

# PWM-IGBT based STATIC STABILIZER

**SUVIK**



The static stabilizer offers a reasonable improvement on slow servo controlled stabilizer as well as other static tap changing stabilizers. This technology does not cause di/dt problems as it does not switch the power path. The basic topology is with buck-boost transformer with high primary to secondary ratio for voltage correction of  $\pm 25\%$ . The control voltage is imposed on the primary of this buck-boost transformer. The voltage regulation with help of buck and boost topology is achieved electronically without the step changes in voltage that occur when the system regulates. This task is accomplished through a feedback and a control system implemented by using a microcontroller.

The system uses IGBTs as power switches. Direct AC-AC converter circuit improve the overall system response and fast voltage correction. No storage capacitor increase life of the system. 20Khz PWM control operation using high end dsPIC controller to achieve correction time of 1 to 1.5 cycle. Excellent performance in voltage sensitive application.

## Principle

Delta Voltage is added and subtracted at the primary of buck-boost transformer by IGBT based AC - AC converter to regulate output voltage

## What is Static Voltage Regulator?

- Major conventional voltage regulators are working on motor moving part or mechanical tap changing relay principle
- Static Voltage Regulator is working on IGBT based PWM Control technique
- At the primary of buck-boost transformer delta Voltage is added and subtracted by IGBT based AC - AC converter to regulate output voltage
- Rating of the AC-AC convert is  $\frac{1}{4}$  (as per input voltage range) of the rated power

## What is Requirement of voltage regulator?

We don't have any control over Input voltage source or transient/fluctuation generated by other load connected on the same grid. Electronics equipment are not designed for the wide input voltage range and in case of beyond specified input under and over voltage causes

- Permanent Damage to the load
- De-rate the life of load
- Unwanted interrupt in load operation
- Production loss due to high down time
- Energy loss

## Key Features

- High dynamic response
- Automatic bypass
- Quite operation
- Light weight design
- No need to oversize-handles crest factor 5:1
- Unit starts up on sine wave zero crossing
- Wide input voltage range
- Fast regulation
- Under voltage cut off with automatic restart
- No moving parts





## Specification for Single Phase



Parameters	Power Rating		3KVA	5KVA	7.5KVA	10KVA	15KVA
Input Voltage	Nominal voltage Rating	V	230 V AC, 1 Phase, 2 Wire, + Earth				
	Voltage Range	V	170V – 290V (Other range available on request)				
	Frequency	Hz	Nominal 50/60 Hz, Range 45-60 Hz				
	Input MCB/MCCB	A	~20A	~30A	~40A	~50	~75A
	Terminal block		Yes				
Output voltage	Voltage	V	230V AC, +/- 1%				
	Correction time		1 – 1.5 cycles				
	Voltage Regulation	%	+/- 1				
	Dynamic Regulation	%	+/- 5				
	Output voltage Regulation in Relaxed Input Voltage range	%	210V – 250V +/- 1%				
	Output Wave form distortion		Nil				
	Effect of Power factor		Nil				
	Output Overload	%	100> & <110 – 60 Mins, 110> & <125 – 10 Mins				
	%	125> & <150 – 1 Mins, 150> & <300 – 10 Secs					
	%	300> - Immediate Trip					
	Terminal block		Yes				
Protection	Output Contactor	A	~15A	~20A	~30A	~45A	~65A
	Automatic bypass		Yes				
	Manual bypass*		Optional				
	Input Under voltage	V	165 +/- 1%				
	Input Over voltage	V	295 +/- 1%				
	Output Under Voltage	V	230 + 5%				
	Output Over Voltage	V	230 - 5%				
	Frequency Out of Range	Hz	45< & >65				
Display / Indication	LED / LCD*		LCD (Optional)				
	Output Healthy	LED	Green LED				
	Input and Output Under voltage	LED	Green LED - Blink				
	Input Over voltage	LED	Green LED - Blink				
	Overload / Short circuit	LED	Red LED - Blink				
	Trip Indication		Red LED				
	I/O port *		2 Output One input IO (Optional)				
	Communication		RS232/485 (Optional)				
Overall	IT/UIT*		Optional				
	Efficiency	%	Better Than 96%				
	Cooling method		Forced cooling				
	Ingress Protection		IP20, for other contact to sales				
	Temperature	%	0-40 Deg C, (Other ranges available on request)				
	Humidity	%	0-95 (RH – Non Condensing)				
	Noise	dB	<60				
	Dimension	mm (HxWxD)	325 x 455 x 325				
Weight	Kg	32	38	40	42	50	

