

# Features

# Regulated Converters

- Long 5 Year Warranty
- 2MOPP/250VAC
- Suitable for built in Class II Applications
- Wide Input Voltage Range (85-264VAC)
- Low Leakage Current (<100µA)
- 5000m Operation
- Active Power Factor Correction
- Connector Set available

## Description

The RACM150-S(/F) is a compact 4.6" x 2.44" high efficiency AC/DC power supply with 2xMOPP safety approval for medical applications. These space saving enclosed power supplies have a universal input voltage range (85-264VAC), 4kVac isolation, require no minimum load and can be used at ambient temperatures of between -25°C and +80°C. The 12V, 15V, 24V or 48V output voltages are fully protected and have tolerances of less than ±0.2% over the entire input voltage range and less than ±0.5% over the entire load range. The RACM150-S(/F) series is certified to medical safety standard IEC/ES/EN-60601-1 3rd Edition and feature BF rated outputs with less than 100µA leakage current. It has a built-in Class B EMI filter and comes with a five year warranty.

## Selection Guide

Part Number	Input Voltage Range (VAC)	Output Voltage (VDC)	Output Current (A) 115/230VAC	Efficiency typ. (%)	Peak Output Power (W) 115/230VAC
RACM150-12S	85-264	12	10.0 / 10.84	91	120 / 130
RACM150-15S	85-264	15	8.33 / 9.0	92	125 / 135
RACM150-24S	85-264	24	5.2 / 5.63	92	125 / 135
RACM150-48S	85-264	48	2.5 / 2.71	91	120 / 130
RACM150-12S/F <sup>(1)</sup>	85-264	12	12.5	91	150
RACM150-15S/F <sup>(1)</sup>	85-264	15	10.0	92	150
RACM150-24S/F <sup>(1)</sup>	85-264	24	6.25	92	150
RACM150-48S/F <sup>(1)</sup>	85-264	48	3.13	91	150

### Notes:

Note1: Please note that removing the fan from the /F version will not give the same performance as the equivalent fanless type. The two versions are not identical.

## Specifications (measured at T<sub>A</sub>= 25°C, 230VAC, full load and after warm-up)

BASIC CHARACTERISTICS				
Parameter	Condition	Min.	Typ.	Max.
Input Voltage		85VAC 120VDC		264VAC 370VDC
Input Current	115VAC, full load 230VAC, full load			1.7A 0.8A
Inrush Current	cold start, 115VAC cold start, 230VAC			30A 60A
No Load Input Power	230VAC, with fan 230VAC, without fan		0.6W 0.25W	1W 0.3W
Input Frequency Range	AC Input	47Hz		63Hz
Start-up Time			0.7s	1s
Rise Time			20ms	
Hold up Time			30ms	
Minimum Load				0%
Power Factor		0.95		
Operating Frequency			60kHz	
Output Ripple and Noise (measured @ 20MHz BW)	12VDC, with 1µF/25V MLCC 15VDC, with 1µF/25V MLCC 24VDC, with 1µF/50V MLCC 48VDC, with 0.1µF/100V MLCC		120mVp-p 150mVp-p 220mVp-p 250mVp-p	

