Sure-Volt™ Electronic Voltage Regulator - Power Conditioner (EVR)

Standard Unit Specifications & Technical Data

Application			
Sizes (kVA) [Ø - phase]	1Ø: 5, 10, 15, 20, 25, 30, 50, 75, 100, 125, 150…larger sizes available		
	3Ø: 5, 10, 15, 20, 25, 30, 50, 75, 100, 125, 150, 200, 250, 300, 400, 500, 600, 750, 1000, 1250, 1500, 1750, 2000…larger sizes available		
Input/Output Voltages	1Ø/60 Hz: 120, 208, 240, 480	1Ø/50 Hz: 110, 220, 380, 400	Voltage step-up or step-down & non-standard voltages available
	3Ø/60 Hz: 208, 240, 480, 600	3Ø/50 Hz: 220, 380, 400, 415	
Regulation/Operating Characteristics			
Regulation	Nominal input voltage +10%/-25%, nominal output voltage ±3%...other options available		
Regulation Variation	None – regulation constant for 0 to 100% load and any load power factor		
Overload/Inrush Capability	6000% -1 cycle, 1000% - 1 second, 500% - 5 seconds, 200% - 1 min. ; 1000% fault clearing		
Load/ Power Factor	No minimum or part load or load power factor limitations, compatible with all load types		
Tap Switching	No load current interruption or waveform distortion on switching at any load or power factor		
Zero Crossing Sensitivity	None, tap switching not dependent on determining load current zero crossing		
Harmonic Distortion	No distortion added at any load or power factor		
Response Time	1 cycle typical regardless of load or load power factor		
Efficiency	Isolation transformer: 97% typical, autotransformer: 99% typical		
Operating Frequency	±3% of nominal frequency		
Noise Suppression/Protection			
Noise Attenuation	150 dB at 100 kHz common mode; 65 dB at 100 kHz normal mode (isolation transformer only)		
Surge Suppression	Included, complies with ANSI/IEEE C62.41		
Input Circuit Breaker	Included, refer to standard circuit breaker sizes		
Failsafe Electronic Bypass	Auto-actuation on high temperature, over-current or component failure - with no loss of load		
Construction			
Technology	Microprocessor-controlled, tap switching series transformer design		
Switching Semiconductors	Non-full power semiconductors – individual SCRs are not required to carry full unit current		
Transformer	500 kVA & below: dry-type isolated, copper wound, shielded [1Ø & 3Ø (delta-wye)]		
	Above 500 kVA: dry-type autotransformer, copper wound [3Ø (wye-wye)]		
	Non-standard transformer configurations available		
Cooling	Natural convection, no cooling fans used		
Enclosure	Floor-mounted NEMA 1, ANSI 61 grey, other enclosure types & color available		
Cabling/Connections	See enclosure drawing for cable entry/exit options and circuit breaker/lug size table		
Audible Sound Level	Less than 65 dB @ 1 meter		
Display	Backlit LCD displays buck/boost per phase and unit status		
Controls	No controls or programming required, no user-adjustable controls		
Monitoring	Contacts for remote indication of unit and surge suppression status are included		
Warranty	5 year warranty against SCR failure, one year on complete unit – see warranty for details		
Environmental Requirements			
Temperature - Humidity	Ambient 32 to 104°F (0 to 40°C) – Relative humidity 0-95% non-condensing		
Operating Altitude	0 to 10,000 ft (3000m)		

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Weights & Dimensions, Model Numbers and Documentation

