

KENWOOD

REGULATED DC POWER SUPPLY

PR-A SERIES

PR18-1.2A PR18-3A PR18-5A

PR36-1.2A PR36-3A

PR70-1A

PR250-0.42A

INSTRUCTION MANUAL

KENWOOD CORPORATION

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Note.

This instruction manual is described for seven models (PR18-1.2A, PR18-3A, PR18-5A, PR36-1.2A, PR36-3A, PR70-1A, and PR250-0.42A).
Refer to item applied to your product.

1. OUTLINE

The PR-A Series is a serial control type regulated DC power supply. It is a constant voltage/current power supply whose output can be varied from 0 up to the rated values.

It is a compact unit which, provided with both voltage and current calibrated meters, allows both voltage and current to be monitored simultaneously. In terms of operability, the unit enables high precision, continues reliability via coarse and fine adjust knobs. We are confident that the unit's design conceived with the user's convenience in mind to enable advantages such as arrangement in easy -to- use configurations and its reliability will satisfy your needs very well.

With the PR-A Series, multiple units of the same model can be connected in parallel to set up a "one-control" master/slave configuration having increased current output.

2. FEATURES

- The PR-A Series is a constant voltage/current supply which features extremely low voltage and load fluctuations and ripple noise.
- Controls the output on and off by using output switch.
- The unit features separate voltage and current meters so that both voltage and current can be monitored simultaneously.
- Output voltage and current can be adjusted continuously to any desired values.
Furthermore, the voltage can be preset easily and precisely using coarse and fine adjust knobs.
- The constant current circuit operates to protect against overload and output shorting. The limiting current can be preset from 0 up to the rated current and the unit can also be used as a constant current supply.
- The unit enables "one-control" operation via connection in series, or via parallel connection in a master/slave configuration.
- Using an optional rack-mounting adapter (RK-604), the PR Series can be installed on a EIA or JIS rack.

3. SPECIFICATIONS

Item	PR18-1.2A	PR18-3A	PR18-5A	PR36-1.2A	PR36-3A	PR70-1A	PR250-0.42A
Output voltage (continuously variable, coarse and fine adusts)	0 to 18V			0 to 36V		0 to 70V	0 to 250V
Output current (continuously variable)	0 to 1.2A	0 to 3A	0 to 5A	0 to 1.2A	0 to 3A	0 to 1A	0 to 0.42A
Constant voltage characteristics							
Input fluctuation (for surge of AC±10%)	0.01%+2mV (3.8mV)			0.01%+2mV (5.6mV)		0.01%+2mV (9mV)	0.01%+2mV (27mV)
Load fluctuation (for surge of 0 to 100%)	0.01%+2mV (3.8mV)		0.01%+3mV (4.8mV)	0.01%+2mV (5.6mV)		0.01%+2mV (9mV)	0.01%+2mV (27mV)
Ripple noise, rms (10Hz to 1MHz) 【Note.1】	0.5mV rms					1mV rms	2.5mV rms
Ripple peak (peak-to-peak) 【Note.1】	2mV p-p						6mV p-p
Transient response (Output current 5% to 100%)	100μs Typical						
Temperature coefficient	150ppm/°C Typical						
Constant current characteristics							
Input fluctuation (for surge of AC±10%)	2mA						
Load fluctuation (for surge of 0 to 100%)	10mA	10mA	15mA	15mA		15mA	10mA
Ripple noise, rms (10Hz, to 1MHz) 【Note.1】	2.4mA rms	6.0mA rms	10mA rms	2.4mA rms	6.0mA rms	2.0mA rms	
Ripple peak (peak-to-peak) 【Note.1】	3.6mA p-p	12mA p-p	15mA p-p	4.5mA p-p	12mA p-p	6.0mA p-p	
Temperature coefficient	500ppm/°C Typical						
Instrumentation							
Voltmeter (2.5-level-F.S.)	18V			36V		70V	250V
Ammeter (2.5-level-F.S.)	1.2A	3A	5A	1.2A	3A	1A	0.42A
Constant-voltage operation indicator	Green CV LED goes on.						
Constant-current operation indicator	Red CC LED goes on.						

