

## Features

- 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

## Regulated Converter

## RACM150

**150 Watt Enclosed Case Style Single Output**



### Description

The RACM150-S(/F) is a compact 4" x 2" 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 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. [%]	max. cont. Power Rating [W] 115/230VAC	Max. Cap. Load <sup>(1)</sup> [µF]
RACM150-12S	85-264	12	10.0 / 10.84	91	120 / 130	10400
RACM150-15S	85-264	15	8.33 / 9.0	92	125 / 135	6600
RACM150-24S	85-264	24	5.2 / 5.63	92	125 / 135	2600
RACM150-48S	85-264	48	2.5 / 2.71	91	120 / 130	650
RACM150-12S/F <sup>(1)</sup>	85-264	12	12.5	91	150	10400
RACM150-15S/F <sup>(1)</sup>	85-264	15	10.0	92	150	6600
RACM150-24S/F <sup>(1)</sup>	85-264	24	6.25	92	150	2600
RACM150-48S/F <sup>(1)</sup>	85-264	48	3.13	91	150	650

#### Notes:

Note1: Max Cap Load is tested at minimum input and full resistive load

### Model Numbering



#### Notes:

Note2: with suffix "/F" = mounted fan (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) without suffix, without fan

#### Examples:

RACM150-12S = 12Vout, without fan  
RACM150-24S/F = 24Vout, with fan

**PREFERRED ALTERNATIVES**  
Please consider this alternatives:

**RACM230-G/ENC Series**

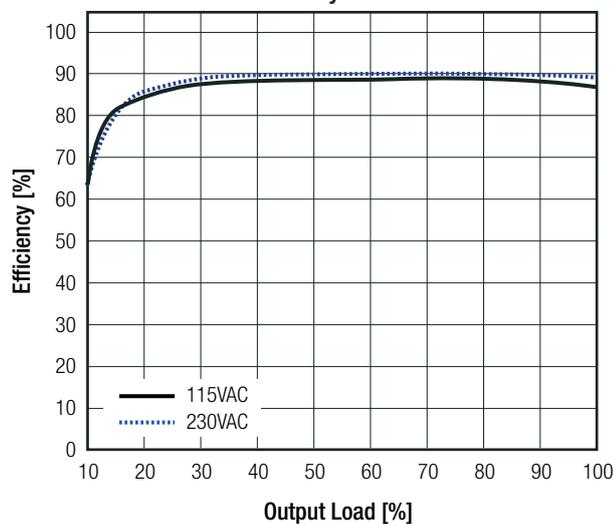
IEC/EN60601 certified  
ANSI/AAMI ES60601 certified  
EN55011 certified  
CISPR11  
FCC Part 15

**Specifications** (measured @ Ta= 25°C, 230VAC, full load and after warm-up)

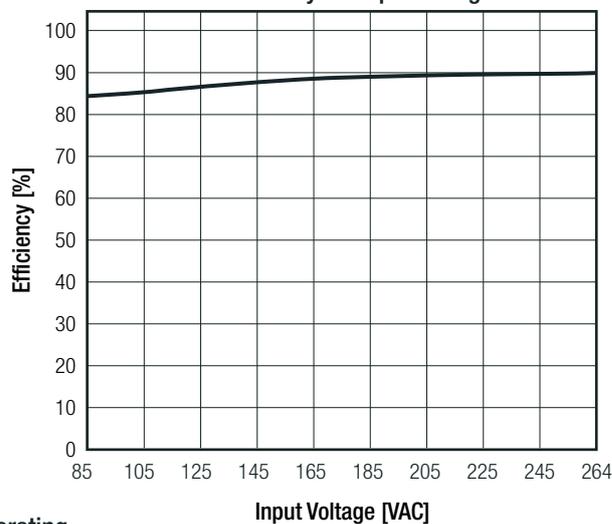
**BASIC CHARACTERISTICS**

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 Power Consumption	230VAC, with fan 230VAC, without fan		0.6W 0.25W	1W 0.3W
Input Frequency Range	AC Input	47Hz		63Hz
Output Voltage Trimming			±10.0%	
Minimum Load		0%		
Power Factor		0.95		
Start-up Time			0.7s	1s
Rise Time			20ms	
Hold up Time			30ms	
Internal 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	

