20W / Input: 100V-277VAC

AC/DC Converter

FEATURES

- 85-305VAC wide input range
- Full load power ratings to 55°C
- 23 Watt Boost Power
- Optional CV/CC overcurrent limited
- O/P either floating or coupled with GND, FE or PE
- Surge immunity 2kVAC: L-N &; 4kV: L; N Earth
- OVC III over voltage category up to 3000m
- Tool free push in terminals: up to 2.5mm² wires
- DIN-Rail or screw mountable
- **IP40** ingress protected
- 3 year warranty



83.0 x 26.4 x 29.5mm (3.2 x 1.0 x 1.1 inch) 70.6g (0.15 lbs)

APPLICATIONS































SAFETY & EMC

RoHS²

DESCRIPTION

RAC20NE-K/277/EPID, power supplies are shaped to flexibly fit into different mounting conditions, regardless of whether back panel mounting with screws or clipping onto DIN rails is required. Apart from the push-in terminals for tool-free connection of wire cross-sections of up to 2.5mm², the modules are IP40 ingress protected. Despite their extremely compact design, the class II units offer increased resistance to surges up to 2kV L-N and 4kV to earth as well as EMI-interference filters to withstand EN55032 Class "B" requirements under floating or earth coupling load conditions such as PELV. The parts are fully certified to safety standards UL/IEC/EN62368, IEC61347, IEC61558 and EN60335 with overvoltage category OVC III for worldwide nominal input voltages 100-277VAC under full load from -40°C to 55°C or with power limitation up to 85°C, constant regulated output voltage from 5V to 36VDC are available, and CV with constant current overload limitation protection is available as an option.

SELECTION GUIDE (CONSTANT VOLTAGE OPERATION)						
Part Number	Input Voltage Range [VAC]	Output Voltage [VDC]	Output Current nom. [mA]	Boost Current max ⁽¹⁾ [mA]	Efficiency ⁽²⁾ typ. [%]	Output Power continuous [W]
RAC20NE-05SK/277/EPID	85-305	5	3000	4600	86	15
RAC20NE-12SK/277/EPID	85-305	12	1667	1916	87	20
RAC20NE-24SK/277/EPID	85-305	24	833	1150	87	20
RAC20NE-36SK/277/EPID	85-305	36	555	638	88	20

SELECTION GUIDE (CONSTANT CURRENT OPERATION)					
Part Number	Input Voltage Range [VAC]	Output Voltage nom. [VDC]	Output Current rated [mA]	Efficiency ⁽²⁾ typ. [%]	Output Power continuous [W]
RAC20NE-24SK/277/CC/EPID	85-305	24	833	87	20

Note1: Refer to "Boost Power Duty Cycle"

Note2: Efficiency is tested at 230VAC and full load at +25°C ambient

20W / Input: 100V-277VAC



Model Numbering



Note3: add suffix "/CC" for constant current limited CV/CC characteristics without suffix= constant voltage characteristics with hiccup SCP

Parameter	Conditi	on	Min.	Тур.	Max.
Nominal Input Voltage	50/60	-lz	100VAC		277VAC
Operating Range (4)	47-63Hz		85VAC		305VAC
operating nange ·	DC (pend	ling)	120VDC		430VDC
Input Current	115/230/2	77VAC			450mA
		115VAC			20A
Inrush Current	cold start at 25°C	230VAC			40A
		277VAC			50A
No Load Power Consumption					100mW
Ecodesign Standby Mode Use	$P_{IN}=0.5$	0.34W			
(Available output power for stated input	P _N = 1.0W		0.74W		
power)	P _{IN} = 2.0W		1.6W		
Input Frequency Range	AC Input		47Hz		63Hz
Minimum Load			0%		
Power Factor				0.6	
Start-up time					150ms
Rise time			40ms		
Hold-up time	230VAC		50ms		
Internal Operating Frequency					150kHz
Output Ripple and Noise (5)	20MHz	BW			1% Vout

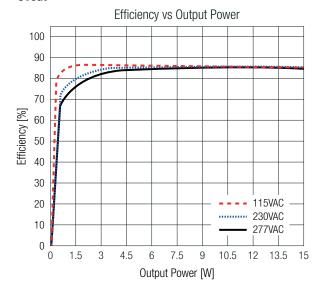
Note4: The products were submitted to all safety files at AC-operation (90-305VAC).

