



Fail-safe

PWM automatic voltage regulator

with precision

VRp model

3000-02xx

3 kVA
3 kW
230 volts

5000-02xx

5 kVA
5 kW
230 volts

Precision PWM voltage regulator with automatic bypass

Precision fast-PWM ac mains voltage correction

TSi Power's VRp automatic precision regulator line conditioner provides output voltage within plus/minus 3% of nominal, for input voltage that varies between 172–276 vac.

There is no switching of taps or otherwise a break in the power path thanks to continuous PWM switching of a buck-boost transformer.

Typical applications

For OEMs and exporters to countries with unstable ac mains. Typical equipment applications include, but are not limited to, medical imaging, analytical/laboratory instruments, telecommunications, wireless sites, broadcast transmitters, semiconductor production, industrial automation and digital printing/graphics.

Key benefits

The low-weight, high efficiency VRp is easy to install in any environment. The automatic bypass assures that connected equipment will not shut down, even if VRp fails. VRp is compatible with all loads as it does not switch any components in the power path. VRp's ultra-low impedance assures stability even with the most demanding loads.

How the VRp Series works

The high frequency IGBT driven converter takes the incoming ac power, measures against the input voltage and adds or subtracts voltage, 20,000 times per second, to achieve the nominal output voltage +/-3%.

The automatic bypass is activated when a fault condition has occurred. Green LED On indicates normal operation; yellow LED indicates start-up or overcurrent bypass; green LED Off indicates a fault condition.



Key features of the VRp Series

- Outstanding voltage regulation: under normal input range of 172–276V (47–63Hz), output regulation will be 230V+/-3%.
- Fail-safe: No switching of power path
- Fast regulation
- Automatic bypass
- Low impedance
- Low weight
- Quiet operation
- 2 year limited depot warranty, parts and labor

*Power with a
precision attitude™*



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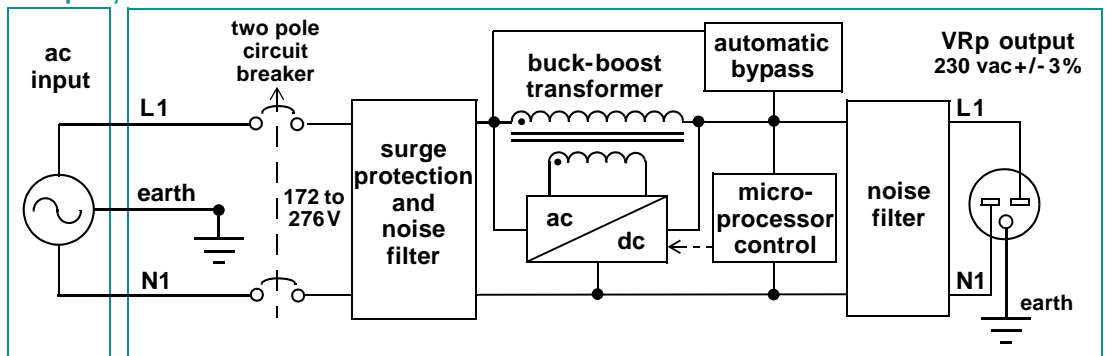
Precision
PWM
voltage
regulator

Specification	VRp-3000-0228/ -0236/0238	VRp-5000-0228/0238/ -0239/0240/0241
Electrical		
Capacity in VA (watts)	3 kVA (3000W)	5 kVA (5000W)
Regulator engine	High frequency 20 kHz IGBT driven voltage regulation converter	
Input		
Nominal voltage	230 volts ac, single phase	
Operating voltage	172–276 volts ac	
Nominal frequency	47–63Hz	
Over-current protection	Circuit breaker	
Circuit breaker rating	2 x 20A	2 x 30A
Input wire size for HW	Model -0228: 6mm ² (AWG 10)	Model -0228: 10mm ² (AWG 8)
Cordset and plug	Model -0236: L6-20P Model -0238: 6-20P	-0238: L6-30P -0239: 14-30P -0240: L14-30P -0241: L6-30P
Output		
Nominal voltage	230 volts ac, single phase	
Power efficiency	96% (typical)	
Voltage regulation	Combined 3% maximum under 0 to 100% load and input of 172 to 276 V	
Automatic bypass	Automatic bypass will be activated when there is a fault condition.	
Status indicators	Green LED indicates normal operation; yellow LED indicates temporary bypass during starting and over-current conditions.	
Ac output connections	Models with -0228: hardwired output terminals (L1, N1, and earth).	
Receptacle(s)	Model -0236: L6-20R Model -0238: 6-20R	-0238: L6-30R -0239: 14-30R -0240: L14-30R -0241: two L6-30R
Physical/environmental		
Dimensions	279 mm (11") wide x 159 mm (6.25") high x 378 mm (14.9") deep	
Weight	18.2kg (40 lbs)	22.7kg (50 lbs)
Wall/floor mounting kit	MK-5019C (optional)	
Ambient temperature	0° to +25°C (32° to +77°F). 10 to 90% RH non-condensing.	
Safety		
ETL Intertek mark	ETL Intertek listed (UL 60950-1, 1st Edition).	
RoHS compliance	RoHS compliant per Directive 2002/95/EC. Unit does not contain lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls (PBB) or polybrominated diphenyl ethers (PBDE).	