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## RACM150

150 Watt  
Enclosed  
Case Style  
Single Output



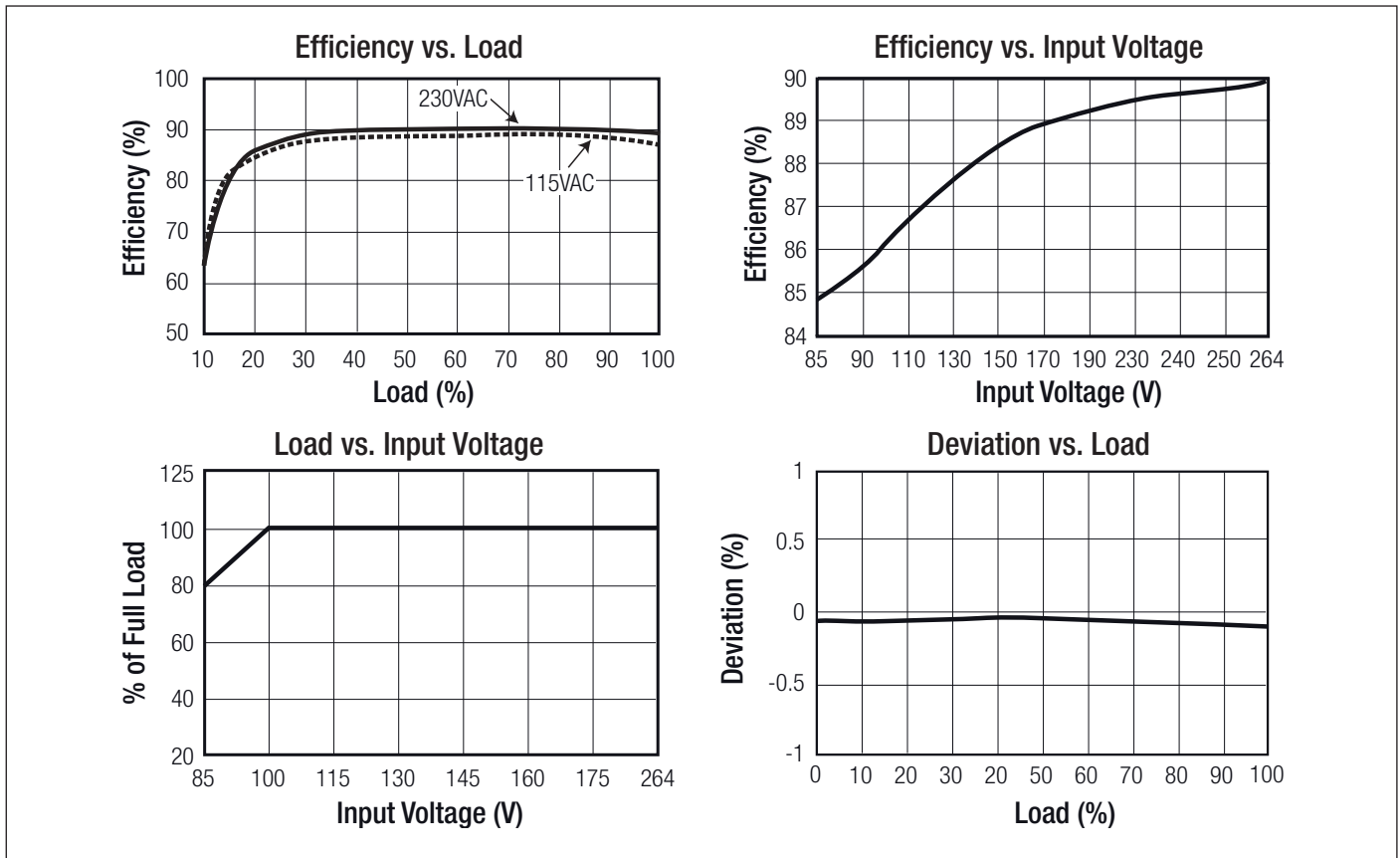
2MOPP  
250VAC



EN-55011 Certified  
EN-55022 Certified  
ES-60601 Certified  
IEC/EN-60601 Certified

Refer to Applications Notes

Specifications (measured at  $T_A = 25^\circ\text{C}$ , 230VAC, full load and after warm-up)



REGULATIONS		
Parameter	Condition	Value
Output Voltage Accuracy	230VAC, full load	$\pm 0.1\%$ typ. / $\pm 1\%$ max.
Line Voltage Regulation	low line to high line, full load	$\pm 0.1\%$ typ. / $\pm 0.2\%$ max.
Load Voltage Regulation	0% to 100% load	$\pm 0.1\%$ typ. / $\pm 0.5\%$ max.
Output Voltage Trim		$\pm 10\%$
Transient Peak Deviation	load step from 50% - 75% change at 2.5A/ $\mu\text{s}$	3% Vout max.
Transient Recovery Time	load step from 50% - 75% change at 2.5A/ $\mu\text{s}$	500 $\mu\text{s}$ typ.

