

Hughes Autoformers

Don't get caught with your voltage down!

USER'S GUIDE

Understanding the enclosed information will help save time and phone calls. Please keep this information for future reference.



**30 amp
Model RV2130**



**50 amp
Model RV220-50**



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INSTALLATION INSTRUCTIONS

All Hughes Autoformers can be used outside near the power post, under your RV or in a ventilated compartment.

Instructions for portable use:

1. Turn off park breaker (if not already off). Plug the Autoformer into the park power receptacle. Make sure it's a tight fit.
2. Turn breaker on and check that the amber diagnostic light is on. If it is not, do not use this power source and report it to the park manager so they can check it out.
3. Plug the RV into the Autoformer. Make sure it's a tight fit.

Installing in an outside compartment:

Installation kits are available to install Autoformers in your RV's outside storage compartment. Use the install kit so that it is removable for service or transfer to another rig. See diagram on page 9. We can not allow you to "hard-wire" the Autoformer to your RV electrical system.



Precautions:

The units are *weather*proof, not *water*proof. Please do not allow them to sit in or collect water, and especially watch out for sprinkler systems (water under pressure). Modifying the Autoformer in any way will void the warranty. Use the Autoformer only as it was designed. Do not use for any purpose other than intended. Do not seal holes or edges with silicone or any other material. To do so will void your warranty. Removing the lid or making any alterations to the Autoformer will also void your warranty.

Refer to page 11 to call our technical support line if you have any questions.

OPERATIONAL TIPS

Match the Autoformer rating to your RV:

If your RV has a 4-wire power cord, you should use a **50-amp** Autoformer. If your RV has a 3-wire power cord use a **30-amp** Autoformer. Always use the highest amperage power source available. You can convert from a lower amperage outlet by using appropriate adaptors, for example: a 50-amp Autoformer from a 30 or 20-amp power source. Of course, you will be restricted to that lower amperage, but the Autoformer will boost the voltage when necessary. Be careful not to overload the lower amperage.

Amber light:

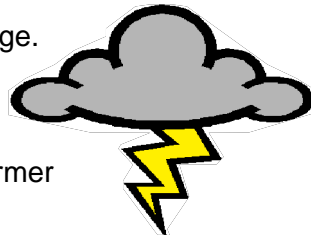
This light will turn on when you plug the Autoformer into the park power only if the park power is safe to use. If the amber light does not stay on, do not plug your rig's service cord into the Autoformer. Use another park power pole and report the bad power pole to the park manager.

Red light(s):

The 30-amp model has one red light; the 50-amp model has two, one for each power lead. Each time the Autoformer is powered up there is a 3 to 5 second delay while the average incoming voltage is evaluated. Then if the park voltage is low the red light(s) will be illuminated, indicating the unit is boosting. Since the 50-amp model monitors two independent power leads, both red lights might not always be on at the same time.

Surge and spike protection:

The Autoformer is designed to boost voltage. However, there is built-in surge and spike protection that will protect your coach from some spikes and surges. But to protect your rig it may damage the Autoformer and it will have to be returned for repair.



QUESTIONS AND ANSWERS

Why is my Autoformer not boosting?

Is the park voltage over 115 volts? Check the park power. See “*Measuring the park power*” on page 11. The unit is in by-pass over 115 volts. It will boost when the park power drops below 112 volts. The Autoformer gets its instructions to boost or by-pass from the park power only. *It does not read or recognize the voltage inside your RV.* If the park power is really low (reading below 90 volts), the Autoformer will not have enough power to work and will go into by-pass mode (will not boost).

Your unit may have absorbed an electrical surge or spike. The Autoformer is designed to take the damage to save other appliances. Return it to us for service (see procedure on page 11).

Electrical surges or spikes can happen at any time and are rarely noticed by the human eye.

The cause of a spike or surge could be lightning or a power outage in a shopping center miles away. Sundays are a common day for surges or spikes to occur because campers are unplugging their RVs to leave the park.



Check the cord for damage. Check for a bad (loose) park receptacle if the prongs are red.

Why does my Autoformer boost all the time?

Check the park power. The unit is designed to boost below 112 volts and go to by-pass over 115 volts. If the Autoformer is boosting when the park voltage is over 115 volts, return it for service (see procedure on page 11).

Will a coffeemaker or heater pull down the voltage at my park power pole?

