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## **SagFighter™ Active Voltage Conditioner / Sag Ride Through (SRT)**

### **Overview**

The SagFighter™ is an industrial-grade, solid state, electronic voltage sag corrector/active voltage conditioner that operates without batteries or energy storage.



Industrial-grade means the SagFighter is compatible with all non-regenerative load types and load power factors and provides a minimum 1,000% fault-clearing capability. Unlike computer-grade products or uninterruptible power supplies (UPS), the SagFighter is designed for frequent high-inrush current and low-power factor loads without the need to over-size the product.

The SagFighter provides the following features:

- Sag protection compliant with SEMI-F47
- Full sag correction within 2 milliseconds
- Sag correction duration independent of load or power factor
- Sag correction for a minimum of 100 seconds
- No need for bypass operation for high inrush or overload currents
- Continuous protection without the need to recharge or reset
- Non-continuous inverter operation that increases reliability and provides 99% efficiency
- Battery-free design

The SagFighter consists of a three-phase transformer with each of its secondary windings connected in series between the source (incoming line) and the load(s). Load current flows through the secondary windings of the transformer while the unit operates in a “monitoring” mode with the primary transformer windings shorted through SRC switches.

The SagFighter™ continuously monitors the input voltage waveform for any deviation from a balanced, three-phase voltage. Upon sensing a deviation, the Sag Fighter engages an inverter circuit to apply an injection voltage to the primary windings of the series-connected transformer. The injection voltage is synthesized with a magnitude, shape, and phase angle so that when it is added in series with the incoming voltage, a balanced, three-phase voltage results. When normal, three-phase incoming voltage is detected at the SagFighter input, the inverter circuit is disengaged and the unit returns to monitoring mode.

The SagFighter is thermally ranged to provide continuous correction for a voltage sag, although this is not normally required.

The SagFighter uses natural convection cooling and has no fans or other moving parts. Larger units may include heat-sink fans that operate only when the unit is correcting a sag event. An automatic electronic failsafe bypass is incorporated into the standard design so the SagFighter maintains power to the load if a unit malfunctions.

The SagFighter automatically corrects voltage sags with no operator or programming required. The unit display provides unit status and historical information on sag correction events. Alarm contacts are also provided to permit remote indication of SagFighter status.

SagFighter installation is simple. The unit arrives completely assembled and requires no programming, testing, measuring or setting of switches. It is designed to install much like a dry-type transformer: simply place the unit and make input and output wiring connections. The SagFighter typically has no maintenance schedule other than routine inspection and cleaning.

# SagFighter™

## Specifications

Application	
Power Rating/Size (kVA)	100, 125, 150, 200, 250, 300, 350, 400, 500, 750, 1,000, 1,250, 1,500, 1,750, 2,000 kVA
Phase - Frequency (Hz)	3Ø, 50 or 60 Hz
Standard Input/Output Voltages	60 Hz: 208, 240, 480, 600 50 Hz: 220, 380, 400, 415 (non-standard voltages available)
Sag Correction/Operating Characteristics	
Sag Correction	1- or 2-phase sags to 30% remaining voltage (-70% sag) corrected to at least 95% of nominal voltage. 3-phase sags to 60% remaining voltage (-40% sag) corrected to at least 95% of nominal voltage.
Output Regulation	Nominal voltage $\pm 5\%$ during sag correction [Note: unit normally operates in monitoring mode until voltage reaches 90% of nominal voltage, at which time sag correction is initiated]
Response Time	Full sag correction typically within 2ms, regardless of load or load power factor.
Correction Duration	Sags corrected for a minimum of 100 seconds, regardless of load or power factor.
Regulation Variation	None: regulation constant for 0 to 100% load and any load power factor.
Phase Shift Correction	Phase shifts are corrected automatically during sag correction.
Harmonic Distortion	None: added in monitoring mode.
Overload/Inrush Capability	1,000 % - 1 second, 500% - 5 seconds, 200% - 1 min.; 1,000% fault clearing
Load / Power Factor	No minimum or part load or load-power factor limitations; compatible with all load types.
Efficiency	99% typical
Operating Frequency	+/- 3% from nominal frequency (50Hz or 60Hz)
Operating Environment	Performance specifications are based on the input (source) voltage meeting IEEE 519 standards.
Noise Suppression/Load Protection	
Surge Suppression	Included, complies with ANSI/IEEE C62.41, UL 1449
Input Circuit Breaker	Included, standard, UL 489, ANSI/IEEE C22.2
Failsafe Electronic Bypass	Auto-actuation on high temperature, over-current, component failure with no loss of load
Construction	
Technology	Microprocessor-controlled, inverter-based series voltage injection
Transformer	Copper-wound, dry-type series transformer (3W+G input and output)
Inverter Operation	Non-continuous operation – only during sag correction
Cooling	Natural convection cooled with heat-sink fans used only during sag correction [contaminant free, dry, clean air]
Enclosure	Floor-mounted NEMA-1, ANSI 61 grey. Custom enclosures also available – contact factory.
Cabling/Connections	See enclosure drawing for cable entry/exit options and circuit breaker/lug size table.
Audible Sound Level	Less than 65dB @ 1 meter
Display	Touch-screen display with event history recorder, operational data, and utilities
Controls	No controls or programming required, no user-adjustable controls
Monitoring	Contacts for remote indication of unit and surge suppression status are included.
Environmental Requirements	
Temperature - Humidity	Ambient 32° to 104°F (0 to 40°C) – Relative humidity 0-95% non-condensing
Operating Altitude	0 to 3,300 ft (1000m)

