

APP 9015S

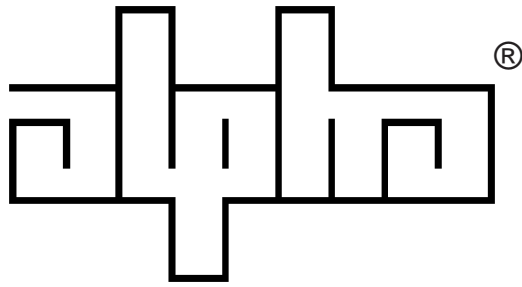
APP 9022S

Service Power Supply



Installation and Operation Manual

Effective: May 2002



APP 9015S

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Installation and Operation Manual

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General product information
and customer service
7:00 AM to 5:00 PM Pacific Time
1-800-863-3930

To obtain complete technical support
7:00 AM to 5:00 PM Pacific Time
or
For after-hours *emergency* support
7 days per week, 24 hours a day
1-800-863-3364

Safety Symbols Used in this Manual



To reduce the risk of electrical shock, injury or death caused by moving parts or the explosion of fuel, and to ensure the safe operation of this unit, the following symbols have been placed throughout this manual. Where these symbols appear, servicing must only be performed by qualified personnel.



Dangerous Voltage

This symbol indicates that a “dangerous voltage” exists in this area of the product. Use caution whenever working in the area to prevent electrical shock.



Attention

This symbol indicates important installation, operation or maintenance instructions. Always follow these instructions closely.

Safety Precautions

- The APP Service Power Supply must be installed and serviced by qualified personnel.
- Always use proper lifting techniques whenever handling units, modules or batteries.
- Verify the voltage requirements of the equipment to be protected (load), the AC input voltage to the power supply (line), and the output voltage of the system prior to installation.
- The utility service panel must be equipped with a properly rated circuit breaker for use with this power supply.
- Do NOT exceed the output rating of the power supply, when connecting the load.
- Use a bucket truck or suitable climbing equipment, such as safety harness and spikes, whenever installing or servicing pole-mount installations.
- Do not let exposed battery cables come in contact with the chassis or enclosure.

Utility Power Connection Notes



Warning!

Do not unplug output connector while unit is in operation! Circuit breaker must be turned off first.



CAUTION:

Installation must be performed by qualified service personnel only, and in compliance with local electrical codes. Connection to utility power must be approved by the local utility before installing the power supply.



CAUTION:

A “high magnetic” trip breaker must be used in order to accommodate the high-inrush currents normally associated with the start-up of ferroresonant transformers (400 Amp, no-trip, first-half cycle). Do not replace this breaker with a conventional service entrance breaker. Alpha recommends only Airpax breakers because of increased reliability in this powering application.



NOTE:

UL and NEC require that a service disconnect switch (UL listed) be provided by the installer and be connected between the power source and the Alpha power supply. Connection to the power supply must include an appropriate service entrance weather head.

Verify that the following items have been included in the shipping container:

APP 9015S:

1. APP 9015S Service Power Supply
Alpha p/n: 016-529-20
2. Power cord with 5-20P plug (120VAC)
Alpha p/n: 874-726-20



NEMA 5-20 Plug

3. Power cord with 6-15P plug (240VAC)
Alpha p/n: 847-727-20



NEMA 6-15 Plug

4. Output cable, single Jones
Alpha p/n: 874-728-20



APP 9022S:

1. APP 9022S Service Power Supply
Alpha p/n: 016-537-20
2. Power cord with 5-20P plug (120VAC)
Alpha p/n: 874-935-20
3. Power cord with 6-15P plug (240VAC)
Alpha p/n: 874-935-21



NEMA 5-20 Plug



NEMA 6-15 Plug

4. Y-cable with Jones connectors
Alpha p/n: 874-949-21



5. Y-cable with 25A connectors
Alpha p/n: 874-949-20

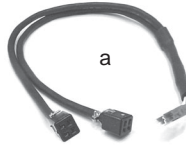


Unpacking and Inspection

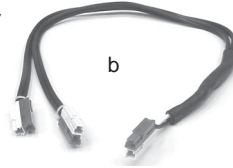
APP 9022S, *continued*

6. Optional 30-Ft Output kit, includes:
Alpha p/n (*for kit*): 745-094-20

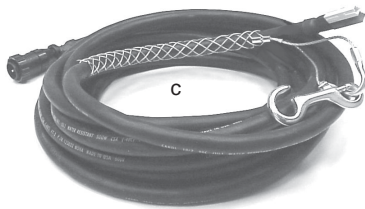
a. Y cable adapter for Jones connector
Alpha p/n: 874-949-34



b. Y cable adapter for 25A connector
Alpha p/n: 874-949-33



c. 30-Ft cable
Alpha p/n: 874-949-32



7. Optional 10-Ft cord with 30A connector
and Twist Lock plug (125VAC)
Alpha p/n: 874-935-22



NEMA L5-30R Plug

Inspect the contents. If items are damaged or missing, contact Alpha Technologies and the shipping company. Most shipping companies have a limited claim period, so it is important to report damage immediately.