TSi's ongoing product improvement process makes specifications subject to change. Other companies product names herein are for identification purposes only, and may be trademarks of their respective companies.



VRp system architecture



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VRP

Model

9000-0339

13.0 A
9000 VA
9000 W
230/400 V

15000-0339

21.7 A
15000 VA
15000 W
230/400 V

22500-0339

32.6 A
22500 VA
22500 W
230/400 V

30000-0339

43.5 A
30000 VA
30000 W
230/400 V

45000-0339

65.2 A
45000 VA
45000 W
230/400 V

Fail-safe

Automatic voltage regulator

PWM precision

Precision PWM Automatic Voltage Regulator

The VRP three-phase automatic precision AC voltage regulator allows trouble-free operation of electronic equipment over a very wide mains voltage range of 160-300 V found in many countries. TSi Power's VRP series is designed to provide precisely regulated power with a typical response time of 20 ms.

Typical VRP applications

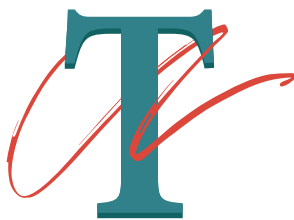
The VRP is designed for applications where absolutely safe and precisely regulated AC power is required, such as base transceiver stations (BTS), backhaul transmission sites (including microwave links), radio/tv broadcast transmitters, industrial process controllers (PLCs), inspection equipment, CNC machines and laboratory or analytical measurement equipment.

How the VRP works

The high frequency insulated gate bi-polar transistor (IGBT) driven converter takes the incoming AC power, measures it against the nominal voltage reference and adds or subtracts voltage to achieve a precisely regulated 230 V output. The automatic bypass will be activated when there is a fault condition. Green LEDs are used to indicate Normal (regulating mode) operation.



Top view showing the Internal components

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Features and Benefits

- Since the VRP does not switch components in the power path, it is compatible with most loads.
- Automatic bypass circuitry assures failsafe operation.
- Output voltage to within $\pm 3\%$ is provided for superior regulation.
- Includes a two-year limited warranty.
- AC input/output DIN type wiring terminals facilitate wiring connections.
- Internal surge voltage protection assures trouble-free operation.
- AC input circuit breakers and load over current protection prevent costly equipment damage.
- Circuit board assemblies are connectorized for easy replacement.
- Display circuit board monitors each phase independently and displays operational status by means of colored LEDs.

SPECIFICATION	VRP-9000	VRP-15000	VRP-22500	VRP-30000	VRP-45000
ELECTRICAL					
Capacity VA & Watts	9000	15000	22500	30000	45000
Switching Technology	High frequency 20 kHz IGBT AC chopper/inverter				
INPUT					
Voltage	Normal - 230 V, Input range - 160 to 330 V, regulation range - 184 to 276 V, three-phase wye				
Frequency	60 Hz \pm 5 %				
Current Amps per phase	13.6 A @ 230 V	22.6 A @ 230 V	32.6 A @ 230 V	45.3 A @ 230 V	67.9 A @ 230 V
Current Amps @ full load	17 A @ 184 V	28.3 A @ 184 V	40.8 A @ 184 V	56.6 A @ 184 V	84.9 A @ 184 V
Circuit breaker rating	3 x 20 A	3 x 30 A	3 x 40 A	3 x 50 A	3 x 80 A
Input wire size	4 mm ² - AWG 12	6 mm ² - AWG 10	8 mm ² - AWG 8	13 mm ² - AWG 6	33 mm ² - AWG 2
OUTPUT					
Voltage	230/400 V \pm 3 % (184 - 264 V / L-N input)				
Output power	9000 VA/W	15000 VA/W	22500 VA/W	30000 VA/W	45000 VA/W
Current Amps per phase	13.0 A	21.7 A	32.6 A	43.5 A	65.2 A
Overload protection	Circuit Breaker	Circuit Breaker	Circuit Breaker	Electronic	Electronic
Automatic bypass	Transfers to unregulated AC in case of failure				
Harmonic distortion	Sinusoidal, <5 % THD				
Power efficiency @ 230 V nominal	98 %				
Power efficiency in max boost mode	96 %				
System status indicators	Green LED ON-Normal operation - Amber LED ON-Bypass operation - Red LED ON-Fault				
Surge voltage let-through, 1.2 μ s x 50 μ s, 6 kV, 8 x 20 μ s, 3 kA waveform	Line - Neutral < 300 V				
PHYSICAL					
Dimensions	22.5" (57 cm) High x 24" (61 cm) Wide x 24" (61 cm) Deep				
Weight lbs (kg)	170 (77)	200 (91)	240 (109)	300 (136)	335 (152)
SAFETY					
Standards	Designed to comply with IEC 60950-1 standards. Protection class IP 20				
ENVIRONMENTAL					
Ambient temperature	0° C to 40° C; Cooling method: Forced Air; Humidity: 0 - 95 % Non-condensing				
WARRANTY					
Warranty	Two-year limited warranty, parts and labor				



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VRP system (per phase)