Weights & Dimensions*						
kVA	Height (inches – cm)	Width (inches – cm)	Depth (inches – cm)	Weight - 60 Hz (lbs – kg)	Weight - 50 Hz (lbs – kg)	Enclosure
5	42 (107)	28 (71)	26 (66)	550 (250)	605 (275)	S28
10	42 (107)	28 (71)	26 (66)	600 (273)	660 (300)	S28
15	42 (107)	28 (71)	26 (66)	650 (295)	715 (325)	S28
20	42 (107)	28 (71)	26 (66)	700 (318)	770 (350)	S28
25	42 (107)	28 (71)	26 (66)	750 (341)	825 (375)	S28
30	42 (107)	28 (71)	26 (66)	800 (364)	880 (400)	S28
50	42 (107)	28 (71)	26 (66)	1000 (455)	1100 (500)	S28
75	46 (117)	36 (91)	28 (71)	1300 (591)	1430 (650)	S36**
100	46 (117)	36 (91)	28 (71)	1600 (727)	1760 (800)	S36
125	65 (165)	44 (112)	33 (84)	1800 (818)	1980 (900)	S44
150	65 (165)	44 (112)	33 (84)	2000 (909)	2200 (1000)	S44
200	65 (165)	44 (112)	33 (84)	2400 (1091)	2640 (1200)	S44
250	65 (165)	44 (112)	33 (84)	2800 (1273)	3080 (1400)	S72**
300	65 (165)	44 (112)	33 (84)	3200 (1455)	3520 (1600)	S72**
350	78 (198)	72 (183)	48 (122)	3600 (1636)	3960 (1800)	S72
400	78 (198)	72 (183)	48 (122)	4000 (1818)	4400 (2000)	S72
500	78 (198)	72 (183)	48 (122)	5000 (2273)	5500 (2500)	S72
600	78 (198)	72 (183)	48 (122)	5000 (2273)	5500 (2500)	S72
750	80 (203)	85 (216)	66 (168)	6300 (2864)	6930 (3150)	S85**
1000	80 (203)	85 (216)	66 (168)	8200 (3727)	9020 (4100)	S85
1250	80 (203)	85 (216)	66 (168)	10200 (4636)	11220 (5100)	S85
1500	80 (203)	96 (244)	78 (198)	12000 (5455)	13200 (6000)	S96**
1750	80 (203)	132 (335)	78 (198)	14000 (6364)	15400 (7000)	S120
2000	80 (203)	132 (335)	78 (198)	16000 (7273)	17600 (8000)	S120

*Weights and dimensions for standard units. Certain options may require a larger enclosure or increase weight.
** Certain voltage combinations may permit application in a smaller enclosure size. Contact factory for details.

Model Number Construction		
Model #: EVR - SSSS - AAAB - CCC - OOOO		Example: 600 kVA, 50 Hz, 3Ø, 380v input, 380v output, with power monitor and adjustable target output voltage: EVR-0600-380Y-220-5DO
SSSS:	kVA size - include leading zeros e.g. 75 kVA = 0075	
AAA:	Input voltage (L-L) e.g. 480v = 480	
B:	D = 3Ø isolation xfmr; Y = 3Ø autotransformer; S = 1Ø	
CCC:	Output voltage (L-N) for wye, e.g. 480v (L-L) = 277v (L-N)	
OOOO	Options – Refer to common options list for option code	

Standard Documentation & Factory Testing

Installation details (weights, enclosure dimensions, cable entry/exit, conductor connections, wiring connections) are typically issued within ten (10) working days in Portable Document Format (PDF). Two (2) copies of Owners Manual with unit information, electrical diagram(s) and factory test data are shipped with each unit. Every unit is factory tested to manufacturer's standards to confirm proper operation of the unit and any options. Contact factory for other requirements.