Save the original shipping container.

In the event that a unit must be returned for service, Alpha requests that it be packaged in its original shipping container. If the original container is not available, make sure the unit is packed with at least three inches of shock absorbing material to prevent shipping damage.



NOTE:

Do not use popcorn-type material. Alpha Technologies is not responsible for damage caused by improper packing on returned units.

1.1 The APP Service Power Supply

The APP Service Power Supply (SPS) is a portable device used to provide temporary power while the existing power supply is being serviced. The APP SPS can be used in either pole- or ground-mount enclosures to provide signal processing equipment in Cable Television and Broadband LAN distribution systems with current-limited, regulated AC power.

The APP SPS contains a front panel ammeter to measure the output current to the load; an output breaker to protect against excessive short circuit currents; an "Output" indicator to verify AC output power; an input breaker to provide additional voltage protection; and a 60/75/90 VAC switch for output voltage selection.

MODEL	APP 9015S	APP 9022S
Input Voltage (VAC)	120/240 ± 15%	120/240 ± 15%
Input Frequency (Hz)	60 ± 3%	60 ± 3%
Input Current (A)	12	12.5 @ 240 VAC max* 22 @ 120 VAC max*
Output Voltage (VAC)	60/75/90 ± 5%†	60/75/90 ± 5%†
Output Current (A)	15 Continuous	22 Continuous (240 VAC in*) 17 (120 VAC in*)
Output Power (VA) (Continuous)	1350	1350/1650/1950
Output Current Limit	150% of Output Rating	150% of Output Rating
Efficiency	90% typical @rated load	90% typical @rated load
Finish	Flat Black	Flat Black
Operating Temperature Range	-40° F to +122° F (-40° C to +50° C)	-40° F to +122° F (-40° C to +50° C)
Dimensions (in/mm) (H x W x D)	9" x 9.5" x 13.75" / 241 x 229 x 349	9" x 9.5" x 13.75" / 241 x 229 x 349
Weight (lbs/kg)	47/21	60/27
Enclosure Type	NEMA 1	NEMA 2

* Figures shown reflect use with power cord supplied with unit.
For 22A @120V, use optional 30A 125V cord (27A max).

† Output voltage w/input frequency=60Hz. Otherwise ±10%

Table 1-1; Specifications

1. Introduction

1.2 Theory of Operation

The APP SPS contains a ferroresonant transformer and a resonant capacitor. (Refer to Figure 3-1, APP 9022S schematic.) During AC LINE operation, utility power is fed into the primary winding of the ferroresonant transformer, T1. An AC capacitor, C1, forms the resonant circuit of the ferroresonant transformer which provides noise and spike attenuation, short circuit current limiting, and output voltage regulation. Note: The ferroresonant transformer produces a "quasi" square wave output which resembles a rounded square wave.

AC power enters the Service Power Supply where it is regulated to 60, 75 or 90 VAC, and passed onto the load via the Service Power Inserter (SPI), located inside the power supply enclosure. A switch, located on the SPI, transfers output power from the power supply requiring service to the APP SPS.



NOTE: When measuring the output voltage of ferroresonant transformers, use only a true RMS AC voltmeter. Non-RMS reading meters are calibrated to respond to pure sine waves and will not provide an accurate reading when measuring a "quasi" square wave output.



Warning! Do not unplug output connector while unit is in operation! Circuit breaker must be turned off first.

1.3 APP Service Power Supply Features

Output Current (Ammeter)

The Ammeter displays output current flowing from the power module to the load. When there is no load at the output, the Ammeter reads zero.

Output Breaker

The AC output breaker protects the load from excessive durations of short circuit current, or an out-of-phase (or buck) condition. If the front panel ammeter reads zero, indicating no output to the load, this breaker must be checked, and reset if necessary.

Input Breaker / Power Switch

The AC input breaker protects the Service Power Supply from short circuit conditions, especially when it is used in conjunction with a generator during outage conditions. If the unit does not turn ON when power is applied, first verify that the unit is plugged into the convenience outlet and that the main AC circuit breaker is in the ON position.

