Instruction Manual

MODEL WA SERIES

Matsusada Precision

B/N 069.9.018 Rev. 1.0

F-RA-001-3R1

SAFETY

This power supply unit generates high voltage and energy.
Electric shock may lead to death or serious injury.
Be sure to follow the instructions below and handle the unit with caution.

1. BE SURE TO GROUND!!

Be sure to ground the power supply unit before use.

2. DO NOT TOUCH ANY HIGH VOLTAGE TERMINALS!!

Do not operate the power supply unless someone who is familiar with the operation precede, the hazards of high voltage, and the treatment for the electrical shock is present.

3. UNDERSTAND THE HAZARDS OF HIGH VOLTAGE!!

In case you let somebody operate the power supply for you, must be sure that he/she fully understands the hazards of high voltage and the areas where never can be touched.

4. CUT OFF THE POWER BEFORE TOUCH THE UNIT!!

Cut off the power, and check that the power is OFF, before you touch the power supply. Capacitors in the output circuit are still charged and dangerous even after the power has been cut off.Discharge all remaining high voltage by grounding them.

5. DISCONNECT THE INPUT LINES(AC LINES) !!

In case you need to touch the inside of the power supply following instruction manual, cut off the power and disconnect the input lines(AC lines), and ground all the capacitors and high voltage section.
Don't remove the case or touch the inside of power supply unless so instructed in the instruction manual.

6. OPERATE THE POWER SUPPLY WITH YOUR RIGHT HAND!!

In order to avoid the electric shock to your important organs, operate the power supply with your right hand and keep your left hand off from the power supply.

For Safe Use

Symbols

Various symbols are used in this instruction manual and on the product for ensuring safety. What will be caused by ignoring the instructions given with the symbols or by improper handling are classified as shown below. Read carefully and understand the descriptions before proceeding to the main body of this manual.

⚠ **Warning:** failure to follow the instructions with this indication may lead to death or serious injury.

⚠ **Caution:** failure to follow the instructions with this indication may lead to injury or damage in property.

Meanings of the Symbols

Some of the symbols used are shown on the right.

⚠ Indicates that which requires caution.

Indicates that which forbidden.

Indicates that which must be done.

Indicates electric shock hazard.

⚠Warning

NO

- Do not touch the output terminal or the leads or load connected to it while the unit is in operation or immediately after it is stopped. Otherwise it may cause electric shock or injury.

NO

- Do not install the unit in a place subject to steam or water vapor. Otherwise it may cause poor insulation and lead to fire or electric shock.

NO

- Do not install the unit in a place subject to dew condensation. Otherwise it may cause electric shock.

NO

- Do not modify or damage the cables. Otherwise it may cause electric shock.

NO

- Do not place any object on the unit. Dangerous situations may occur if the object drops or falls.
- Do not put any object in the unit. It may cause damage.

GROUND

- Be sure to ground the unit to avoid a rare possibility of electric shock. Otherwise it may lead to fire, electric shock or injury.

NO DISASSEMBLY

- Do not disassemble, remodel or repair the unit. High voltage may be built up inside, which may cause electric shock.
- Disassembly, remodeling or repair hamper ensuring of safety and may lead to dangerous situations.

NO

- Do not install the unit outdoors or in a place subject to leaking of water, flood or snow. Otherwise it may cause electric shock.

⚠Caution

NO

- Do not install the unit upside down or on a wrong side.
  Insufficient heat release may cause deterioration of parts, which may generate smoke or set fire.

NO

- Do not use the unit in a place subject to high temperature or in an enclosed, limited area.
  It not only hampers the unit from achieving its performance but also causes deterioration of parts leading to smoking or burning.

NO

- Do not cover the vent holes of the unit.
  Vent holes are provided to prevent elevation of temperature inside.
  Covering them not only hampers the unit from achieving its performance but also causes deterioration of parts, which may generate smoke or set fire.

NO

- Do not install the unit and the remote controller in a place subject to direct cold air. Condensation may lead to electrical leak/burning.

NO

- Do not wipe the unit with chemicals (such as thinner) or wet cloth.
  It may allow water inside leading to electric shock, electrical leak or burning.

NO

- Do not install the unit in a place subject to corrosive gas or liquid (such as a place where chemicals are handled).
  Deterioration of parts may cause generation of smoke or burning.

■ After reading this manual, be sure to store it in a place convenient for the users so that it can be referred to at anytime.

First-aid procedures to be implemented in case of electrical shock

RESCUE

1. Free victim from contact with live conductor quickly.
   Avoid contact with neither live conductor nor victim's body.

2. Shut off high voltage at once and ground the circuit. If high voltage cannot be turned off quickly, ground the circuit to discharge, or cut high voltage line by an ax with dry wooden handle. Be careful of electric flash.

3. If circuit cannot be broken or grounded, use a dry board, dry clothing, or other nonconductor to free victim.

4. Call an ambulance immediately.

SYMPTOMS

NEVER TAKE ELECTRICALLY SHOCKED CONDITION AS DEATH.