The voltage at your meter inside the coach may drop as much as 5 to 10 volts if the meter is on the same line as a heater or appliance. But the park voltage may not drop enough to cause the Autoformer to boost.

QUESTIONS AND ANSWERS (cont'd)

Why is the voltage in my coach lower than the voltage measured at the power pole?

The voltage to an outlet will depend on the number of things plugged in and the length and size of wire from the panel to the plug (line loss). If you measure the voltage in the coach on the same circuit that a heater or coffeemaker is plugged into, you will get a lower reading due to voltage loss in the wire.



The reading will not be the voltage to the coach. It will be the reading of the one circuit your meter is plugged into.

Why can't I get all the amps shown on the breaker?

Stated amperage may be compromised by old breakers, low voltage, many users, high temperature, loose connections and small wires.

Can I use an extension cord?

Yes, if it's the proper size. To avoid voltage drop, use larger wire on longer extension cords. 16 gauge wire has only $\frac{1}{4}$ the capacity as 8 gauge. For 30 amp service, use 10 gauge wire or larger. For 50 amp service, use 8 gauge wire or larger. (Note: wire size is *larger* when the gauge number is *smaller*). Use the Autoformer after the extension cord to help correct any line loss.

What is the difference between the Hughes Autoformer, a Power Line Monitor and a Surge Protector?

DEVICE	PRIMARY FUNCTION
Hughes Autoformer	Voltage booster with some surge & spike protection
Power Line Monitor	Interrupts power if voltage is too high or too low
Surge Protector	Surges, spikes, ground faults

HELPFUL HINTS

Hughes Autoformers are designed to increase voltage to your RV and help eliminate low voltage damage to your appliances. Unlike a “boost transformer”, the ‘sense circuit’ in the Autoformer will adjust the output based on the load demand. For this reason you can run additional appliances on a 30-amp input. With the increase in voltage to the RV (through the Autoformer), the amperage demand will be lower and the overall performance will be greater. Your appliances will operate smoothly and efficiently without premature wear and damage to motors and compressors. With an operation range of 95 to 130 volts input, the Autoformer will correct your RV voltage to safe and efficient levels.

Appliance failure can be costly, as well as frustrating and inconvenient. Many AC motors burn out due to higher than rated current draw caused by low voltage.



The **wiring** in many RVs is smaller than wire used in houses. Motors need to be lighter and smaller. We need higher voltage and lower amperage. While the voltage at the park connection may be enough, the voltage in the RV may be lower, sometimes by several volts. The further you move away from the input, the smaller the wire and the greater the load, the more the voltage will drop. We have seen the voltage in coaches as much as 10 volts below the park.



If **breakers** are tripping with a small load, check the breaker and the load. If you are pulling too much power for the system, use fewer items at a time. Remember... the refrigerator, electric hot water heater element and battery charger may always be on and using power. If a breaker trips at the park pole, you are usually using too much power for the breaker.

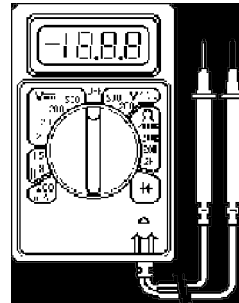
CHECKING VOLTAGE

The Autoformer is designed to boost at a park voltage less than 112 and to go to bypass above 115 volts. See “*Measuring the park power*” on page 11. While this is the park voltage, your RV may read less inside. The voltage at the park pole may be 117 volts while voltage in the RV may be 111 volts or less. This is a percentage voltage loss in wiring. Small volt meters can be off by several volts, making the reading even lower. Analog meters are not as accurate as digital meters.

CAUTION

If you are not comfortable using a meter to measure electrical voltage, we recommend you seek competent professional assistance.

If you have a large **drop in voltage**, check the wiring – especially the neutral (white) wires. A burned plug or cord can destroy an air-conditioner or refrigerator. Check the male plug at the park pole for red discoloration, which indicates a high resistance connection. You must have a load on the circuit or you will get a false reading. An easy test is to use a volt meter and check the voltage at several places in the RV. If you have a large drop when you plug in items, the wire could be too small for the load, you may have too many things on a circuit or a loose connection. It is best to use an electric heater on a circuit by itself.



