Features

Regulated Converter

- Long 5 year warranty
- 2MOPP/250VAC
- Suitable for built in Class II applications
- Wide input voltage range (85-264VAC)
- Low leakage current (<75µA)
- 5000m operation
- -40°C to +85°C operating temperature

RECOM
AC/DC Converter

RACM40

40 Watt Enclosed & Open Frame Case Style Single Output

2MOPP
250VAC

CSA/CAN-C22.2 No 60601-1:14 certified
ANSI/AAMI ES60601-1 certified
EN60601-1-2
CISPR11
FCC Part 15 & 18

Description

The RACM40 is a compact 3" x 2" high efficiency AC/DC power supply with 2xMOPP safety approval for medical applications. These space saving enclosed power supplies have an universal input voltage range (85-264VAC), 4kVAC isolation, require no minimum load and can be used at ambient temperatures of between -40°C and +85°C. The 5V, 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 output voltage can be trimmed over a ±10% range. The RACM40 series is certified to medical safety standard IEC/ES/EN-60601-1 3rd Edition and with less than 75µA leakage current. It has a built-in Class B EMI filter and comes with a 5 year warranty.

Selection Guide

Part Number	Input Voltage Range [VAC]	Output Voltage [VDC]	Output Current [A]	Efficiency typ. [%]	Max. Capacitive Load (1) [µF]
RACM40-05S (1,2)	85-264	5	8.0	90	16000
RACM40-12S (1,2)	85-264	12	3.34	92	2785
RACM40-15S (1,2)	85-264	15	2.67	92	1780
RACM40-24S (1,2)	85-264	24	1.67	92	700
RACM40-48S (1,2)	85-264	48	0.84	93	175

Notes:

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

Model Numbering

RACM40- __ S / __ -

- Output Power
- Output Voltage
- Single
- Connections (3)
- Case Style (2)

Notes:

Note2: Case Style: without suffix, standard enclosed case
add suffix "/OF" for open frame style

Note3: Connections: without suffix, standard connection with connector
with suffix "-ST" connection with screw terminals

Examples:

RACM40-12S = 12Vout, standard enclosed case
RACM40-48S/OF = 48Vout, open frame style
RACM40-15S/OF-ST = 15Vout, open frame style with screw terminal connection

Specifications (measured at Ta= 25°C, 250VAC, full load and after warm-up)

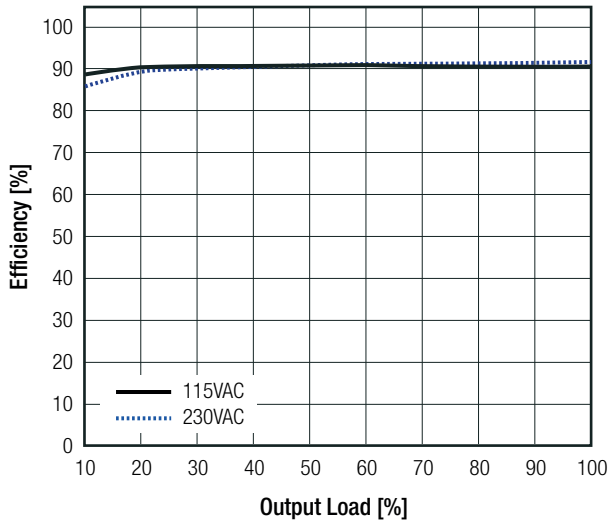
BASIC CHARACTERISTICS				
Parameter	**Condition**	**Min.**	**Typ.**	**Max.**
Input Voltage		85VAC 100VDC (4)	230VAC	264VAC 370VDC
Input Current	115VAC, full load 230VAC, full load			1.0A 0.5A
Inrush Current	230VAC			60A
No load Power Consumption				0.11W
Input Frequency Range	AC Input		50/60Hz	440Hz (4)
Output Voltage Trimming	on-board trimpot		±10.0%	
Minimum Load		0%		
Start-up Time				1s
Rise Time			20ms	
Hold up Time	115VAC, full load		25ms	
Internal Operating Frequency	5VDC, 230VAC others, 230VAC		70kHz 120kHz	
Output Ripple and Noise (measured @ 20MHz BW)	5VDC, 12VDC and 15VDC with 10µF/25V MLCC 24VDC, with 1µF/50V MLCC 48VDC, with 0.1µF/100V MLCC		75mVp-p 75mVp-p 150mVp-p	