Symptoms of electric shock may include unconsciousness, failure to breathe, absence of pulse, pallor, and stiffness, as well as severe burns.

Whenever victim is not breathing properly, give artificial respiration(see next page).

TREATMENT

1. Start artificial respiration at scene of accident. Only in case victim's or operator's life is endangered, remove victim to safe location nearby.
2. After starting artificial respiration, continue without loss of rhythm until victim start breathing without help, or being passed to medical aid.
3. When operator change while giving artificial respiration, do so without losing the rhythm of respiration.
4. After giving first aid, try to get a diagnosis by a doctor as soon as possible because shock can cause internal burn, which can be lethal if left untreated.

AFTER VICTIM REVIVES

Be prepared to resume artificial respiration, as he may stop breathing again.

Keep victim warm and lying down until he or she has been conscious for at least thirty minutes.

Artificial respiration

1. PLACE VICTIM

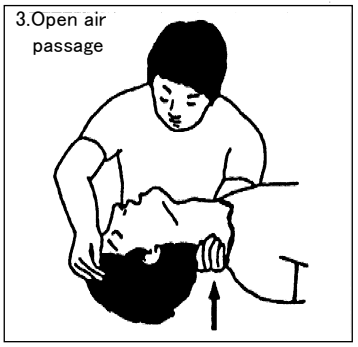
Place victim in face-upward position horizontally.

2. CLEAR THROAT

Turn head to one side quickly wipe out any fluid, mucus, or foreign body from mouth and throat with fingers.

3. OPEN AIR PASSAGE

Tilt head back and extend neck to open air passage.

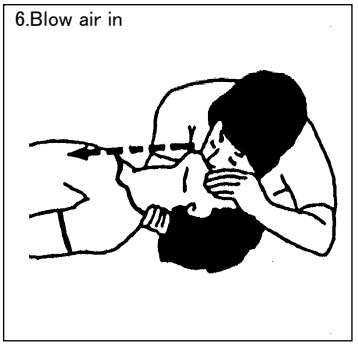


4. LIFT JAW FORWARD

Put thumb in victim's mouth and grasp jaw firmly. Lift jaw forward to pull tongue out of air passage. Do not hold or depress tongue.

5. PINCH NOSTRILS CLOSED

With other hand pinch nostrils closed to prevent air leak.



6. BLOW AIR IN

Take a deep breath, seal victim's open mouth and exhale firmly into victim's mouth until chest is seen to lift.
Make sure to open mouth widely to avoid air leakage.

7.REMOVE MOUTH AND CHECK

Check the sound of breathing out air and see normal breathing when releasing mouth. If no sound, repeat from OPEN AIR PASSAGE. Continue at a rate of 12 to 20 times per minute.

Quantity of air have to be increased gradually. Especially when victim is infant, be carefully not to be too strong, not to blow in too much air.
Keep giving artificial respiration until victim start breathing without help, or being passed to medical aid.

WARRANTY

1. WARRANTY POLICY

Matsusada Precision Inc. ("Matsusada") warrants that the products supplied by it will be free from defects in materials and workmanship for a period of twelve (12) months from the date of original shipment to buyer. This warranty shall not apply to any product which has been repaired, modified or worked on by persons unauthorized by Matsusada, used other than in accordance with the instruction manuals, used in inappropriate environment (with corrosive gas, high humidity, etc) or damaged by any event beyond Matsusada's control such as force majeure. Matsusada shall in no way be liable for any incidental, special or consequential damages relating to this warranty.

Matsusada's sole liabilities and the buyer's sole remedies shall be limited, at Matsusada's discretion, to a repair or replacement of the products.

The foregoing warranty is in lieu of all other warranties, express or implied, including those of merchantability or fitness for a particular purpose.

As the products are not designed and manufactured for applications which require extraordinary reliability or safety, or affecting people's life (nuclear energy, aerospace, socially fundamental facility, medical equipment, etc), this warranty shall not be applied for such applications. The specific design and manufacturing might be required for such applications.

No modification or supplement of this warranty shall be binding unless in writing and signed by a duly authorized officer of Matsusada.

2. INSTRUCTION MANUAL AND TEST DATA

- Each rack mount and bench top power supply have 1 instruction manual. Extra instruction manuals available with charge.
- Schematics of products shall not be submitted to users. Test result or test data for the products shall be available upon request with charge.

CONTENTS

1 Introduction

1－1 Introduction

Thank you very much for your purchase of our product HIGH VOLTAGE POWER SUPPLY. We have done
Please handle this unit properly according to this instruction manual so that you can use the full performance of this unit safely for long.
We have carefully prepared this instruction manual, but if you find any doubtful or unclear point or any omission, please kindly contact us shortly.

1－2 Unpacking the POWER SUPPLY

When unpacked the unit, you will please check the following accessories are enclosed with power supply main body.

〈ACCESSORIES〉

- AC input cord (1 pc.)

  150W, 300W : Cable for AC 125V/10A
  600W : Cable for AC 125V/15A
  900W, 1200W : Cable for AC 250V/10A

- Instruction manual
- Output cable
- D-type connector 25pin (1 pc.)