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Common Options

Common Options		
Option	Code	Description
50 Hz	5	Required to identify 50 Hz units – standard units are 60 Hz
Power monitor with ModBus Communications	C	Same device as the local power monitor (option D) with the inclusion of Modbus serial communications with RS485 or RS422 (2 or 4-wire) interface
Local power monitor	D	Local, pushbutton, digital display of amps, volts, power factor, kW. For input or output. Two (2) devices are required for both input and output.
Non-standard enclosure	E	A variety of enclosures and enclosure cooling options are available including NEMA 3R, 12 and 4X. Contact factory for further details.
Mechanical bypass	M	An open-transition (break-before-make) bypass to power load while isolating the Sure-Volt™ for inspection or maintenance. The standard Sure-Volt™ 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. NOTE: this option may only be applied if the nominal input and output voltages are the same.
Non-standard voltage(s)	N	For any non-standard input or output voltages
Adjustable target output voltage	O	Permits adjustment of the target output voltage by approximately ±10% to increase or decrease output voltage or limit normal output to a minimum or maximum value. Contact factory for further details.
Undefined option(s)	Q, Q2, Q3, etc.	Used for any options not already defined
Non-standard regulation range	R	For any regulation ranges other than nominal input voltage +10%/-25% and nominal output voltage ±3%. Contact factory for further details.
Split phase output	S	For 1Ø units only. Provides dual voltage output such as 240/120 or 220/110. Contact factory for other options or further details.
Non-standard transformer	X	To provide an autotransformer in lieu of isolation transformer or vice versa. To provide any other non-standard transformer configuration. Contact factory for further details.
Voltmeter	V	Local voltage display per phase. For input or output. Two (2) devices are required for both input and output.

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Input Circuit Breaker & Output Lug Sizes

1Ø Circuit Breaker & Output Lug Sizes												
KVA	5			10			15			20		
Vinput	Amps	#	Size	Amps	#	Size	Amps	#	Size	Amps	#	Size
120	56	1	14AWG-1/0	111	1	14AWG-1/0	167	1	4AWG-300kcmil	222	1	4AWG-300kcmil
208	32	1	14AWG-1/0	64	1	14AWG-1/0	96	1	14AWG-1/0	128	1	4AWG-300kcmil
240	28	1	14AWG-1/0	56	1	14AWG-1/0	83	1	14AWG-1/0	111	1	4AWG-300kcmil
380	18	1	14AWG-1/0	35	1	14AWG-1/0	53	1	14AWG-1/0	70	1	14AWG-1/0
400	17	1	14AWG-1/0	33	1	14AWG-1/0	50	1	14AWG-1/0	67	1	14AWG-1/0
480	14	1	14AWG-1/0	28	1	14AWG-1/0	42	1	14AWG-1/0	56	1	14AWG-1/0
KVA	25			30			50			75		
Vinput	Amps	#	Size	Amps	#	Size	Amps	#	Size	Amps	#	Size
120	278	2	3/0-250kcmil	333	2	3/0-250kcmil	556	2	250-500kcmil	833	3	2/0-400kcmil
208	160	1	4AWG-300kcmil	192	1	4AWG-300kcmil	321	2	250-500kcmil	481	2	250-500kcmil
240	139	1	2AWG-4/0	167	1	4AWG-300kcmil	278	2	3/0-250kcmil	417	2	3/0-250kcmil
380	88	1	14AWG-1/0	105	1	14AWG-1/0	175	1	4AWG-300kcmil	263	1	6AWG-350kcmil
400	83	1	14AWG-1/0	100	1	14AWG-1/0	167	1	4AWG-300kcmil	250	1	6AWG-350kcmil
480	69	1	14AWG-1/0	83	1	14AWG-1/0	139	1	2AWG-4/0	208	1	6AWG-350kcmil
KVA	100			125			150					
Vinput	Amps	#	Size	Amps	#	Size	Amps	#	Size			
120	1111	4	4/0-500kcmi	1389	4	4/0-750kcmil	1667	4	4/0-750kcmil			
208	641	3	2/0-400kcmil	801	3	2/0-400kcmil	962	4	4/0-500kcmi			
240	556	3	250-500kcmil	694	3	2/0-400kcmil	833	3	2/0-400kcmil			
380	351	2	3/0-250kcmil	439	2	250-500kcmil	526	2	250-500kcmil			
400	333	2	3/0-250kcmil	417	2	3/0-250kcmil	500	2	250-500kcmil			
480	278	2	3/0-250kcmil	347	2	3/0-250kcmil	417	2	3/0-250kcmil			

- Notes:
- kVA = unit kVA
- Voltage = input or output voltage
- Amps = Input circuit breaker rating
- # = maximum number of input or output conductors
- Size = Minimum/maximum input and output conductor sizes
- Contact factory for other circuit breaker or conductor arrangements
- Neutral connections, where applicable, will be the same number and size as the input connections
- All units include an internal grounding lug in accordance with the Grounding Lug Table. Larger units also have external grounding connections as shown on the enclosure drawing

