INSTRUCTION MANUAL

ELECTRONIC LOAD

PLZ-WU SERIES

APLICABLE MODELS

RMF 3-WU
PZL 50WU
PLZ 150WU
PLZ 300WU

KIKUSUI ELECTRONICS CORPORATION

(KIKUSUI PART NO. Z1-737-220)

IA001261

Power Requirements of this Product

Power requirements of this product have been changed and the relevant sections of the Operation Manual should be revised accordingly.
(Revision should be applied to items indicated by a check mark ☑.)

☐ Input voltage

The input voltage of this product is _____ VAC,
and the voltage range is _____ to _____ VAC. Use the product within this range only.

☐ Input fuse

The rating of this product's input fuse is _____A, _____VAC, and _____.

WARNING

- To avoid electrical shock, always disconnect the AC power cable or turn off the switch on the switchboard before attempting to check or replace the fuse.
- Use a fuse element having a shape, rating, and characteristics suitable for this product. The use of a fuse with a different rating or one that short circuits the fuse holder may result in fire, electric shock, or irreparable damage.

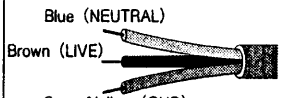
☐ AC power cable

The product is porvided with AC power cables described below. If the cable has no power plug, attach a power plug or crimp-style terminals to the cable in accordance with the wire colors specified in the drawing.

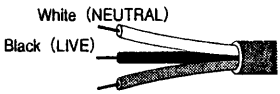
WARNING

- The attachment of a power plug or crimp-style terminals must be carried out by qualified personnel.

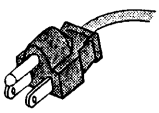
☐ Without a power plug



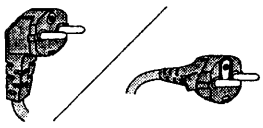
☐ Without a power plug



☐ Plugs for USA



☐ Plugs for Europe



☐ Provided by Kikusui agents

Kikusui agents can provide you with suitable AC power cable.
For further information, contact your Kikusui agent.

☐ Another Cable _____

 Kikusui Part No. Z9-000-027 IB001681

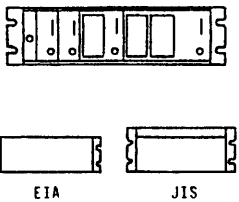
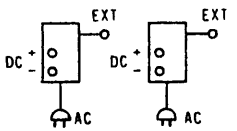
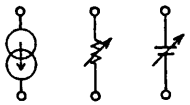
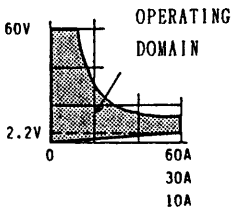
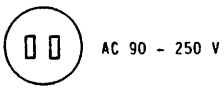
KIKUSUI

TABLE OF CONTENTS

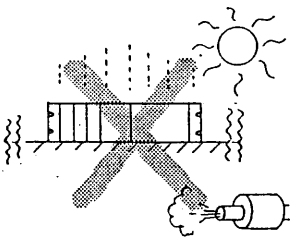
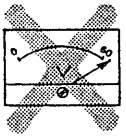
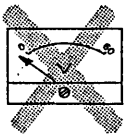
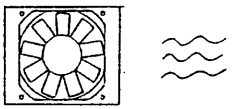
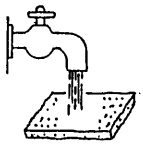
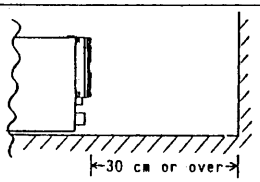
Introduction

The Electronic Load, Series PLZ-WU, is a versatile device with features as described below.
Be sure to read this manual before using the Electronic Load in order to make the correct use of it.

1. <FEATURES>

	o The PLZ-WU is of a unit structure and housed in a rack mount frame. The frame can be installed on an EIA or JIS standard cabinet. (The model number of the frame is RMF3-WU.)
	o Individual units of PLZ-UW are mutually isolated.
	o The PLZ-UW can operate in a constant current, constant resistance or constant voltage mode, and can be remote-controlled when in constant current or constant voltage mode.
	o The PLZ-WU has a wide operation range and can draw the rated maximum current with 2.2 volts DC.
	o The PLZ-WU can operate on an AC line voltage of 90 V - 250 V, without requiring any switching over or modification of the AC line power input circuit.

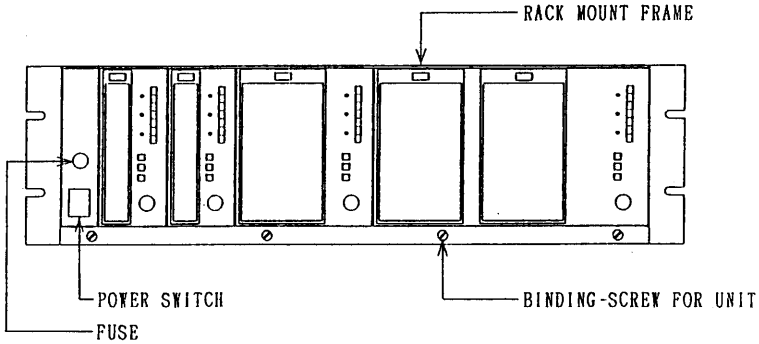
2. <PRECAUTIONS>

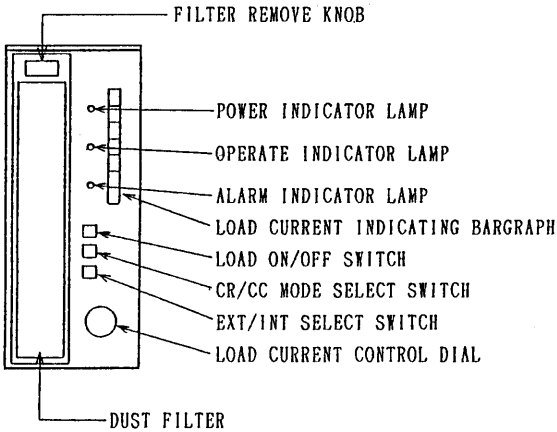
	○ Do not expose the PLZ-WU to heat(direct sunlight) dusty or corrosive atmosphere, mechanical vibration, or other adverse environment.
	○ Do not apply a voltage of 60 volts DC or more to the input circuit of the Load. Note that the Load may bedamaged if such voltage is applied to it.
	○ When applying a voltage or feeding a current to the Load, make certain that it is connected in the correct polarity to the Load. If it is connected in the wrong polarity, the Load may be damaged. (The Load has a fuse to protect it against this type of failure.)
	○ The Load units are cooled by the fan of the rack mount frame. Do not use the units being removed from the frame.
	○ Clean the dust filter at appropriate intervals. If it is clogged, cooling power will be degraded.
	○ Do not block the fan air outlet. Keep a clearance of 30 cm at least from the air outlet.