〈Initial Checking〉

・Check the panel and chassis for any apparent trace of impact such as a dent.
If any failure is found, contact the carrier and the manufacturer.

1－3 Installation conditions

⚠ WARNING	This unit is a high voltage power supply. Observe the safety precautions and operate correctly, or an electric shock or a fatal accident may be caused. Observe the following precautions in operation and inspection this power supply to operate and handle it correctly.

MUST ・Install the power supply unit horizontally for use.

MUST ・The top and side surfaces are the cooling air supply and exhaust openings. The power supply must be arranged with adequate space and good ventilation.

NO ・Do not put any object on the power supply unit.

NO ・Do not operate the power supply in a dusty area or in corrosive gas environment.

NO ・Do not use any substitute for the parts in the internal circuits or do not modify them without permission.

CAUTION ・Contact us for repair. The power supply should be repaired by us.

1－4 Connecting AC line input cord

・Plug the enclosed AC line input cord to the panel AC line input connector.

・The AC100V is different from the AC200V in the type of the included AC line input cord. For AC100V, a commercial outlet can be used. For AC200V, attach a crimp style terminal to the cord end and connect to the commercial power board.

Connect the power board as follows:

NEUTRAL= Blue

LINE= Brown

EARTH(⏚) = Yellow/Green

CAUTION ・Electrically ground the power supply main body with the AC line input connector, or it is very dangerous.

CAUTION
・The rated input voltage is set when the unit is dispatched from the factory. Verify the input voltage indicated on the rear panel and input the correct voltage.

・Unless the input voltage is as shown above due to special specifications, verify the input voltage indicated on the rear panel and input the correct voltage

・Any wrong voltage input may damage the unit.

1－5 Points to be careful about in handling.

WHEN TOUCHING LOAD AFTER TURNING OFF THE OUTPUT

1. Make the setting of an output voltage to zero (0).
2. Check and confirm that the voltage is zero at an output voltmeter of this unit.
3. Be sure to disconnect the AC line cord.
4. Earthling an output for more than 10 seconds, check and confirm that the voltage is zero with another high voltage meter. It is especially dangerous that the load is capacitive or a long cable is used.
5. Make it a rule to touch load with right hand.

How to GROUND

・For safe operation, be sure to ground the ground terminal of power supply at one point on the ground.

