

# Using Your Solid State Anodizer

0-160Volts dc, 0-10.0 Amp



**RMS**  
Reactive Metals Studio Inc  
**RMS**

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**For the purposes of these anodizing instructions only the components that are involved in anodizing are high lighted and discussed. Safety information is listed here. It is recommended you familiarize yourself with this information.**

#### **SAFETY SUMMARY**

The following general safety precautions must be observed during all phases of operation, service, and repair of this instrument. Failure to comply with these precautions or with specific warnings elsewhere in this manual violates safety standards of design, manufacture, and in-tended use of the instrument. Reactive Metals Studio, Inc. and GW Instek assumes no liability for the customer's failure to comply with these requirements.

# **S**AFETY INSTRUCTIONS

This chapter contains important safety instructions that you must follow during operation and storage. Read the following before any operation to ensure your safety and to keep the instrument in the best possible condition.

### **Safety Symbols**

These safety symbols may appear in this manual or on the instrument.

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**WARNING**

Warning: Identifies conditions or practices that could result in injury or loss of life.



**CAUTION**

Caution: Identifies conditions or practices that could result in damage to the RMS10AF or to other properties.



**DANGER High Voltage**



Attention Refer to the Manual



Protective Conductor Terminal



Earth (ground) Terminal



Do not dispose electronic equipment as unsorted municipal waste. Please use a separate collection facility or contact the supplier from which this instrument was purchased.

## Safety Guidelines

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### General Guideline



#### CAUTION

- Do not place any heavy object on the RMS10AF.
- Avoid severe impact or rough handling that leads to damaging the RMS10AF.
- Do not discharge static electricity to the RMS10AF.
- Use only mating connectors, not bare wires, for the terminals.
- Do not block the cooling fan opening.
- Do not disassemble the RMS10AF unless you are qualified.

(Measurement categories) EN 61010-1:2010 specifies the measurement categories and their requirements as follows. The RMS10AF doesn't fall under category II, III or IV.

- Measurement category IV is for measurement performed at the source of low-voltage installation.
- Measurement category III is for measurement performed in the building installation.
- Measurement category II is for measurement performed on the circuits directly connected to the low voltage installation.
- 0 is for measurements performed on circuits not directly connected to Mains.

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### Power Supply



#### WARNING

- AC Input voltage range: 100Vac to 240Vac
  - Frequency: 47Hz-63Hz
  - To avoid electrical shock connect the protective grounding conductor of the AC power cord to an earth ground.
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 Cleaning the  
RMS10AF

- Disconnect the power cord before cleaning.
  - Use a soft cloth dampened in a solution of mild detergent and water. Do not spray any liquid.
  - Do not use chemicals containing harsh material such as benzene, toluene, xylene, and acetone.
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 Operation  
Environment

- Location: Indoor, no direct sunlight, dust free, almost non-conductive pollution (Note below)
- Relative Humidity: 20%- 85%, no condensation
- Altitude: Maximum 2000m
- Temperature: 0°C to 40°C

(Pollution Degree) EN 61010-1:2010 specifies the pollution degrees and their requirements as follows. The RMS10AF falls under degree 2.

Pollution refers to “addition of foreign matter, solid, liquid, or gaseous (ionized gases), that may produce a reduction of dielectric strength or surface resistivity”.

- Pollution degree 1: No pollution or only dry, non-conductive pollution occurs. The pollution has no influence.
  - Pollution degree 2: Normally only non-conductive pollution occurs. Occasionally, however, a temporary conductivity caused by condensation must be expected.
  - Pollution degree 3: Conductive pollution occurs, or dry, non-conductive pollution occurs which becomes conductive due to condensation which is expected. In such conditions, equipment is normally protected against exposure to direct sunlight, precipitation, and full wind pressure, but neither temperature nor humidity is controlled.
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 Storage  
environment

