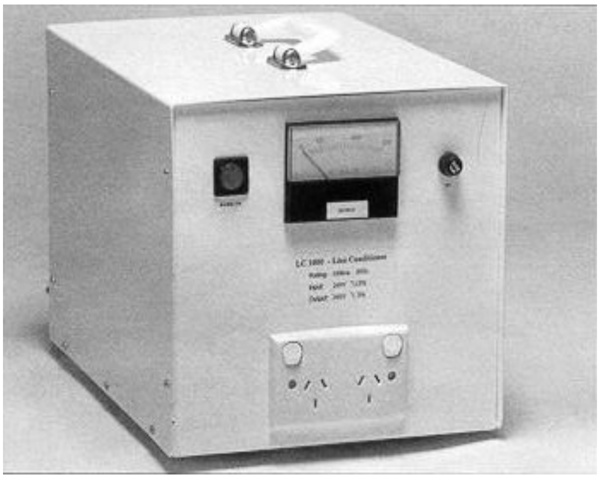
SA-SLC Series

Ferroresonant Line Conditioners
100VA to 15KVA , Single and Three Phase



Enclosed model shown with optional Metre

- **Supply voltage 240v +/-15% - Output voltage 240 +/-3%**
- **Line Conditioners with non-standard input or output are readily available.**
- **Inherent short circuit protection.**
- **Manufactured to AS3108.**
- **Provides a sinusoidal output (typically 3% harmonic content) irrespective of electricity supply voltage distortions.**
- **Durable ferro-resonant style construction**
- **Designed for efficient operation - typically 90%**
- **Manufactured in Australia by a 100% Australian owned company.**
- **Available in enclosed , open gear tray style.**

