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Standard Sure-Volt™ Power Conditioner / Voltage Regulator

Introduction

The Sure-Volt™ electronic voltage regulator / power conditioner provides the broadest range of protection available to guard against voltage fluctuations that can wreak havoc with your electrical load (equipment).



- Fast voltage regulation corrects under/over voltage, sags, and swells
- High fault-clearing capacity permits reliable operation of other protective devices
- Built-in surge suppression for surges and spikes
- Line isolation minimizes transients
- Transformer shielding reduces line noise to deliver clean power
- Independent phase regulation to correct voltage imbalance
- Input circuit breaker protects against damaging over-current and short circuits
- Automatic failsafe electronic bypass keeps the load powered

The Sure-Volt combines the best qualities of typical mechanical and electronic voltage regulators while eliminating their weaknesses. Mechanical voltage regulators are valued for their high overload capacity and good voltage regulation. But these qualities are offset by their slow correction speed and the need for regular maintenance of moving parts. Similarly, electronic voltage regulators are known for their fast correction speed, but suffer from poor overload capacity.

The Sure-Volt provides high overload capacity for loads with large inrush-current requirements. At the same time, it provides consistent voltage regulation and fast correction without regular maintenance or moving parts.

The UST Sure-Volt EVR is a tap-switching voltage regulator that uses solid-state devices (SCRs) to select transformer taps to regulate output within the desired range. UST units use a patented design, resulting in reliability far superior to our competitors' designs.

UST's Sure-Volt EVR is more reliable because:

1. UST's configuration does not require the SCRs to handle the full load current (as other EVR units do), but merely a fraction of the load current.
2. UST sizes SCRs to operate between 1/4 and 1/3 of their rated current capacity.
3. UST's patented technology does not require the unit to wait for a zero crossing of the current to initiate a tap change. When competitive units miscalculate the zero crossing, damage to SCRs or the transformer can occur. UST eliminates these potential problems by incorporating the ability to initiate tap changes at any time in the cycle. This also makes the UST Sure-Volt correct voltage faster than units that must wait for a zero crossing.
4. UST incorporates an additional level of protection—a circuit breaker in the SCR path to protect the SCRs in case of over-current conditions (e.g., short circuit load) or other malfunctions.

Overload Capacity

The Sure-Volt uses a non-full-power semiconductor design to provide an overload capacity of 1000% for 1 second rather than 1000% or 1 cycle like other electronic power conditioners. This also makes the Sure-Volt compatible with all load types and load power factors. The Sure-Volt delivers a minimum 1000% fault-clearing capability to permit circuit protective devices to operate properly. High overload capacity also means that the Sure-Volt does not need to be sized for the peak load current.

Current Interruption Eliminated

The Sure-Volt's unique design eliminates the load current interruption seen in some power conditioners during switching. These interruptions to the current flow can create voltage spikes when switching, affecting sensitive loads and causing premature component failure.

Natural Convection Cooling

Cooling fans are a maintenance problem, and dirty fans can result in power conditioner failure. With 100% natural convection cooling, the Sure-Volt requires no fans or other moving parts. Other enclosure designs are available and can be

quoted specific to customer requirements.

Fast Correction

The Sure-Volt provides fast voltage correction to keep sensitive equipment up and running. Programmable logic controllers (PLCs), variable frequency drives (VFDs) and instrumentation all benefit from the Sure-Volt's short correction time (typically 1 cycle).

Electronic Failsafe Bypass

UST provides auxiliary circuit breakers in the SCR paths of the EVR design. When the current limit is exceeded or manually tripped, the SCRs are reset to the nominal path (no boost, no buck), and the unit is placed into non-regulation mode, where output voltage is similar to input voltage. When this circuit breaker is opened either manually or automatically, there is NO interruption to the load, and the EVR is simply not regulating. The unit can be operated in this mode until it is appropriate to shut down the loads and take the unit off-line for maintenance. Most customers find this level of bypass acceptable and usually do not require a separate mechanical bypass. When in automatic internal bypass mode, some internal electrical components (e.g. the transformer and some SCRs) remain energized. In these cases, it is necessary to wait until the load can be removed and the unit can be completely de-energized before attempting maintenance.

The standard location of the auxiliary circuit breakers is inside the enclosure. UST users are in favor of this arrangement so access is limited to the appropriate personnel. UST can arrange to have the auxiliary breaker accessible from the outside if it is necessary to manually force the unit into internal bypass from an external switch.

If the EVR is functioning properly, however, a user should have no reason to initiate bypass mode, since the unit has no scheduled maintenance other than an annual cleaning.

All Digital Controls

All digital controls and operation permit the Sure-Volt to provide the highest levels of performance and accuracy in operation as well as a broad degree of customization for applications.

Simple Operation

The Sure-Volt uses microprocessor-controlled tap-switching technology with an isolated, shielded transformer and a unique control design that makes the Sure-Volt the leading electronic voltage regulator / power conditioner available. The Sure-Volt works automatically to regulate voltage and conditioner power with no operator or programming required. The standard LCD display provides information on the status and then-current operation of the unit while alarm contacts are provided to permit remote indication of any problem.

Easy Installation and Maintenance

Sure-Volt installation is as simple as setting it in place and installing the wiring in and out. The unit arrives completely assembled and requires no programming, testing, measuring, setting of switches or internal wiring. Maintenance is just as easy. With no moving parts, wear parts or fans, the Sure-Volt requires no regularly scheduled maintenance.