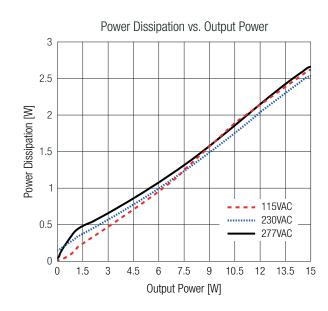
Note5: Measurements are made with a 0.1µF MLCC & 10µF E-cap in parallel across output (low ESR)

The test setup can have an impact on ripple noise values (placement of scope probe, capacitors, it's specifications,

wires, PCB tracks, distances, etc.)

5Vout



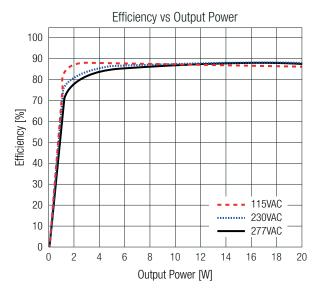


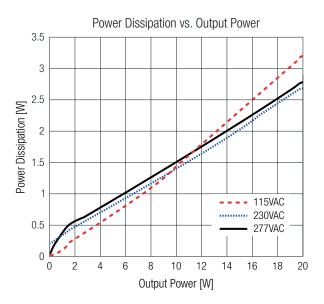
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BASIC CHARACTERISTICS (measured @ T_{AMB}= 25°C, nom. V_{IN}, full load and after warm-up unless otherwise stated)

others





REGULATIONS (measured @ T _{AMB} = 25°C, nom. V _{IN} , full load and after warm-up unless otherwise stated)				
Parameter	Condition	Value		
Output Accuracy		±2.0% max.		
Line Regulation	low line to high line, full load	±1.0% max.		
Load Regulation (6)	10% to 100% load	2.0% max.		
Transient Response	25% load step change	4.0% max.		
	recovery time	500μs typ.		

Note6: Operation below 10% load will not harm the converter, but specifications may not be met

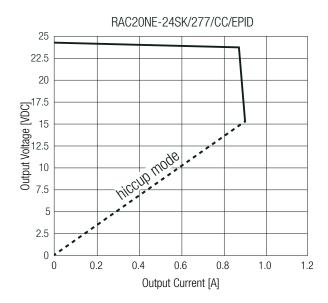
PROTECTIONS (measured @ T _{AMB} = 25°C, nom. V _{IN} , full load and after warm-up unless otherwise stated)					
Parameter		Ту	ре	Value	
Input Fuse		inte	ernal	T2A, slow blow type	
Short Circuit Protection (SCP)		below	100mΩ	hiccup mode; auto recovery	
Over Current Protection (OCD)		"/277/EPI	D" versions	120% - 150%, hiccup mode	
Over Current Protection (OCP)	"/277/CC/EPID" v	rersion; refer to "Ou	constant current limitation until hiccup mode		
Over Voltage Protection (OVP)			120% - 180%, latch off mode		
Over Voltage Category (OVC)	according to 62368-1, 60335-1, 61558, 61347			OVC III (3000m)	
Over Voltage Category (OVC)	á	according to 62368	OVC II (5000m)		
Over Temperature Protection (OTP)				auto recovery	
DC ON LED				green: output voltage present	
Class of Equipment				Class II	
Isolation Voltage	I/P to O/P		according to 61558	4.2kVAC	
	1/2 10 0/2	1 minute	according to 62368-1	6kVDC	
Insulation Grade		I/P t	reinforced		

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PROTECTIONS (measured @ T_{AMB}= 25°C, nom. V_{IN}, full load and after warm-up unless otherwise stated)

Output Voltage vs. Output Current



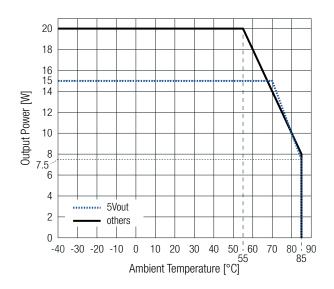
ENVIRONMENTAL (measured @ T _{AMB} = 25°C, nom. V _{IN} , full load and after warm-up unless otherwise stated)				
Parameter	Cond	Value		
Operating Ambient Temperature Range	@ natural convection (0.1m/s) refer to "Derating Graph"		-40°C to +85°C	
Maximum Case Temperature			+95°C	
Temperature Coefficient			±0.05%/K	
Operating Altitude (7)	according to 62368	5000m (OVC II)		
Operating Altitude (7)	according to 62368-1, 6	3000m (OVC III)		
Operating Humidity			95% RH max.	
Pollution Degree			PD2	
MTBF	according to MIL-HDBK-217, G.B.	T _{AMB} = +25°C	1190 x 10 ³ hours	
Design Lifetime	full load	T _{AMB} = +25°C	130 x 10 ³ hours	

Note7: Recognized by safety agency for safe operation up to 5000m. High altitude operation may impact the performance and lifetime.

