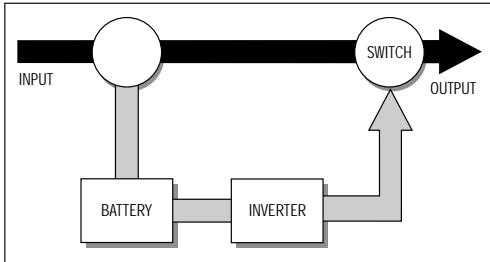


CFR Advantage

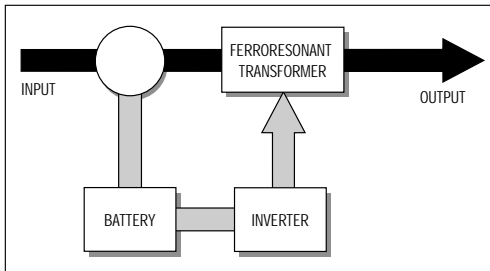
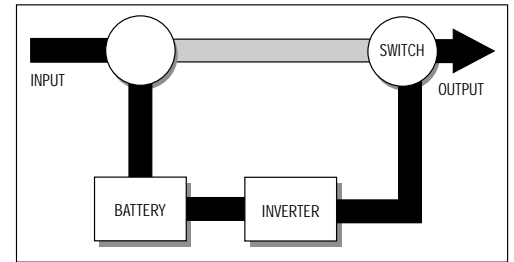


Basic Standby Design (*Forward Transfer System*)

Basic Standby designs provide only limited protection against spikes and surges. True power conditioning is not provided, and backup power is only supplied through the inverter and batteries when the unit is in standby mode. The inverter is typically designed for short run times, and cannot be run in a continuous or long-term mode. In addition, the transfer time from line to inverter and back is often unacceptable for sensitive applications, which may result in valuable data loss, down-time and frustration.

Double-Conversion Design (*Reverse Transfer System*)

With Double-Conversion designs, power is consistently filtered through the batteries and inverter, increasing power conditioning characteristics at the expense of efficiency and reliability. Under certain conditions, line noise, disturbances and other harmful transients can be carried to the output along the neutral bus.



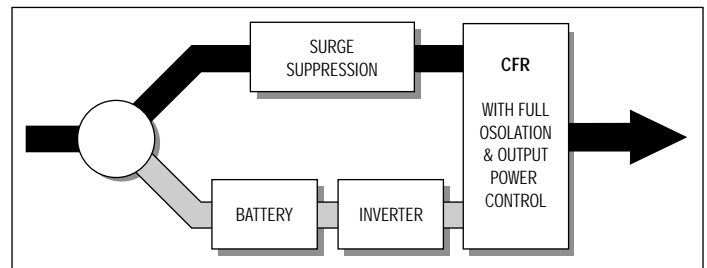
Basic Ferroresonant Design

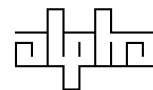
To combine the benefits of both Standby and Double-Conversion designs, a ferroresonant transformer is added to filter and regulate the incoming power. When utility power drifts out of tolerance—or fails completely, the batteries and inverter continue to provide clean, uninterrupted power. This basic ferroresonant design is extremely reliable, but there are several inadequacies such as poor step-load response, reduced efficiency with loads less than 100%, narrow input window, additional heat output, and loud operation.

The Alpha CFR Design

Recognizing the inadequacies of earlier designs—including those using a basic ferroresonant transformer—Alpha Technologies developed the CFR Uninterruptible Power Supply. The benefits of this new hybrid design are noteworthy. Not only does the CFR offer all of the advantages of a ferroresonant transformer, but it also adds significant advance in power conversion technology previously unattainable:

- Outstanding Regulation
- Soft-Start Capabilities
- Quiet Operation
- Extremely Reliable
- Excellent Step-Load Response
- High Efficiency
- Frequency Compensation
- Communications Ready
- Improved Output Waveform





Higher Efficiency

Most ferro-based UPS systems are typically 90% efficient at full load and become less efficient as the load decreases. At 3/4 load, efficiency can be as low as 75%. Unfortunately, most users size their unit at 3/4 load to allow for future growth. This translates directly into lower efficiency, additional heat output and higher operating costs.

The CFR is one of the most efficient UPS systems available: up to 94% at full load all the way down to 1/4 load. This saves energy, reduces heat output and lowers your overall operating costs.