Notes:

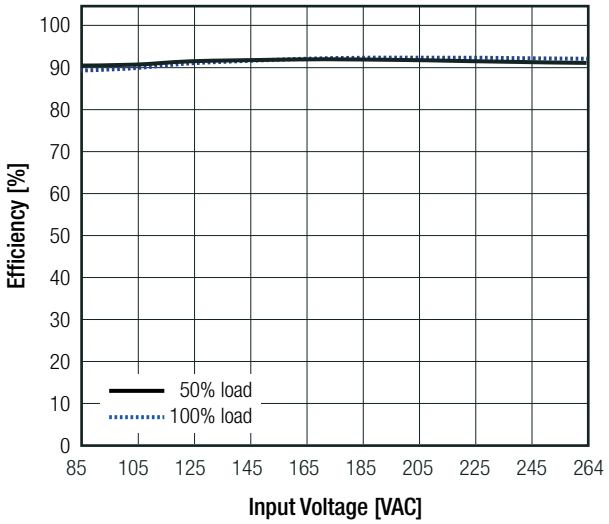
Note4: Confirmed performance, but not covered in certificates. 100V input voltage with derating

RACM40-24S

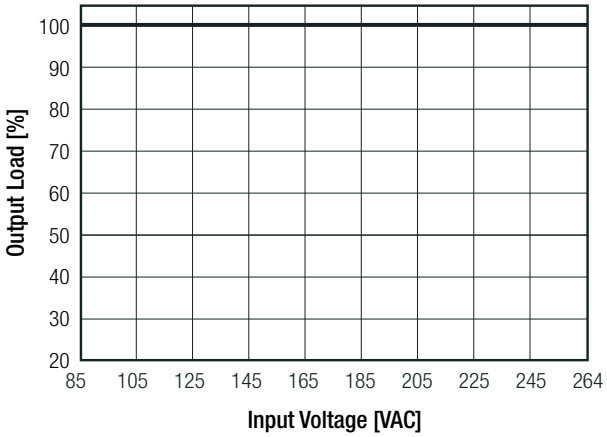
Efficiency vs. Load



Efficiency vs. Input Voltage



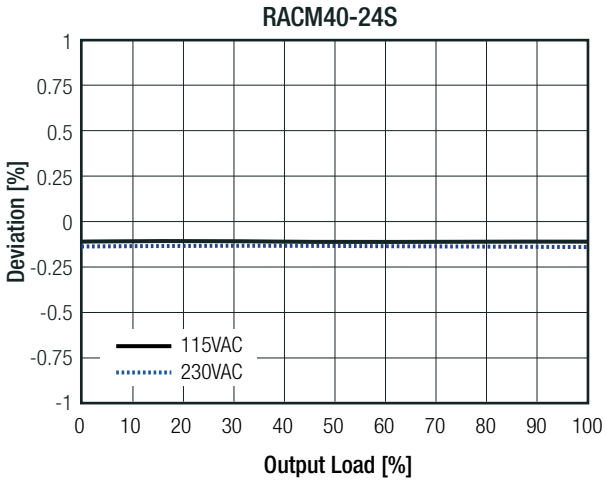
Line Derating



Specifications (measured at Ta= 25°C, 250VAC, 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 Voltage Regulation	0% to 100% load	5VDC others	0.7% 0.5%
	10% to 90% load	5VDC others	0.6% 0.4%
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 neutral		T3.15A / 250VAC, slow blow type T3.15A / 250VAC, slow blow type
Short Circuit Protection (SCP)			continuous, auto-recovery
Over Load Protection (OLP)	% of Iout rated (Hiccup)		145% typ.
Over Voltage Protection (OVP)	% of Vout nominal (Latch off)		125% min / 140% max.
Isolation Voltage [5]	tested for 1 minute	I/P to O/P I/P to Case, O/P to Case	4kVAC 2.5kVAC
Isolation Resistance	500VDC		100MΩ min.
Insulation Grade			reinforced
Leakage Current	264VAC		75µA max.
Means of Protection	working voltage 250VAC/continuous		2MOPP
Medical Device Classification			built-in power supply
Internal	clearance creepage		>8.0mm >8.0mm