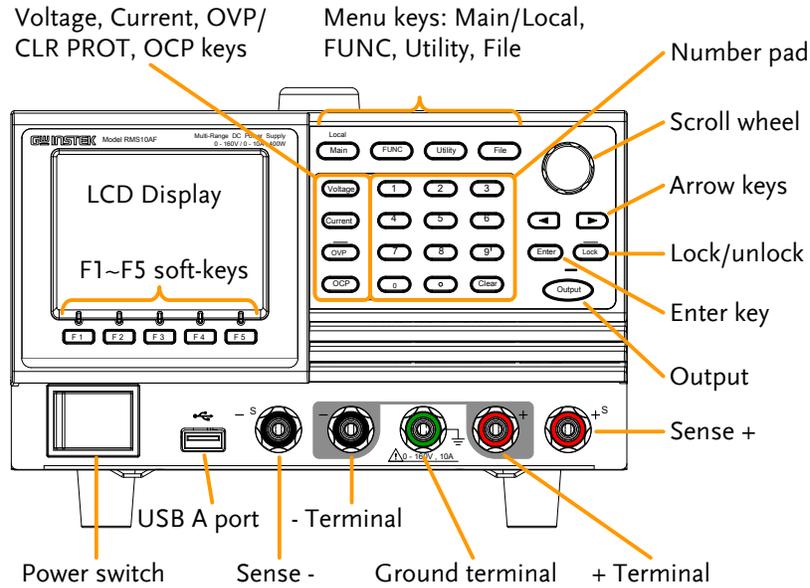
- Location: Indoor
  - Temperature: -25°C to 70°C
  - Relative Humidity: ≤90%, no condensation
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## Disposal



Do not dispose this instrument as unsorted municipal waste. Please use a separate collection facility or contact the supplier from which this instrument was purchased. Please make sure discarded electrical waste is properly recycled to reduce environmental impact.

## Front Panel



INPUT: 100 Vac to 240Vac, 47-63Hz

OUTPUT: 0 to 160 Vdc, 0-10A

SIZE: 5.625"H x 8.375"W x 17.625"D, 14.29cmH x 21.27cmW x 44.77cmD

WEIGHT: Approx. 12lbs (5.2 kg)

MODEL: RMS10AF

## INSTALLATION

### Inspection

When you receive your power supply, inspect it for any obvious damage that may have occurred during shipment. If there is damage, notify the carrier and Reactive Metals Studio, Inc. immediately. Warranty information is printed on a card in the packing container. Save the shipping carton and packing materials in case the supply has to be returned in the future. If you need to return the supply for service call for authorization and instruction. Attach a tag identifying the owner and model number. Also include a brief description of the problem.

The "Turn-On Checkout Procedure" in this manual can be used as an incoming inspection check to verify that the supply is operational. See the factory manual appendix for tests that verify the supply's specifications.

### Location And Cooling

The unit is shipped ready for bench operation after connection to an AC power source. The supply is air cooled. Sufficient space should be allotted so that a free flow of cooling air can reach the rear of the instrument when it is in operation. It should be used in an area where the ambient temperature does not exceed 40 degrees C. The current derates 1% per degree C between 40°C-55°C.



## WARNING

*Do not install on a metal work surface or next to metal pumbing fittings.*

### Input Power Requirements

The power supply is ready to be operated from 110-240Vac, 47-63Hz.

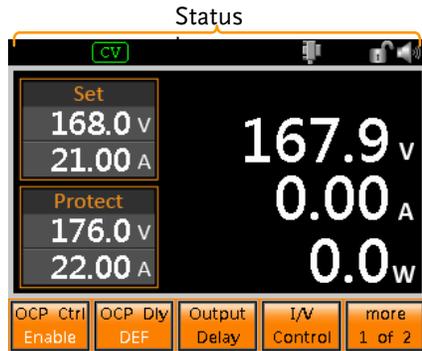
### Power Cord

This instrument is equipped with a three conductor power cable. The third conductor is the ground conductor and when the cable is plugged into an appropriate receptacle, the instrument is grounded. The offset pin on the power cable three prong connector is the ground connection. In no event should this instrument be operated without an adequate cabinet ground connection.

The power supply was shipped with a power cord for the type of outlet used in the USA. To use with international voltages you will need to use a plug adapter.

Note: The terms Current, Amp and Amperage are used interchangeably and have the same meaning.

## Status Bar Icons



<b>OFF</b>	Indicates if the output is OFF.	<b>OVP</b>	An alarm icon will appear on the status bar when one of the protection functions is tripped.
<b>CV</b>	Indicates that the output is in CV mode.	<b>OCP</b>	
<b>CC</b>	Indicates that the output is in CC mode.	<b>OTP</b>	
<b>ON</b>	Indicates that the output is operating at 105% of rated power (constant power mode).	<b>RS</b>	(Remote sense fail) Indicates a problem with the remote sense connection.
<b>RM</b>	Indicates that the unit is in remote mode.	<b>PF</b>	(Power fail) Indicates that the external shutdown pin was tripped.
		<b>ALM</b>	Indicates that the instrument has hardware errors.