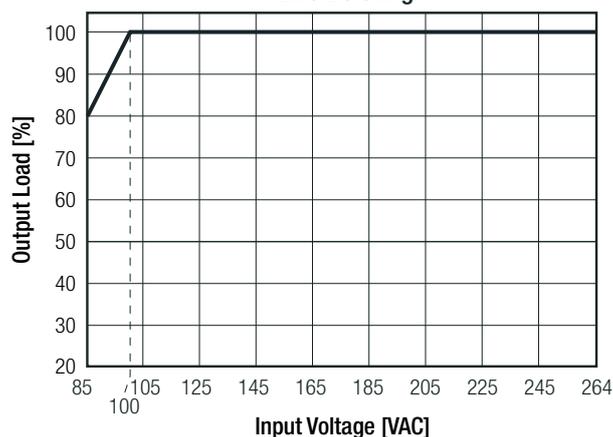
**Efficiency vs. Load**



**Efficiency vs. Input Voltage**



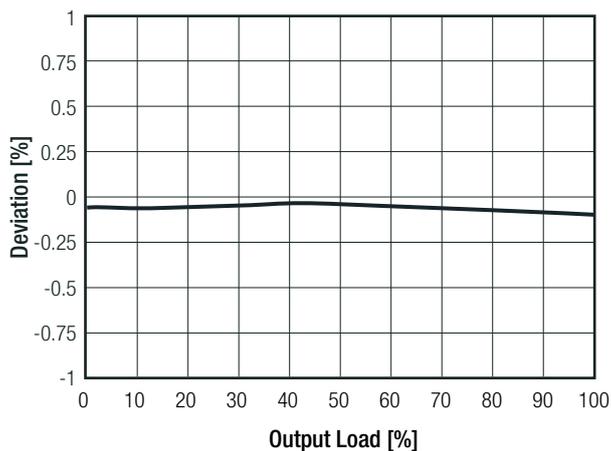
**Line Derating**



**Specifications** (measured @ Ta= 25°C, 230VAC, full load and after warm-up)

REGULATIONS		
Parameter	Condition	Value
Output Accuracy	230VAC, full load	±1.0%
Line Regulation	low line to high line, full load	±0.2%
Load Regulation	0% to 100% load	0.1% typ. / 0.5% max.
Transient Peak Deviation	load step from 50% - 75% change at 2.5A/μs	3.0% Vout max.
Transient Recovery Time	load step from 50% - 75% change at 2.5A/μs	500μs typ.

**Deviation vs. Load**



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)	115% min. / 150% max.	
Over Voltage Protection (OVP)	% of Vout nominal (Latch off)	115% min. / 135% max.	
Isolation Voltage <sup>(5)</sup>	tested for 1 minute	I/P to O/P	4kVAC
		I/P to Case	2kVAC
		O/P to Case	2kVAC
Isolation Resistance	500VDC	100MΩ min.	
Insulation Grade		reinforced	
Leakage Current	264VAC	100μA max.	
Means of Protection	working voltage 250VAC/continuous	2MOPP	
Medical Device Classification		built-in power supply	
Internal	clearance	>8.0mm	
	creepage	>8.0mm	

