



RT4F - 220V/12A RECTIFIER/CHARGER

The RT4F-220V/12A is a switched mode rectifier/charger module designed to provide up to 12A of output current into a 220V nominal system. This charger has been designed to be used in conjunction with a battery to provide an uninterruptable DC power system. The low noise and high reliability make it ideally suited to industrial applications including switch tripping and emergency lighting. Up to five chargers can fit in a single magazine and up to fifteen chargers can be configured as a system using one control and supervisory unit (MiniCSU).

Illustrated are five chargers in a magazine.



Principal operating characteristics of the RT4F-220V/12A SMC at 25°C ambient temperature:

Input

Voltage:

Single phase: Active, Neutral and Earth
220 +25/-32% VAC (150VAC - 275VAC);

Current:

21A RMS max at 150VAC; 14A RMS at 220VAC; Sinusoidal waveform;

Frequency:

45 - 66Hz;

Power Factor:

Better than 0.99 at more than 40% load;

Harmonic Distortion: Current THD < 5%
at full load when operated with mains
supply voltage THD < 1%;

Efficiency:

Better than 90% at > 50% load at 220VAC;

Inrush Current:

< 8A peak at maximum mains voltage;

Soft Start:

Output current ramp-up time 8 seconds to full load;

Protection:

HRC fuses at input of SMC; power circuit is turned off if the AC voltage exceeds approximately 280VAC or falls to less than approximately 145VAC; unit re-activates when AC voltage is approximately within 170 – 270VAC; input circuit relay prevents high surges when connection is made to a live AC bus;

Voltage Withstand Test:

1500VAC input to chassis for 1 minute; (2200VDC 100% testing on production units);

Conversion Frequency:

140kHz for input stage;
180kHz for output stage;





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Output

Voltage:

Float: 220 - 280V**
Equalise: 250 - 310V**

** parameters set by MiniCSU

Current Limit: 2 - 12A**

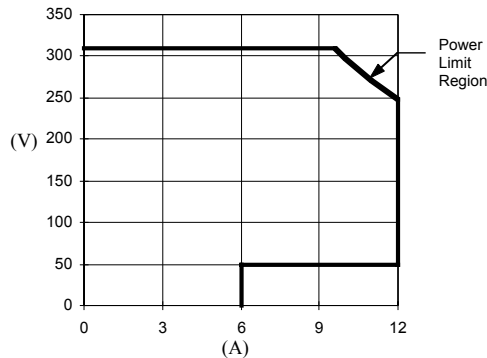
Efficiency:

Better than 90% at more than 50% load at nominal input voltage;

Power Limit:

Current limit is automatically reduced in inverse proportion to output voltage above 247V to limit output power to 2970 watts;

Max. current limit : 12A at 247V
11A at 270V
10A at 297V
9.6A at 310V



Static Regulation:

Line: better than $\pm 0.02\%$;

Load: terminal voltage drops by $1.20V \pm 0.30V$ from zero to full load (for passive current sharing) for stand alone units, or regulates to better than $\pm 0.05\%$ for MiniCSU controlled units;

Dynamic Regulation:

$\pm 5\%$ for 10%-90%-10% step load change;

$\pm 1\%$ of final value within 1ms of step change;

$\pm 1\%$ for $\pm 25\%$ step change in AC input voltage;

Noise:

< 20mV RMS Psophometrically weighted;

< 100mV RMS (100Hz - 10kHz);

< 100mV RMS (10kHz - 100MHz);

< 1V peak to peak (10kHz - 100MHz);

Load Sharing:

Better than $\pm 5\%$ of full scale with active current sharing from MiniCSU;

Protection:

Fuse at output of SMC;

Overvoltage - only faulty unit shuts down;

Overcurrent - can sustain short circuit at output terminals indefinitely. Output current drops to 6A when output voltage drops below 50V;

Over-temperature - gradual reduction of power limit if heatsink temperature exceeds pre-set limit; current limited to 3A when cooling air flow inadequate;

Relay in output circuit prevents surges when connection is made to a live DC bus;

Voltage Withstand Test:

1000VAC output to chassis for 1 minute;

(1500V 100% testing on production units);





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Alarms and Monitoring

Alarm and Status LED indications on SMC:

On/Green - SMC functioning normally;

Alarm/Amber - Flashes (*) when any SMC alarm is present. Continually on when in Equalise or Boost Charge mode;

Shutdown/Red - SMC has turned off due to a signal from the MiniCSU or an internal fault;

SMC alarm monitoring (Displayed on WinCSU and MiniCSU):

These alarms are monitored by the SMC and are displayed on both MiniCSU and WinCSU. The mnemonics listed here appear on WinCSU, but full alarm description appears on MiniCSU. “*” indicates flashing of alarm led.