・If the Load frame is not grounded

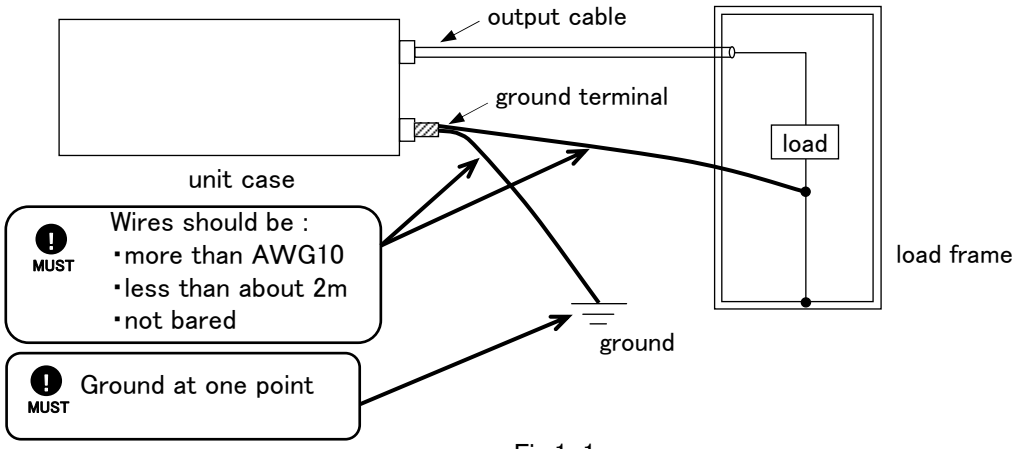


Fig.1-1

・If the Load frame is grounded

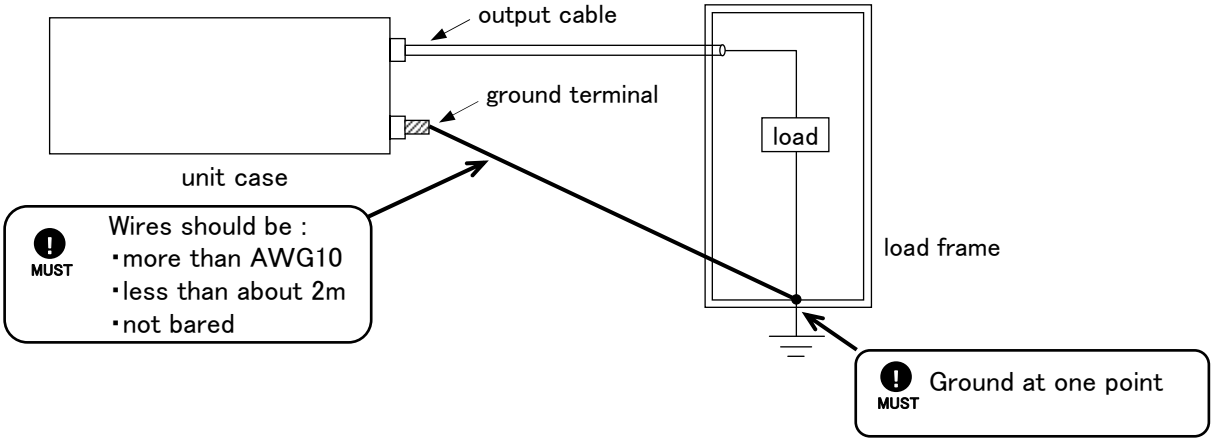


Fig.1-2

・Make sure to connect the GROUND terminal correctly. Poor grounding is dangerous and may cause an electric shock or damage the power supply.

・When load short-circuit or discharge is forecasted, make the GROUND cable thicker and shorter.

FOR SAFER OPEREATION

1. Laying an insulation plate which can withstand the voltage to be used on the floor on which an operator stands, carry out the operation. If done so, it will be comparatively safe.
2. When operating a power supply and load, do so with right hand with left hand put in the pocket, taking care not to touch other objects.
3. After turning off the voltage (even if a long time has lapsed after turning off), if you touch load, be sure to earth the output longer than 10 seconds.

1－6 Troubleshooting

・No output voltage

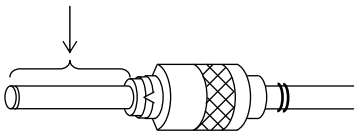
1. Check if the specified voltage is input.
   - ・Power supply input voltage

     150W – 600W MODEL : AC100–240V±10% 50/60Hz single phase

     900W, 1200W MODEL : AV200–240V±10% 50/60Hz single phase
   - ・Control voltage 0–10V in external voltage controlling.
   - ・Control voltage 0–10V in external current controlling.
2. Check if the remote switch (LS) and the door switch (LD) are correctly connected.

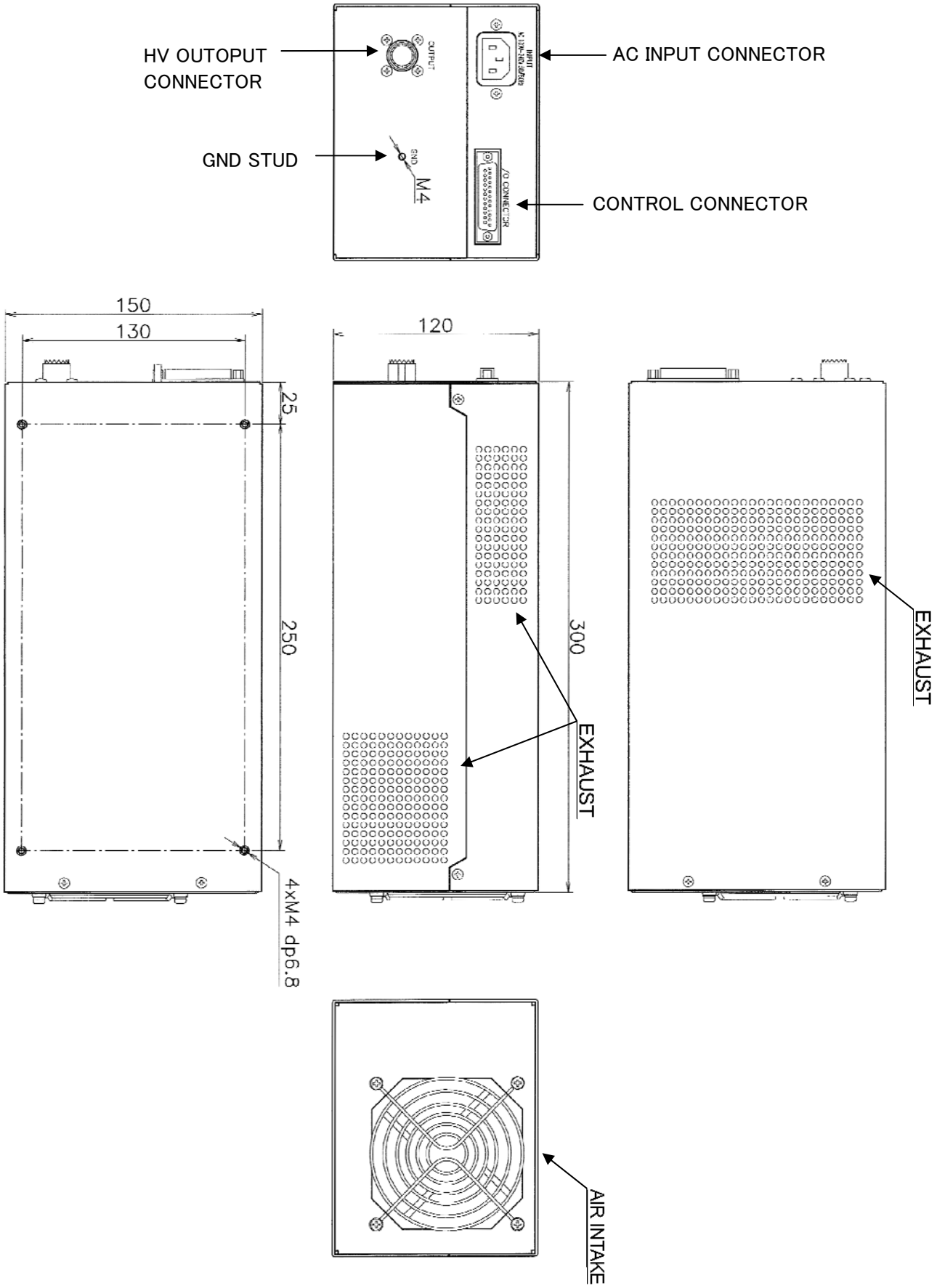
・Discharge noise from the high voltage output