Equivalent Area for Parallel Conductors (AWG/kcmil)	Size of Grounding Lug
2 or smaller	8
1 or 1/0	6
2/0 or 3/0	4
Over 3/0 though 350	2
Over 350 through 600	1/0
Over 600 through 1100	2/0
Over 1100	3/0

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3Ø Circuit Breaker & Output Lug Sizes												
KVA	5			10			15			20		
Vinput	Amps	#	Size	Amps	#	Size	Amps	#	Size	Amps	#	Size
208	19	1	14AWG-1/0	37	1	14AWG-1/0	56	1	14AWG-1/0	74	1	14AWG-1/0
240	16	1	14AWG-1/0	32	1	14AWG-1/0	48	1	14AWG-1/0	64	1	14AWG-1/0
380	10	1	14AWG-1/0	20	1	14AWG-1/0	30	1	14AWG-1/0	41	1	14AWG-1/0
400	10	1	14AWG-1/0	19	1	14AWG-1/0	29	1	14AWG-1/0	38	1	14AWG-1/0
480	8	1	14AWG-1/0	16	1	14AWG-1/0	24	1	14AWG-1/0	32	1	14AWG-1/0
600	6	1	2AWG-4/0	13	1	2AWG-4/0	19	1	2AWG-4/0	26	1	2AWG-4/0
KVA	25			30			50			75		
Vinput	Amps	#	Size	Amps	#	Size	Amps	#	Size	Amps	#	Size
208	93	1	14AWG-1/0	111	1	4AWG-300kcmil	185	1	4AWG-300kcmil	278	2	3/0-250kcmil
240	80	1	14AWG-1/0	96	1	14AWG-1/0	160	1	4AWG-300kcmil	226	1	4AWG-300kcmil
380	51	1	14AWG-1/0	61	1	14AWG-1/0	101	1	14AWG-1/0	142	1	2AWG-4/0
400	48	1	14AWG-1/0	58	1	14AWG-1/0	96	1	14AWG-1/0	135	1	2AWG-4/0
480	40	1	14AWG-1/0	48	1	14AWG-1/0	80	1	14AWG-1/0	113	1	2AWG-4/0
600	32	1	2AWG-4/0	38	1	2AWG-4/0	64	1	2AWG-4/0	90	1	2AWG-4/0
KVA	100			125			150			200		
Vinput	Amps	#	Size	Amps	#	Size	Amps	#	Size	Amps	#	Size
208	369	2	3/0-250kcmil	461	3	2/0-400kcmil	555	2	250-500kcmil	740	3	2/0-400kcmil
240	320	2	3/0-250kcmil	400	2	3/0-250kcmil	481	2	250-500kcmil	642	3	2/0-400kcmil
380	202	1	6AWG-350kcmil	253	1	6AWG-350kcmil	304	2	3/0-250kcmil	405	2	3/0-250kcmil
400	192	1	4AWG-300kcmil	240	1	6AWG-350kcmil	289	2	3/0-250kcmil	385	2	3/0-250kcmil
480	160	1	4AWG-300kcmil	200	1	6AWG-350kcmil	241	1	6AWG-350kcmil	321	2	3/0-250kcmil
600	128	1	2AWG-4/0	160	1	6AWG-350kcmil	192	1	6AWG-350kcmil	257	2	3/0-250kcmil
KVA	250			300			350			400		
Vinput	Amps	#	Size	Amps	#	Size	Amps	#	Size	Amps	#	Size
208	925	4	4/0-500kcmil	1110	4	4/0-500kcmil	1295	4	1/0-750kcmil	1480	4	#2-600kcmil
240	802	3	2/0-400kcmil	962	4	4/0-500kcmil	1123	4	4/0-500kcmil	1283	4	#2-600kcmil
380	506	2	250-500kcmil	608	2	250-500kcmil	709	3	2/0-400kcmil	810	4	#2-600kcmil
400	481	2	250-500kcmil	577	2	250-500kcmil	674	3	2/0-400kcmil	770	4	#2-600kcmil
480	401	2	3/0-250kcmil	481	2	250-500kcmil	561	2	250-500kcmil	642	4	#2-600kcmil
600	321	2	3/0-250kcmil	385	2	3/0-250kcmil	449	2	250-500kcmil	513	4	#2-600kcmil
KVA	500			600			750			1000		
Vinput	Amps	#	Size	Amps	#	Size	Amps	#	Size	Amps	#	Size
208	1850	6	#2-600kcmil	2221	6	#2-600kcmil	2776	10	#2-600kcmil	3701	12	#2-600kcmil
240	1604	4	#2-600kcmil	1925	6	#2-600kcmil	2406	10	#2-600kcmil	3208	10	#2-600kcmil
380	1013	4	#2-600kcmil	1215	4	#2-600kcmil	1519	6	#2-600kcmil	2026	6	#2-600kcmil
400	962	4	#2-600kcmil	1155	4	#2-600kcmil	1443	6	#2-600kcmil	1925	6	#2-600kcmil
480	802	4	#2-600kcmil	962	4	#2-600kcmil	1203	4	#2-600kcmil	1604	6	#2-600kcmil
600	642	4	#2-600kcmil	770	4	#2-600kcmil	962	4	#2-600kcmil	1283	4	#2-600kcmil
KVA	1250			1500			1750			2000		
Vinput	Amps	#	Size	Amps	#	Size	Amps	#	Size	Amps	#	Size
380	2532	6	#2-600kcmil	3039	6	#2-600kcmil	3545	12	#2-600kcmil	4052	12	#2-600kcmil
400	2406	6	#2-600kcmil	2887	6	#2-600kcmil	3368	12	#2-600kcmil	3849	12	#2-600kcmil
480	2005	6	#2-600kcmil	2406	6	#2-600kcmil	2807	10	#2-600kcmil	3208	10	#2-600kcmil
600	1604	4	#2-600kcmil	1925	6	#2-600kcmil	2245	6	#2-600kcmil	2566	6	#2-600kcmil