3 . <LAYOUT OF COMPONENTS>

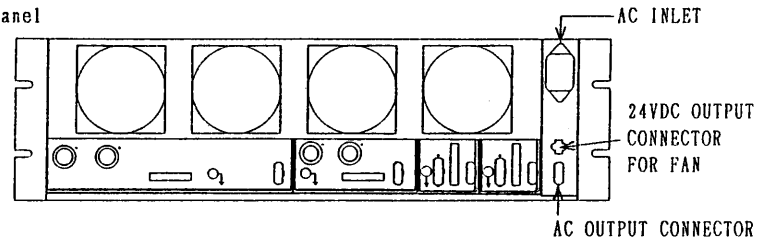
The layout of the control switches, indicator lamps and other components of the PLZ-WU is as shown in this section.

o Front Panel



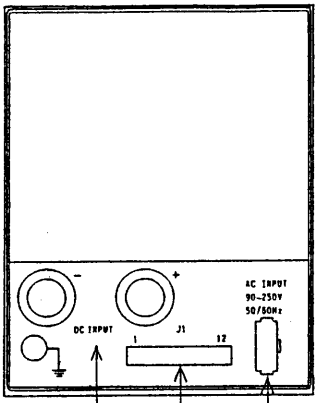


o Rear Panel

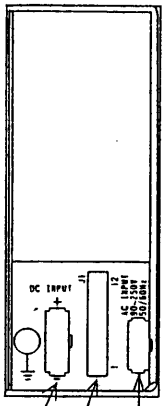


○ Rear Panel of Load Unit

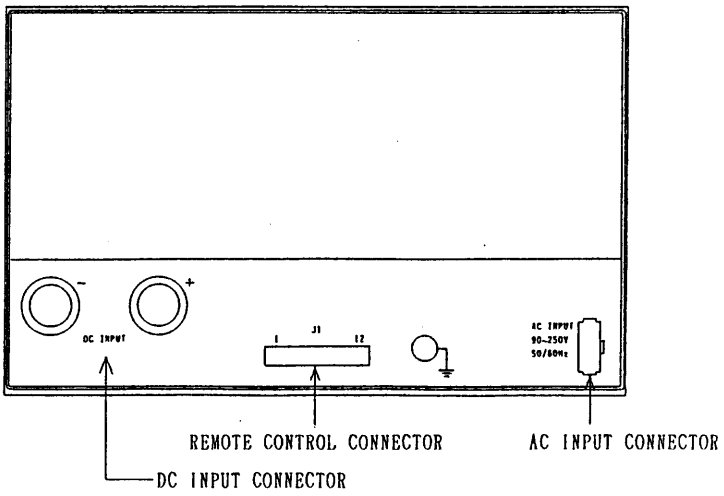
PLZ150WU



PLZ50WU



PLZ300WU



4 . <ELECTRICAL CONNECTIONS>

For electrical connections between the rack mount frame and the Load units, cables are provided as shown in Figure 4-1.

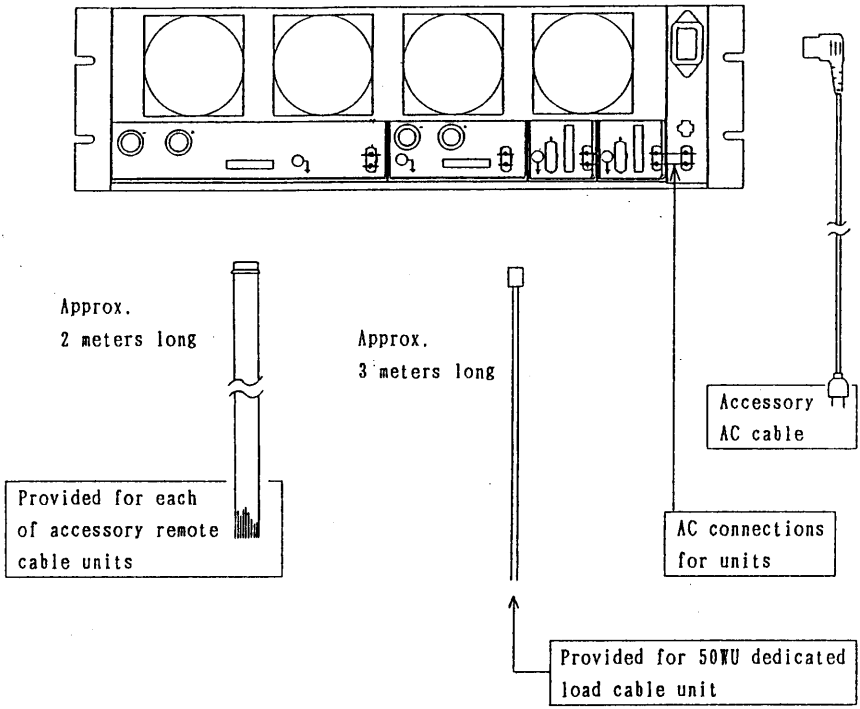
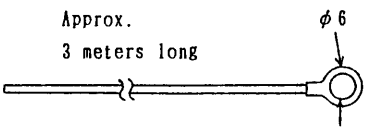


Figure 4-1

No load cables are provided accompanying Models PLZ150WU and PLZ300WU Electronic Loads, for which load cables should be prepared by the user as follows.