Check if the high voltage connector plug (arrow in the figure below) is contaminated.
The dirty plug may cause electric discharge in the connector.
Wipe away the dirt with cloth soaked in alcohol and dry completely to use.

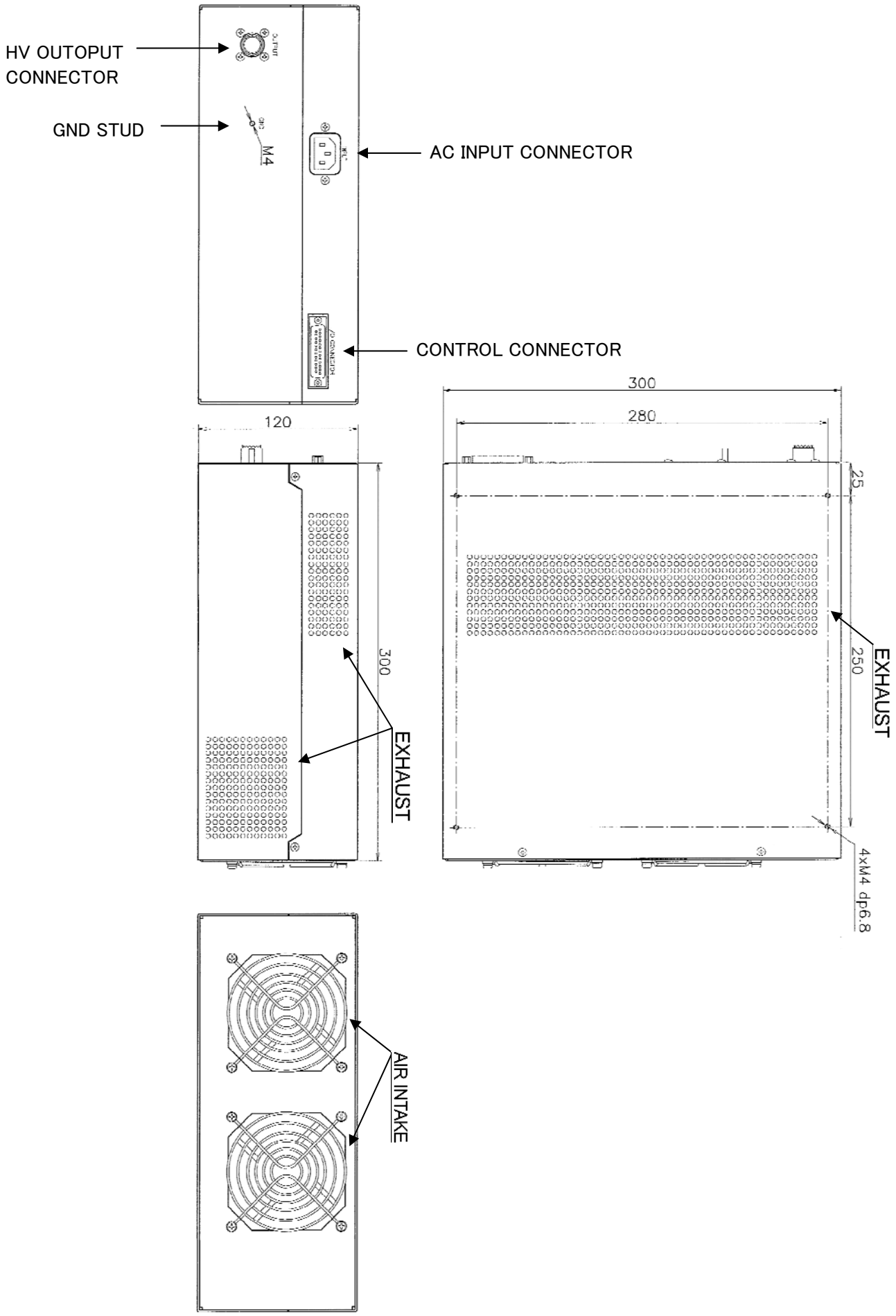


2 Exterior view diagram

[150W – 600W MODEL] (mm)



[900W, 1200W MODEL] (mm)



3 Basic operation

> ⚠ WARNING
> This instrument generates **HIGH VOLTAGE**.
> Ignoring the instructions for safe operation of the power supply may result to **DEATH** or **BODILY INJURY** due electric shock. Please follow the instructions.