**Notes:**

Note5: For repeat Hi-Pot testing, reduce the time and/or the test voltage

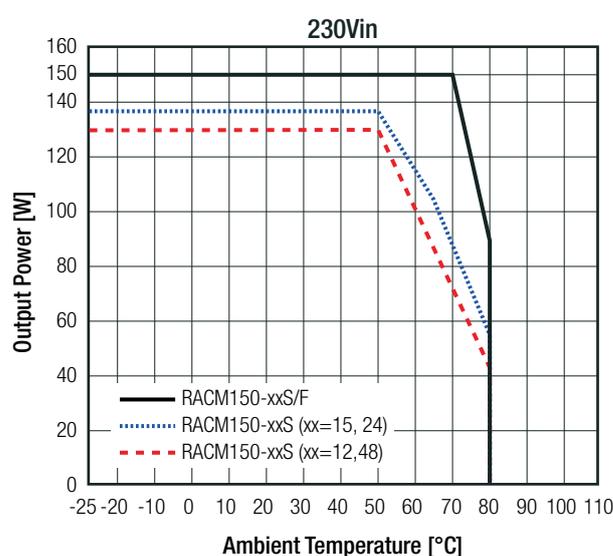
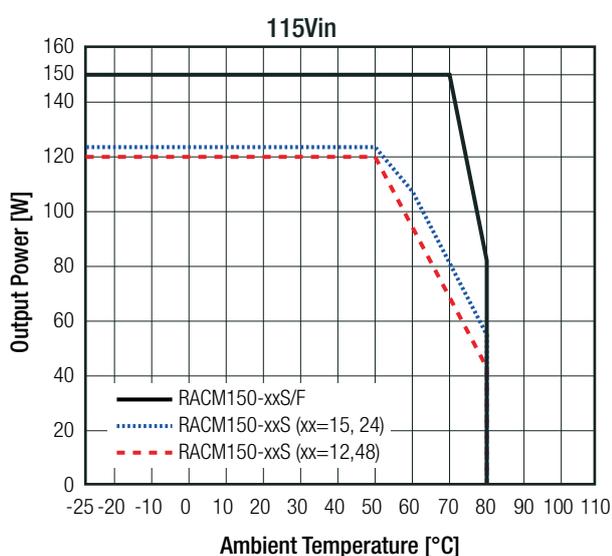
**Specifications** (measured @ Ta= 25°C, 230VAC, full load and after warm-up)

**ENVIRONMENTAL**

Parameter	Condition		Value
	refer to derating graph	without fan with fan	
Temperature Coefficient			±0.02%/K
Operating Altitude			5000m max.
Operating Humidity		non-condensing	5% to 95% RH
Pollution Degree			PD2
MTBF	according to MIL-HDBK-217F, full load, +25°C		786.1 x 10 <sup>3</sup> hours

**Derating Graph**

(@ Chamber and natural convection 0.1m/s)



**SAFETY AND CERTIFICATIONS**

Certificate Type (Safety)	Report / File Number	Standard
Medical Electric Equipment, General Requirements for Safety and Essential Performance	E314885	CAN/CSA-C22.2 No. 60601-1:14 ANSI/AAMI ES60601-1:2005 + A2:2010
Medical Electric Equipment, General Requirements for Safety and Essential Performance (CB)	181200102	IEC60601-1:2005 + A1:2012, 3rd Edition
Medical Electric Equipment, General Requirements for Safety and Essential Performance		EN60601-1:2006 +12:2014
Information Technology Equipment - General Requirements for Safety (LVD)	TW1708008-001	EN60950-1:2006 + A2:2013
Information Technology Equipment - General Requirements for Safety		IEC60950-1:2005, 2nd Edition + A2:2013
EAC	RU-AT.49.09571	TP TC 004/2011 TP TC 004/2011
RoHS2		RoHS-2011/65/EU + AM-2015/863
EMC Compliance (Medical)	Conditions	Standard / Criterion
Medical electrical equipment - Part 1-2: General requirements for basic safety and essential performance - Collateral standard: Electromagnetic compatibility - Requirements and tests		EN60601-1-2:2015
Industrial, scientific and medical equipment – Radio frequency disturbance characteristics - Limits and methods of measurement		EN55011:2009 + A1:2010 Class B Conducted, Class A Radiated
Industrial, scientific and medical equipment - Radio frequency disturbance characteristics - Limits and methods of measurement		CISPR11:2009 + A1:2010 Class B Conducted, Class A Radiated