Please contact RECOM tech support for advice

Derating Graph for continuous loads

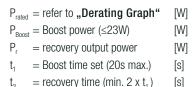
(@ Chamber, any orientation and natural convection 0.1m/s)



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BOOST POWER DUTY CYCLE (EXCEPT "/CC" MODELS)

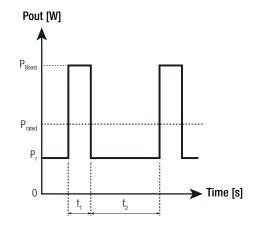


$$P_{r} = \frac{P_{rated} \times (t_{1} + t_{2}) - (P_{Boost} \times t_{1})}{t_{2}}$$

Practical Example (RAC20NE-05SK/277/EPID):

Take the RAC20NE-05SK/277/EPID at 230VAC input voltage and full load at T_{AMB} = 80°C, with natural convection.

$$\begin{array}{ll} P_{\text{rated}} &= 10\text{W} \\ P_{\text{Boost}} &= 23\text{W} \\ t_1 &= 20\text{s} \\ t_2 &= 50\text{s} \end{array} \qquad \begin{array}{ll} P_r = & \frac{10\text{W x } (20\text{s} + 50\text{s}) - (23\text{W x } 20\text{s})}{50\text{s}} &= \underline{\textbf{4.8W}} \end{array}$$



SAFETY & CERTIFICATIONS		
Certificate Type (Safety)	Report Number	Standard
Audio/Video, information and communication technology equipment - Part1:	E491408-A6034-UL	UL62368-1:2019 3rd Edition
Safety requirements 3rd Edition	E491400-A0034-UL	CAN/CSA-C22.2 No. 62368-1-19 3rd Edition
Audio/Video, information and communication technology equipment - Part1:	240408022	IEC62368-1:2018 3rd Edition
Safety requirements 3rd Edition	240400022	EN IEC 62368-1:2020+A11:2020
Audio/Video, information and communication technology equipment - Part1:	085-240223001-000	IEC62368-1:2018 3rd Edition
Safety requirements 3rd Edition	003-240223001-000	EN IEC 62368-1:2020+A11:2020
Audio/Video, information and communication technology equipment - Part1:	085-240223401-000	IEC62368-1:2018 3rd Edition
Safety requirements 3rd Edition	003-240223401-000	EN IEC 62368-1:2020+A11:2020
Household and similar electrical appliances – Safety – Part 1: General requirements	64.110.24.02233.01	IEC60335-1:2010 + C1:2016 5th Edition
Tibuseriolu anu similai electricai appliances – Salety – Fart T. General requirements	04.110.24.02233.01	EN60335-1:2012 + A15:2021
Measurement methods for electromagnetic fields of household appliances and similar apparatus with regard to human exposure	64.110.24.02233.01	EN62233:2008
Safety of power transformers, power supplies, reactors and similar products for supply voltages		IEC61558-1:2017 3rd Edition
up to 1100 V 3rd Edition	005 040000101 000	EN IEC 61558-1:2019
Safety of power transformers, power supplies, reactors and similar products for supply	085-240223101-000	IEC61558-2-16:2009+A1:2013 1st Edition
voltages up to 1100 V Part 2: Particular requirements		EN61558-2-16:2009+A1:2013
Lamp control goar Port 1. Conoral and anfaturaguirements		IEC61347-1:2015+A1:2017 3rd Edition
Lamp controlgear Part 1: General and safety requirements	005 040000001 000	EN61347-1:2015+A1:2021
Lamp controlgear Part 2-13: Particular requirements for d.c. or a.c. supplied electronic	- 085-240223201-000	IEC61347-2-13:2014+A1:2016 2nd Edition
controlgear for LED modules		EN61347-2-13:2014+A1:2017