PROTECTIONS		
Parameter	Condition	Value
Input Fuse	internal line and neutral	T3.15A / 250VAC, slow blow type
Short Circuit Protection (SCP)		continuous, auto-recovery
Over Load Protection (OLP)	% of Iout rated	Hiccup Mode, 115% min. / 150% max.
Over Voltage Protection (OVP)	% of Vout nominal	Latch Mode, 115% min. / 135% max.
Isolation Voltage	I/P to O/P	4kVAC / 1 minute
	I/P to Chassis	2kVAC / 1 minute
	O/P to Chassis	2kVAC / 1 minute
	working voltage	250VAC / continuous

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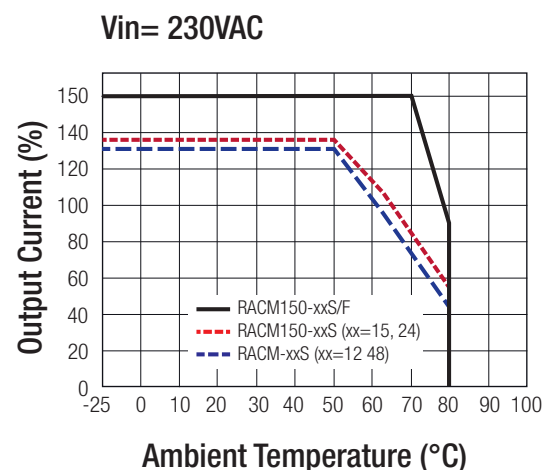
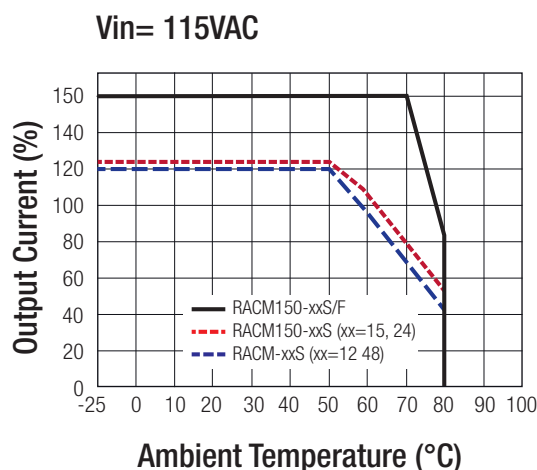
**Specifications** (measured at  $T_A= 25^{\circ}\text{C}$ , 230VAC, full load and after warm-up)

Means of Protection		2MOPP
Leakage Current	264VAC	100 $\mu$ A max.
Medical Device Classification		Type BF applied device
Internal Clearance	I/P to O/P	8mm min.
Creepage	I/P to O/P	8mm min.
Isolation Resistance	500VDC	100M $\Omega$ min.
Insulation Grade		Reinforced Insulation

**ENVIRONMENTAL**

Parameter	Condition	Value
Relative Humidity	non-condensing	5% to 95% RH
Temperature Coefficient		$\pm 0.02\%$ / $^{\circ}\text{C}$
Operating Temperature Range (refer to derating graph)	without fan and with derating with fan and with derating	-25 $^{\circ}\text{C}$ to +80 $^{\circ}\text{C}$ -25 $^{\circ}\text{C}$ to +80 $^{\circ}\text{C}$
Operating Altitude		5000m max.
MTBF (+25 $^{\circ}\text{C}$ )	according to MIL-HDBK-217F, full load	786.1 x 10 <sup>3</sup> hours

**Derating Graph**



**SAFETY AND CERTIFICATIONS**

Certificate Type (Safety)	Report / File Number	Standard
IEC/EN Medical Safety	1408016004	IEC/EN-60601-1
ANSI/AAMI Medical Safety		ES60601-1
CAN/CSA Medical Safety		C22.2 No. 60601-1
Risk Management	1408016005	Medical Report + ISO14971 Risk Assessment

EMC Compliance	Conditions	Standard / Criterion
EMI	Conducted	CISPR 11, EN-55011, Class B
	Radiated	CISPR 11, EN-55011, Class A
	Conducted and Radiated	FCC18, Class B
ESD	Air $\pm 8\text{kV}$ ; Contact $\pm 6\text{kV}$	EN61000-4-2, Criteria A
Radiated Immunity	20V/m	EN61000-4-3, Criteria A
Fast Transient	$\pm 2\text{kV}$	EN61000-4-4, Criteria A

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**Specifications (measured at  $T_A = 25^\circ\text{C}$ , 230VAC, full load and after warm-up)**