Output Power Indicator (9022) / Pilot Light (9015)

The Output Power Lamp displays the presence of output AC voltage.

1.3 APP Service Power Supply Features, *continued*

Output Voltage Selector

The VAC switch is used to select the desired output voltage. Output options are 60, 75 and 90 Volts.



NOTE: Verify that output voltage settings are correct *before* connecting load to supply. Do not rotate switch when unit is in operation. Always remove power from unit when selecting output settings.

60/ 75/ 90 VAC Output Connector

The 60/ 75/ 90 VAC output connector supplies up to 22 Amps of power to a Service Power Inserter (SPI) through an output cable.

Output Cables

9015S:

Included with the APP 9015S is an output cable used to connect the Service Power Supply to the SPI, via a four-pin Jones connector.

9022S:

Included with the APP 9022S are two 6-ft output "Y" cables. One cable terminates with two Jones connectors, and provides service power to one or two separate 20A SPIs. The other cable terminates with two 25A connectors, for 25A SPIs.

Input Connector

Input Connector is used to connect the APP SPS to line power through an AC line cord. The cord plugs directly into enclosure convenience outlet.

9015S:

Includes two power cords for 120VAC or 240VAC operation.



NOTE: Before connecting power cord, Input voltage must first be selected via the 120/240 Input Voltage Selector switch.

9022S:

Includes two power cords. One with a 5-20P plug to set voltage to 120 VAC; and one with a 6-15P plug to set voltage to 240 VAC.

9022s Option: 30-Ft Output Cables

A 30-foot output kit is available. This kit provides "Y" cables for both 25A and Jones connectors. Alpha part number: 745-094-20.

9022S Option: 10-Ft Cord w/30A Connector and Twist Lock Plug (125VAC)

For full current output with a 120 VAC input, use with a twist lock receptacle. This line cord is equipped with a NEMA L5-30P plug. Alpha part number: 874-935-22.

1. Introduction

1.3 APP Service Power Supply Features, *continued*



Figure 1-1; APP 9015S Service Power Supply, Front Panel

1. Output Current
2. 120/240V Input Voltage Selector
3. 20 AMP AC Input Breaker/Power Switch
4. 120/240V Input Connector
5. 60/75/90 Output Selector Dial
6. 60/75/90V Output Connector
7. 20 AMP Output Breaker
8. Pilot Light

1.3 APP Service Power Supply Features, *continued*



Figure 1-2; APP 9022S Service Power Supply, Front Panel

1. Output Current
2. Output Power Indicator
3. 30 AMP Output Breaker
4. 60/75/90V Output Connector
5. 60/75/90 Output Selector Dial
6. 120/240V Input Connector
7. 15 AMP AC Input Breaker/
Power Switch

2. Installation

2.1 APP SPS Installation and Power Module Removal



NOTE: Inspect all cables before installation. Replace or repair damaged cords.



Warning! Do not unplug output connector or change setting of output selector while unit is in operation! Circuit breaker must be turned off first.

Procedure

1. Locate Service Power Inserter (SPI) in enclosure. (Refer to Figures 2-1 and 2-2.) For 20A SPI, plug APP SPS "Jones" connector into SPI. (Figure 2-1.) For 25A SPI (9022S model only), plug APP SPS into red and white 25A connectors. (Figure 2-2.)
2. Determine the line voltage of the UPS.
3. *This step for APP 9015S model only:*
Select appropriate line voltage (120/240 VAC) by using the Input Voltage Selector switch.
4. Select and connect appropriate line cord to Input Connector and plug into outlet.



CAUTION: Do not use the 120 VAC cord to plug into GFCI outlet! The GFCI outlet is intended for lights and tools only. If necessary, remove the LAP and use that outlet.

5. Set the 60/75/90 Output Selector Dial to the desired voltage. Plug the APP SPS power cord into the enclosure's convenience outlet. Switch the APP SPS ON, and verify that the Output Power Indicator is lit.
6. Toggle the SPI's ALT/ON switch to ALT. This transfers output power from the module to the APP SPS which can now be used to maintain regulated, non-standby power to the cable plant until a replacement power module has been installed.
7. Switch the battery breaker on the power module OFF.
8. Unplug the power module LINE cord from the enclosure convenience outlet.
9. Wait approximately 1 minute for the power module capacitors to fully discharge.

(Continued on next page)

2.1 APP SPS Installation and Power Module Removal, *continued*

10. Disconnect the wires from the power module.



CAUTION: Do not let exposed battery cables come in contact with the chassis or enclosure.