continued on next page

**Specifications** (measured @ Ta= 25°C, 230VAC, full load and after warm-up)

EMC Compliance (Medical)	Conditions	Standard / Criterion
ESD Electrostatic discharge immunity test	Air ±15kV; Contact ±8kV	IEC61000-4-2:2008
Radiated, radio-frequency, electromagnetic field immunity test	10V/m (80-2700MHz) 27V/m (385MHz) 28V/m (450MHz)	IEC61000-4-3:2006 + A2:2010
Fast Transient and Burst Immunity	AC Power Port: ±2kV	IEC61000-4-4:2012
Surge Immunity	AC Port: L-N= ±1kV L-GND= ±2kV	IEC61000-4-5:2005
Immunity to conducted disturbances, induced by radio-frequency fields	6Vr.m.s	IEC61000-4-6:2013
Power Frequency Magnetic Field	50Hz, 30A/m	IEC61000-4-8:2009
Voltage Dips and Interruptions	Dips: >95%; 30%; Interruptions >95%	IEC61000-4-11:2004
Limits of Harmonic Current Emissions		EN61000-3-2:2005 + A2:2009, Class D
Limits of Voltage Fluctuations and Flicker		EN61000-3-3:2013
Limitations on the amount of electromagnetic interference allowed from digital & electronic devices		47CFR FCC Part 15 Subpart B, Class B
Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9kHz to 40GHz		ANSI C63.4:2014
EMC Compliance (Industrial)	Conditions	Standard / Criterion
Electromagnetic compatibility of multimedia equipment – Emission Requirements		EN55032:2015+AC:2013, Class B
Information technology equipment - Immunity characteristics - Limits and methods of measurement		EN55024:2010+A1:2015
ESD Electrostatic discharge immunity test	Air ±8kV; Contact ±6kV	IEC61000-4-2:2008, Criteria A
Radiated, radio-frequency, electromagnetic field immunity test	3V/m (80-1000MHz) 20V/m (80-1000MHz) 3V/m (1-2.5GHz) 10V/m (1-2.5GHz)	IEC61000-4-3:2006 + A2:2010, Criteria A
Fast Transient and Burst Immunity	DC Port: ±2kV	IEC61000-4-4:2012, Criteria A
Surge Immunity	DC Port: ±1kV	IEC61000-4-5:2014, Criteria A
Immunity to conducted disturbances, induced by radio-frequency fields	DC Power Port 3V + 20V	IEC61000-4-6:2013, Criteria A
Power Frequency Magnetic Field	50Hz/60Hz 1A/m 50Hz/60Hz 10A/m	IEC61000-4-8:2009, Criteria A
Voltage Dips and Interruptions	Dips: >95%; 60%; 30%; Interruptions >95%	IEC61000-4-11:2004, Criteria A IEC61000-4-11:2004, Criteria B
Limits of Harmonic Current Emissions		EN61000-3-2:2014, Class D
Limits of Voltage Fluctuations and Flicker		EN61000-3-3:2013

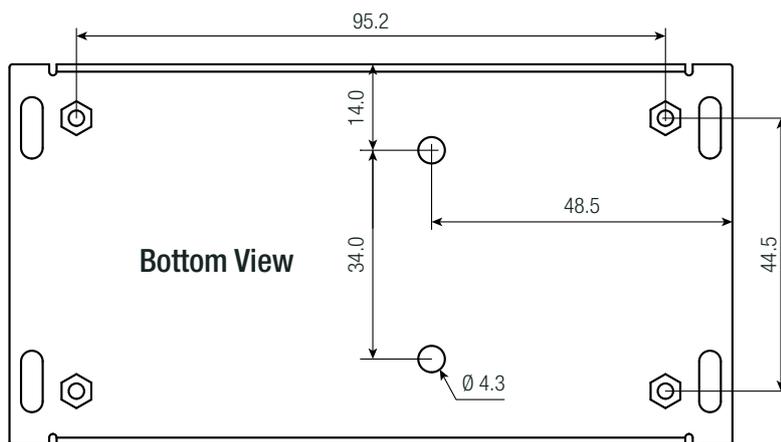
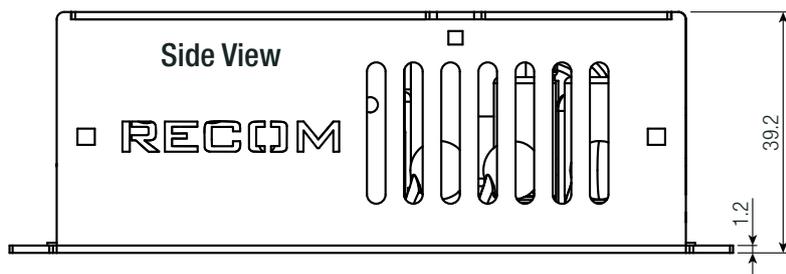
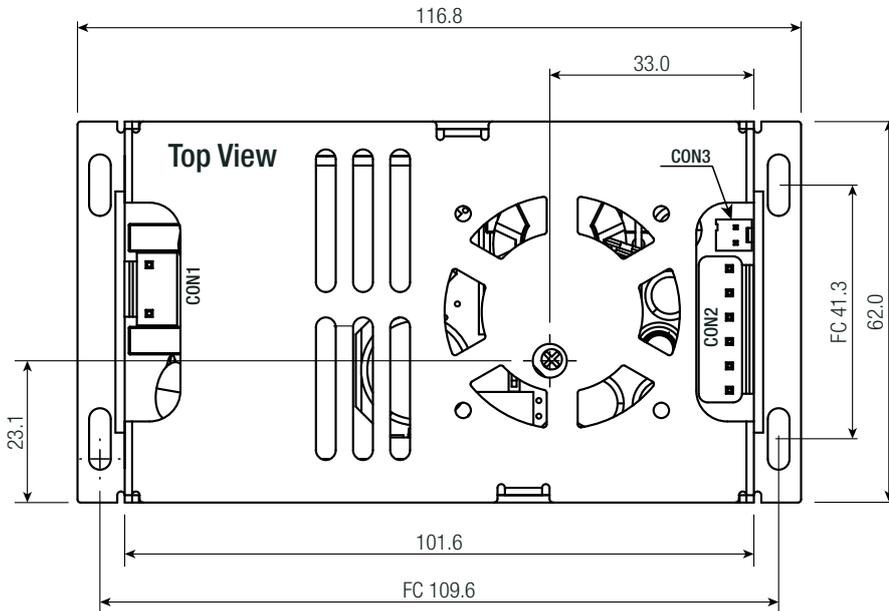
**DIMENSION and PHYSICAL CHARACTERISTICS**

