, etc. When connecting the negative side, the switch shall be opened. The voltage of the external power shall be 7.5 V or less.
- 3) Press the POWER switch ① on the front panel to activate it (switch depressed). In approx. a second, only the decimal points are displayed on the voltmeter ② and ammeter ③.
- 4) Activate the external switch, and the main relay in the PS Series is turned on and the PS Series becomes ready for operation in approx. three seconds.
- 5) By deactivating the external switch, the main relay in the PS Series is turned off. Display on the panel is as described in item ② above.

NOTE: Pins 17, 18 and 19 of the control terminal block J_1 on the rear panel may be floated from other terminals. Voltage below ± 250 VDC shall be applied to them.

6-17 Turning Output On and Off through Remote Control

The output of the PS Series may be turned on and off using an external switch, etc.

The description below assumes that only the output is controlled from outside and all other operations are made on the front panel.

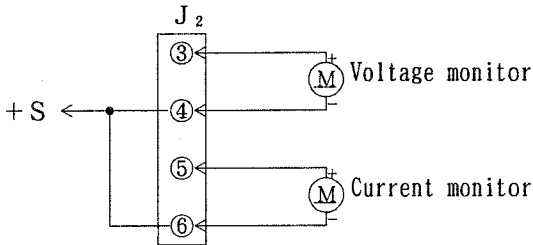


- 1) Deactivate the POWER switch ① on the front panel (switch released). Set control switches 1 and 3 of S_1 on the rear panel ON. Set all other switches OFF.
- 2) Connect the positive side of external power to pin No. 19 of the control terminal block J_1 ② on the rear panel. Connect the negative side to pin No. 17 by the intermediation of a switch, etc. When connecting the negative side, the switch shall be opened. The voltage of the external power shall be 7.5 V or less.
- 3) Press the POWER switch ① on the front panel to activate it (switch depressed). In approx. four seconds, operations of the PS Series are enabled except the OUTPUT key ⑨.
- 4) Activate the external switch, and the OUTPUT LED ⑧ goes on and the PS Series begins to output power.
- 5) By deactivating the external switch, the PS Series stops power output and the OUTPUT LED ⑧ goes off.

NOTE: Pins 17, 18 and 19 of the control terminal block J_1 on the rear panel may be floated from other terminals. Voltage below ± 250 VDC shall be applied to them.

6-18 Monitoring Voltage and Current

The output voltage and current of the PS Series may be monitored in terms of voltage.

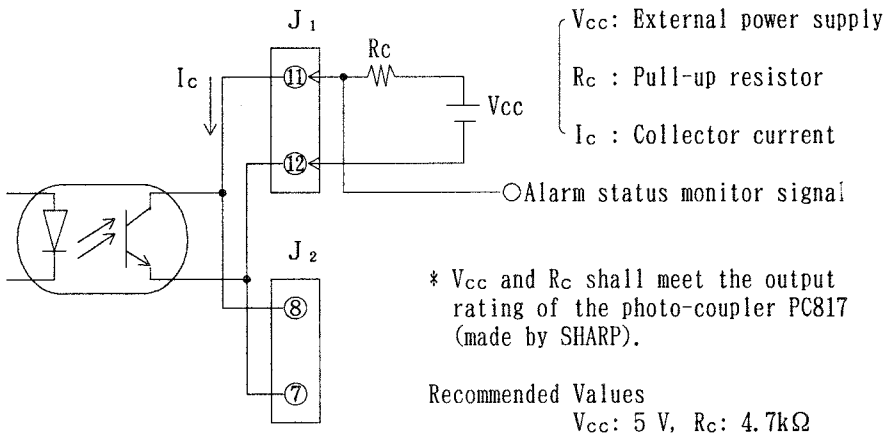


- 1) Deactivate the POWER switch ① on the front panel (switch released).
- 2) Connect a voltage monitoring meter to pins 3 and 4 of the control terminal block J₂ ② on the rear panel. Connect a current monitor meter to pins 5 and 6 of J₂.
- 3) Press the POWER switch ① (switch depressed) to turn on the output.
- 4) Voltage approx. 1/10 of the output voltage is output through pin 3 of the control terminal block J₂ on the rear panel. Pin 4 is GND. Voltage ten times as high as (output current/rated current) is output through pin 5. Pin 6 is GND.