Item	PR18-1.2A	PR18-3A	PR18-5A	PR36-1.2A	PR36-3A	PR70-1A	PR250-0.42A
Functions							
Output on/off switching	Turn the output on and off.						
Serial connection (independent control mode)	Can be connected in series (within limits of ground proof voltage.)						
Parallel operation (master-slave mode)	Can be operated in "one-control" parallel configuration (only with other machines of same model.)						
Output							
Polarity	Positive or negative ground possible						
Output terminals (color)	(+)red, (-)white, (GND)black						
Ground proof voltage	±250VDC					±500VDC	
Operating conditions							
Operating Temperature/Humidity Range	0 to 40 deg C, 10 to 80% R.H.						
Storage Temperature/Humidity Range	-20 to 60 deg C, 10 to 85% R.H.						
Cooling mechanism	Natural convection						
Power consumption							
VA/W (for rated load of AC 100V)	Approx. 60VA/45W	Approx. 125VA/100W	Approx. 200VA/165W	Approx. 105VA/73W	Approx. 225VA/170W	Approx. 140VA/110W	Approx. 200VA/155W
Input voltage							
Voltage, Frequency	AC 100V ± 10%, 50/60Hz. 120V/200V/220V/240V ± 10% (max. AC 250V) Internal switching possible						
Dimensions and weight							
Dimensions (width×height×depth)	104×147×180mm	104×147×215mm	138×147×230mm	104×147×180mm	138×147×230mm	104×147×215mm	138×147×230mm
Max. dimensions (width×height×depth)	108×161×200mm	108×167×265mm	142×167×290mm	108×161×200mm	142×167×290mm	108×167×265mm	142×167×290mm
weight	Approx. 3.8kg	Approx. 5.7kg	Approx. 8.1kg	Approx. 4.4kg	Approx. 8.6kg	Approx. 5.8kg	Approx. 7.0kg
Accessory items	1 Instruction Manual, 2 Fuses						

* Measured with positive or negative grounded.

■ Circuit and ratings subject to change without notice due to developments in technology.

4. PRECAUTIONS FOR USE

1) Confirming the supply voltage

- *Use this unit within the specified range. The unit's rated voltage is single-phase 100/120/200/220/240VAC $\pm 10\%$ (max. 250V) at 50/60Hz.
- *The rated voltage is indicated on the specification and name plate located beside the input connector on the rear panel.
- *See the Maintenance section (7-2. Changing the supply voltage) for information on how to change the rated voltage.

2) Precautions for connection of output terminals

- *This unit is a floating type power supply. For ordinary use, be sure that the MASTER/SLAVE switch on the rear panel is set to MASTER, and that either the (+) output terminal or the (-) output terminal is connected to the GND terminal (case GND) via the shorting bar.

3) Output current value setting

- *To set the constant current value, short-circuit output terminals (+) and (-) and deliver the output current.

4) Set-up environment

- *Be sure to use this unit within the specified ambient temperature range of 0 to 40 deg C.
- *Because the unit is cooled by natural convection, do not place objects on top, place the unit on or near any heat-emitting device, or use multiple units in any stacked configuration. Also use the unit in an environment that is as well cross-ventilated as possible.

5. EXPLANATION OF PANELS

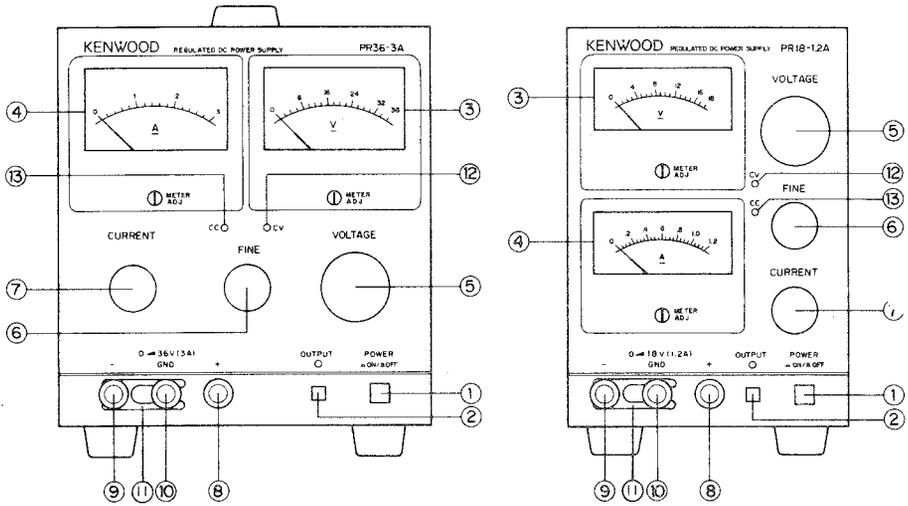


Figure 1.