Solderless terminal

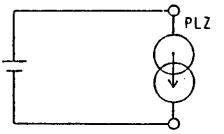
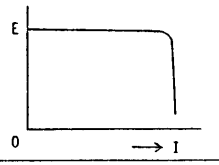
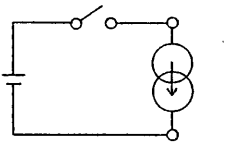
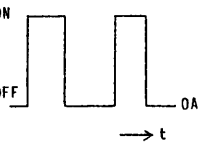
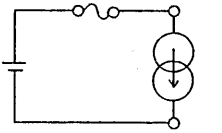
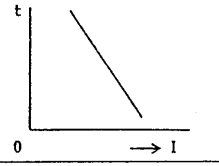
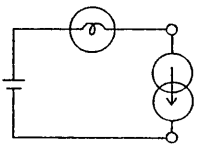
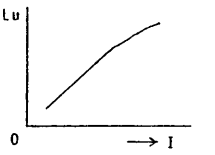
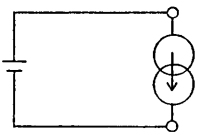
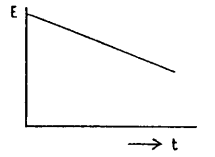
Current Rating	Sectional Area of Conductor
30A	14mm²
60A	22mm²

Note: Note that noise may be introduced if a remote control cable or a load cable longer than the standard length is used.

5 . <APPLICATION EXAMPLES>

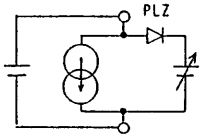
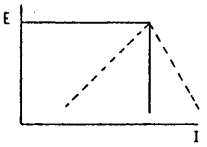
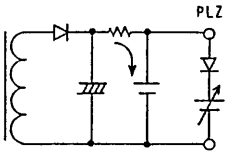
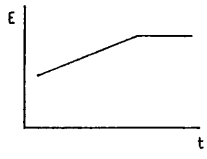
Typical application examples of the Electronic Load are illustrated in this section.

Constant Current Mode

Type of Test	Test Setup	Test Characteristics
Load Test of Regulated DC Power Supply		
Contact Test		
Fuse Test		
Lamp Test		
Constant-current Discharge Test of Battery		

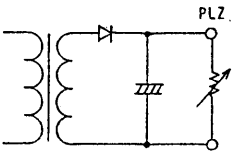
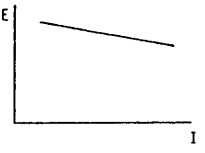
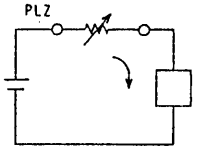
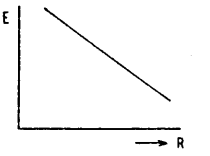
Constant-current setting can be remote-controlled.

Constant Voltage Mode

Type of Test	Test Setup	Test Characteristics
Drooping Characteristic Test	 The diode is a VF zero-volt equivalent one.	
To Prevent Overcharge		

Constant voltage setting can be done only in the remote control mode.

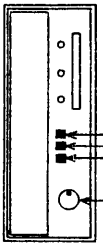
Constant Resistance Test

Type of Test	Test Setup	Test Characteristics
Load Test of Transformer		
To Limit Current		

The constant-resistance mode remote-control feature is optional.
CR01-PLZ: Factory-installed option

6 . <Local Control>

○Setting of Controls for Constant Current Mode

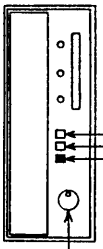


Control	Setting
CR/CC switch	■ CC
EXT/INT switch	■ INT
ON/OFF switch	▂ ON
LOAD dial	As required(continuously variable current)

○Setting of Controls for Constant Resistance Mode

Control	Setting
CR/CC switch	▂ CR
LOAD dial	As required(continuously variable resistance)

7 . <Remote Control>



Control	Setting
EXT/INT	▂ EXT

Setting to the remote control mode is complete by the above procedure.

Function	Local	Remote
ON/OFF select		○
CC mode		○
LOAD adjustment	△	○

Note1

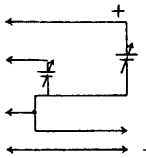
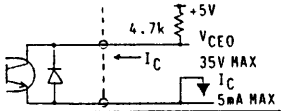
Note2

Note1: CR mode can't be remote-controlled.

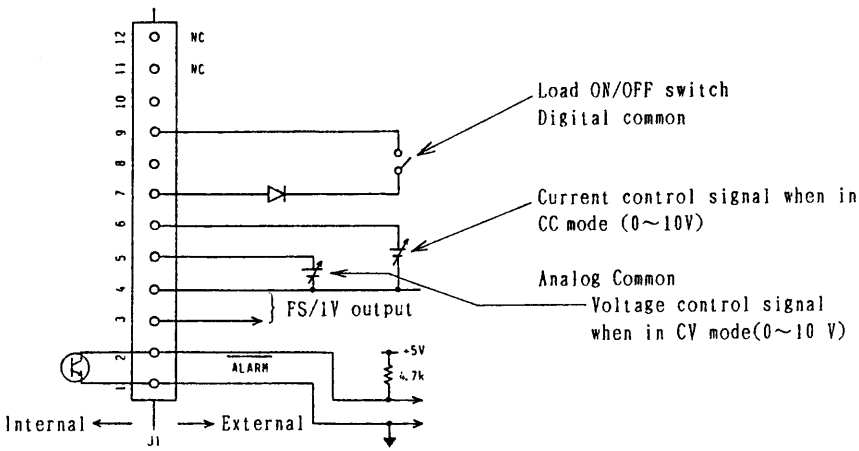
Note2: Turn to the full clockwise position. Adjustment is effective even when in the remote control mode.

○ Table of Remote Control Functions

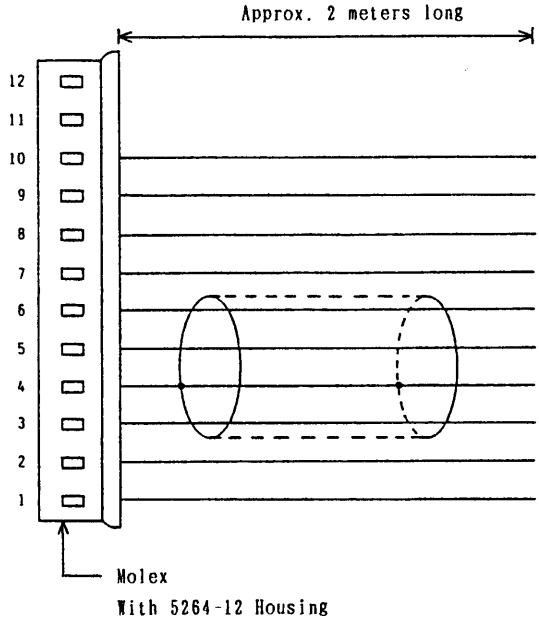
The digital signal is of a positive logic.