Sure-Volt™ Electronic Voltage Regulator - Power Conditioner (EVR)

Overview

The Sure-Volt™ is an industrial-grade, microprocessor-controlled, electronic tap switching voltage regulator using a non-full power semiconductor design. The unit continuously monitors the output voltage, and very quickly switches transformer taps when the voltage falls outside of the regulation range. The Sure-Volt™ works automatically to regulate voltage and condition power with no operator effort or programming required. In the event of a malfunction, the automatic bypass actuates to isolate the power electronics and controls while maintaining power to the load and all other functionality except voltage regulation.

Industrial-grade means that the Sure-Volt™ is compatible with all load types and load power factors and provides a minimum 1000% fault clearing capability. Unlike computer-grade products, the Sure-Volt™ is designed for frequent high inrush current and low power factor loads without the need to over-size the product or to sacrifice reliability.

The Sure-Volt™ provides the following features:

- Highest overload capacity available for compatibility with all loads types
- Highest fault clearing capacity available for reliable operation of protective devices
- Best warranty in the industry - 5 year limited warranty against SCR failure
- 97 to 99% efficiency for nearly all of the load range
- Continuous load current - no load current interruption on tap switching
- Very fast response to quickly correct under/over voltage, sags, and swells
- Automatic failsafe electronic bypass eliminates load current interruption in the event of a malfunction
- Zero moving parts and fan-free design for increased reliability and no scheduled maintenance
- Independent phase regulation for correction of voltage imbalance
- Surge suppression and input circuit breaker are standard

The standard Sure-Volt™ uses natural convection cooling, solid state components and has no fans or other moving parts. No regularly scheduled maintenance is required.

Installation of the Sure-Volt™ is simple. The unit arrives completely assembled and requires no programming, testing, measuring, setting of switches or internal wiring. It installs much like a dry-type transformer – placing the unit and making input and output wiring connections.

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