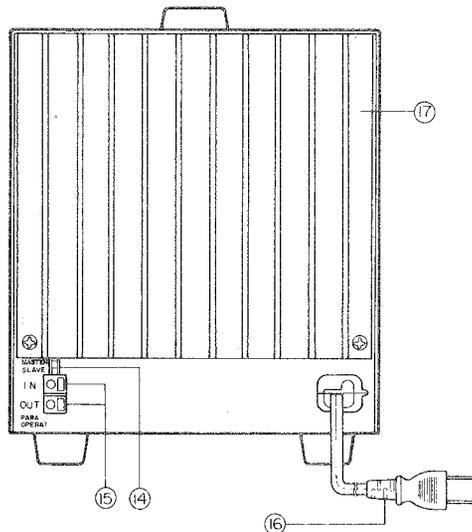


Figure 2.

5-1 Front panel

①POWER ON /OFF

The power switch. The power supply should be on and operating when this switch is depressed.

②OUTPUT switch

Turns the output on and off.

When the output is turned on, the OUTPUT LED goes on.

③Voltmeter

A DC voltmeter that indicates the output voltage.

④Ammeter

A DC ammeter that indicates the output current.

⑤VOLTAGE COARSE

Coarse adjust knob for the output voltage.

⑥VOLTAGE FINE

Fine adjust knob for the output voltage.

⑦CURRENT

Knob for setting the current value in the constant current mode. It can be used to set the limiting value for the output current.

⑧Output terminal (+)

Terminal for tapping of (+) output voltages.

⑨Output terminal (-)

Terminal for tapping of (-) output voltages.

⑩GND terminal

The ground terminal, it is connected to the main chassis. Normally, this terminal is connected to either the (+) or (-) terminal with short bar.

⑪Short bar

Normal use, this bar connects between GND and output (+) or output (-) terminals.

⑫CV LED (Green)

The LED keeps lighting in process of constant-voltage operation.

⑬CC LED (Red)

The LED keeps lighting in process of constant-current operation.

5-2. Rear panel

⑭ MASTER/SLAVE switch

Used during "one-control" parallel operation in the master/slave configuration. During normal operation, the switch should be set to MASTER. (For details, see section 6-3; "Parallel Operation.")

⑮ IN/OUT terminals for parallel operation

Control terminals for use in the "one-control" parallel operation mode.

⑯ Power cable

Approx. 2 meter-long power cable, equipped with standard wall plug.

⑰ Heat sink

A heat dissipator for the transistors, be careful as this area can become quite hot during operation.

6. OPERATION PROCEDURES

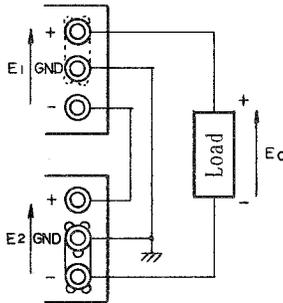
6-1. Stand-alone operation

*When using the power supply in stand-alone, simply operate by manipulation of the panel switches as needed. However, be sure that the MASTER/SLAVE switch is set to MASTER.

6-2. Serial connection

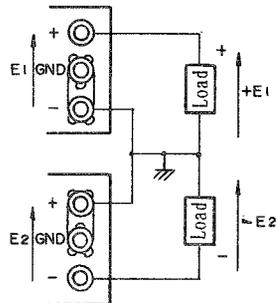
Two or more units of the power supply can be hooked up in series to achieve an increase in output voltage. The final output will be the sum of the outputs of the individual units. In this situation, however, care must be taken that the voltage of neither of the terminals with respect to the chassis GND exceeds the ground proof voltage.

- *In the case of serial operation of two units (both same model);
 - a. For connection as in Fig. 4, the output voltage, but output current will be limited to within the value specified for a single unit.
 - b. For connection as in Fig. 5, where an intermediate point is hooked up to ground, the configuration can be used as a plus/minus power supply.



(Connection of GND
 For positive ground (dotted line)
 For negative ground (solid line)
 $E_0 = E_1 + E_2$)

Figure 3.



(Intermediate point is
 hooked up to ground.)

Figure 4.