Pin No.	Function	Signal Level	Recommendable external circuit
12	NC		
11	NC		
10	Not used		Contact When connecting the cables, make certain that the connections are in the correct polarity.
9	Load ON(operate)	L (Internal pull up)	Voltage approx. 12 V 0.4mA Fanout, approx. 4 mA Voltage approx. 12 V 0.4mA Fanout, approx. 4 mA
8	Not used		
7	Digital ground	Ground	
6	CC mode current change	0～10V	
5	CV mode voltage change	0～10V	
4	Analog ground	Ground	
3	Current monitor output	FS/1V	
2	Alarm	Open collector	
1	Photocoupler isolation	Emitter	

Observe that the connections are in the correct polarity.

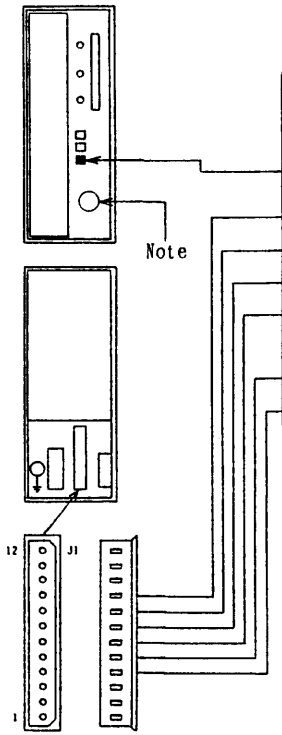


o Remote Control Cable (Accessory)



No. 8 and 10 are not used.
Use this accessory when operating the PLZ-WU in the remote control mode.

○ Setting of Controls for Constant Current Mode



For remote control of the load current in the constant current mode, see the following.

Setting Item	Control Signal Level	Circuit Example	Status
EXT/INT switch			EXT
J1, Pin 9	L		ON
Pin 8	OPEN		C.C
Pin 7	Digital common		
J1, Pin 6	DC 0～10V		Current adjustable
Pin 5			
Pin 4	Analog common		

The load current which is set by the analog control voltage is expressed as follows:

$$Io = K1 \times Es$$

where, Io: Load current [ampere]
Es: Control voltage [volt]
K1: Constant, 1 for PLZ50WU
3 for PLZ150WU
6 for PLZ300WU

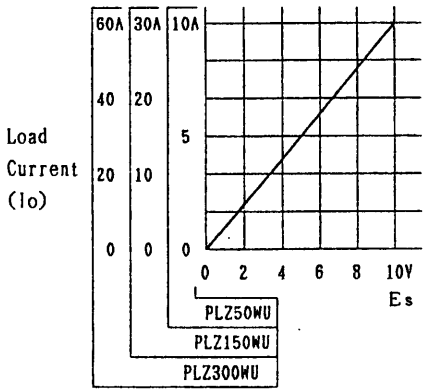
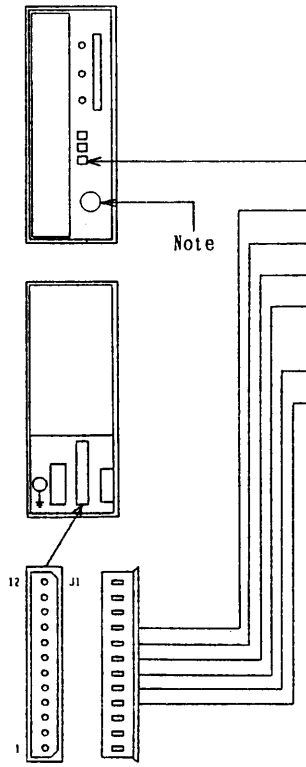


Figure 7-1 shows the relationship of analog control voltage versus load current.

Note: Turn to the full clockwise position. Adjustment is effective even when in the remote control mode.

Figure 7-1

○ Setting of Controls for Constant Current/Constant Voltage Mode



This mode can be used for test and adjustment of output drooping range of a power supply.

Setting Item	Control Signal Level	Circuit Example	Status
EXT/INT switch			EXT
J1, Pin 9	L		ON
Pin 8	OPEN		C.C
Pin 7	Digital common		
J1, Pin 6	DC 0～10V		Current adjustable
Pin 5	DC 0～10V		Voltage adjustable
Pin 4	Analog common		

For setting of the controls for the constant current mode, see the preceding page.

The load voltage which is set by the analog control voltage is expressed as follows:

$$Eo = 6 \times Ev$$

Where, Eo: Load voltage [volt]
Ev: Control voltage [volt]

Even when the load current (Io) is after setting the load voltage (Eo), the output of the tested power supply is maintained at Eo as shown is Figure 7-2.

Example of power supply output characteristics

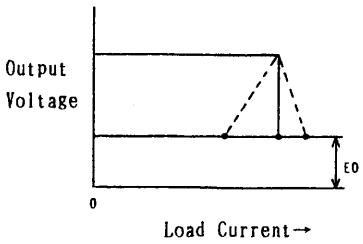
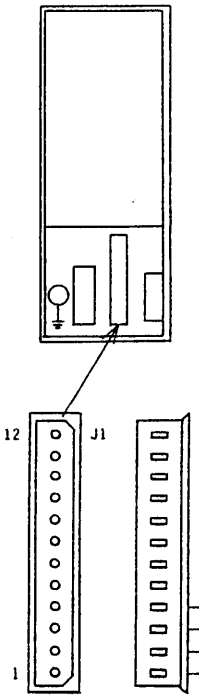


Figure 7-2

Note: Turn to the full clockwise position.
Adjustment is effective even when in the remote control mode.

8. <MONITORS>



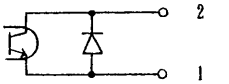
A monitor signal representing the load current is delivered.

Monitor Terminal	Output Signal	Output Impedance
J1, Pin 4	Analog Common	
Pin 3	FS/1V 2%	Approx. 500 ohms

The monitor signal voltage is 1 V ±2% when at the maximum rated current of the Load.