Since you can run more appliances without blowing a fuse with the Autoformer than you could without the Autoformer, you are obviously using **less power** from the park. In fact, test runs show the Autoformer uses 10% less power.

HOW DOES THE AUTOFORMER WORK?

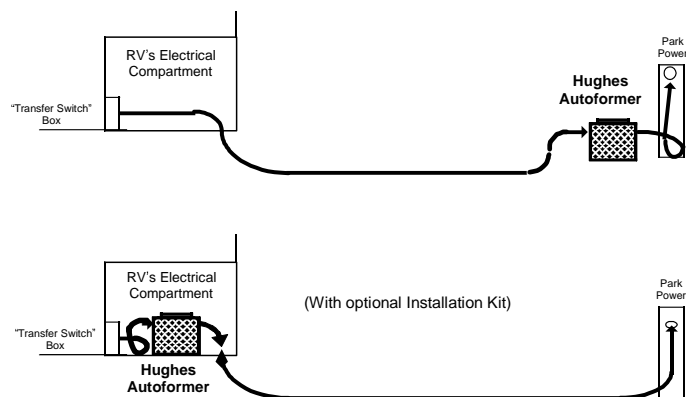
At first we are tempted to say 'very well'. But this may not be the only answer you are looking for! Autoformers are used in commercial applications to stabilize voltage and lower the operating cost of equipment. When the park or input voltage is below 112 volts, the output is 10% over the input (**boost mode**). When the input is over 115 volts, the output is 2% over the input (**by-pass mode**). Additionally, all models have some surge and spike protection.

The Autoformer DOES NOT take power from the park. It does not affect the park or source voltage, or make electricity.

What it DOES is change the voltage – amperage relationship, lowering the amperage requirement by raising the voltage. Since appliances run better on higher voltage with lower amperage, *less* overall power is used from the park, and better service is enjoyed from your RV.

An Autoformer running at full output (30 amps) will use approximately one amp, but will cause appliances to cycle on less often and run cooler. This will use less total power from the park.

Typical installations:



ADD UP WHAT YOU'RE USING



<u>TYPICAL APPLIANCES</u>	<u>WATTS</u>	<u>AMPS (±)</u>
Air Conditioner	1400-2200	13-20
Battery Charger	up to 850	up to 8
Blender	600	5.5
Broiler	1350	12
Coffee Pot	750-1500	7-14
CD / DVD Player	50-100	.5-.9
Computer	50-100	.5-.9
Converter	300-450	3-4
Curling Iron	20-50	.2-.5
Drill	250-320	2-3
Electric Blanket	50-200	.5-2
Electric Broom / Vacuum	200-500	2-5
Fan	25-100	.2-.9
Frying Pan / Wok	1000-1350	9-12
Hair Dryer	350-1000	3-9
Iron	500-1200	5-11
Light Bulbs	40-100	.4-.9
Microwave	700-1500	6-14
Radio	50-200	.5-2
Refrigerator	550-1000	5-9
Space Heater	1000-1500	9-14
Surround Sound	40-225	.4-2
Television	200-650	2-6
Toaster	570-1200	5-11
Washer/Dryer	2000-2250	18-20
Water Heater (electric)	1000-1500	9-14
Water Pump	500-650	5-6
VCR	150-200	1.4-2

REMINDERS

Many Autoformers received for factory service have nothing wrong. Please read all information in this User's Guide and consider the following:

Remember:

Plug-in analog meters are only accurate within two to four volts. A digital multi-meter is much more accurate.

Measuring the park power:

Do not measure park power at the 15 amp plug; it is on a different circuit. Use a multi-meter with probes to read the voltage at the park's receptacle. Or use an appropriate adaptor and plug-in meter.

Technical questions and warranty support:

(888) 540-1504 Mon-Fri 8:00 a.m. - 4:00 p.m. PST.

To return your Autoformer for service:

To obtain warranty support you will need proof-of-purchase (dated sales receipt), unless you have previously sent in your warranty registration card. Call (888) 540-1504 (see hours above). A technical advisor will ask you to provide voltage readings for park power and within your RV. You will receive a Return Authorization number and shipping instructions. Units sent without a Return Authorization number will cause delays. Your warranty covers parts and labor necessary to correct factory defects. The shipping costs are your responsibility.

For your records, record your model, serial number and purchase date here:

Model Number: _____ Serial Number: _____

Purchase Date: _____

Notes:



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