At .08¢ per kWh, the annual energy savings between a 94% and 75% efficient 5,000 watt unit is approximately \$1,027.00 a year. Over a ten year period, the difference exceeds \$10,000. Add to this the expense of running an air conditioner to remove the excess heat generated from the inefficient unit, and the amount becomes staggering.

Soft-Start System

The CFR is designed to slowly power-up when it is initially started. This eliminates high in-rush currents or transients normally associated with the start-up of standard ferroresonant transformers. If the in-rush current is heavy enough, the utility circuit breaker will reset which is why many UPS systems require a special, high magnetic breaker.

Improved Waveshape / Reduced Harmonic Distortion

With its advanced design, the CFR provides a nearly perfect sine wave—which more closely meets the requirements of sensitive equipment. This also reduces harmonic distortion.

Communications Options

Unlike any other UPS on the market, the CFR is designed to be an active part of your communications network, featuring a simple, user-friendly, menu-driven serial interface, configurable for RS-232, RS-485 or modem application. Built to support SNMP (Simple Network Management Protocol), the CFR UPS communicates smoothly with your network via a computer to provide critical power management data. Most UPS systems have nothing more than several LEDs to communicate the operational status of the power supply. Others utilize another manufacturer's software package to indicate various modes of UPS operation.

| Design Comparison | Alpha CFR | Basic Ferroresonant |
|---------------------------|---------------------|---------------------|
| Regulation | | |
| Input window | -25% to +10% | -15% to +15% |
| Output Window | +/- 1% | +/- 3% |
| Adjustable Output Voltage | Yes | No |
| Closed Loop Feedback | Yes | No |
| Efficiency | | |
| @ full load | up to 94% | typically 85 to 92% |
| Step-Load Response | 1/2 Cycle | 5 or more cycles |
| Soft-Start Capabilities | Yes | No |
| Frequency Compensation | Yes | No |
| Output Waveform | Sine Wave (<5% THD) | Sine Wave (5% THD) |
| Communications | Yes | Limited |
| Audible Noise | 32 to 39 dB | 45 to 65 dB |

Fast Step-Load Response Time

With many ferroresonant UPS systems, there is a temporary drop in the output voltage (typically 5 or more cycles) whenever a heavy load is added to the existing load. This may be severe enough to cause your computers to reboot. One solution has been to oversize the UPS—which, unfortunately, decreases efficiency.

Outstanding Output Regulation

Unlike many standby designs, which regulate only when operating from their battery backup, the CFR constantly maintains +/- 1% output regulation. Even with input voltage fluctuations as great as -25% or +10%, the output remains constant (regardless of the amount of load). The CFR uses its batteries only when incoming power exceeds these limits. Up until now, batteries were brought on-line more often with only +/- 3% output regulation possible.

The Alpha CFR features an "Adjustable Output Voltage" (up to +/-7% VAC which allows you to fine tune your power requirements. For example, if your protected equipment requires 117 VAC, the CFR can be adjusted to 117 VAC output and still maintain its +/-1% output regulation. With other types of ferroresonant units, you are limited to the factory calibrated output voltage of the UPS. Typically, this voltage can vary as much as several volts from nominal. With an output regulation of +/-3%, (and any variation in output calibrations), an increase or decrease in voltage could potentially affect the performance of your equipment.

Another feature for the CFR is its ability to accept a greater variation in input voltage (-25%/+10% without drawing on vital backup power. With other ferroresonant designs, the batteries are brought on-line to protect the load whenever incoming power exceeds +/- 15%, plus there is no control of the output other than the transformers +/- 3% regulation.

Using "closed loop feedback circuitry," the CFR constantly monitors the incoming line voltage and compares it to the output load, adjusting the output voltage, as required, to maintain its +/- 1% regulation. Since the batteries are not required to come on-line as often, this greatly extends the CFR's power reserves.

Frequency Compensation

The CFR is equipped with a frequency sense circuit, along with a constant slew frequency synchronization circuit, to provide trouble-free operation with standby generators. The CFR compensates for shifts in input frequency without affecting the output voltage. With most ferro-based UPS systems, whenever a shift in input frequency occurs, the output voltage is affected. This is why some manufacturers suggest a specific, or custom generator for use with their UPS. This is not necessary with the CFR.

Low Audible Noise

One of the most common complaints with any ferroresonant UPS is noise. The problem becomes worse as the load decreases from 100%. This is not an issue with the CFR - regardless of load, it is one of the quietest UPS systems available.

Please contact your Alpha sales representative for additional information.