Notes:

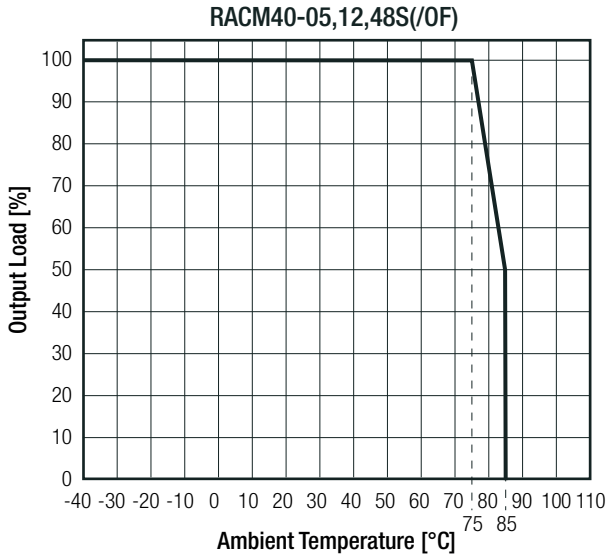
Note5: For repeat Hi-Pot testing, reduce the time and/or the test voltage

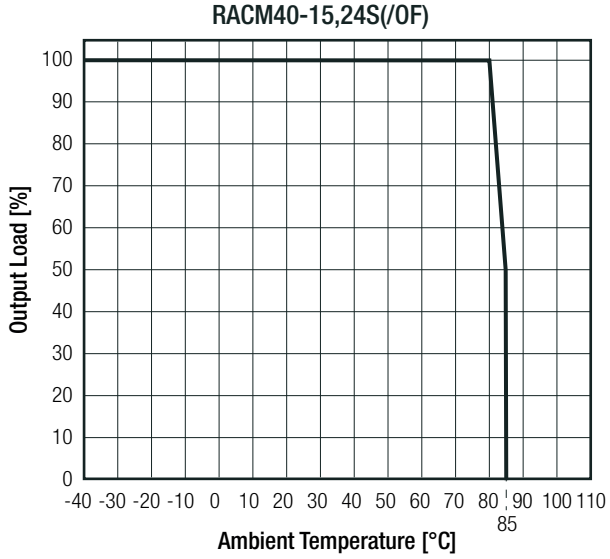
Specifications (measured at Ta= 25°C, 250VAC, full load and after warm-up)

ENVIRONMENTAL

Parameter	Condition	Value
Operating Temperature Range	refer to derating graph	-40°C to +85°C
Temperature Coefficient		±0.02%/K
Operating Altitude		5000m max.
Operating Humidity	non-condensing	5% to 95% RH
Pollution Degree		PD2
Shock		according to IEC60068-2-27
Vibration		according to IEC60068-2-6
MTBF	according to MIL-HDBK-217F, full load, +25°C	3010 x 10^3 hours

Derating Graph
(@ 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 Scheme)	151101302	IEC60601-1:2005 + C2:2007, 3rd Edition EN60601-1:2006
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 characteritics - Limits and methods of measurement		CISPR11:2009 + A1:2010, Class B

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Specifications (measured at Ta= 25°C, 250VAC, 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	20V/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	IEC61000-4-5:2014
Immunity to conducted disturbances, induced by radio-frequency fields	20Vr.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 Voltage Fluctuations and Flicker			EN61000-3-3:2013
Limitations on the amount of electromagnetic intererence 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 9 kHz to 40 GHz			ANSI C63.4:2014
FCC methods of measurement of radio noise emissions from industrial, scientific, and medical equipment			FCC OST/MP-5

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 ±15kV; Contact ±6kV		IEC61000-4-2:2008, Criteria A
Radiated, radio-frequency, electromagnetic field immunity test	10V/m (80-1000MHz) 20V/m (80-1000MHz)		IEC61000-4-3:2006 + A2:2010, Criteria A
Fast Transient and Burst Immunity	AC Power Port: ±4kV		IEC61000-4-4:2012, Criteria A
Surge Immunity	AC Port:	L-N= ±2kV L-PE= ±4kV	IEC61000-4-5:2014, Criteria A
Immunity to conducted disturbances, induced by radio-frequency fields	AC Power Port 10V, 20V		IEC61000-4-6:2013, Criteria A
Power Frequency Magnetic Field	50Hz/60Hz, 100A/m, 1000A/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
Damped oscillatory wave immunity test	AC Port:	L-N= ±1kV L/N-G= ±2.5kV	IEC61000-4-18:2006 + A1:2010, Criteria A
Limits of Voltage Fluctuations and Flicker			EN61000-3-3:2013

