

Model 2024-1

Power Safer Operation Manual

Thank you for purchasing the Power Safer. This operating manual will provide an overview of the product, safety instructions, a quick guide to operation, and complete instructions for correct usage. Take the time to completely review these instructions as well as safety warnings to ensure your best use of the product.

Safety Instructions:

- The operating voltage is limited to +/- 10% of Line voltage 120Vac. Do not use it in other voltage rating.
- The maximum output current is 15A.
- To reduce the risk of electric shock, do not remove cover. No user-serviceable parts inside. Refer servicing to qualified service personnel.

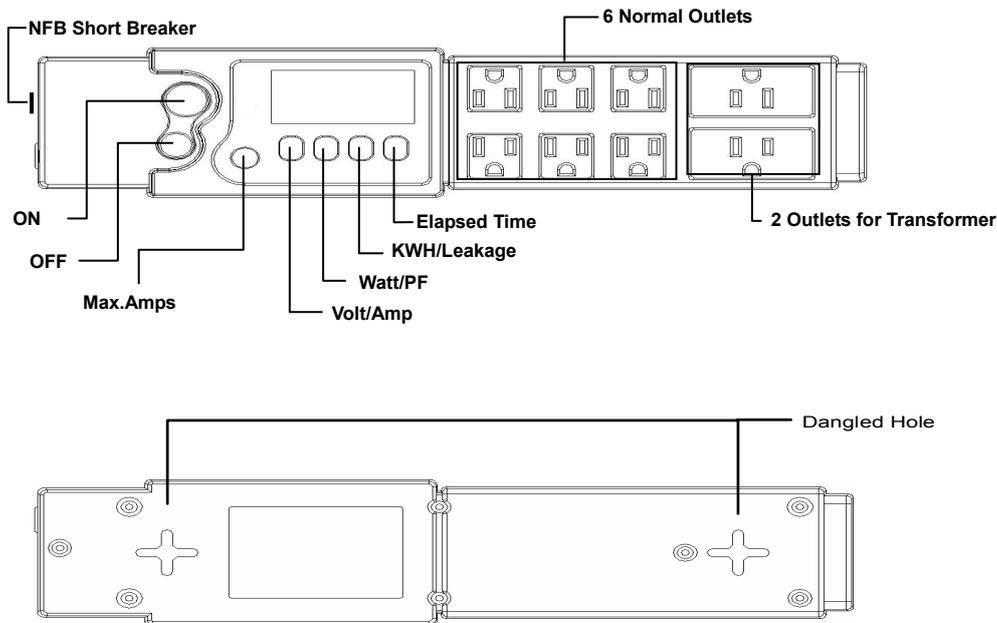
Warning:

- To reduce the risk of fire or electric shock, do not expose this appliance to rain or moisture.

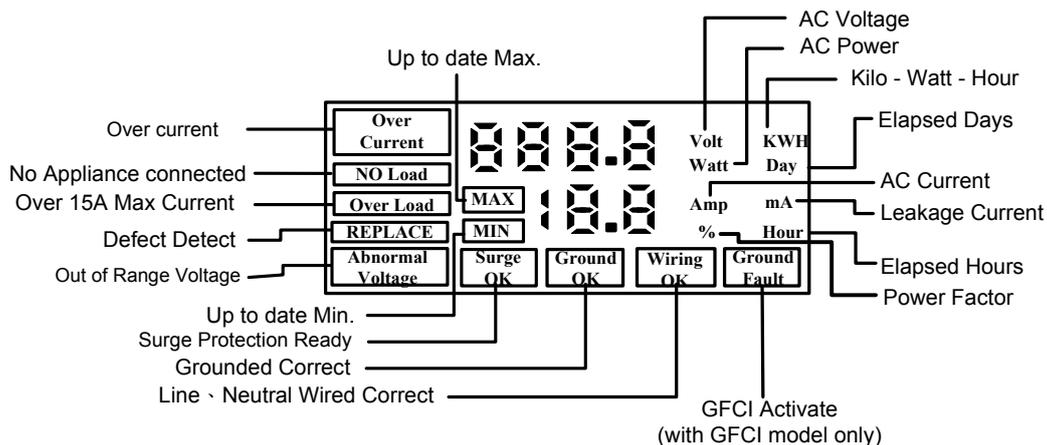
Function Introduction:

- **Power strip:** 8 outlets Power Safer.
- **Multi-Meters:** Voltage, Current, Active power, Power Factor, KWH, Leakage current, Elapsed Time.
- **Protection:** Abnormal Voltage. Over Current. Over Load. Surge.
- **Programmable breaker current:** User adjustable 2, 5, 10, or 15A breaker.