MiniCSU status monitoring:

- Output current of charger module;
- Temperature of heatsink of charger module;
- Software version of charger module;

Current:

Monitored on MiniCSU display with 0.1A resolution; Analog measurement accuracy $\pm 1\%$ at full load; Optional bar-graph display on charger;

Voltage:

System voltage normally displayed on MiniCSU alpha-numeric LCD display; Accuracy $\pm 0.5\%$

Vh *	Output voltage too high.
VI *	Output voltage too low.
Il *	Unit is in current limit.
Po *	Unit is in power limit.
Th *	Heatsink temperature high and thermal limit is active.
Nd *	No demand.
Lo *	Low output current, less than 0.9A.
Ma *	Operating parameters out of range (or eeprom fault).
Sd	Unit is shut down by remote command - user shutdown
Mr	Internal voltage reference faulty.
Mc	SMC communication fault. Generated within MiniCSU.
Vs	High voltage shut down (output), latched alarm. User setting or fault
Unit Off	Unit is shut down due to AC out of range or SMC primary circuit fault. (normal operation or fault)
Ts	Temperature sensor fault.
Dc	DC-DC feedback fault, latched alarm.
Ff	Fan failure, or inadequate internal cooling air flow





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SMC parameters remotely programmable with MiniCSU

In the SMC menu on the MiniCSU:

- Current Limit
- High Voltage Shut-Down (HVSD)
- High Voltage Alarm
- Low Voltage Alarm
- Output Voltage Fine Adjustment (Automatic)
- HVSD Reset

In the Battery menu on MiniCSU:

- Float Voltage
- Equalise Voltage

Test Function:

When the test function is activated on the MiniCSU the charger LEDs are flashed.

SMC address:

The SMC address is automatically set by a resistor on the magazine.

Remote Controls

Equalise Mode:

Equalise mode can be initiated by a signal from the MiniCSU;

optimally adjust battery voltage for temperature and voltage drop in DC bus, limit the maximum battery recharging current and to achieve active current sharing; see MiniCSU Specification;

External Voltage Control (EVC):

Optically coupled PWM signal used to control charger Float and Equalise voltage over a limited voltage range in order to

Charger Inhibit:

Charger can be inhibited by a signal from a remote computer, transmitted via the MiniCSU



**RT4F - 220V/12A RECTIFIER/CHARGER****COMPLIANCES (* denotes equivalent standard)**

EMC:	Category	Tested to Comply with:	
Emissions:	Harmonics	IEC 61000-3-2; EN61000-3-2*; AS/NZS 61000-3-2*: Class A.	
	Flicker	IEC 61000-3-3; EN61000-3-3*; AS/NZS 61000-3-3*.	
	Conducted	AC	IEC 61000-6-4; AS/NZS 2064*: CISPR 11 Group 1, Class A.
		DC, signal	Standard under consideration.
	Radiated	IEC 61000-6-4; AS/NZS 2064*: CISPR 11 Group 1, Class A.	
Immunity:	Power Frequency Magnetic fields	IEC 61000-4-8; EN61000-4-8*: (30A/m at 50 and 60Hz) Criterion A	
	Electrostatic Discharge (ESD)	IEC 61000-4-2; EN61000-4-2*: (Level 4: Air 15kV, Contact 8kV) Criterion A	
	Radiated RF	IEC 61000-4-3; EN61000-4-3* : (Level 4: 10V/m, 1kHz 80% AM): Criterion A ENV50204 - Mobile Phone Radiation (Level 4: 10V/m, 100% AM, 50% duty): Criterion A	
	Electrical Fast Transient (EFT)	IEC 61000-4-4; EN61000-4-4*: (Level 4: 4kV on AC lines): Criterion A (Level 3: 2kV on load and comms lines): Criterion A	
	Surge Protection	ANSI C62.41-1991 category B3 - AC lines; (Combination wave 6kV/3kA; Ring wave 6kV/500A); IEC 61000-4-5; EN61000-4-5* (Impulse) (Level X: 6kV/3kA on AC lines) CM: Criterion A, DM Criterion C IEC 61000-4-12; EN61000-4-12* (Ring Wave) (Level X: 6kV/500A, 100kHz on AC lines): Criterion A	
	Conducted RF	IEC 61000-4-6; EN 61000-4-6*: (Level 3: 10V on AC, load & comms lines): Criterion A	
	Voltage Dips, Interruptions	IEC 61000-4-11; EN61000-4-11*: (Level: 30% dropout for 10ms): Criterion A (Level: 60% dropout for 100ms): Criterion C (Level: 60% dropout for 1s): Criterion C (Level: 100% of nominal dip for 5s): Criterion C	