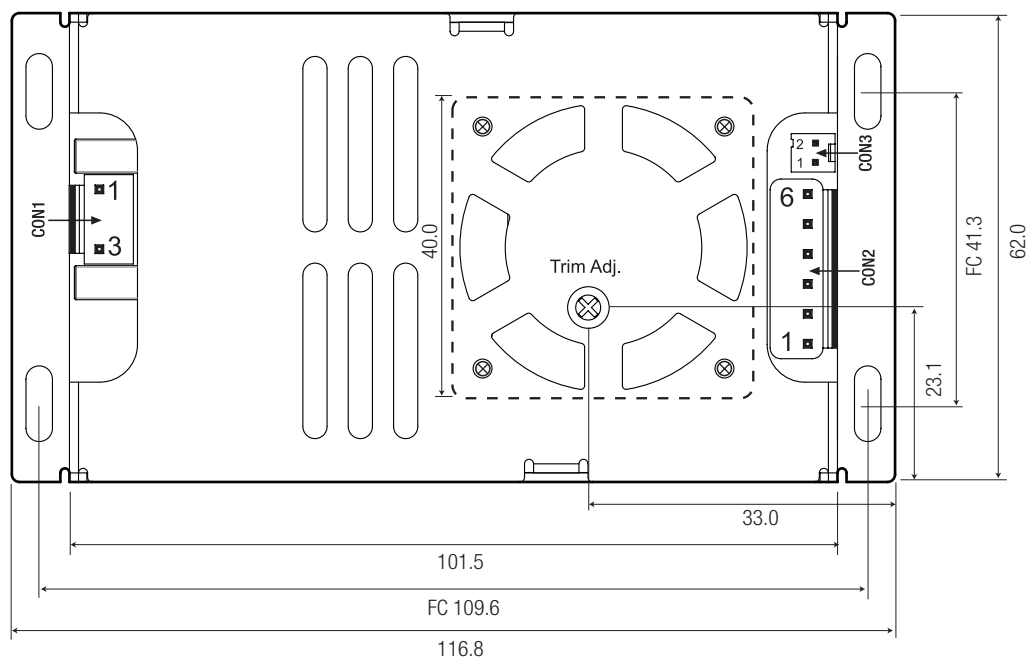
Surge	L-N $\pm 1\text{kV}$ and L-PE/N-PE $\pm 2\text{kV}$		EN61000-4-5, Criteria A
Conducted Immunity	20Vr.m.s		EN61000-4-6, Criteria A
Power Frequency Magnetic Field	10A/m		EN61000-4-8, Criteria A
Voltage Dip and Interruptions	100/230VAC, 50Hz	30% 500ms	EN61000-4-11, EN60601-1-2, Criteria A
		>95% 10ms	EN61000-4-11, EN60601-1-2, Criteria A
		>95% 5000ms	EN61000-4-11, EN60601-1-2, Criteria B
Harmonic Current	full load		EN61000-3-2; Class D
Voltage Flicker			EN61000-3-3, PASS
Thermal Shock			MIL-STD-810F
Shock			IEC60068-2-27
Vibration			IEC60068-2-6

**DIMENSION and PHYSICAL CHARACTERISTICS**

Parameter	Type	Value
Case Material		Aluminum
Package Dimension (LxWxH)	with fan	116.8 x 62.0 x 49.2mm
	without Fan	116.8 x 62.0 x 39.2mm
Package Weight	with Fan	270g
	without Fan	255g