Panel Description:



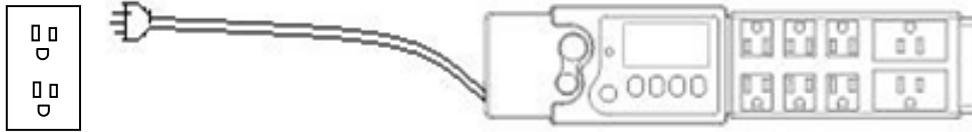
Display Description:



Quick Start Guide:

It is included multiple measure functions AC power meter and over voltage, over current, under voltage, over load...etc protection functions. Use these quick start instructions to get up and running in just a few minutes. Be sure to review all the operating instructions later to ensure full enjoyment of the product.

1. Connect the Power Safer unit to the outlet.



2. LCD display Volt/Amp, Voltage and Current of measuring, LCD will flash, press any key to stop flashing.
3. Press ON/OFF key, internal relay activate, ON/OFF LED light respectively.
4. Press ON key, it can turn OFF its output automatically after a few seconds if there is no appliance on its receptacles, the blue LED on ON key and the red LED on OFF/RESET key are all not bright and the No Load icon will flash to indicate NO Load mode. (it is a no load protection function, to avoid any person electrical shock)
5. And it turns ON automatically within a few seconds if appliance is connected to its receptacle, blue LED on ON key light, LCD display Volt/Amp.
6. Press Volt/Amp key will cycle through currently measure Voltage (in Volts), Current (in Amps), and Max. Min. Volt/Amp.
7. Press Watt/PF key will cycle through currently measure active power Watts (in Watt), Power factor (in %), and Max. Min. Watt/PF.
8. Press KWH/Leakage key will cycle through cumulative Kilowatt-hours (in KWH), currently measure Leakage current (in mA), and Max. Min. Leakage current.
9. Press Elapsed Time will cycle through Days: Hours, and Hours: Minutes.
10. Review the complete operating instructions to familiarize yourself with all features.

Installation:

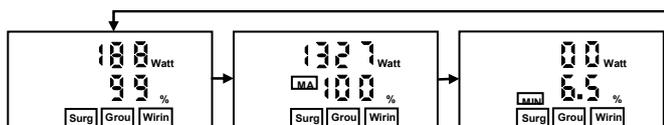
1. Turn off the appliance and remove the power cord from the outlet. Connect the Power Safer unit to the outlet and appliance to the unit.
2. Turn the appliance back ON and confirm normal operation. If the appliance does not function, please recheck your installation.
3. LCD display Volt/Amp, Voltage and Current of measuring, LCD will flash, press any key to stop flashing.

Meter Function:

- 1  **Volt/Amp** key: Press the Volt/Amp key will cycle through currently measure AC Line Voltage (in Volts) and Load Current (in Amps) on display, up to date Max. Voltage / current, and up to date Min. voltage / current. It will back to default Volt/Amp display if there is no press within a few seconds.

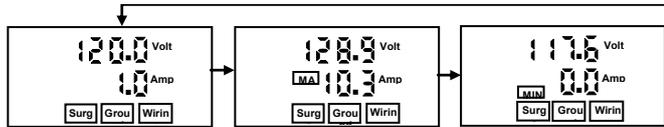


- 2  **Watt/PF** key: Press the Watt/PF key will cycle through currently measure Appliance power consumption(in Watts) and Power Factor(in %) on display, up to date Max. Watt / PF, and up to date Min. Watt / PF. It will back to default Watt/PF display if there is no press within a few seconds.



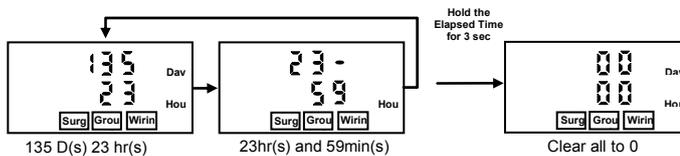
- 3  **KWH/Leakage** key: Press the KWH/Leakage key will cycle through cumulative Electrical energy in Kilowatt-Hours(in KWH) and Leakage (Ground Fault) current(in mA)on display, up to date Max. Leakage current, and up to date Min. Leakage current. It will back to defaulted KWH/Leakage display if there is no press within a few seconds. (there is no Max. Min. KWH as it's a cumulative value.)