> ⚠ CAUTION
> Always operate the unit with the cover on.

3－1 Operation

1. Connect the Ground wire product as shown in Section 1-5. To ensure your safety during installation, make sure the unit is always grounded.
2. Attach the output cable to the load.
3. Plug the high voltage output cable into the power supply.
4. Connect control and monitoring connections as described in this manual.
5. Set the voltage and current output to 0. Set the remote ON/OFF switch to OFF and the door switch to ON.
6. Connect the AC power cord (make sure the AC input voltage is correct.)
7. Turn the remote ON/OFF switch to ON. The power supply is ready for operation.
8. Program the output voltage and current to desired level. Monitor the output voltage and current via the monitoring test points.
9. To end operating the power supply, return the output voltage setting to 0 (keep as it is when the unit is re-operated at the same voltage) and set the remote ON/OFF switch to OFF. If equipment is to be kept off for extended periods, disconnect power supply from AC input voltage source.

> ⚠ WARNING
> Never touch the load immediately after the operation ends. It is very dangerous. When capacity load is used, carefully connect the load to the ground and make sure that electricity is discharged.

3－2 Protection

a. Over Voltage Protection (O.V.P.)
This unit is equipped with the over voltage protection. To protect the power supply and the load, the voltage is limited approx. 105% of the maximum rated voltage even if any abnormality occurs.

b. Over Current Protection (O.C.P.)
This unit is equipped with the over current protection. To protect the power supply and the load, the current is limited approx. 105% of the maximum rated voltage even if any abnormality occurs.

c. Over Temperature Protection
This unit is equipped with the built-in circuit to cut off the high voltage output at the set internal temperature or higher. For resetting protection disconnect power supply from AC input voltage source once, and turn it on once again.

4 Control connector

4－1 Introduction

We suggest on Remote Programming Operation.
This function is available for external control and monitor.

4－2 Function of control connector

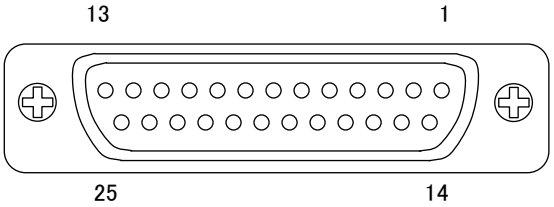


Fig 4-1 Control connector

List 4-1 Function of control connector

TB1	SIGNAL	PARAMETER
1	Remote Voltage Program In	0 to 10Vdc = 0 to 100% rated output
2	Remote Current Program In	0 to 10Vdc = 0 to 100% rated output
3	Output Current Monitor	0 to 10Vdc = 0 to 100% rated output
4	Spare(out of use)	
5	Common(GND of Power Supply)	For 1 , 2 , 3 , 14 , 15
6	Spare(out of use)	
7	Door switch(Inter Lock)	Short = HV ON
8	Spare(out of use)	
9	Spare(out of use)	
10	Spare(out of use)	
11	Spare(out of use)	
12	Spare(out of use)	
13	Spare(out of use)	
14	Reference	Reference +10.24V, 4mA MAX output
15	Output Voltage Monitor	0 to 10Vdc = 0 to 100% rated output
16	Spare(out of use)	
17	Common(GND of Power Supply)	For 7 , 19 , 20
18	Spare(out of use)	
19	HV Status	HV ON = TTL Lo, HV OFF = TTL Hi
20	Spare(out of use)	
21	Remote switch	Short = HV ON　Open = HV OFF
22	Spare(out of use)	
23	Spare(out of use)	
24	Spare(out of use)	
25	Spare(out of use)	

4－3 Remote switch ON/OFF (LS)

The remote switch can select the output to ON/OFF. (The open collector can also do.)

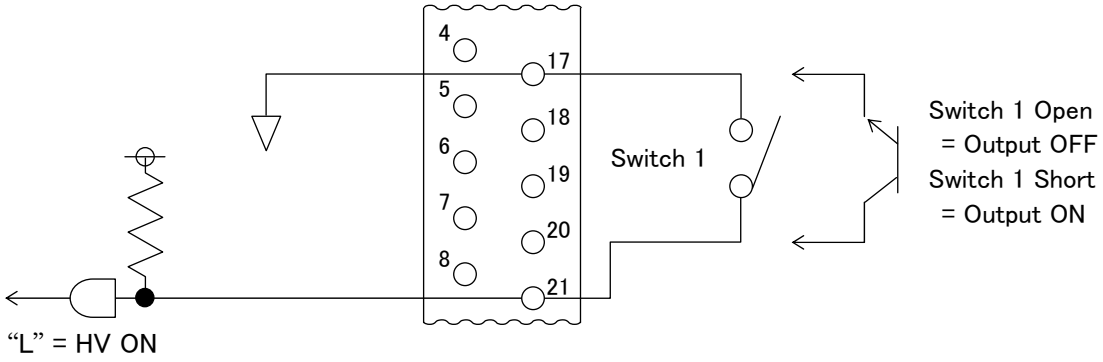


Fig 4-2 Remote switch

4－4 Door switch = Interlock (LD)

Select the external switch to OFF, and the high voltage output is cut off.
Once cut off closing interlock shall not resume HV output.
Cut AC line and put it again in order to reset cut off status.