6-3 Parallel operation (master-slave control)

- *Two or more units of the same machine can be hooked up in parallel to give an increase in output current. The total output current will be the sum of the output currents of the individual machines.
- *In parallel operation, one machine will act as the master and all others will act as slaves. The output voltages and output currents are all set from the master machine.
- *When hooking the machines up in parallel, be sure that all the power ON/OFF switches are OFF.

HOOK-UP PROCEDURE;

- 1) Turn the power switches of the master unit and slave unit(s) all to "OFF"
- 2) Turn the MASTRE/SLAVE switch (located on the back panel) on all the slave units from "MASTRE" to "SLAVE".
- 3) Hook up the parallel operation-use terminals (IN/OUT, located on the rear panel) of the master and slave(s) as shown in Figure 5.
- 4) For connecting the output terminals of each of the machines to the load, use all cords of the same length.
- 5) For (+) and (-) grounding to the GND terminal, hook up the master and slave machines via the terminals on the panels.
Figure 7 shows the output connection scheme for (-) grounding.
- 6) Set the voltage and current knobs of all the slave unit(s) to the maximum setting.
- 7) Turn the power switches of the master unit and slave unit(s) all to "ON".
Control the output voltage and current as desired via the voltage and current knobs on the master unit.

- *When the output goes to 0 amperes in the parallel operation mode, output voltage can no longer be controlled by the master machine. Be sure to keep a current flowing that is several % of the rated current.

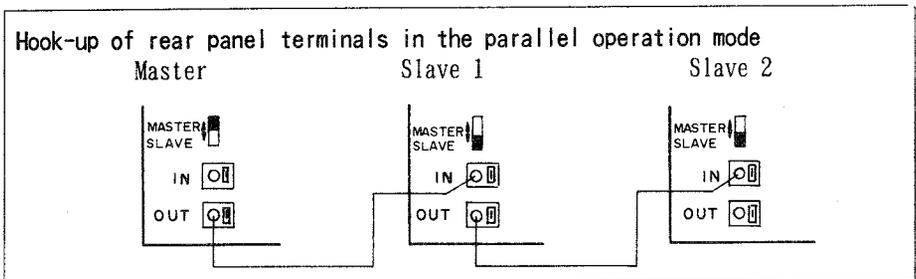
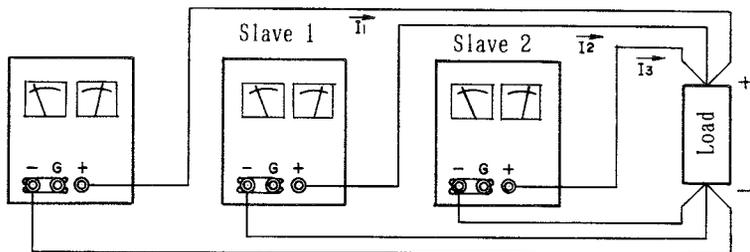


Figure 5.

Hook-up front panel terminals in the parallel operation mode.



Note; $I = I_1 + I_2 + I_3$

The voltage presets on all the slave machines are set to maximum. The master operates

in constant voltage mode and the slaves operate in constant current mode.

Figure 6.

For instructions on how to achieve parallel operation of multiple machines of different models,

please contact your dealer or our distributor.

*Connection of Terminal on Rear Panel

While pressing on the slit portion of the terminal with an ordinary (-) screwdriver, insert the connecting cable into the round juck. When insertion is complete, remove the screwdriver. The cable will remain locked into the terminal even after the screwdriver is removed.

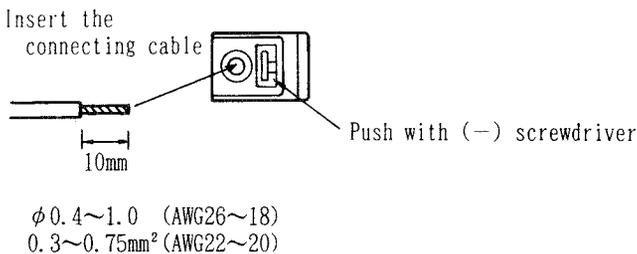


Figure 7.

Note: When using stranded (twisted) cable. the connector should be attached by soldering.

7. MAINTENANCE

7-1. Removing the case

The case can be removed by taking out the screws on the top and side panels and pulling the case upwards.