Note: It will be a dangerous situation, high risk for electrical shock to person if leakage current over 4 mA, please refer servicing to qualified personnel immediately.



- 4  **Elapsed Time** key: Press the Elapsed Time key will cycle through the Elapsed time of energy usage in days: Hours, Hours: Min.

To reset the accumulated KWH and elapsed time measurement, Press and hold the Elapsed Time key for a few seconds can clear KWH and Elapsed time to Zero. This indicates that previous measurements have been deleted and that the total accumulated KWH and elapsed time have been reset to zero.



- 5 Press and hold the Volt/Amp, Watt/PF or KWH/Leakage key for a few seconds can clear Max. Min. value during LCD display Max. Min. period. This indicates that previous measurements have been deleted and that all up to date max. And Min has been reset.

Protection function Keys:

- 1  **Max. Amps** key: There is a 4 steps switch (2A, 5A, 10A, 15A) of Max Amps. Use screwdriver to set Over Current protection, default is 15A.

Setting skill: it shall be larger than the total current of all appliances which are connected to Power Safer.

Setting procedure:

Step1: Use screwdriver set **Max. Amps** to 15A.

Step2: Confirm all appliances are connected properly to Power Safer and work normally.

Step3: Press the Volt/Amp key to view the current value.

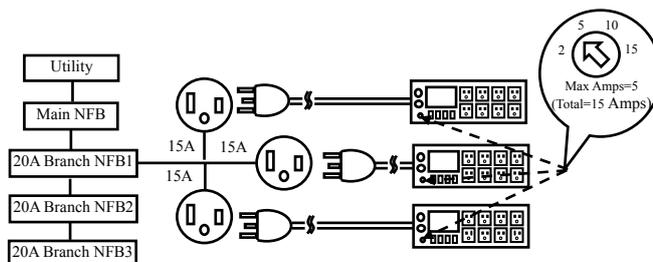
Step4: Use Screwdriver set **Max. Amps** to larger and next current value.

Over Current protection function:

* The most appropriate protection:

Many appliances max. Operation current is seldom up to 15A, it may 12A, 7A, 3A...etc. If we set the Power Safer **Max. Amps** to be larger and next current value of the appliances max. Operation current, Power Safer will provide the fastest protection as any abnormal over current happen.

* The most safe interior AC power line layout:



This figure is general interior AC power line layout, a branch NFB is 20A and support several receptacles which is 15A each, and total is 20A only. If all receptacles are used, and use Power Safer set the Max. Amps is limited to 15A or less, it will provide the greatest protection for your AC power usage.

- 2  **ON** key: Power ON and the blue LED will light.
- 3  **OFF/RESET** key: Power OFF and the red LED will light.
- 4 **NFB Short Breaker:**
NFB Short Breaker will activate when Power Safer is over load. Press it to restart.

Protection function:

1 Over Current mode:

When the load draw current over the setting Max. Amps, the unit will OFF its output immediately, red LED will light and flash, LCD display shows protected current value, Over Current icon flash, and audible Alarm. Readjust Max. Amps value, or remove the over current equipment, press OFF/RESET key then press ON key to restart the power.

- a. When Max. Amps set to 2A, load current over 2A, over current will activate.
- b. When Max. Amps set to 5A, load current over 5A, over current will activate.
- c. When Max. Amps set to 10A, load current over 10A, over current will activate.
- d. When Max. Amps set to 15A, load current over 15A, over current will activate.

2 Abnormal Voltage mode:

When the voltage over or under normal voltage range, the unit will OFF its output immediately, red LED will light and flash, LCD display shows protected voltage value, Abnormal Voltage icon flash, and audible alarm. As the AC line voltage back to normal range and stable for 3 seconds, Abnormal Voltage icon flash disappear, the unit will restart the power again automatically.

OFF power output range is voltage over 13% or under 18%, restart power range is from +10% to – 15%.