11. Reverse this procedure when reinstalling a module.



CAUTION: The ferroresonant transformer generates heat and may cause burns if handled with bare hands.



NOTE: Always test that the power module is operating correctly before toggling the SPI's "ALT/ON" switch back to the ON position.

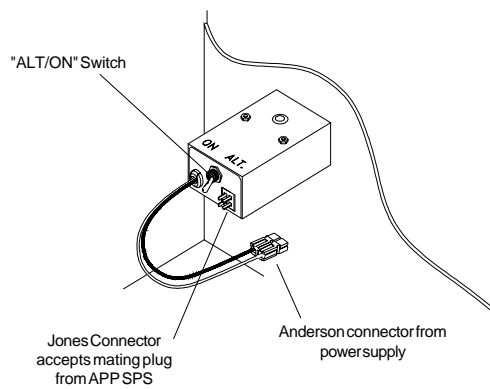


Figure 2-1; 20A Service Power Inserter
(shown in PWE and UPE/M enclosures)

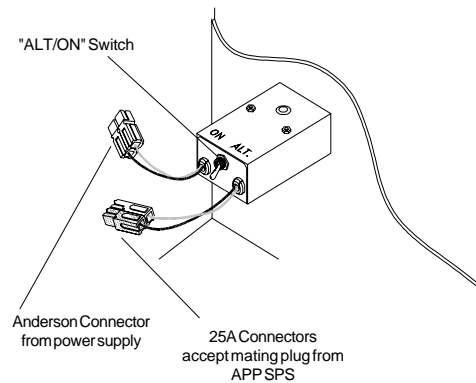


Figure 2-2; 25A Service Power Inserter
(shown in PWE and UPE/M enclosures)

3. Trouble-Shooting

3.1 Trouble-Shooting Guide

This guide is designed to cover typical symptoms, causes and solutions for trouble-shooting the APP SPS. Alpha Technologies recommends that the power supply maintenance log accompany units brought in for bench service to aid the technician in trouble-shooting the problem.

Symptom #1:

No output to cable; No AC line power; Green Output Power indicator OFF:

Probable Cause:

Solution:

AC line cord unplugged

Plug in AC line cord

AC input circuit breaker tripped (or input fuse open)

Reset AC circuit breaker

Utility power outage

Use voltmeter to verify correct voltage (120/240 VAC) at receptacle. Connect generator in the event of an extended power outage.

Symptom #2:

No output to cable; AC line power available; Green "Output Power" indicator ON; And Ammeter reads "0":

Probable Cause:

Solution:

AC output breaker has tripped

Reset output breaker

SPI "ALT/ON" switch in wrong position

Move switch to "ALT" position

"Jones" connector loose or not connected to SPI

Check connection

Loose seizure screw inside SPI

Tighten screw

3.1 Trouble-Shooting Guide, *Continued*

Symptom #3:

Incorrect output voltage; And/or Ammeter reads excessive current (above rated output of APP SPS):

Probable Cause:**Solution:**

60/75/90 VAC switch in wrong position

Move switch to required position

Wrong type of voltmeter used

Use true RMS voltmeter

Under-loaded output (less than 1 Amp)

Connect load

Overloaded output

Reduce load

Short exists in load

Locate and remove short

MOV shorted in SPI

Replace SPI

APP 9015S only: 120/240 V switch in wrong position

Set switch to correct line voltage

3.3 Returns, Repair, and Parts Ordering

Returns for Repair

For units that must be returned for repair, Alpha requires a Return Material Authorization (RMA). An RMA can be obtained from Alpha Customer Service, using either method listed below:

- Download the necessary forms directly from Alpha's Web site, under "Customer Service": **www.alpha.com**
- Or call (800) 322-5742 for assistance.

Clearly mark the RMA on the unit's original shipping container. If the original container is not available, make sure the unit is packed with at least three inches of shock absorbing material to prevent shipping damage.



NOTE: *Do not* use popcorn-type material. Alpha Technologies is not responsible for damage caused by improper packing on returned units.

In addition to the returned unit, please include a copy of the power supply maintenance log and any information relevant to the power supply failure.

Returns for Credit

For returns for credit, call (800) 322-5742.

Parts and Ordering Information

To order parts, contact the Alpha Technologies Customer Service Department directly at:

United States	
and Latin America:	(360) 647-2360
Canada:	(604) 430-1476
United Kingdom:	44-279-422110
Germany:	49-9122-997303
Middle East:	357-5-375675

To obtain **emergency** technical support
(7 days/week, 24 hours/day) call:

1-800-322-5742
(USA)

1-800-667-8743
(CANADA)



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