NOTE: Pins 4 and 6 of J₂ are connected internally. They are connected with the +S terminal (analog control GND of the PS Series). Use monitor meters in the floating state to avoid accidents and troubles. These monitor pins may not be used for waveform monitoring.

6-19 Monitoring Alarm Condition

The PS Series outputs an active low alarm signal when an alarm occurs inside or the POWER switch ① on the front panel is deactivated (switch released).



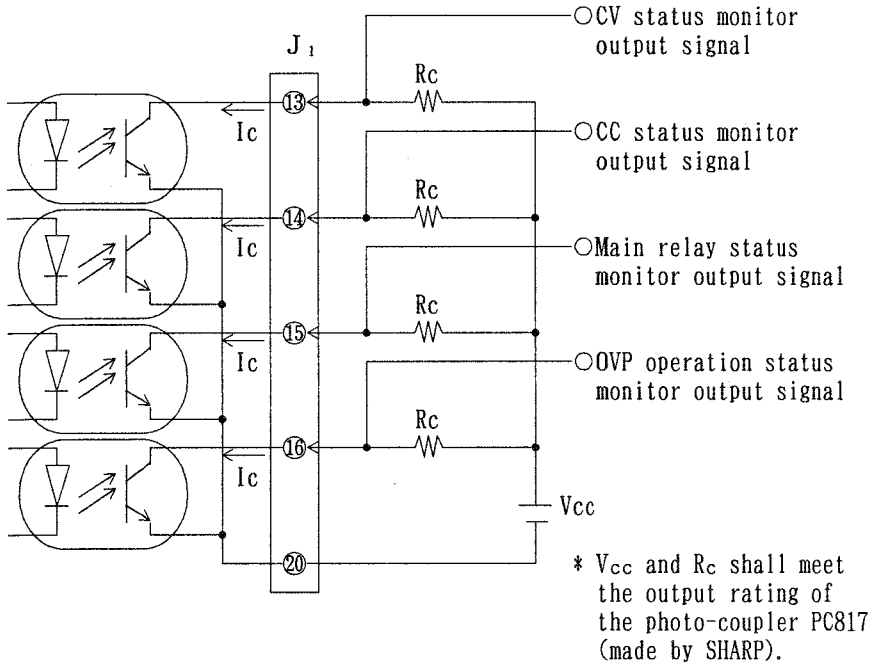
Example of Alarm Monitor Signal Circuit

- 1) Deactivate the POWER switch ① on the front panel (switch released).
- 2) Connect the alarm monitor signal circuit to pins 11 and 12 of the control terminal block J_1 ㉑ on the rear panel or pins 8 and 7 of the control terminal block J_2 ㉒ as shown above. Pin 11 of J_1 and pin 8 of J_2 are connected to the collector of the photo-coupler. Pin 12 of J_1 and pin 7 of J_2 are connected to the emitter of the photo-coupler.
- 3) If some error occurs in the PS Series while it is running or the POWER switch ① on the front panel is deactivated (switch released), an alarm monitor signal below 0.2 V is output, provided the circuit as shown above is used, V_{cc} is 5 V, and R_c is 4.7 k Ω . (V_{cc} load serves as GND.)

NOTE: Pins 11 and 12 of the control terminal block J_1 and pins 8 and 7 of the control terminal block J_2 on the rear panel may be floated from other terminals. Voltage below ± 250 VDC shall be applied to them.

6-20 Monitoring Other Conditions

In addition to the alarm signal, the PS Series outputs an active low signal which shows the status of the PS Series.