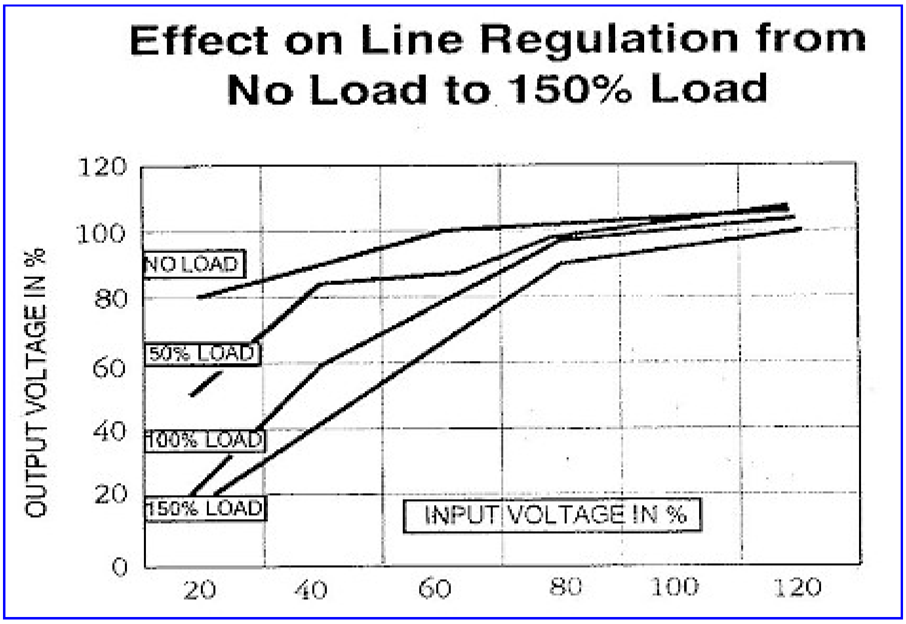
SPECIFICATIONS

Input Power Factor:	At full load (unity p.f.) the input powerfactor will be greater than 0.9 when the input voltage is within the rated operating range, and typically 0.98 at nominal supply voltage.
Load Powerfactor:	The output voltage is influenced by the load powerfactor. A leading powerfactor marginally increases the output voltage while a lagging PF decreases the output voltage.
Frequency Change:	The output voltage will change by 1.5% for every 1% change in the nominal supply frequency.
Overload:	The Line Conditioner can tolerate an overload of up to 150% and still maintain output voltage. With a complete short-circuit on the output, the Line Conditioner will limit the output current to 200%, thereby protecting the unit from damage.
Harmonic Distortion:	The output waveform is sinusoidal with a total harmonic distortion level of less than 3% at full load. The output waveform will remain sinsoidal even if the supply waveform is distorted.
Response Time:	The Line Conditioner will respond immediately to slow changes in the load and supply voltage, and within 30 milliseconds for abrupt changes. Stored energy in the capacitor circuit of the ferroresonant transformer allows the Line Conditioner to maintain full output for a total line loss of up to 3 milliseconds.
Noise Rejection:	Typical common-mode rejection is greater than 120dB for frequencies up to 1MHz and transverse-mode rejection greater than 60dB for frequencies from 10kHz to 1MHz.
Regulation:	The output voltage will remain within plus or minus 3% of nominal with a variation in the supply voltage of plus or minus 15% or change in the load from no-load to full-load.
Ambient Temperature Limits:	-20C to +65C.

MODEL TYPES (ENCLOSED VERSION)

TYPE	RATING	DIMENSIONS (mm) L H W	WEIGHT
(1)	100VA to 300VA	300 215 220	8 - 12
(2)	350VA to 1100VA	395 280 280	13 - 28
(3)	1200VA to 5000VA	490 320 360	30 - 70

REGULATION GRAPH



PRINCIPLE OF OPERATION

The Line Conditioner is designed to provide relatively constant output voltage when there are substantial fluctuations in the supply voltage. It is also used to isolate the critical load from both common-mode and transverse-mode electrical noise. The Line Conditioner may be considered as a combination of a voltage regulator and an electrical noise filter. Fluctuating supply voltage and electrical noise cause 99.5% of power related computer problems.

The basic component of the Line Conditioner is a ferroresonant transformer. A schematic circuit diagram of the ferroresonant transformer is shown in Fig. D1 and an outline drawing of a typical ferroresonant transformer is shown in Fig. D2.

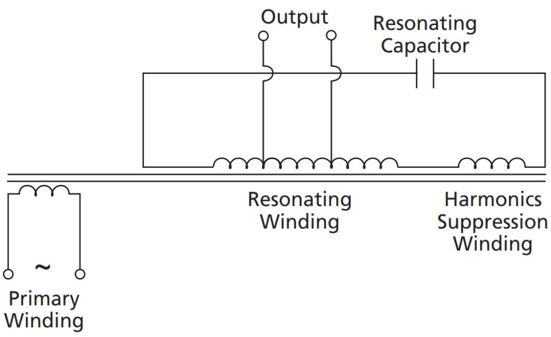


Fig. D1 Schematic circuit diagram of a ferroresonant transformer

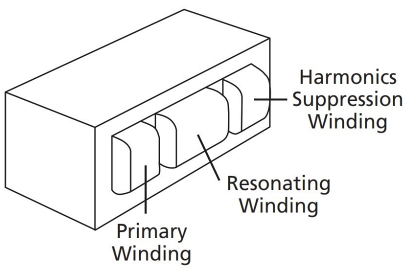


Fig. D2 Typical physical arrangement of a ferroresonant transformer

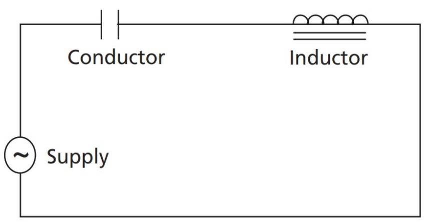


Fig. D3 Series circuit that can exhibit ferroresonance

Brief description of ferroresonance

Ferroresonance is a saturated magnetic state that occurs under certain circumstances when an inductor having a ferromagnetic core is operated with a capacitor. Consider a series circuit consisting of an inductor and a capacitor shown in Fig. D3. The volt-ampere characteristic of the capacitor is illustrated in Fig. D4(a), and in Fig. D4(b) is shown the volt-ampere characteristic of the inductor. Note that the inductor exhibits saturation, i.e. the V/A curve flattens out. Illustrated in Fig. D4(c) is the volt-ampere characteristic of the series combination of capacitor and inductor. Note that there is a negative impedance region.