	Speaker enabled.		Indicates that the GPIB option is installed and enabled.
	Speaker disabled.		Indicates that the GPIB option is installed and disabled.
	Indicates that the panel lock is active.		Indicates that the instrument is connected with a PC.
	Indicates that the panel keys are unlocked.		Indicates that a USB flash drive is inserted in the front panel USB port.
	Indicates that a USB flash drive is inserted in the front panel USB port, but there is an access error. Please re-insert.		Indicates that the instrument is connected to a LAN.
	Indicates that the instrument is connected to a LAN, however, there are configuration errors. Please re-configure the LAN settings.		Indicates that the PSB-1000 is in LAN remote mode.
	Indicates that the PSB-1000 is in LAN remote mode, but there are connection errors. Please re-configure the LAN settings.		

## OPERATION

### Turn-On Checkout Procedure

The following checkout procedure describes the use of the front panel controls and indicators and ensures that the supply is operational:

- Rock the **ON/OFF** button to **ON**.
- Press the **VOLTAGE** button to activate voltage adjustment controls. Once active, you can input your desired voltage on the number pad (example 55.5 volts) or by turning the scroll wheel clockwise to raise the voltage or counter clockwise to lower it. Your starting Set screen should read 0 V and 0 A. Turn up the voltage to maximum setting and back down to zero. (Max volts is 160)
- Press the **CURRENT** button to activate amperage adjustment controls. Once active, you can input your desired amps on the number pad (example 3.5 amps) or by turning the scroll wheel clockwise to raise the current or counter clockwise to lower it. Your starting Set screen should read 0 V and 0 A. Turn up the amps to maximum setting and back down to zero. (Max amps is 10)

**ON/OFF & OUTPUT:** It is very important to turn the unit **OFF** and the voltage down when not in use. This procedure will help prevent electrical shock.

The **OUTPUT** button provides a means to preset the amperage without applying power to the output. This is a safety issue. You may leave the voltage and amperage turned up when **OUTPUT** is OFF. There will be no power to the leads.

**LEADS:** Plug the red lead into the + **Terminal**(Anode). **Note: Do NOT use the +Sense terminal.** This is the lead that will attach to your work. Plug the black lead into the - **Terminal** (Cathode). **Note: Do NOT use the -Sense terminal.** This will attach to the metal cathode strip in your anodizing bath. It will also connect to the cathode in applicators like brushes and sponges.

(The third output which is ground is not accessed for anodizing.)



### Operation Beyond Rated Output

The output controls can adjust the voltage or current to values above (up to 5%) the rated output as indicated on the front panel display. Although the supply can be operated in the 5% overrange region without being damaged, it can not be guaranteed to meet all of its performance specifications in this region.

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## ANODIZING QUICK START



*Electrical shock hazard!*

*Wear rubber gloves at all times.*

*This is a dangerous process! Maintain all safety procedures at all times. This power supply is capable of dangerous electrical shocks if misused. If you are unsure of the safety of your setup check with an electrical specialist.*

The following is a step by step procedure to quick start you into anodizing. Please read the copy of **Studio Preparation and Coloring of Titanium** that came packed with your anodizer. It contains more detailed information.

### **Electrolyte**

The liquid solution used for this process may be many different things. We recommend TSP (Tri Sodium Phosphate) or TSP-PF (Phosphate free version). This is a low sudsing detergent. Products similar to this include automatic dishwasher detergents and may be substituted. The water can be distilled or demineralized bottled water. Do not use tap or well water. A cup of dry TSP per gallon of water is sufficient for most anodizing, although as much as two cups can be used. Mix the dry ingredient into the water and mix well. TSP-PF requires one half cup of powder per gallon.

A lidded plastic container is best suited for an anodizing tank. The container may be up to 5 gallons(19 liters). It should relate to the size of your work. Mark the container well, so that it will not be confused with other containers or food. Larger baths help dissipate heat during continuous operations.