DIMENSION and PHYSICAL CHARACTERISTICS		
Parameter	**Type**	**Value**
Material	enclosed case PCB	aluminum FR4, (UL94V-0)
Dimension (LxWxH)	enclosed case open frame	91.4 x 60.5 x 33.3mm 76.2 x 50.8 x 26.5mm
Weight	enclosed case open frame + "-ST" version	172g 137g

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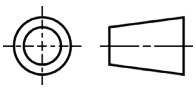
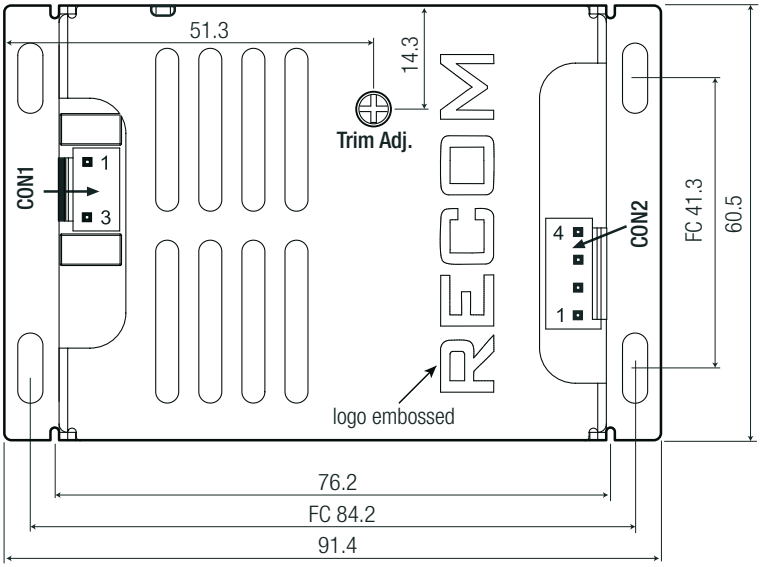
Specifications (measured at Ta= 25°C, 250VAC, full load and after warm-up)

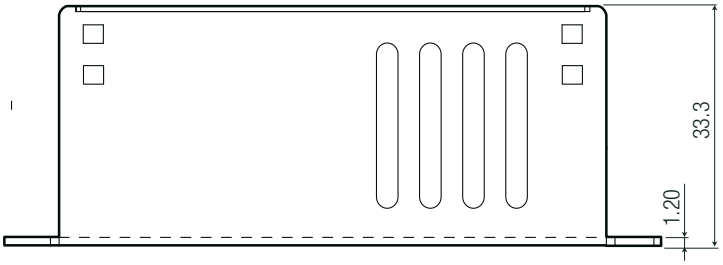
Dimension Drawing Enclosed Case (mm)



Top View



Side View



Bottom View

AC Input Connector (CON1)

Pin#	Terminal	Mating Housing
1 AC/L 3 AC/N	Molex KK156 (SD-2478)	Molex KK156 (09508031)

DC Output Connector (CON2)

Pin#	Terminal	Mating Housing
1,2 V- 3,4 V+	Molex KK156 (SD-2478)	Molex KK156 (09508041)

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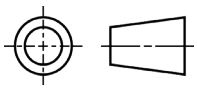
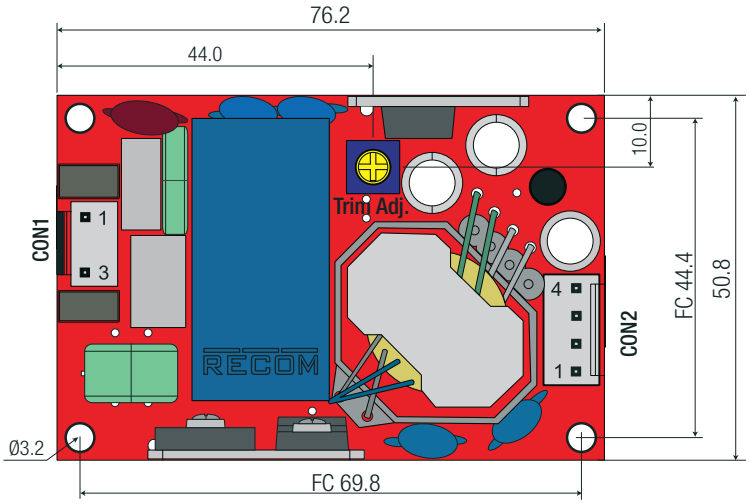
Specifications (measured at Ta= 25°C, 250VAC, full load and after warm-up)