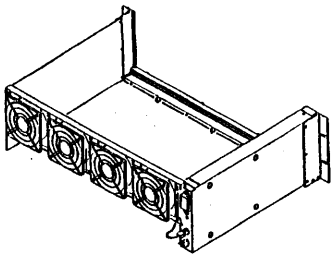
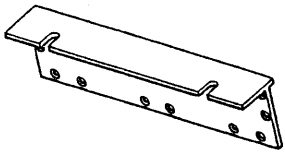
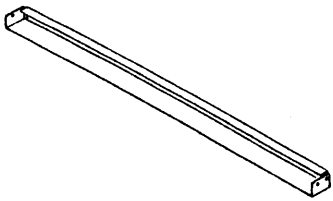
9. <ALARMS>

Protected Items	Indication	Output
Overvoltage	Alarm flag	Photocoupler isolated open collector
Overcurrent		
Overpower		
Overtemperature		
Reverse polarity		



When an alarm is indicated immediately stop operating the Load and eliminate the cause of the alarm.

10. <COMPOSITION OF RACK MOUNT FRAME RMF3-WU>

Item No.	Name	Form	Q'ty
①	Rack mount frane (for EIA rack)		1
②	Brackets (right and left) for JIS rack		2
③	Blank panel for JIS rack		1
④	Screws, flat head M3×6		4
⑤	Screws, oval head M5×14		4
⑥	Finishing washer		4

[For JIS Rack]

To assemble the rack mount frame for a JIS (Japanese Industrial Standard), proceed as follows:

1. Replace the front pillar of the right and left panel units (for EIA rack) ① with the right and left brackets for JIS rack ②, using the original binding -screws for both brackets.

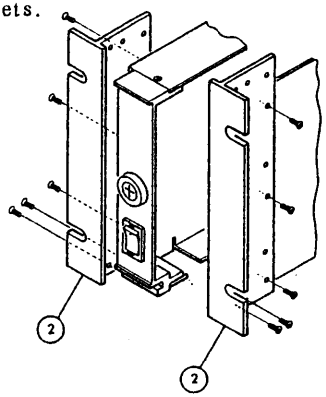


Figure 10-3

2. After installing the Load Unit(s) (See <TO INSTALL LOAD UNIT(S) IN RACK MOUNT FRAME>), fix the blank panel for JIS rack ③ with the screws M3×6 ④.

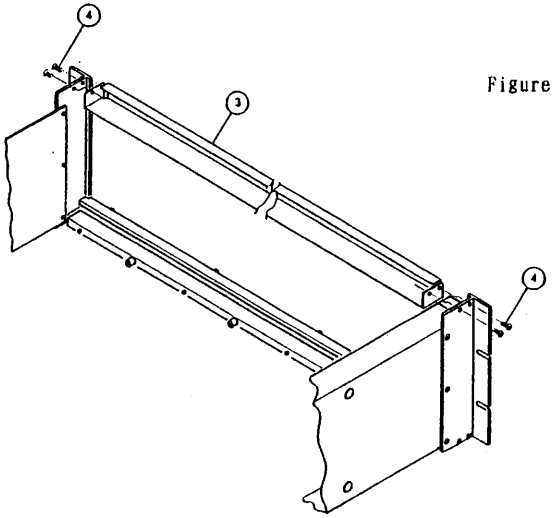


Figure 10-2

Assembly of the rack mount frame for JIS rack is complete by the above procedure.

11. <TO INSTALL LOAD UNIT(S) IN RACK MOUNT FRAME>

To install the Load Unit(s) in the rack mount frame RMF3-WU, follow the instructions given below.

Note: Note that the rack mount frame should be assembled in a different manner depending on whether the rack is of the EIA or JIS standard as mentioned in Section 10.

Installing Procedure

1. Loosen the four unit binding-screws ① at the front of RMF3-WU and widen the gap "A". (B－B view)

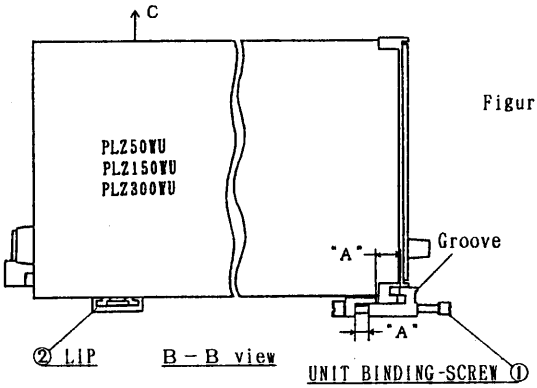


Figure 11-1

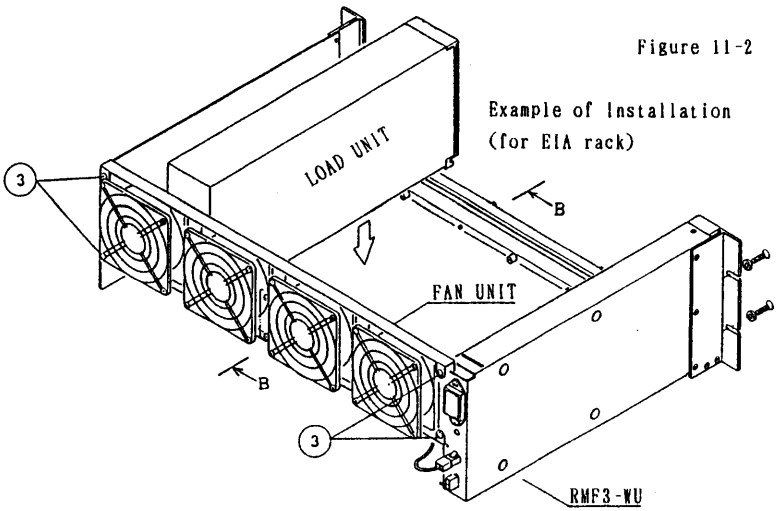


Figure 11-2

Example of Installation
(for EIA rack)

2. Loosen the four fan unit binding-screws ③. (The fan unit can move to the rear.)
3. Put the Load Unit in the frame. Make sure that the lip ② is in the groove.
4. Move the Load Unit to the required position (to the right or left as required).
5. Tighten the four unit binding-screws ①.
6. Make sure that the lip ② is securely engaged in the groove.
   (This can be made by raising the unit in the C direction shown in Figure 11-1.)
7. Tighten the four fan unit binding-screws ③.

The installation procedure is complete by the above.

Notes: 1. The groove indicated with the asterisk in Figure 11-1 may be used for identification marks (such as "CH1", "CH2").
2. Figure 11-2 shows only an example of installation of PLZ50WU. PLZ 150WU and PLZ300WU also can be installed in the same manner. Any combination of PLZ50WU, PLZ150WU and PLZ300WU also can be installed.
3. To cover up the unused void space of the rack mount space, blank panels (BP8-WU, BP4-WU, and BP2-WU) are available as options.