Example of Status Monitor Signal Circuit

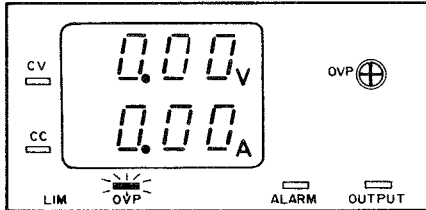
Recommended values

V_{CC} : 5 V, R_c : 4.7 k Ω

- 1) Deactivate the POWER switch ① on the front panel (switch released).
- 2) Connect the status monitor signal circuit to any of pins 13 to 16 and pin 12 of the control terminal block J_1 ② on the rear panel as shown above.
- 3) If the PS Series enters some status (CV status, CC status, main relay ON, or OVP operation), a signal corresponding to the status below 0.2 V is output, provided the circuit as shown above is used, V_{CC} is 5 V, and R_c is 4.7 k Ω . (V_{CC} load serves as GND).

6-21 Resetting Over-Voltage Protection

If the OVP circuit functions while the PS Series is running, the output is turned off, the OUTPUT LED ⑧ goes off, and the OVP LED ⑬ goes on.



OUTPUT LED goes off.

OVP LED goes on.

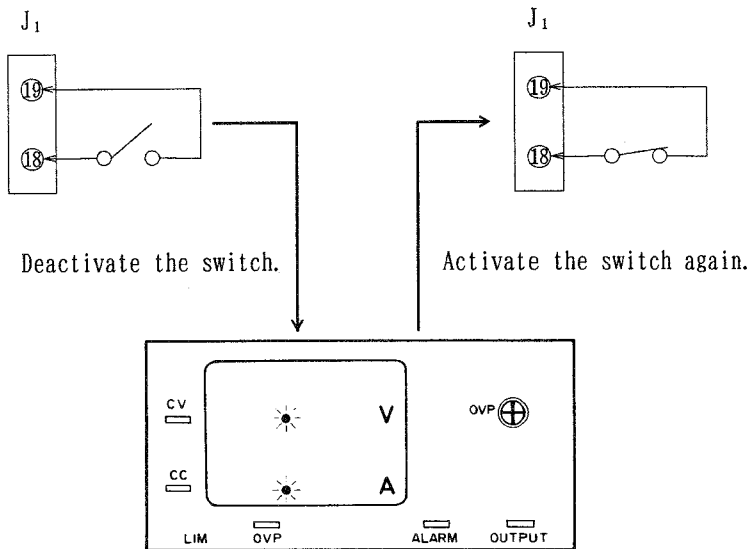
○Resetting procedure 1

Deactivate the POWER switch ① on the front panel (switch released). When all LED's has gone off, press the POWER switch to activate it (switch depressed). The OVP function is reset.

○Resetting procedure 2 (In case that the main relay is remote-controlled)

1) Deactivate the external switch connected between pins 18 and 19 of the control terminal block J₁ ② on the rear panel. All digits on the voltmeter ② and ammeter ③ on the front panel go off, except the decimal points. The OVP LED ⑬ also goes off, and the OVP function is reset.

2) Then, activate the external switch again. The PS Series becomes ready for operation in approx. three seconds. (See the figure on the following page.)



Only the decimal points are displayed.

6-22 Resetting Alarm Condition

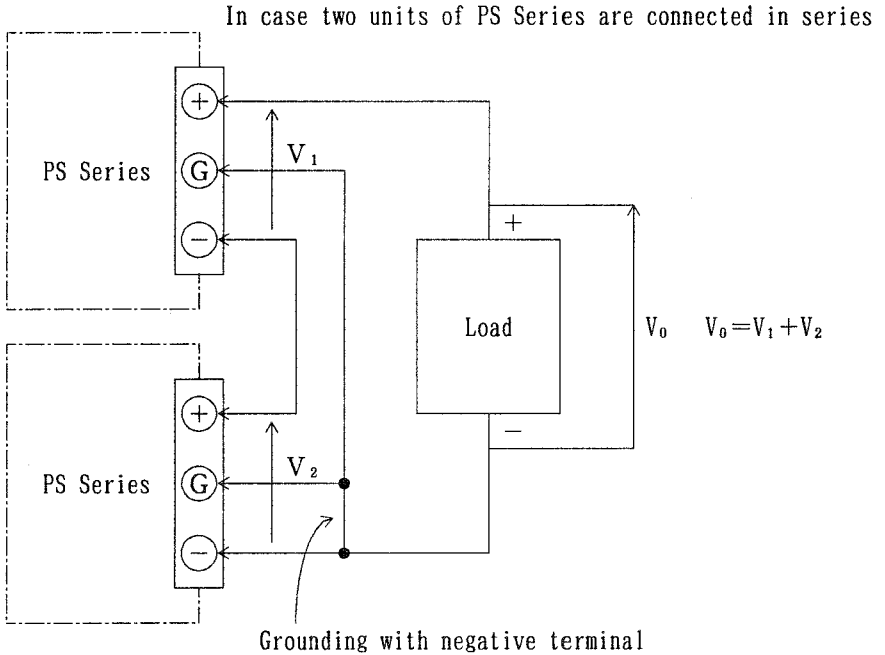
If some error occurs in the PS Series while it is running, the ALARM LED ⑭ on the front panel goes on, and operation of the PS Series is disabled.