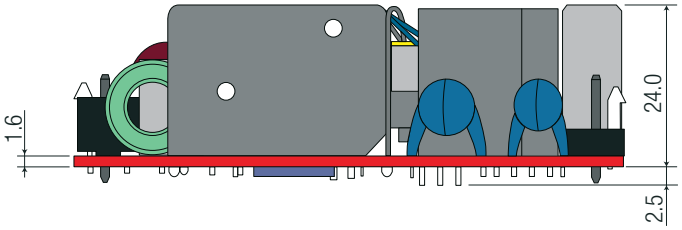
Dimension Drawing Open Frame (/OF) (mm)



Top View



Side View



AC Input Connector (CON1)

Pin#	Terminal	Mating Housing
1 AC/L 3 AC/N	Molex KK156 (SD-2478)	Molex KK156 (09508031)

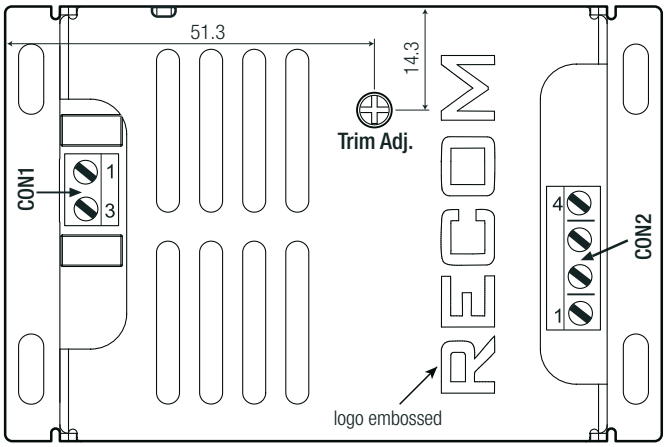
DC Output Connector (CON2)

Pin#	Terminal	Mating Housing
1,2 V- 3,4 V+	Molex KK156 (SD-2478)	Molex KK156 (09508041)

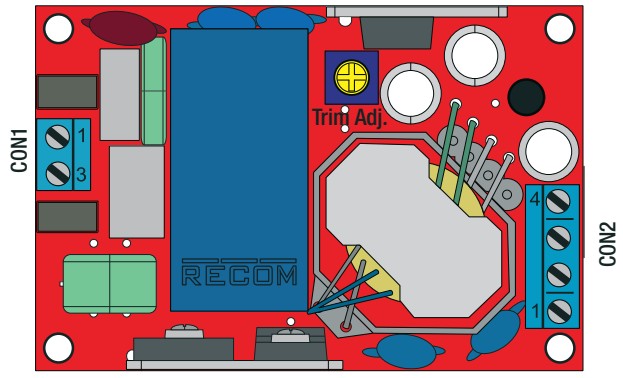
Screw Terminal Connection "-ST"

Top View

Enclosed Version



Open Frame Version



Screw terminal information

#	Function	AWG	Model
1	VAC in (L)	26-16	ETB30 (EK381V)
3	VAC in (N)	26-16	
1,2	-Vout	26-16	ETB30 (EK381V)
3,4	+Vout	26-16	

recommended tightening torque: 0.2Nm

Specifications (measured at Ta= 25°C, 250VAC, full load and after warm-up)

PACKAGING INFORMATION			
Parameter	**Type**		**Value**
Packaging Dimension (LxWxH)	cardboard box	enclosed case	120.0 x 80.0 x 85.0mm
		open frame	111.0 x 94.0 x 51.0mm
Packaging Quantity			1pcs
Storage Temperature Range			-40°C to +85°C
Storage Humidity	non-condensing		5% to 95% RH