12. <INSTALLING BLANK PANEL>

To cover up the unused void space of the rack mount frame, blank panels are available as shown in Figure 12-1.

Note: Note that the rack mount frame should be assembled in a differnt manner depending on whether the rack is of the EIA or JIS standard as mentioned in Section 10.

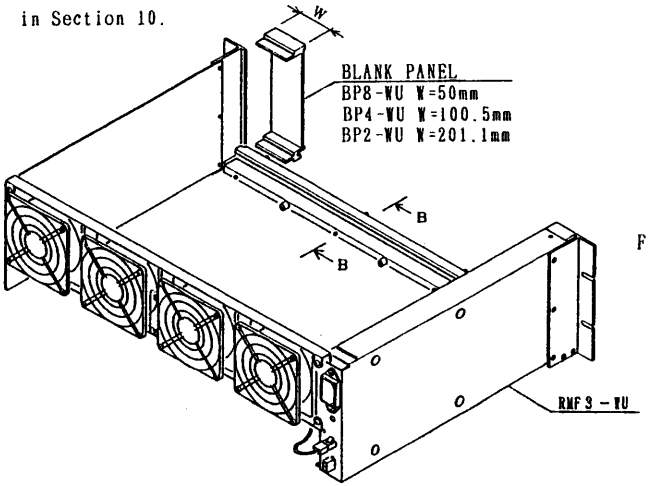


Figure 12-1

To install a blank panel, proceed as follows:

1. Loosen the four unit binding-screws ① at the front of RMF3-WU and widen the gap "A". (B - B view)
2. Place a blank panel at the required position on the rack mount frame. (The panel can be moved to the right or left on the rack as required.)
3. Tighten the four unit binding-screws ①.

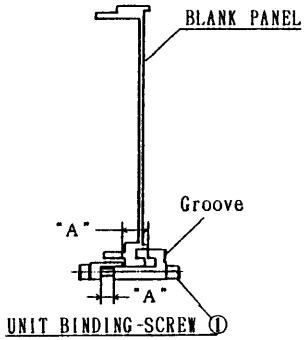


Figure 12-2

Notes: 1. The groove indicated with the asterisk in Figure 12-2 may be used for identification marks (such as "CH1", "CH2").

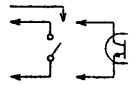
2. The above illustrations are only for the sake of explanation. Actually, the blank panel may be installed at the same time as the Load Unit(s) is installed on the rack mount frame.

13. <SPECIFICATIONS>

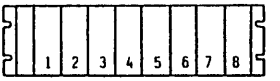
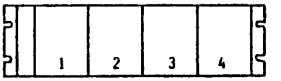
Item Model	PLZ-50WU	PLZ-150WU	PLZ-300WU	Remarks
Power Requirements	90－250 V, 50/60 Hz single-phase AC, approx. 12 VA			
Load Input				
Maximum Operable Voltage	60 VDC			
Minimum Operable Voltage	2 VDC, 10A	2.2 VDC, 30A	2.2 VDC, 60A	Refer to Section 15 "Operable Range Charts".
Maximum Current	10 A	30 A	60 A	
Maximum Wattage	50 W	150 W	300 W	
Constant Current Mode				
Current Range	0 - 10 A	0 - 30 A	0 - 60 A	
Stability	±0.1% +2mA	±0.1% +3mA	±0.1% +5mA	Note 1, Note 2
Response Time	100 μs or less	150 μs or less	200 μs or less	For change of 10 - 90% of full scale
Ripple Noise	0.05% A rms of full scale			Within 5Hz - 1MHz
Constant Resistance Mode				
Resistance Range	0.2 - 10 Ω or over	0.1 - 5 Ω or over	0.05 - 2 Ω or over	
Stability	±0.1% +2mA	±0.1% +3mA	±0.1% +5mA	Note 2
Constant Voltage Mode				
Type	Shunt regulator			For remote control only
Operable Voltage Range	2 - 60 VDC	2.2 - 60VDC		

Note 1: For change within load input operable voltage

Note 2: For ±10% change of AC line voltage

Item \ Model	PLZ-50WU	PLZ-150WU	PLZ300-WU	Remarks
Remote Control				
Constant Current Mode	Control of load current with voltage signal (Maximum load current with 10V siganal)			Input impedance approx. 70 kΩ
Constant Voltage Mode	Control of load voltage with to voltage signal (Maximum load voltage with 10V signal)			Input impedance approx. 15 kΩ
CC/CR Select	CR mode/L CC mode/H	Contact signal or photo-isolated open collector		12 VDC, 0.4 mA 
Load ON/OFF Control	Load ON/L Load OFF/H	With internal pull up circuit 12 VDC fanout approx. 0.4 mA		
Protectors				
Overvoltage	Cuts out current when voltage has exceeded approx. 70 V			Alarm lamp blinks
Overcurrent	Approx. 11A	Approx. 33A	Approx. 65A	
Overpower	Approx. 55W	Approx. 160W	Approx. 330W	
Overtemperature	At approx. 90 deg.C (194 deg.F) of heat sink			
Reverse Polarity	Fuse to break the circuit			
Output Signals				
Current Monitor Signal	1 volt for maximum load current. Accuracy: ±2% of maximum load current			Output impedance approx. 500 Ω
Alarm Signal	When one of the protectors has tripped, the photoisolated open-collector output becomes L.			
Indicator Lamps				
POWER Lamp	Green LED (illuminates to indecate power on)			
OPERATE Lamp	Red LED (illuminates to indicate load on)			
ALARM Lamp	Red LED (illuminates to indicate protector trip)			
CURRENT Lamp	Red 7-dot bargraph (illuminates to indicate load current level)			