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SAFETY & CERTIFICATIONS		
EMC Compliance according to EN IEC61204-3	Condition	Standard / Criterion
Low voltage power supplies, d.c. output Part 3: Electromagnetic compatibility (EMC)		EN IEC 61204-3:2018
ESD Electrostatic discharge immunity test	Air: ±2, 4, 8kV Contact: ±6kV for all versions except 5Vout version Contact: ±4kV for all versions except 5Vout version	IEC61000-4-2:2008, Criteria A EN61000-4-2:2009, Criteria A
Radiated, radio-frequency, electromagnetic field immunity test	10V/m (80-1000MHz), 3V/m (1400-2000MHz), 1V/m (2000-2700MHz)	IEC/EN61000-4-3:2006 + A2:2010 Criteria A
	L, N, L-N ±2kV for 24V and 36Vout versions	IEC/EN61000-4-4:2012, Criteria A
Fast Transient and Burst Immunity	L, N, L-N ±2kV for 5V and 12Vout versions	IEC/EN61000-4-4:2012, Criteria B
	L, N, L-N ± 4 kV for all versions	ILO/LINOTOGO-4-4.2012, GIRIGIIA B
	L-N: 0.5, 1kV; for all versions	IEC/EN61000-4-5:2014 + A1:2017, Criteria A
	L-N: 2kV; for all versions	IEC/EN61000-4-5:2014 + A1:2017, Criteria B
Surge Immunity	L-PE, N-PE: 1, 2kV; for all versions	IEC/EN61000-4-5:2014 + A1:2017, Criteria A
	L-PE: 4kV; for all versions; O/P connected to GND	IEC/EN61000-4-5:2014 + A1:2017, Criteria B
	N-PE: 4kV; for all versions; O/P connected to GND	IEC/EN61000-4-5:2014 + A1:2017, Criteria A
Immunity to conducted disturbances, induced by radio-frequency fields	10Vrms (0.15-80MHz)	IEC61000-4-6:2013, Criteria A EN61000-4-6:2014, Criteria A
Power Magnetic Field Immunity	30A/m	IEC61000-4-8:2009 / EN61000-4-8:2010
Voltage Dips and Interruptions	Dips: 100% (0.5P, 1.0P), 60%, 30%, 20%	IEC/EN61000-4-11:2004+A1:2017, Criteria A
	Interruption: 100%	IEC/EN61000-4-11:2004+A1:2017, Criteria B
Limits of Voltage Fluctuations & Flicker		EN61000-3-3:2013+A1:2019
EMC Compliance according to EN55032	Condition	Standard / Criterion
Electromagnetic compatibility of multimedia equipment – Emission Requirements	O/P either floating or earth coupled (FE; PE or GND)	EN55032:2015+A11:2020, Criteria B

DIMENSION & PHYSICAL CHARACTERISTICS				
Parameter	Туре	Value		
	case/baseplate	plastic, (UL94 V-0)		
Materials	potting	silicone, (UL94 V-0)		
	PCB	FR4, (UL94 V-0)		
Dimonoion /Ly/MyLl)		83.0 x 26.4 x 29.5mm		
Dimension (LxWxH)		3.2 x 1.0 x 1.1 inch		
Weight		70.6g typ.		
		0.15 lbs		

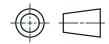
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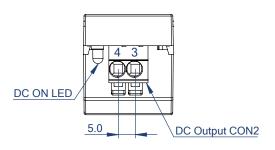
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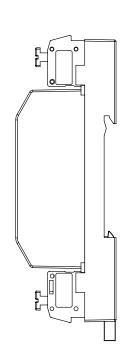


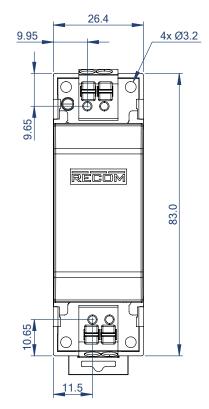
DIMENSION & PHYSICAL CHARACTERISTICS

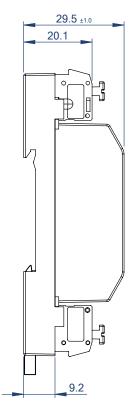
Dimension Drawing (mm)

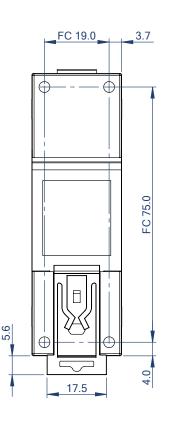


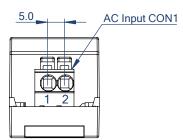












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Note9: Min. Wire cross section are suggested values only, and need to be aligned with the applicable safety regulation. No ferrules required for stranded wires when tool-less pushing in is not suggested.