3 Over Load mode:

There are dual, redundant over load protection, include electronic control breaker and traditional NFB.

a. Electronic control breaker:

When the current over 15A, the unit will OFF its output immediately, red LED will light and flash Over Load icon will flash and audible alarm. Check and remove the over load equipment, press OFF/RESET key then ON key to restart the power.

b. NFB short breaker:

When the current over 15A, the NFB will activate to OFF its input AC line power (both LED and LCD are off). Check and remove the over load equipment, then press NFB short breaker to restart the power.

4 Retained measurement:

When power to the Power Safer is interrupted, the display will go blank and the unit will stop measuring consumption and elapsed time. However, all accumulated measurements including KWH and Elapsed Time will be retained.

This allows the user to take measurements anywhere. When the unit plugged back in, the LCD display Volt/Amp, Voltage and Current of measuring, LCD will flash; press any key to stop flashing. The accumulated KWH can be retrieved by using the KWH/Leakage key; the accumulated elapsed time can be retrieved by using the Elapsed Time key. Data should be retrieved immediately as the Elapsed Time counter will restart and potentially skew the data as time with no load elapses.

To reset the accumulated measurements, press and hold the Elapsed Time key for a few seconds can clear KWH and elapsed time to zero. This indicates that previous measurements have been deleted and that the total accumulated KWH and elapsed time have been reset to zero.

5 Retained Output condition:

When power to the Power Safer is interrupted, and back later, after a few seconds, the output condition will remain original status,(for example, if the output is ON condition before power interrupted, its output will be ON after power back, if the output is OFF condition before power interrupted, its output will be OFF after power back.) and LCD will flash, press any key to stop flashing.

6 No load detection:

When the Power Safer on ON(blue LED light) condition, and there is no appliance connect to the unit, after a few seconds, it will turn OFF its output automatically, the blue LED is off and the No Load icon will Flash to indicate NO Load mode. And if Appliance is connected to the unit, after a few seconds, it will turn ON its output automatically.

It's a great advantage for person to prevent from electrical shock because there is no AC line power existing on its output if there is no appliance connect to the unit.

7 ON/OFF with Spike Free Switch:

The Power Safer Output ON/OFF is controlled by ON or OFF key respectively. ON and OFF switching is activated at zero crossing with Spike Free. Spike is a potential risk or a stress to electrical and electronic circuit of appliances, no spike is the best operational condition to appliances.

8 Ground OK, Wiring OK detection:

Connect Power Safer to the outlet, if the outlet Line, Neutral and Ground is correct, Ground OK and Wire OK icon will display on LCD. If Line, Neutral in the outlet is wrong position, Wire OK icon will disappear. If ground is not grounding correct, both Ground OK and Wire OK icon will disappear.

9 Surge protection:

Power Safer built-in self test function, if surge protector is in the correct guarding, LCD will display Surge OK icon. If surge protector is malfunction, Surge OK icon will disappear.

10 EMI Filter:

Power Safer built-in EMI filter to reject the noise from AC power line.

11 ON switch self test capability:

LCD will flash REPLACE icon and audible alarm when the internal relay switch is defected.

Specification:

Model 2024-1 for 120V line voltage						
ITEM	RANGE	Accuracy		Response Time		
		Typ.	Max.	Action	Recovery	
¹ RMS voltage	108.0~132.0 Vrms	0.4%	2%	1sec		
¹ RMS current	0.0~15.0 Arms	0.6%	2%	1sec		
¹ Active power	0~1980 Watts	1%	4%	1sec		
² KWH	0.0~9999 KWH	1%	4%	1sec		
¹ Power Factor	0~100%	PF=W/Vrms*Arms		1sec		
¹ Leakage Current	0~30mA	±1mA		1sec		
² Elapsed Time	00Day / 00Hour ~ 9999 Day / 23 Hour	30ppm		1Hour		
	00Hour/00minute~23Hour/59minute			1minute		
Abnormal Voltage	Under Voltage Protection Output Off if Vac: <98.4V (Rating-18%) Then ON if Vac:>102V (Rating-15%)	0.4%	2%	1sec	3 Sec (Auto)	
	Over Voltage Protection Output Off if Vac: >135.6V (Rating+13%) Then ON if Vac:<132V (Rating+10%)	0.4%	2%			
Over Current Breaker	Programmable	2A, 5A,10A,15A	0.4%	2%	2sec	Manual
Short Breaker	Electronic NFB	Active Current	Ipk>100A		<0.1sec	Manual
			LoadAmp=100%(15A)		-----	
			LoadAmp=150%(22.5A)		1Hour	
			LoadAmp=200%(30A)		4~40sec	
			LoadAmp=400%(60A)		0.42~5.0 sec	
LoadAmp=600%(90A)		0.1~1.8sec				
No Load Detector	OFF: <1mA : ON : >1mA				3sec	3sec
Surge Protection	Maximum energy dissipation(Joules) (L-N,L-G&N-G)		330 J		< 1ns	N/A
	Maximum Clamping Voltage		395 V			
	Maximum Surge Current		19500 A			
EMI Filter	Up to 20db for 100K to 20MHz					