**Dimension Drawing (mm)**

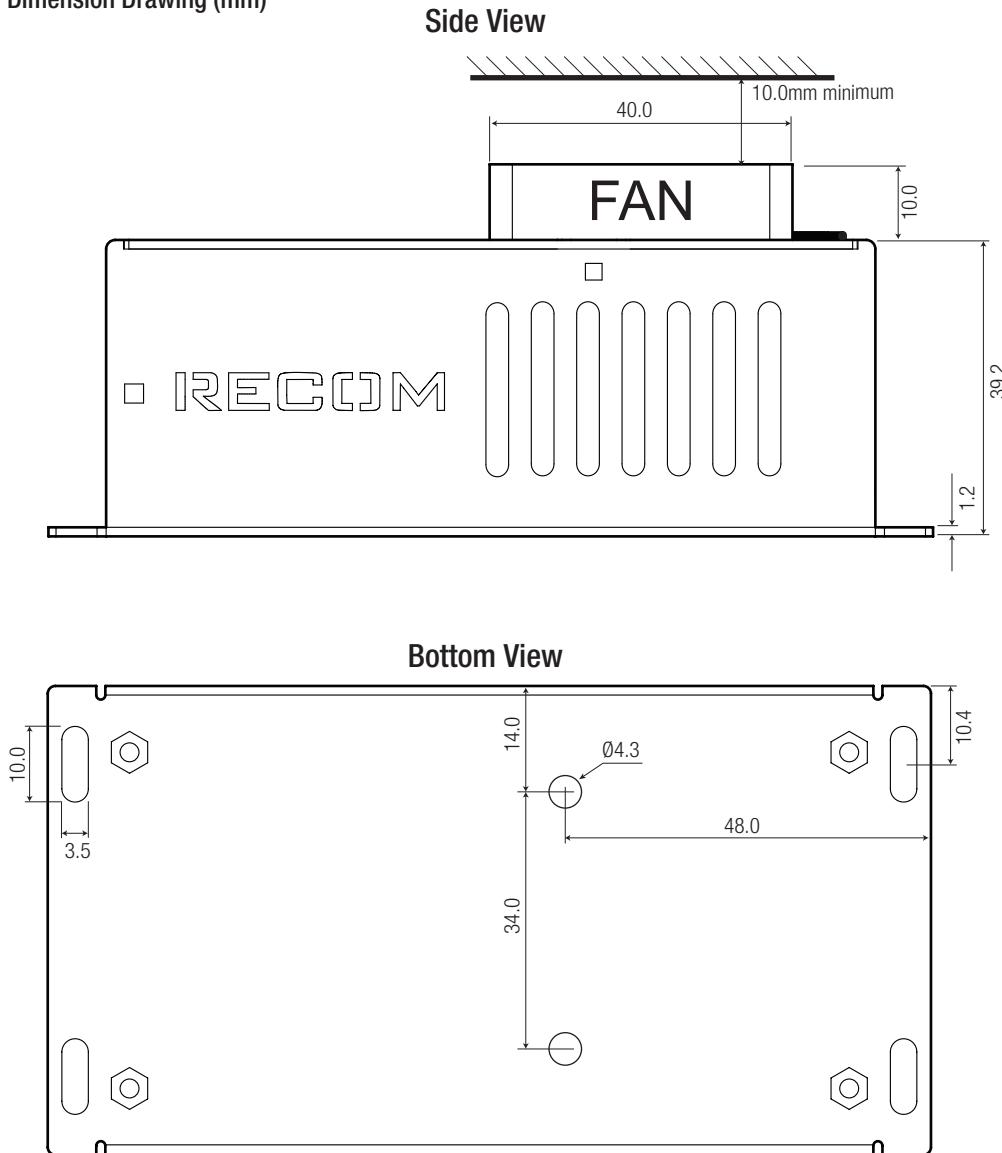
**Top View**



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Specifications (measured at  $T_A = 25^\circ\text{C}$ , 230VAC, full load and after warm-up)

Dimension Drawing (mm)



### AC Input Connector CON1

**Pin1** Line  
**Pin3** Neutral

Mates with  
JST housing: VHR-3N  
JST crimp terminals: SVH-21T-P1.1

### DC Output Connector CON2

**Pin1,2,3** -Vout  
**Pin4,5,6** +Vout

Mates with  
JST housing: VHR-6N  
JST crimp terminals: SVH-21T-P1.1

### FAN Output Connector CON3

**Pin1** -Fan  
**Pin2** +Fan

Mates with  
Molex housing: 22-01-1022  
Molex crimp terminals: 2759

Tolerance:  $\pm 0.5\text{mm}$   
FC: fixing center

### FAN

Rated Voltage:	12V (7-13.8)
Input Power:	0.96W typ. 1.8W max.
Speed:	6000RPM
Air Flow:	7CFM/Min.; 30dBA max.
expected Lifetime (40°C):	>70khours continuous
Cable length:	55mm including connector

### PACKAGING INFORMATION

Parameter	Type	Value
Packaging Dimension (LxWxH)	Cardboard Box	418 x 308 x 105mm
Packaging Quantity		10pcs
Storage Temperature Range	with fan	-40°C to +80°C
	without fan	-40°C to +80°C

The product information and specifications are subject to change without prior notice. RECOM products are not authorized for use in safety-critical applications (such as life support) without RECOM's explicit written consent. A safety-critical application is defined as an application where a failure of a RECOM product may reasonably be expected to endanger or cause loss of life, inflict bodily harm or damage property. The buyer shall indemnify and hold harmless RECOM, its affiliated companies and its representatives against any damage claims in connection with the unauthorized use of RECOM products in such safety-critical applications.