In such a case, deactivate the POWER switch ① on the front panel (switch released), make sure that the ALARM LED goes off, then activate the POWER switch again (switch depressed). The PS Series is recovered from the alarm and becomes ready for operation in approx. four seconds.

NOTE: If the ALARM LED remains lighting after activating the POWER switch again (switch depressed), the PS Series may be defective.

7. APPLICATIONS

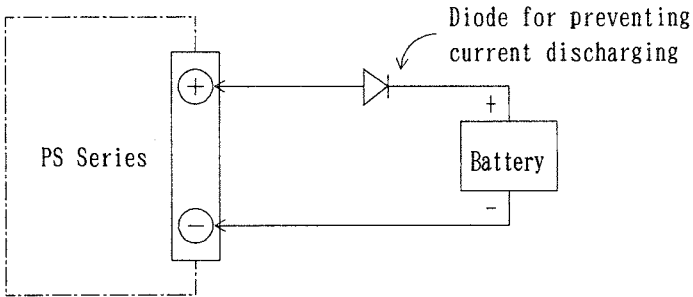
7-1 Series Operation



If several units of PS Series are connected in series as shown above, the sum of the output voltages of the units is applied to a load.

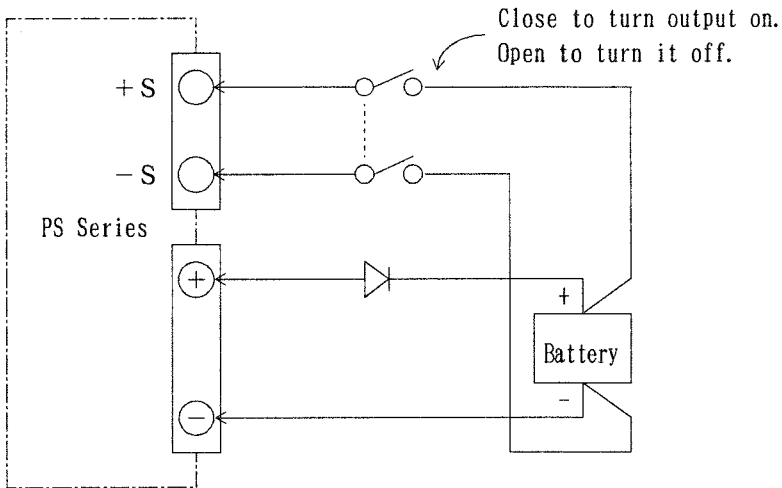
- NOTE:
- Turn on and off the units connected in series simultaneously.
 - Be sure to use the same type of units for series operation. If different types of units are connected in series, current over the rating flows through a unit of the smallest rated current, and the unit may be damaged.

7-2 Charging Battery



The output circuit of the PS Series has capacitors of several hundred to several thousand microfarads. Electric charge in the capacitors is discharged by a built-in discharge circuit when the output is turned off. If the PS Series is used to charge a battery, be sure to use a diode for preventing discharge as shown above.

NOTE: Use a diode which withstands the rated current of the PS Series.



If the remote sensing function is used to charge a battery, be sure to use a relay in series in the +S and -S lines. Close the relay to turn the output on, and open it to turn the output off. Discharge current also flows through the +S and -S lines.

8. TROUBLE SHOOTING

The table below shows the possible causes of troubles which may occur in the PS Series. If a trouble may be caused by blowing of the internal input fuse or defects in the internal circuits, contact your dealer or our distributor.