Technical Specification
Indoor use only
Altitude up to 2000m
Temperature 5°C to 40°C
Maximum relative humidity 80% for temperature up to 31°C decreasing linearly to 50% relative humidity at 40°C
Mains supply voltage fluctuations not to exceed ±10% of the nominal voltage
Pollution Degree 2
Installation category II

- Note: *1: Current, Max. Or Min. display of Vrms, Arms, Watt, PF and Leakage Current can be cycle through by pressing key.
 *2: It starts to cumulate for KWH and Elapsed Time after Power ON. The LCD will flash to show the maximum of KWH and Elapsed Time when 9999 is displayed.
 *3: The Accuracy=X% (Reading + Range)

Maintenance:

- Protect the meter from adverse weather conditions. The meter is not waterproof. Do not expose the LCD display to direct sunlight for long periods of time.
- CAUTION: To avoid damage to the meter, do not expose it to sprays, liquids, or solvents.
- Clean the exterior of the meter by removing dust with a lint-free cloth.
- Use care to avoid scratching the clear plastic display filter.
- For further cleaning, use a soft cloth or paper towel dampened with water. You can use a 75% isopropyl alcohol solution for more efficient cleaning.
- CAUTION: To avoid damage to the surface of the meter, do not use abrasive or chemical cleaning agents.

Trouble Shooting:

Item	Symptom	Action	Description
1	LCD flash	Press any key	1, This is normal operation after plug into wall outlet. 2, AC power line to Power Safer had been interrupted.
2	Over Current icon on LCD flash & audible alarm, output off & red LED of OFF key light & flash.	Press Reset key (OFF key), check & remove the abnormal appliances or reduce the number of appliances connection or larger Max. Amps setting value press ON key to restart.	This is over current protection function; indicate the total power consumption larger than the Max. Amps setting value or appliances abnormal operation induce to the total power consumption larger than the Max. Amps setting value.
3	Over Load icon on LCD flash & audible alarm, output off & red LED of OFF key light & flash.	Press Reset key (OFF key), check & remove the abnormal appliances or electronic circuit, press ON key to restart.	This is over load protection function; indicate the appliances or electronic equipment had been short-circuit.
4	Abnormal Voltage icon on LCD flash & audible alarm, output off & red LED of OFF key light & flash.	It will be restart automatically when the AC power line voltage return to normal voltage range, if it take too long period to recovery, please ask for qualified technician.	This is abnormal voltage (voltage too high or too low) protection function.
5	No Load icon on LCD flash.	1, Press OFF key to off the output. 2, it will power on automatically when the appliances connected.	This is no load protection function to avoid the possibility for electrical shock to human being.
6	It still No Load icon on LCD flash when the appliances connected.	Increase the number of appliances connected.	The min. current of no load is 1 mA, some appliances, handset charger/adapter, standby current may be lower than 1 mA.
7	Replace icon on LCD flash.	Ask for service department.	This is self diagnostic function for main power relay switch, indicate the relay is defective.
8	Ground OK & Wiring OK icon on LCD disappear.	Ask for qualified technician to check your house grounding and wiring.	This is correct grounding and wiring detect function, icon disappear indicate the grounding and wiring is wrong.
9	Surge OK icons on LCD disappear.	Ask for service department.	This is self diagnostic function for surge protector MOV, indicate MOV is defective.
10	No any display on LCD, no any response for pressing keys.	1, Plug in AC power line? 2, Check the NFB rejected? if yes, check the connected appliances and remove abnormal one, then press NFB again to restart. 3, Ask for service department.	When no AC power input or NFB is rejected, there is no LCD display, no LED and no pressing keys response. Or internal defective.