Item \ Model	PLZ-50WU	PLZ-150WU	PLZ-300WU	Remarks
General Items				
Parallel Operation	Can be done in constant current mode with remote control			
Cooling System	Forced air cooling with fans on Rack Mount Frame RMF3-WU			
Operable Ambient Temperature and Humidity	0 to 40 deg C (32 to 104 deg F), 80% RH or lower			
Withstanding Voltage	1500 VAC, between AC input terminal and casing, for 1 minute			
Insulation Resistance	Between load input terminal and casing: > 20 MΩ, with 500 VDC Between AC input terminal and casing: > 30 MΩ, with 500 VDC			
Overall Dimensions, Including Extrusions	50W × 128H × 330D mm (1.96W × 5.04H × 13.0D in.)	100W × 128H × 330D mm (3.94W × 5.04H × 13.0D in.)	202W × 128H × 330D mm (7.95W × 5.04H × 13.0D in.)	
Weight	Approx. 1.1kg (Approx. 2.4 lbs)	Approx. 2.2kg (Approx. 4.8 lbs)	Approx. 4kg (Approx. 8.8 lbs)	
Accessories				
Instruction Manual	1 copy			
Fuse	15 A × 1	10 A × 4	75 A × 1	
Terminal Parts for load input	Load wires (3m) with molex 3191-02P··· 1 sets			
Remote Control Cable	Cable with Molex 5264-12 ··· 2 m × 1			

Item \ Model	RMF3-WU Rack Mount Frame *1	Remarks
Number of Units Accommodated	(1) 8 units of PLZ50WU *2  (2) 4 units of PLZ150WU *3  (3) 2 units of PLZ300WU *4  (4) Combination of PLZ50WU, PLZ150WU and PLZ300WU also is possible.	
Air Cooling Unit	80-mm 24 V DC four fans	
Power Requirements	90 - 250 V, 50/60 Hz single-phase AC, approx. 25 VA	
Withstanding Voltage	1500 VAC, between AC input terminal and casing, for 1 minute	
Insulation Resistance	Between AC input terminal and casing: > 30 MΩ, with 500 VDC	
Dimensions (Frame Only)	See Figure 14-2.	
Weight (Frame Only)	Approx. 3 kg (6.6 lbs)	
Accessories		
Instruction Manual	1 copy	Z1-737-220
Power Cord	VM1165B-VM1172 AC Cord Set	85-10-0121
Power Cord for Unit	Wire Kit for RMF	91-87-3748

*1 : Can be installed on an EIA or JIS standard rack. See Section 10 for details.

*2 : Cover up the void space with Blank Panel BP8-WU (optional).

*3 : Cover up the void space with Blank Panel BP4-WU (optional).

*4 : Cover up the void space with Blank Panel BP2-WU (optional).