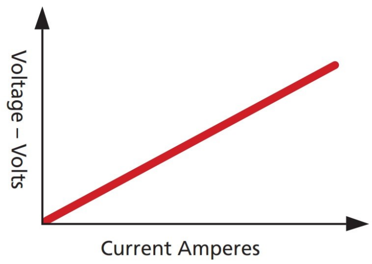


Fig. D4(a) Capacitor V/A Characteristics

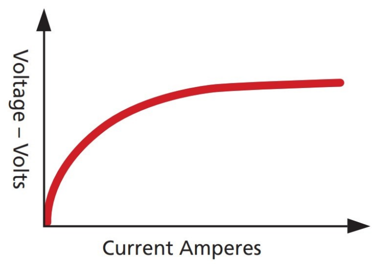


Fig. D4(b) Inductor V/A Characteristics

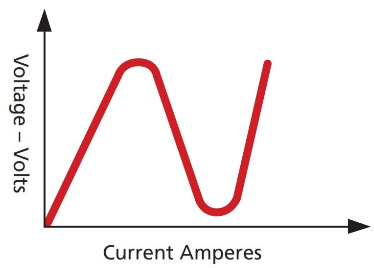


Fig. D4(c) Volt-Ampere characteristics of the series combination of the inductor and capacitor

This unusual volt-ampere characteristic results from the inductor having a nonlinear characteristic while the capacitor has a linear characteristic. The magnitude of the supply voltage is the difference between the amplitudes of the capacitor and inductor voltages since they are 180° out of phase with each other. Fig. D5 illustrates the relationship between the supply voltage and the inductor voltage of Fig. D3. Referring to Fig. D5, as the supply voltage is increased, the voltage across the inductor jumps to point B: this is the so-called"JUMP" phenomena associated with an inductor entering ferroresonance. If the supply is further increased to, say, point C, the voltage across the inductor is increased only slightly, i.e. for a substantial change in supply voltage, the voltage across the inductor has remained almost constant.

If the supply is gradually reduced, the voltage across the inductor remains almost constant until it reaches point D, at which time it drops to point E. Further reductions of the supply voltage also cause a reduction of the inductor voltage. Note that, when lowering the supply voltage from point C, the inductor voltage stays at high value beyond its "jump-up" point B. It remains in resonance until the supply is reduced to a relatively low value (point D) before there is a substantial drop in inductor volts.

The ferroresonance principle is used in the operation of the special transformer in line conditioners. The output section of the transformer is operated in a ferroresonant state where the output voltage changes only slightly for a large change in supply voltage. This slight change in output voltage can be reduced to almost zero by the series connection of a small voltage of opposite polarity in the output circuit. This is normally accomplished by a "bucking" winding wound over the primary winding, see Fig D6. The small reverse voltage counteracts the slight changes in output voltage as the supply voltage varies. While the inclusion of a "bucking" winding slightly improves the line regulation of the ferroresonant transformer, it reduces the transverse-mode electrical noise rejection capability and consequently it is rarely used in line conditioners.

The output waveform of a ferroresonant transformer (consisting of a primary and resonating winding) contains a substantial amount of harmonic content and tends to be relatively square. Since most computer installations require a sinusoidal supply, a harmonics suppression winding has been included in these ferroresonant transformers to achieve a sine wave output voltage.

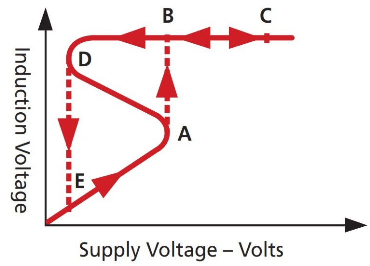


Fig. D5 Relationship between the supply voltage and the inductor voltage for the circuit shown in Fig. D3

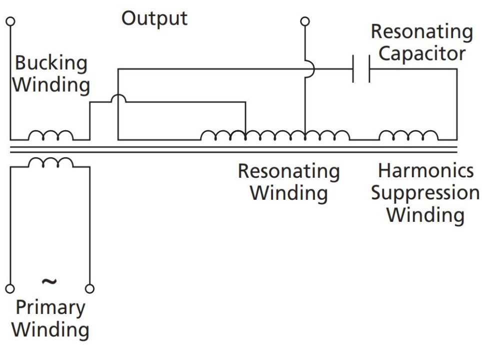


Fig. D6 Schematic circuit diagram of a ferroresonant transformer including the "bucking" winding