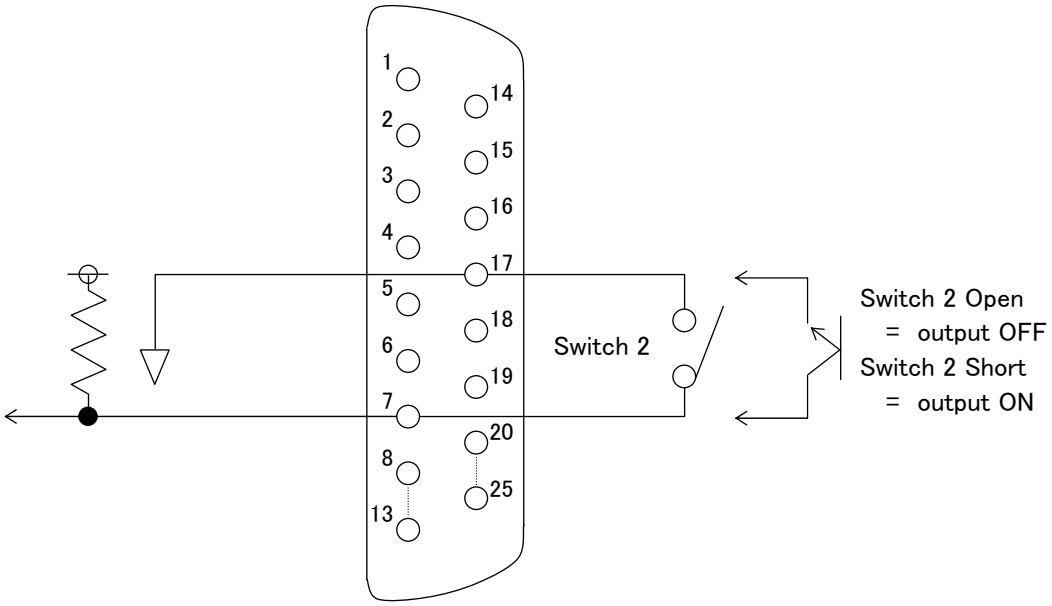
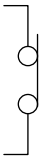
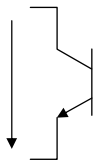
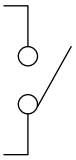
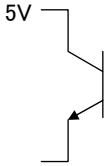


Fig 4-3 Door switch

Use the open collector according to the following.

List 4-2 Open collector

Output	Switch	Open collector
ON	 Short	 V_{CE} Under 0.4V (10mA)
OFF	 Open	5V  V_{CE} Over 2V (Open 5V)

4－5 External voltage control Note1

4-5-1 Voltage control by external voltage

0-10Vdc external voltage can control the output voltage within the range of 0-100%.

4-5-2 Current control by external voltage

0-10Vdc external voltage can control the output current within the range of 0-100%.

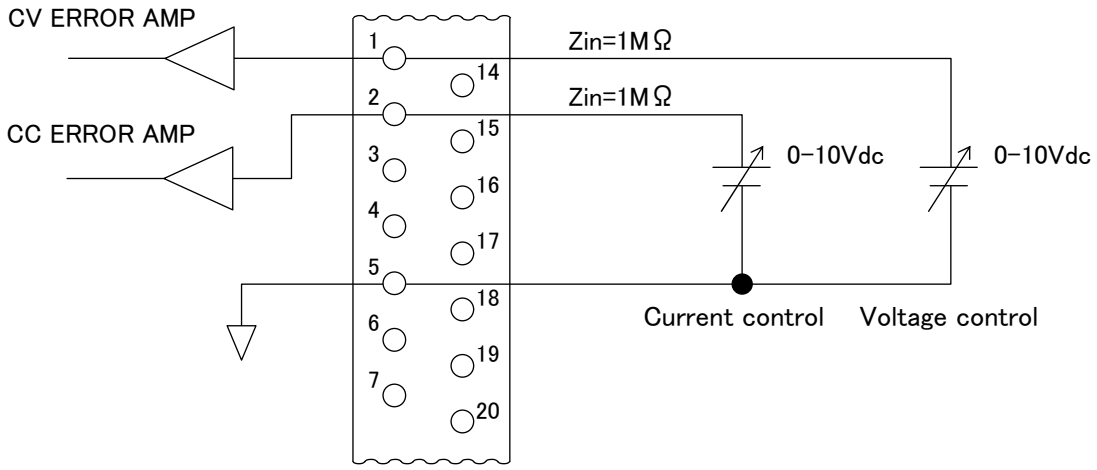


Fig 4-4 External voltage control

Note1. External voltage fluctuation directly influences on the output. The external voltage should be stable.

4－6 External volume control

4-6-1 External volume voltage control

The external volume 5kΩ can control the output voltage within the range of 0-100%.