Note10: For DIN-Rail mounting, follow the instructions under "Mounting Instruction"

Connector Information

	AC Input (CON1)				
# Function Wire cross section (9)					
1	VAC in (L)	20-12 AWG (0.2-2.5mm²)			
3	VAC in (N)	Usable wire: solid/stranded			

DC Output (CON2)

#	Function	Wire cross section (9)		
3	+Vout	20-12 AWG (0.2-2.5mm ²)		
4	-Vout	Usable wire: solid/stranded		
FC= Fixing centers				

Tolerance: $xx.x = \pm 0.5mm$ $xx.xx = \pm 0.25mm$

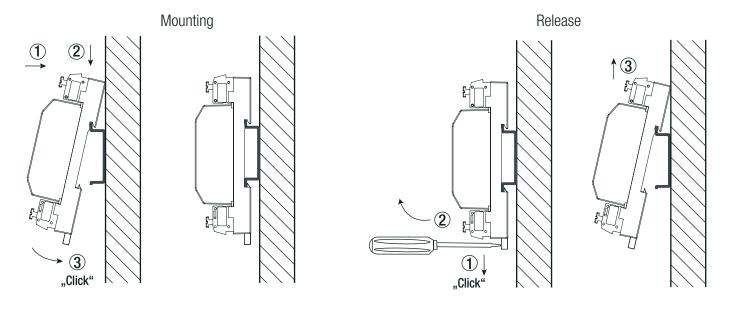
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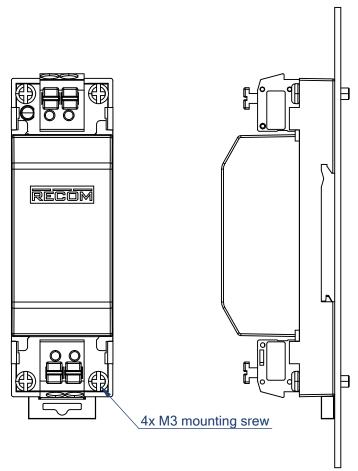
INSTALLATION & APPLICATION

Mounting Instruction

Mounting Rail: Standard TS35 DIN Rail in accordance with EN 60715



Mounting Instruction with screws



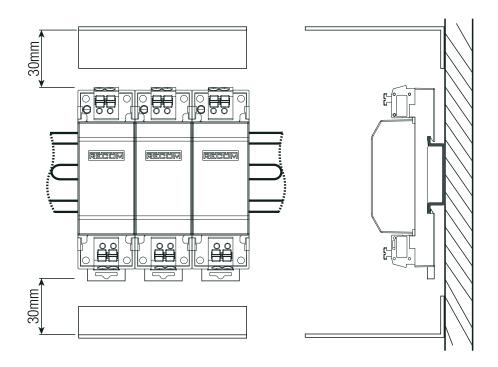
Recommended mounting tightening torque= 0.7Nm

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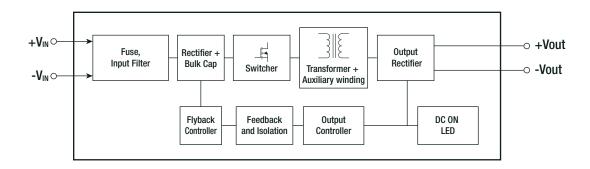
INSTALLATION & APPLICATION

Installation Instruction (11)



Note11: Panel mount installations can be realized in any orientation. No distance to adjacent components is required for thermally effective contact. In pure convection cooled ambient at least two of four long sides shall have access to air convection (eg 2cm distance)

BLOCK DIAGRAMM



PACKAGING INFORMATION				
Parameter	Туре	Value		
Packaging Dimension (LxWxH)	box	365.0 x 210.0 x 46.0mm		
Packaging Quantity		22pcs		
Storage Temperature Range		-40°C to +90°C		
Storage Humidity		95% RH max.		

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.

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