14. <OVERALL DIMENSIONS>

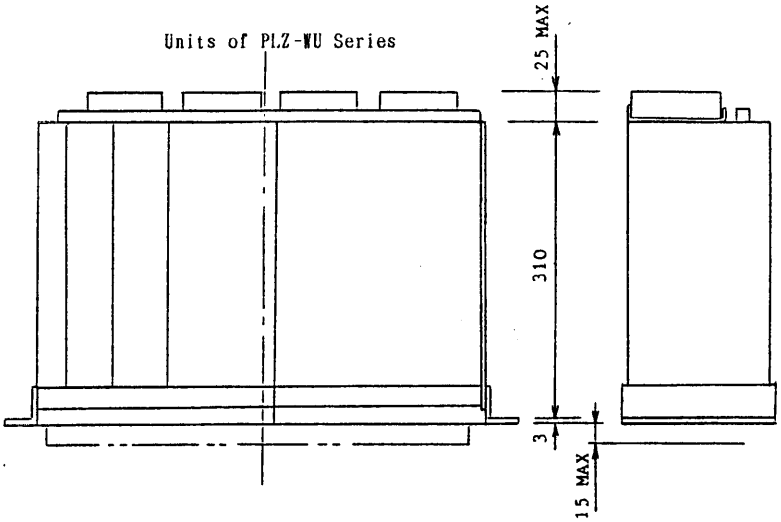


Figure 14-1

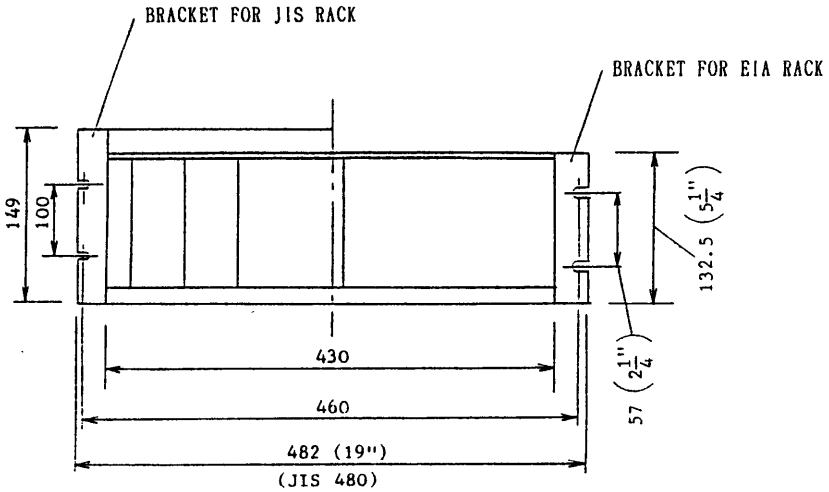
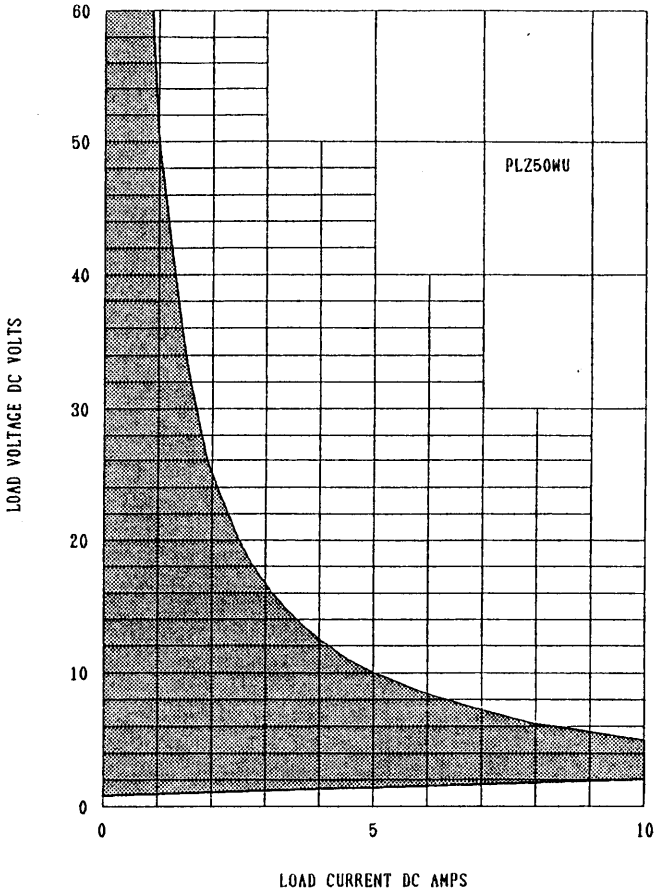
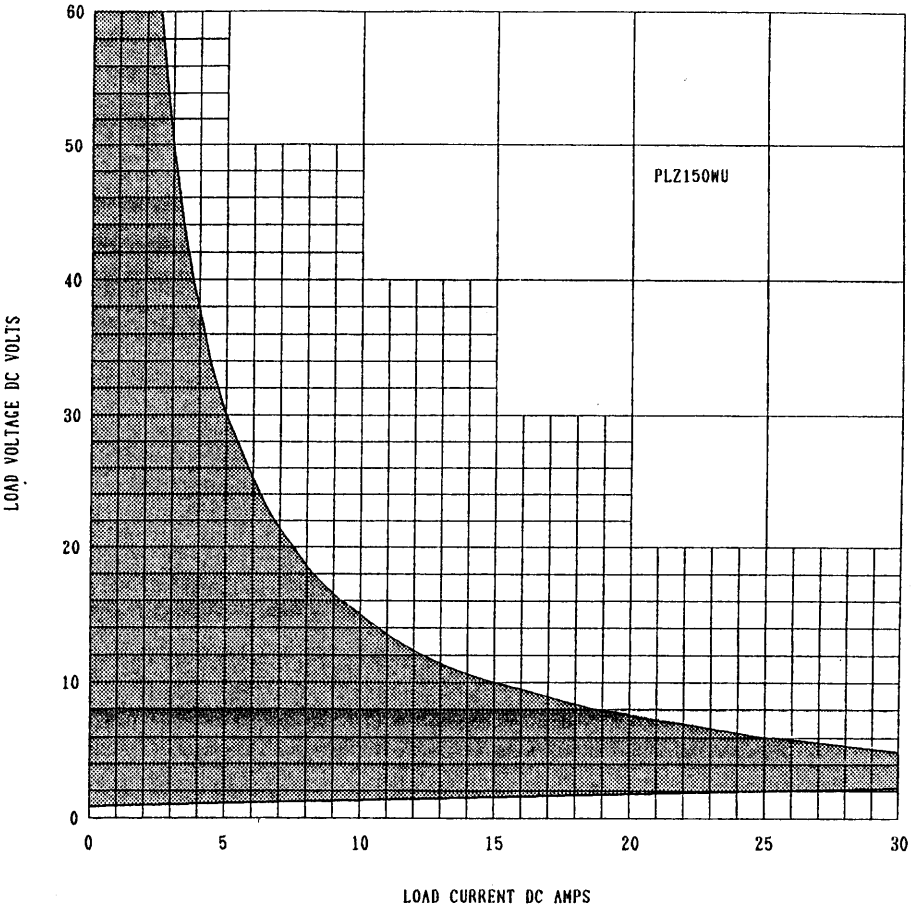
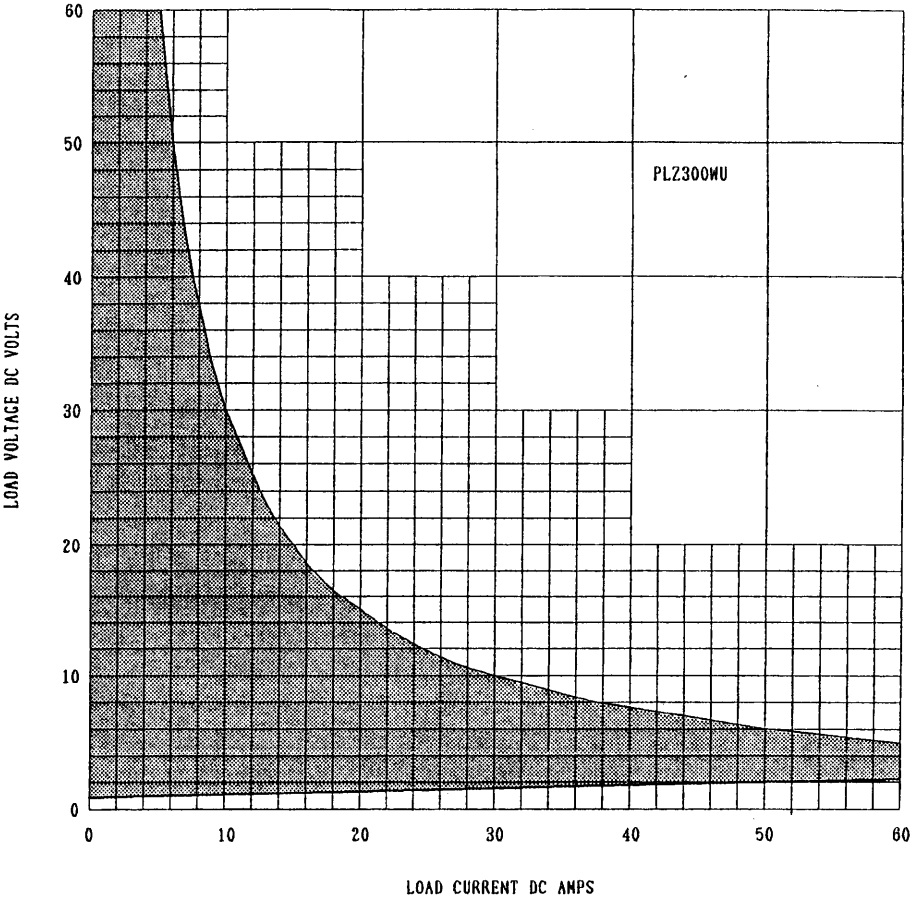


Figure 14-2

15. <OPERABLE RANGE CHARTS>




PLZ150WU
LOAD VOLTAGE DC VOLTS
LOAD CURRENT DC AMPS
0
10
20
30
40
50
60
0
5
10
15
20
25
30


PLZ300MU
LOAD VOLTAGE DC VOLTS
LOAD CURRENT DC AMPS
0
10
20
30
40
50
60