4-6-2 External volume current control

The external volume 5kΩ can set the output current within the range of 0-100%.

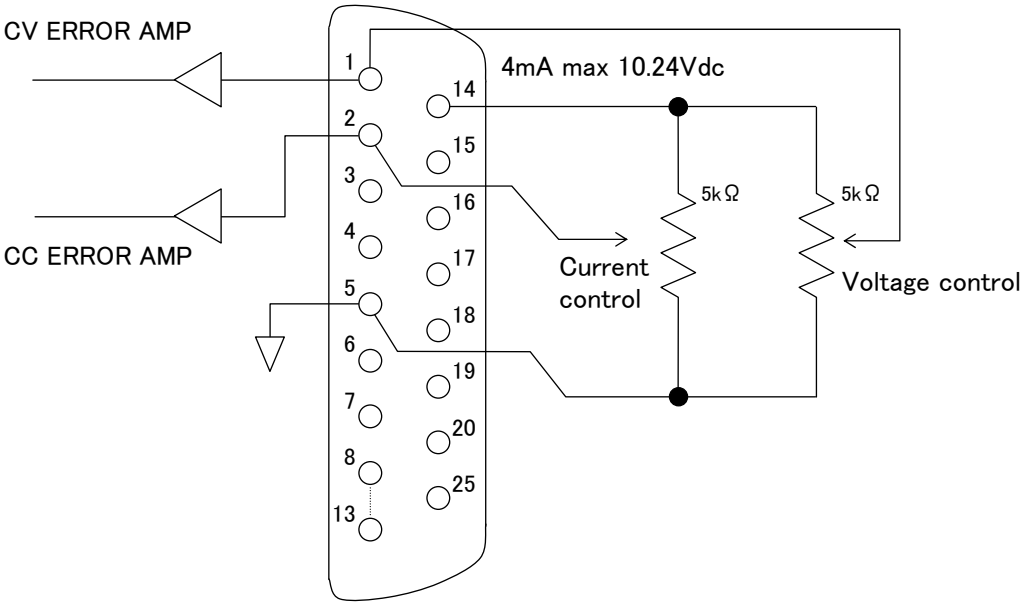


Fig 4-5 External volume voltage control

4－7 Output current monitor, Output voltage monitor

4-7-1 Output current monitor

10V voltage is output at the maximum output current. The output impedance is 1kΩ.

The monitor output polarity is positive regardless of the high voltage output polarity.

4-7-2 Output voltage monitor

10V voltage is output at the maximum output voltage. The output impedance is 1kΩ.

The monitor output polarity is positive regardless of the high voltage output polarity.

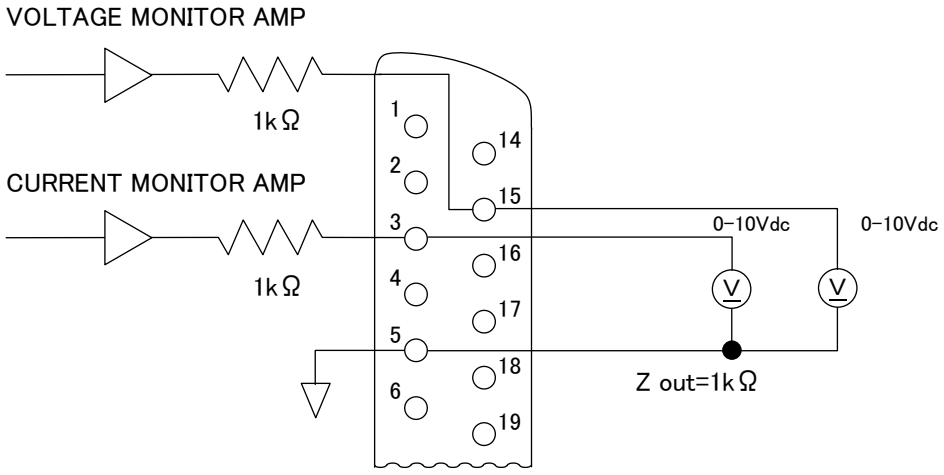


Fig 4-6 Output current monitor, Output voltage monitor

4－8 HV status signal

Output Lo when HV output is ON and Hi when HV is OFF.

Below is internal equivalent circuit.

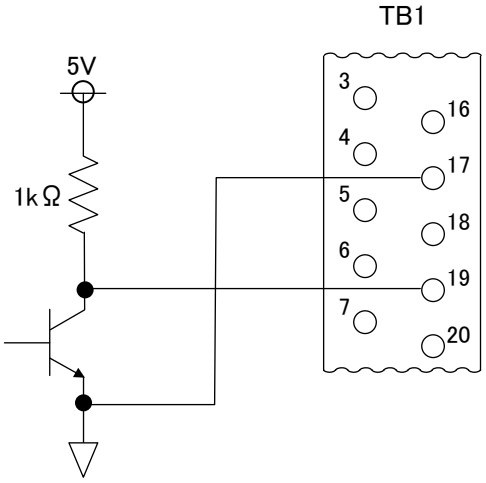


Fig 4-7 HV status signal

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