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## Options

Option	Code	Description
<b>50 Hz</b>	5	Required to identify 50Hz units - standard units are 60Hz
<b>Power Monitor with ModBus Communications</b>	C	Local, push-button digital display of amps, volts, power factor, Power. For input and/or output.
<b>Non-Standard Enclosure</b>	E	Per customer specification. Contact factory for further details.
<b>Mechanical bypass</b>	M	An open transition bypass to power load while isolating the SagFighter™ for inspection or maintenance. The standard SagFighter includes an automatic failsafe internal bypass to maintain power to the load in the event of a malfunction and may operate indefinitely on this internal bypass. The internal bypass will be supplied even if the mechanical bypass option is selected.
<b>Non-Standard Voltages</b>	N	For any non-standard input or output voltage
<b>Wiring Labels</b>	L	
<b>Undefined Options (custom)</b>	Q	Option designed to meet specific customer requirement

# SagFighter™

## Weights and Dimensions•

kVA	Height Inches (cm)	Width Inches (cm)	Depth Inches (cm)	Weight - 60Hz Lbs. (kg)	Weight - 50Hz Lbs. (kg)	Enclosure
100	46 (117)	36 (91)	28 (71)	1000 (455)	500	S36
125	65 (165)	44 (112)	33 (84)	1150 (523)	575	S44
150	65 (165)	44 (112)	33 (84)	1300 (591)	650	S44
200	65 (165)	44 (112)	33 (84)	1600 (727)	800	S44
250	65 (165)	44 (112)	33 (84)	2000 (909)	1,000	S44
300	80 (203)	56 (142)	40 (102)	2400 (1091)	1,200	S56
350	80 (203)	56 (142)	40 (102)	2800 (1273)	1,400	S56
400	80 (203)	72 (183)	48 (122)	3500 (1591)	1,909	S72
500	80 (203)	72 (183)	48 (122)	4500 (2045)	2,455	S72
600	80 (203)	72 (183)	48 (122)	5500 (2500)	3,000	S72
750	80 (203)	85 (216)	66 (168)	6500 (2955)	3,250	S85
1,000	80 (203)	85 (216)	66 (168)	8500 (3864)	4,250	S85
1,250	80 (203)	85 (216)	66 (168)	10000 (4545)	5,000	S85
1,500	80 (203)	96 (244)	78 (198)	11000 (5000)	5,500	S96
1,750	80 (203)	120 (305)	78 (198)	12000 (5455)	6,000	S120
2,000	80 (203)	120 (305)	78 (198)	13000 (5909)	6,500	S120

\* Weights and dimensions for standard units. Certain options may require a larger enclosure or increase the weight.

Contact factory for details



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