Parameter	Type	Value
Material	enclosed	aluminum
Dimension (LxWxH)	with Fan	116.8 x 62.0 x 49.2mm
	without Fan	116.8 x 62.0 x 39.2mm
Weight	with Fan	270g
	without Fan	255g

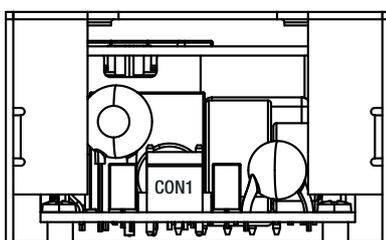
continued on next page

**Specifications** (measured @ Ta= 25°C, 230VAC, full load and after warm-up)

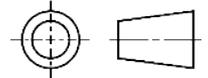
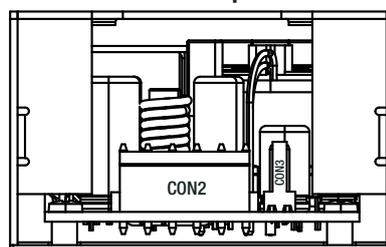
Dimension Drawing without FAN (mm)



AC Input Side



DC/FAN Output Side



**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

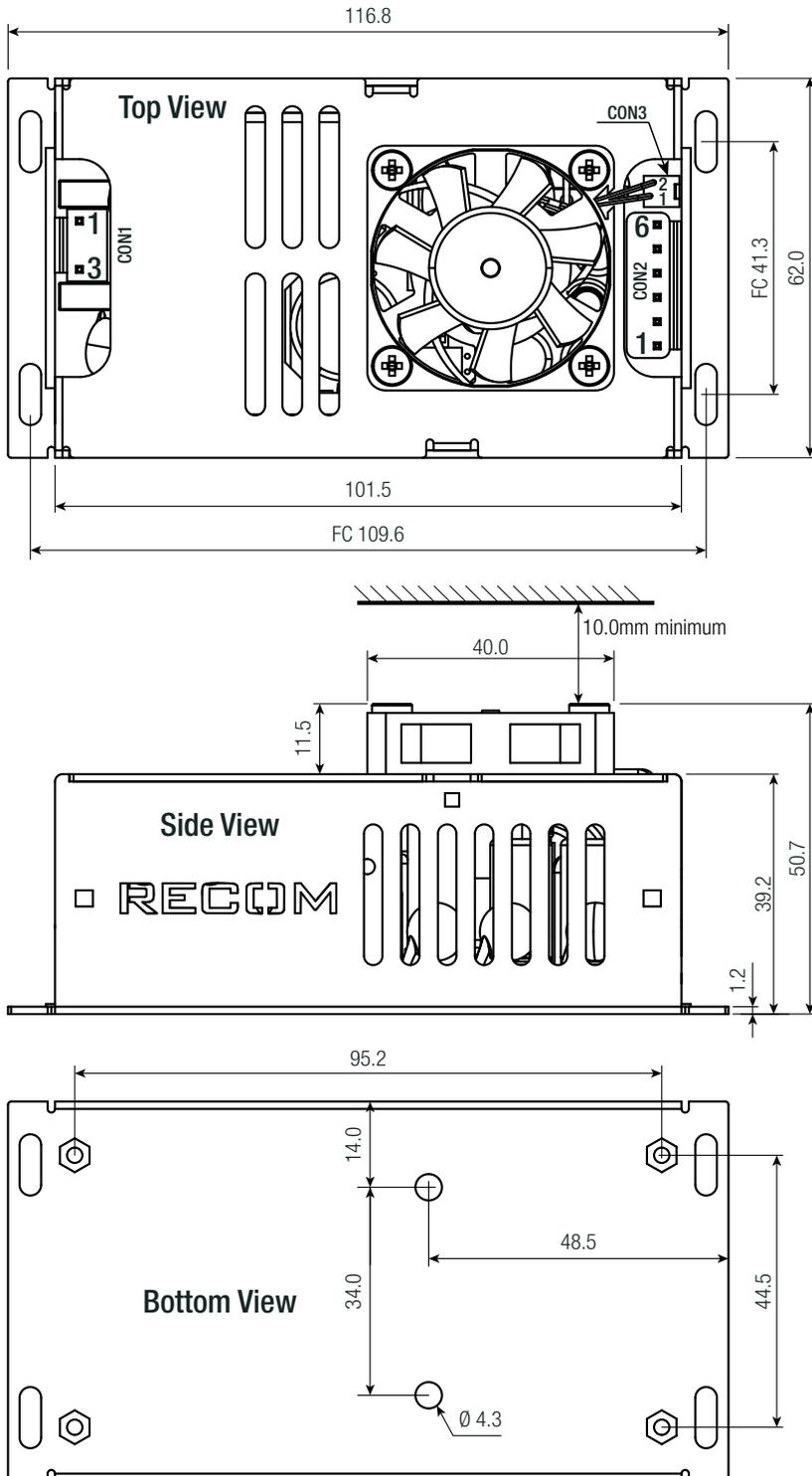
Tolerance: ±0.5mm

FC: fixing center

Recommended tightening torque for mounting holes= 0.49Nm

**Specifications** (measured @ Ta= 25°C, 230VAC, full load and after warm-up)

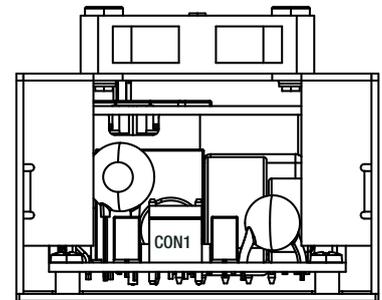
Dimension Drawing with FAN (mm)



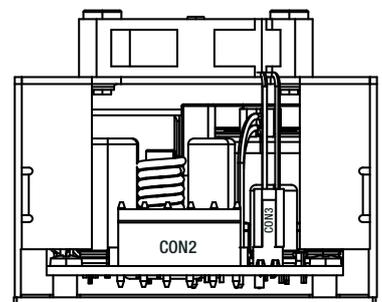
**FAN**

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

**AC Input Side**



**DC/FAN Output Side**



**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: ±0.5mm  
FC: fixing center  
Recommended tightening torque for mounting holes= 0.49Nm

**Specifications** (measured @ Ta= 25°C, 230VAC, full load and after warm-up)**PACKAGING INFORMATION**

Parameter	Type	Value
Packaging Dimension (LxWxH)	cardboard Box	418.0 x 308.0 x 105.0mm
Packaging Quantity		10pcs
Storage Temperature Range		-40°C to +80°C
Storage Humidity	non-condensing	5% to 95% RH

The product information and specifications may be subject to changes even without prior written notice. The product has been designed for various applications; its suitability lies in the responsibility of each customer. The products are not authorized for use in safety-critical applications without RECOM's explicit written consent. A safety-critical application is an application where a failure may reasonably be expected to endanger or cause loss of life, inflict bodily harm or damage property. The applicant 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.