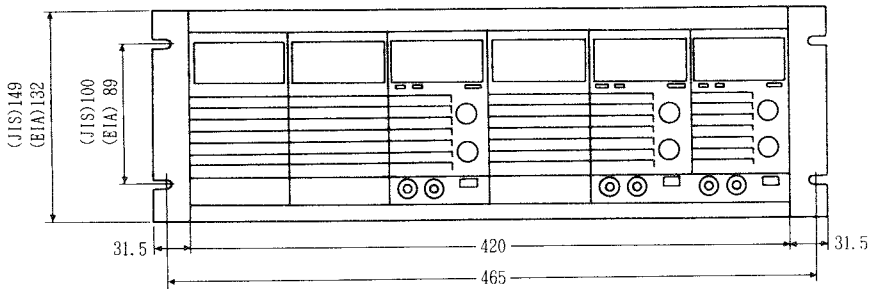
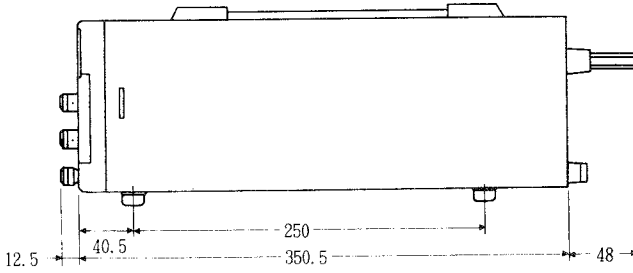
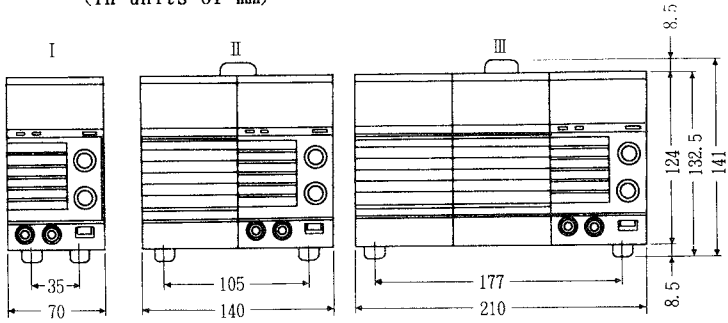
Trouble	Check points	Possible causes
Power is not turned on.	*All LED on the front panel does not go on.	*Poor contact or breakage of the power cord *Defects in the input switch *Blowing of the sub input fuse
Only the decimal points are displayed on the indicators on the front panel after power on.	*Control switch 1 of S_1 on the rear panel is set improperly.	*Improper setting of S_1
Voltage and/or current may not be set or controlled.	*Control switches S_1 on the rear panel are improperly set. *Others	*Improper setting of S_1 *Defects in the circuits
No output is given.	*Is the supply voltage within the rating? *Others	*No output is given if a 200 V type unit is connected to a 100 V type power line. *Blowing of the main input fuse *Defects in the circuits

Trouble	Check points	Possible causes
Alarm occurs when power is turned on.	<ul style="list-style-type: none"> *Is the supply voltage within the rating? *Others 	<ul style="list-style-type: none"> *An alarm is give if a 100 V type unit is connected to a 200 V type power line. *Defects in the circuits
Output voltage exceeds set voltage. (Over-voltage)	<ul style="list-style-type: none"> *Control switches S_2 on the rear panel are set improperly. *Others 	<ul style="list-style-type: none"> *Improper setting of S_2 *Defects in the circuits
Unstable output	<ul style="list-style-type: none"> *Control switches S_2 on the rear panel are set improperly. *Is the supply voltage within the rating? *Are +S and -S lines connected properly? *Others 	<ul style="list-style-type: none"> *Improper setting of S_2 *The supply voltage is out of the input voltage rating. *Connect the +S and -S lines properly. *Defects in the circuits

NOTE: Never detach the case. If the case need be detached for repair work or fuse replacement, please contact your dealer or our distributor.

9. EXTERNAL DIMENSIONS FIGURE

(In units of mm)



A product of
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