Application			
Size (kVA)	Single Phase	5, 10, 15, 20, 25, 30, 50, 75, 100, 150 [larger sizes available upon request]	
	3-Phase	5, 10, 15, 20, 25, 30, 50, 75, 100, 125, 150, 200, 250, 300, 350, 400, 500, 600, 750, 1,000, 1,250, 1,500, 1,750, 2,000, 2,500	
	Note:	Standard configuration is an isolation transformer up to 500kVA. Auto-transformer is for units above 500kVA.	
Input / Output Voltages	1Ø/60Hz: 120, 208, 240, 480 3Ø/60Hz: 208, 240, 480, 600	1Ø/50Hz: 110, 220, 380, 400 3Ø/50Hz: 220, 380, 400, 415	Voltage step up or step down and non-standard voltages available upon request.
Regulation/Operating Characteristics			
Regulation Variation	None: regulation constant for 0 to 100% load and any load or power factor.		
Overload/Inrush Capability	6000% -1 cycle, 1000% - 1 second, 500% - 5 seconds, 200% - 1 min. ; 1000% fault clearing		
Minimum Load	No minimum load or part load limitations.		
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	Tap switching not dependent upon 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	97% typical (isolation transformer); 99% typical (auto-transformer).		
Operating Frequency	± 3% of nominal frequency		
Noise Suppression/Load Protection			
Noise Attenuation	150 dB at 100 kHz common mode; 65 dB at 100 kHz normal mode		
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, or component failure with no loss of load.		
Construction			
Technology	Electronically controlled tap-switching series transformer design.		
Switching Semiconductors	Non-full power semiconductors. Individual SCRs are not required to carry full unit current.		
Controls	Microprocessor-based control		
Cooling	Standard NEMA-1 indoor enclosure designed for natural convection cooling [contaminant-free, dry, clean air].		
Copper wound transformer	Meets ANSI specifications.		
Enclosure	NEMA-1 indoor is standard (optional custom indoor or outdoor enclosures also available).		
Backlit LCD	Phase regulation and status indicators		
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)		

UST SureVolt™ Options

Option	Code	Description
50 Hz	5	Required to identify 50Hz units - standard units are 60Hz
Power Monitor with ModBus Communications	C	Local, push-button digital display of amps, volts, power factor, power. For input and/or output.
Non-Standard Enclosure	E	Per customer specification. 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 can only be applied if the nominal input and output voltages are the same.
Non-Standard Voltages	N	For any non-standard input or output voltage
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.
Non-Standard Regulation Range	R	For any regulation ranges other than normal 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 auto transformer 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) meters required for both input and output.
Wiring Labels	L	
Undefined Options (custom)	Q	Option designed to meet specific customer requirements

Weights and Dimensions

kVA	Height Inches (cm)	Width Inches (cm)	Depth Inches (cm)	Weight-60Hz lbs. (kg.)	Weight-50Hz kg.	Enclosure
5	43 (109)	28 (71)	26 (66)	550 (250)	275	S28
10	43 (109)	28 (71)	26 (66)	600 (272)	300	S28
15	43 (109)	28 (71)	26 (66)	650 (294)	325	S28
20	43 (109)	28 (71)	26 (66)	700 (318)	350	S28
25	43 (109)	28 (71)	26 (66)	750 (340)	375	S28
30	43 (109)	28 (71)	26 (66)	850 (385)	400	S28
50	43 (109)	28 (71)	26 (66)	1,000 (454)	500	S28
75	46 (117)	36 (91)	28 (71)	1,300 (591)	650	S36
100	46 (117)	36 (91)	28 (71)	1,300 (591)	650	S36
125	65 (165)	44 (112)	33 (84)	1,800 (818)	900	S44
150	65 (165)	44 (112)	33 (84)	2,000 (909)	1,000	S44
200	65 (165)	44 (112)	33 (84)	2,400 (1,091)	1,200	S44
250	80 (203)	56 (142)	40 (102)	2,800 (1,273)	1,400	S56
300	80 (203)	56 (142)	40 (102)	3,200 (1,455)	1,600	S56
350	80 (203)	56 (142)	40 (102)	3,600 (1,636)	1,800	S56
400	80 (203)	72 (183)	48 (122)	4,000 (1,818)	2,000	S72
500	80 (203)	72 (183)	48 (122)	5,000 (2,273)	2,500	S72
600	80 (203)	72 (183)	48 (122)	5,750 (2,608)	2,700	S72
750	80 (203)	85 (216)	66 (168)	6,300 (2,864)	3,150	S85
1,000	80 (203)	85 (216)	66 (168)	8,200 (3,727)	4,100	S85
1,250	80 (203)	85 (216)	66 (168)	10,200(4,636)	5,100	S85
1,500	80 (203)	96 (244)	78 (198)	12,000(5,455)	6,000	S96
1,750	80 (203)	132 (335)	78 (198)	14,000(6,364)	7,000	S120
2,000	80 (203)	132 (335)	78 (198)	16,000(7,273)	8,000	S120

Note (1) Weights and dimensions for standard units are noted above. Certain options may require a larger enclosure or increase the weight.

Note (2) Certain voltage combinations may permit a smaller enclosure or may require a larger enclosure. Contact factory for details on any non-standard voltage or enclosure configuration.

Model Number Construction

Model #: EVR-SSS-AAAB-CCC-OOO		Example: 500kVA, 50Hz, 3Ø, 400v input, 400v output with power monitor & adjustable large output voltage: EVR-0500-400D-230-5CO
SSSS	kVA size – Include leading zeros [e.g. 75kVA=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 output = 277v L-N]	
OOOO	Options-Refer to common options list for option code (letter)	

Standard Documentation & Factory Testing

Installation details (weights, enclosure dimensions, cable entry/exit, conductor connections, wiring connections) are typically issued within 10 working days of order in PDF format. One (1) copy of the Owner's Manual with unit information, electrical diagram(s), mechanical drawings, and factory test data are shipped with each unit. Every unit is factory tested to UST's standards to confirm proper operation of the unit and any options within specification. Contact factory for other requirements.



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