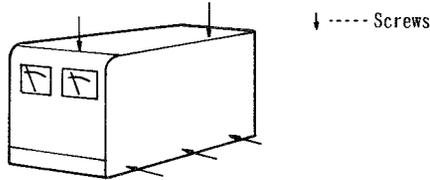
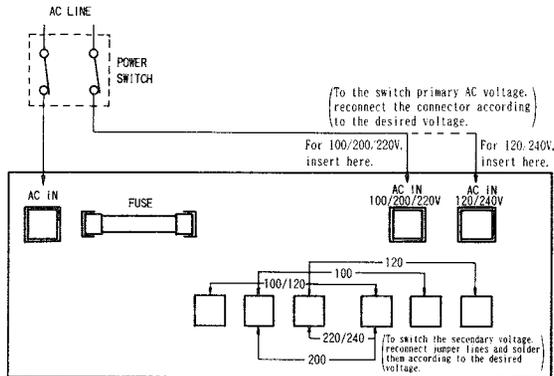


Figure 8.

7-2. Changing the rated source voltage

To change the AC source voltage of the machine, change the internal power transformer and fuse specifications as shown in the figure below.

(Supply voltage conversion and fuse replacement)



Voltage-Switching/Fuse PC Board (View from Component Side)

Figure 9.

7-3 Fuse replacement

When a fuse blows, replace it after investigating the cause of the blow-out. Furthermore, since alterations of the supply voltage is accompanied by a change in fuse type, select a fuse that has the appropriate rating according to the chart below.

Note: When changing the supply voltage or replacing a fuse, remove the power cord from the AC outlet.

Model Name	PR18-1.2A	PR18-3A	PR18-5A	PR36-1.2A	PR36-3A	PR70-1A	PR250-0.42A
100/120V	1.5A	3A	5A	2.5A	5A	3A	4A
200/220/240V	0.8A	2A	3A	1.5A	3A	2A	2.5A

Supply voltage conversion and fuse replacement

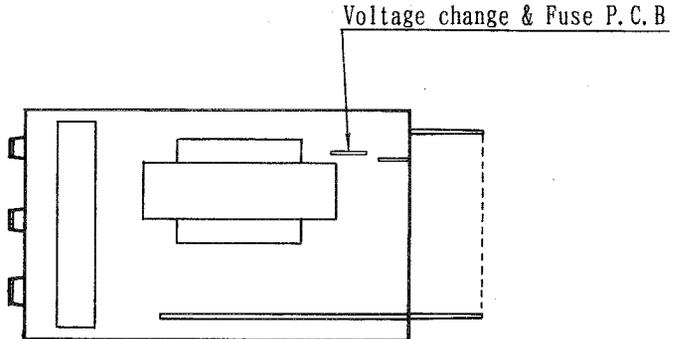


Figure 10 .

8. TROUBLESHOOTING

P r o b l e m	Indicators or Areas to check	C a u s e
power supply will not go on.	Power ON lamp does not light up.	<ul style="list-style-type: none"> *poor connection of power cord, or broken wire *Bad power switch *Fuse meltdown
No output voltage.	Voltmeter does not move.	*Circuit malfunction
No output current.	Ammeter does not move.	*Circuit malfunction
Excessively large output.	Output voltmeter and ammeter readings do not decrease.	<ul style="list-style-type: none"> *Bad power transistor or control mechanism *Circuit malfunction
Unstable output.	Input voltage is wrong. Machine is vibrating. Strong magnetic or electrical field nearby.	<ul style="list-style-type: none"> *Operating outside the rated voltage range *Oscillations due to special load type *Remove from source of oscillations.

A product of
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Change to Instruction Manual of PR-A Power Supply Series

Please change the following descriptions to the instruction manual of PR-A power supply series.

(Page 5)

ERROR



3. SPECIFICATIONS

Item	PR18-1.2A	PR18-3A	PR18-5A	PR36-1.2A	PR36-3A	PR70-1A	PR250-0.42A
Constant current characteristics							
Input fluctuation (for surge of AC±10%)	2mA						
Load fluctuation (for surge of 0 to 100%)	10mA	10mA	15mA	15mA	15mA	15mA	10mA

CORRECT



3. SPECIFICATIONS

Item	PR18-1.2A	PR18-3A	PR18-5A	PR36-1.2A	PR36-3A	PR70-1A	PR250-0.42A
Constant current characteristics							
Input fluctuation (for surge of AC±10%)	2mA						
Load fluctuation (for surge of 0 to 100%)	10mA	15mA	10mA	15mA	15mA	15mA	10mA