\* Indicates Optional feature or components



## Specification for Three Phase

Parameters	Power Rating (3 Phase 100% Unbalance)										
		10KVA	15KVA	20KVA	25KVA	30KVA	40KVA	45KVA			
Input Voltage	Nominal voltage Rating	V	230V/400 3 Phase, 4 wire + Earth, 100 Unbalance								
	Voltage Range	V	190 - 270 Ph-N, 340-480 Line to Line, For other Other range available on request								
	Frequency	Hz	Nominal -50Hz, Range 45-65 Hz								
	Input MCB/MCCB	A	~20	~25	~40A	~50A	~63A	~70A	~80A		
	Terminal block		Yes								
Output voltage	Voltage	V	230V +/- 1%								
	Correction time		1-1.5 Cycle								
	Voltage Regulation	%	+/- 1								
	Dynamic Regulation	%	+/- 5								
	Output voltage Regulation in Relaxed Input Voltage range*		210 – 250V +/- 1% (Optional)								
	Output Wave form distortion		Nil								
	Effect of Power factor		Nil								
	Output Overload		%	100/ Continuous							
			%	100> & <110 /60 Min							
			%	> 110 & 125 /10 Min							
			%	> 125 & 150 /1 Min							
		%	> 150 & <300 /250 ms								
	%	>300 Immediate trip									
Terminal block		Yes									
Protection	Output Contactor	A	~18A	~22A	~32A	~38A	~50A	~65A	~80A		
	Automatic bypass		Yes								
	Manual bypass*		Optional								
	Input Under voltage	V	185 +/- 1%								
	Input Over voltage	V	280 +/- 1%								
	Output Under Voltage	V	230 + 5%								
	Output Over Voltage	V	230 - 5%								
Frequency Out of Range	Hz	<45 or >65									
Display / Indication	LED / LCD*		LCD (Optional)								
	Output Healthy	LED	Green LED								
	Input and Output Under voltage	LED	Green LED - Blink								
	Input Over voltage	LED	Green LED - Blink								
	Overload / Short circuit	LED	Red LED - Blink								
	Trip Indication		Red LED								
	I/O port *		2 Output One input IO (Optional)								
	Communication		RS232/485 Optional								
Overall	IT/UIT*		Optional								
	Efficiency	%	Better Than 96%								
	Cooling method		Forced cooling								
	Ingress Protection		IP20 (Other available on request)								
	Temperature	%	0-40 Deg C, for other contact to sales								
	Humidity	%	0-95 (RH - Non Condensing)								
	Noise	dB	<60								
	Caster wheel*		Optional								
	Dimension	mm (HxWxD)	585 x 385 x 775								
Weight	Kg	85	95	100	120	130	160	175			

\* Indicates Optional feature or components



## Models

### Rating

- Single phase → 3 KVA to 15 KVA
- Three phase → 10 KVA to 45 KVA
- \* Above 45 KVA models are available on request

### Input Voltage Range

- Standard Single Phase → 170-290 volts ac, 1-phase, 2 wire, 50Hz
- Standard Three Phase → 340-480 volts ac, 3-phase, 4 wire, 50Hz

## USP

- Regulation speed 500V / sec
- Handles crest factor of 5:1
- Less than 1ms response time
- A soft start feature
- No moving parts

## Comparison between Suvik Static Stabilizer and Other Static Stabilizers

Sr. No	Parameters	Suvik Static Stabilizer	Other Static Stabilizers
1	Regulation	+/-1%	+/-3%
2	Standard input range	170-290VAC	175-280VAC
3	Over Load Protection	Yes* (Only MCB at input)	No
4	Output and input over voltage under voltage protection	Yes	No
5	Contactor at output	Yes	No
6	LED & LCD for Metering and parameter and fault display	Yes	No
7	Single phase prevention in case of phase loss (Three Phase system)	Yes	No
*	Over load protection at different load level, >150% 1minute, 300% immediate		

## Accessories / Options

- Manual by-pass facility
- Built in isolation Transformer
- Out-door versions
- Reverse polarity protection
- Noise and interference dv/dt filter
- EMI/RFI noise filter
- LCD for parameter and fault display
- RS232 / RS485 communication
- Potential free contact

## Typical Applications

- Ideal for UPS bypass supply
- IT equipments
- CNC Machines
- Plastic Moulding Machines
- Spark Erosion and Wire-cut machines
- For BTS/Mobile Towers
- Communication equipments like Radio & TV transmitters, Space application
- Operation theatres, large X-ray machines, CT Scanners & other medical equipments
- Air-conditioning plants
- Automation machines and all input voltage sensitive machines

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