### **Cathode**

**A stainless steel foil strip wrapped around the inside of a container as shown in the illustration is an excellent cathode. Cut a long strip along the top edge and fold it up. This should reach above the tank edge and will be where the BLACK(-) cathode lead attaches. A stainless steel container can also act as the cathode. Restaurant type steam table pans are excellent.** *Great care must be taken to protect the operator and equipment from short circuits in and around a metal container. Use plastic mesh and baskets or other insulating materials. Insulate the outside edges/sides of the bath with heavy electrical tape to prevent contact with the anode at any instance.*

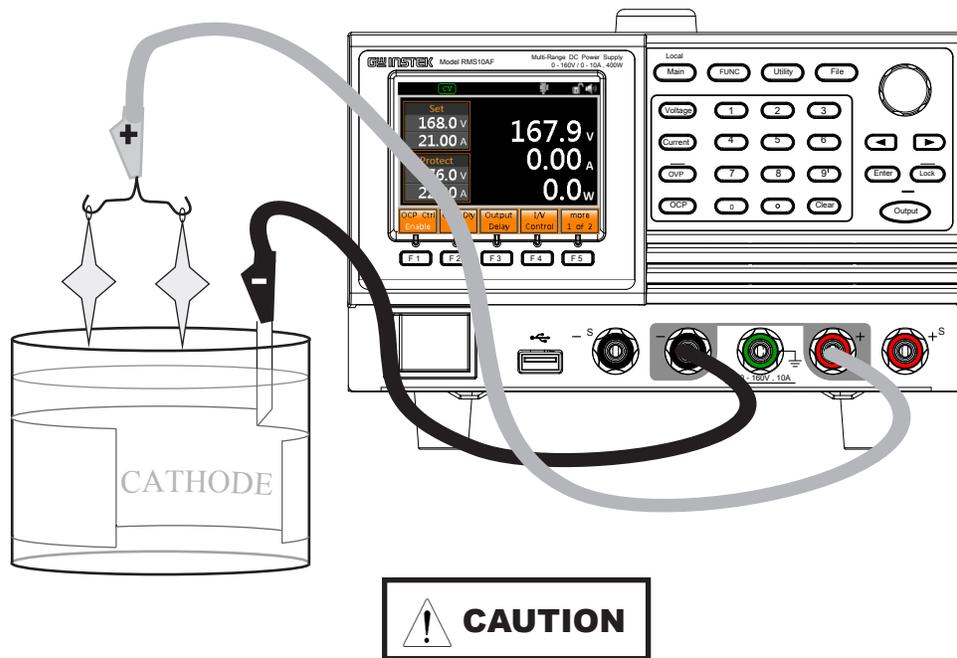
### **Terminals & Lead Use**

**Note: Neither alligator clip should ever touch your electrolyte.**

The Black (-Cathode) alligator clip lead connects to a cathode strip tail which hangs outside the bath. When working outside the bath, you use paintbrush or marker leads in the black cathode terminal.

The Red (+Anode) alligator clip lead connects to a wire to hang your pieces in the bath. You can also replace this lead with the Niobium Mini Grabber Lead or the Niobium Magic Wand Lead (use with an all plastic basket to hold many parts). When working outside the bath, you use the alligator clip to clip to a piece of cathode which is laying under your flat piece and then secured with Anodizers tape. You may also clip your Niobium Mini Grabber Lead to clip directly to your piece instead of using cathode.

## Anodizing setup



*The alligator clips can not be submerged in the electrolyte.*

- 1) The bath is ready, cathode is in place and the **BLACK** lead is connected to the cathode.
- 2) Put on your rubber gloves.
- 3) Turn **ON** the anodizer. You will see the screen do an initial startup for a few seconds.
- 4) Press the **VOLTAGE** button. Use the number pad or turn the scroll wheel to enter your desired voltage.
- 5) Press the **ENTER** button.
- 6) Press the **CURRENT** button. Use the number pad or turn the scroll wheel to enter your desired voltage.
- 7) Press the **ENTER** button.
- 8) Press the **OUTPUT** button. This will make the bath live when you add your pieces--make sure you're wearing your gloves!! Press **OUTPUT** again to pause the electricity in your bath when making changes to voltage.
- 9) Choose your anodic lead and put your pieces into an all plastic basket. (see **Terminal & Lead Use** on previous page for anodic lead options). Congratulations, you're anodizing!
- 10) It is recommended to always reset your **VOLTAGE** to 0.00 and have your **OUTPUT** off when finished anodizing as a safety measure.
- 11) Note: There will be an alarm message when you turn off the power. It is normal and nothing to worry about.
- 12) Using the above procedures make a series of metal pieces representing 5 volt increments. Label the voltage on each and save. This will give you a color scale to work from in the future.

To learn more see the enclosed copy of [Studio Preparation and Coloring of Titanium.](#)