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Environmental

Cooling:

Forced convection cooling using 80mm fan with variable speed temperature control, finger guard and filter. Fan stops if AC power fails or charger inhibited remotely. The fan is mounted externally to the charger in the magazine.

Temperature:

Operating range 0 - 50°C ;

The charger senses its internal heat-sink temperature and adjusts power limit in order to protect itself against over-heating.

Humidity:

0 - 90% non-condensing

Altitude:

Reduce maximum ambient temperature by 5°C per 1000m above sea level.

Vibration, packaged:

Sine:	2 - 9Hz	3.5mm pk
	9 - 200Hz:	1g
	200 - 500Hz:	1.5g
Random:	10 - 200Hz:	0.01g_/Hz
	200 -2 kHz:	0.003g_/Hz

Vibration, operational:

Sine:	2 - 9Hz	1.5mm pk
	9 - 200Hz:	0.5g
	200 - 500Hz:	1.5g

Shock, packaged:

40g, 6ms, half-sine.

Shock, operational:

10g, 11ms, half-sine.

Drop, packaged:

65cm.

Mechanical

Size:

Width - 87mm
Height - 266 mm (6U)
Depth - 320 mm

Mass:

< 6kg

Acoustic Noise:

< 55dB (A Weighted)

Magazine size:

The RTMag4F-220V-5way magazine allows 5 chargers to fit side by side in a standard 19 inch rack and one row of chargers in every 10U of rack height. The magazine fits a rack 400 mm or greater in depth.

Connections

Input, Output, Fan, and Communications:

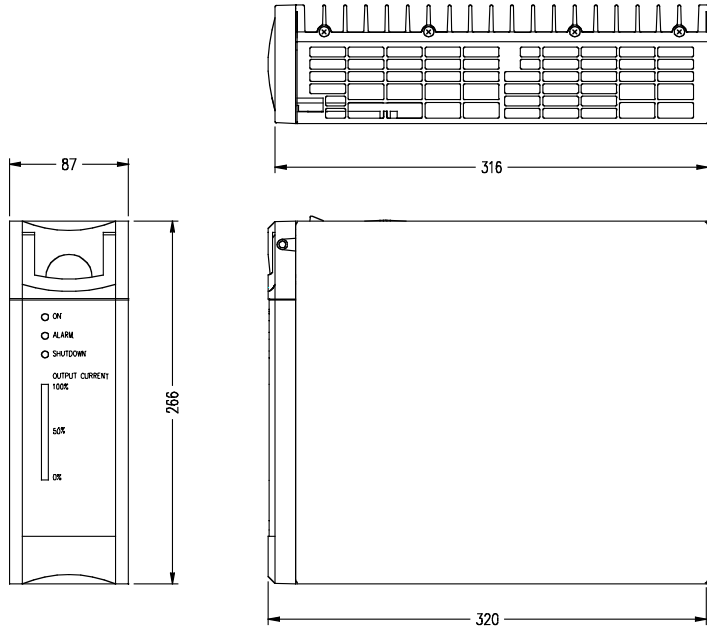
A multi-purpose connector is mounted on the back of the charger module; a matching connector is located at the back of the magazine; mating of connectors occurs when unit is plugged into the magazine; the charger is mechanically latched to ensure reliable mating. An insertion key prevents the charger from being plugged into low voltage rectifier positions.





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RT4F Rectifier/Charger dimensions



RT4F Magazine dimensions:

