Technical Data Sheet

RAC20NE-K/277/EPID Series ◊ AC/DC Power Supply

20W / Input: 100V-277VAC

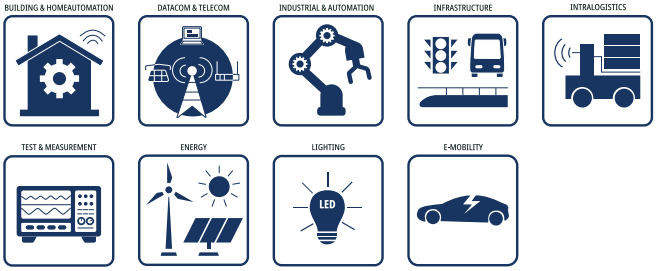
RECOM AC/DC Converter

FEATURES

- 85-305VAC wide input range
- Full load power ratings to 55°C
- 23 Watt Boost Power
- Optional CV/CC overcurrent limited
- EN55032 “B”: O/P either floating or earth referenced
- 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 compliant 10 from 10

Reach compliant

c UL us E224736

IECEE CB SCHEME

HOUSEHOLD CERTIFIED EN-60335-1

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 and earth reference 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

RAC20NE-K/277/EPID Series ◊ AC/DC Power Supply

20W / Input: 100V-277VAC

RECOM AC/DC Converter

Model Numbering

RAC20NE-__ SK/277/__/EPID

- nom. Output Power
- Output Voltage
- **S**ingle
- Constant Current operation (3)
- Panel Mount with DIN-Rail clip

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

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

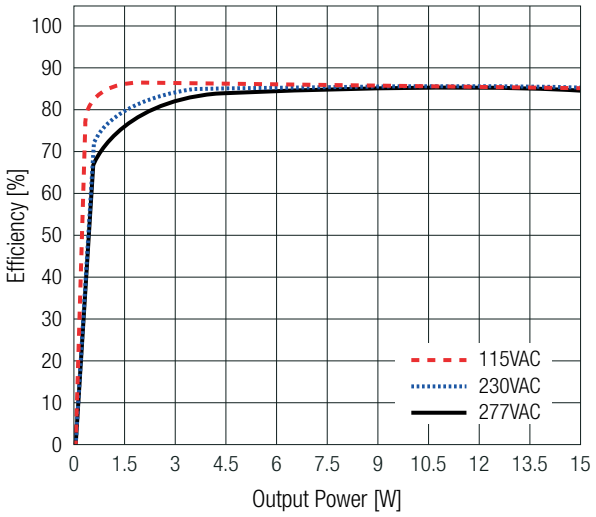
Parameter	Condition		Min.	Typ.	Max.
Nominal Input Voltage	50/60Hz		100VAC		277VAC
Operating Range (4)	47-63Hz		85VAC		305VAC
Input Current	115/230/277VAC				450mA
Inrush Current	cold start at 25°C	115VAC			20A
		230VAC			40A
		277VAC			50A
No Load Power Consumption					100mW
Ecodesign Standby Mode Use (Available output power for stated input power)	P_{IN}= 0.5W		0.34W		
	P_{IN}= 1.0W		0.74W		
	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).

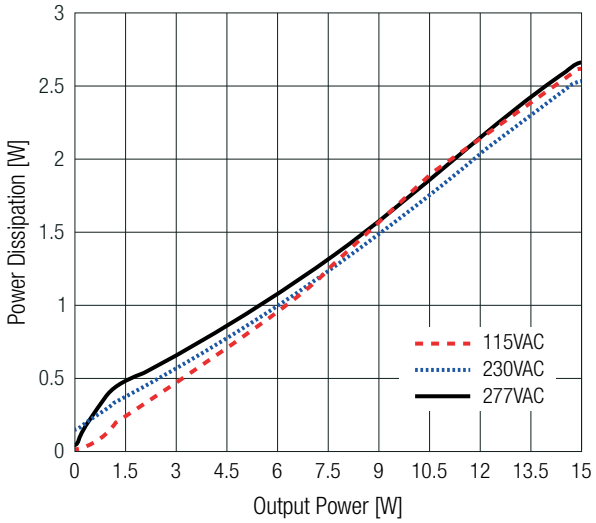
Note5: Measurements are made with a 0.1µF MLCC & 10µF E-cap in parallel across output (low ESR)
The test setup can have an impact on ripple noise values (placement of scope probe, capacitors, it's specifications, wires, PCB tracks, distances, etc.)

5Vout

Efficiency vs Output Power



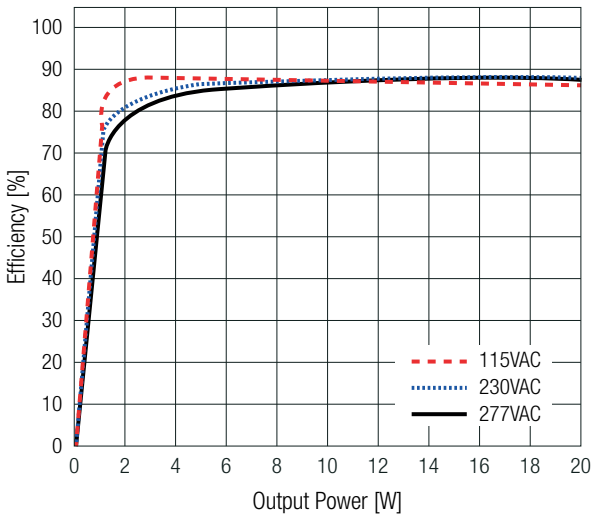
Power Dissipation vs. Output Power



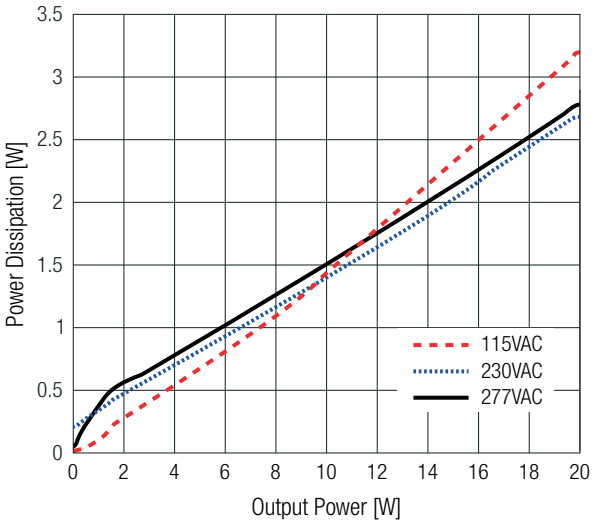
BASIC CHARACTERISTICS (measured @ T_{AMB}= 25°C, nom. V_{IN}, full load and after warm-up unless otherwise stated)

others

Efficiency vs Output Power



Power Dissipation vs. Output Power



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.

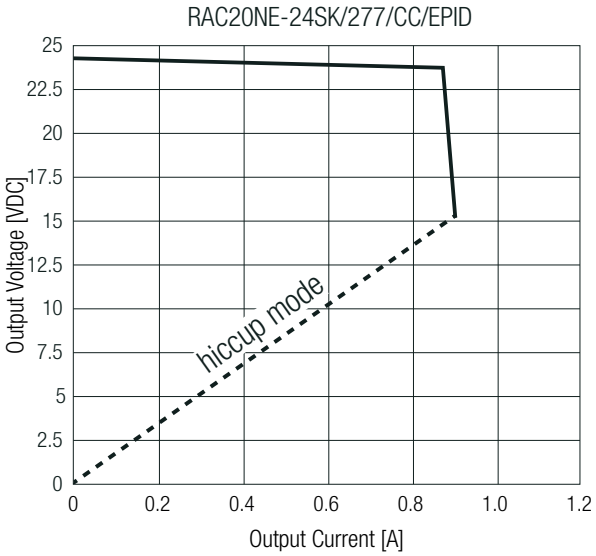
Note6: Operation below 10% load will not harm the converter, but specifications may not be met

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

Parameter	Type			Value
Input Fuse	internal			T2A, slow blow type
Short Circuit Protection (SCP)	below 100mΩ			hiccup mode; auto recovery
Over Current Protection (OCP)	"/277/EPID" versions			120% - 150%, hiccup mode
	"/277/CC/EPID" version; refer to **„Output Voltage vs. Output Current"**			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)
	according to 62368-1, 60335-1, 61558			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	1 minute	according to 61558	4.2kVAC
			according to 62368-1	6kVDC
Insulation Grade	I/P to O/P			reinforced

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

Output Voltage vs. Output Current



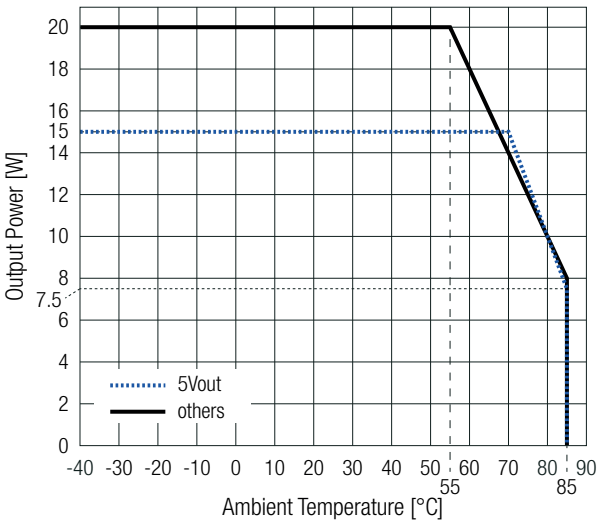
ENVIRONMENTAL (measured @ T_{AMB}= 25°C, nom. V_{IN}, full load and after warm-up unless otherwise stated)

Parameter	Condition		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 62368-1, 60335-1, 61558		5000m (OVC II)
	according to 62368-1, 60335-1, 61558, 61347		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

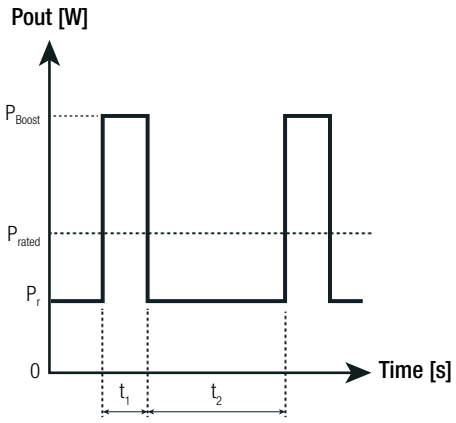
(@ Chamber, any orientation and natural convection 0.1m/s)



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

P_{rated} = refer to **„Derating Graph"** [W]
P_{Boost} = Boost power (≤23W) [W]
P_r = recovery output power [W]
t_1 = Boost time set (20s max.) [s]
t_2 = recovery time (min. 2 x t_1) [s]

$$P_r = \frac{P_{rated} \times (t_1 + t_2) - (P_{Boost} \times t_1)}{t_2}$$



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.

P_{rated} = 10W
P_{Boost} = 23W
t_1 = 20s
t_2 = 50s

$$P_r = \frac{10W \times (20s + 50s) - (23W \times 20s)}{50s} = \underline{4.8W}$$

SAFETY & CERTIFICATIONS

Certificate Type (Safety)	Report Number	Standard
Audio/Video, information and communication technology equipment - Part1: Safety requirements 3rd Edition	E491408-A6034-UL	UL62368-1:2019 3rd Edition
		CAN/CSA-C22.2 No. 62368-1-19 3rd Edition
Audio/Video, information and communication technology equipment - Part1: Safety requirements 3rd Edition	240408022	IEC62368-1:2018 3rd Edition
		EN IEC 62368-1:2020+A11:2020
Audio/Video, information and communication technology equipment - Part1: Safety requirements 3rd Edition	085-240223001-000	IEC62368-1:2018 3rd Edition
		EN IEC 62368-1:2020+A11:2020
Audio/Video, information and communication technology equipment - Part1: Safety requirements 3rd Edition	085-240223401-000	IEC62368-1:2018 3rd Edition
		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
		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 up to 1100 V 3rd Edition	085-240223101-000	IEC61558-1:2017 3rd Edition
		EN IEC 61558-1:2019
Safety of power transformers, power supplies, reactors and similar products for supply voltages up to 1100 V Part 2: Particular requirements		IEC61558-2-16:2009+A1:2013 1st Edition
		EN61558-2-16:2009+A1:2013
Lamp controlgear Part 1: General and safety requirements	085-240223201-000	IEC61347-1:2015+A1:2017 3rd Edition
		EN61347-1:2015+A1:2021
Lamp controlgear Part 2-13: Particular requirements for d.c. or a.c. supplied electronic controlgear for LED modules		IEC61347-2-13:2014+A1:2016 2nd Edition
		EN61347-2-13:2014+A1:2017

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
Fast Transient and Burst Immunity	L, N, L-N ±2kV for 24V and 36Vout versions	IEC/EN61000-4-4:2012, Criteria A
	L, N, L-N ±2kV for 5V and 12Vout versions	IEC/EN61000-4-4:2012, Criteria B
	L, N, L-N ±4kV for all versions	
Surge Immunity	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
	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

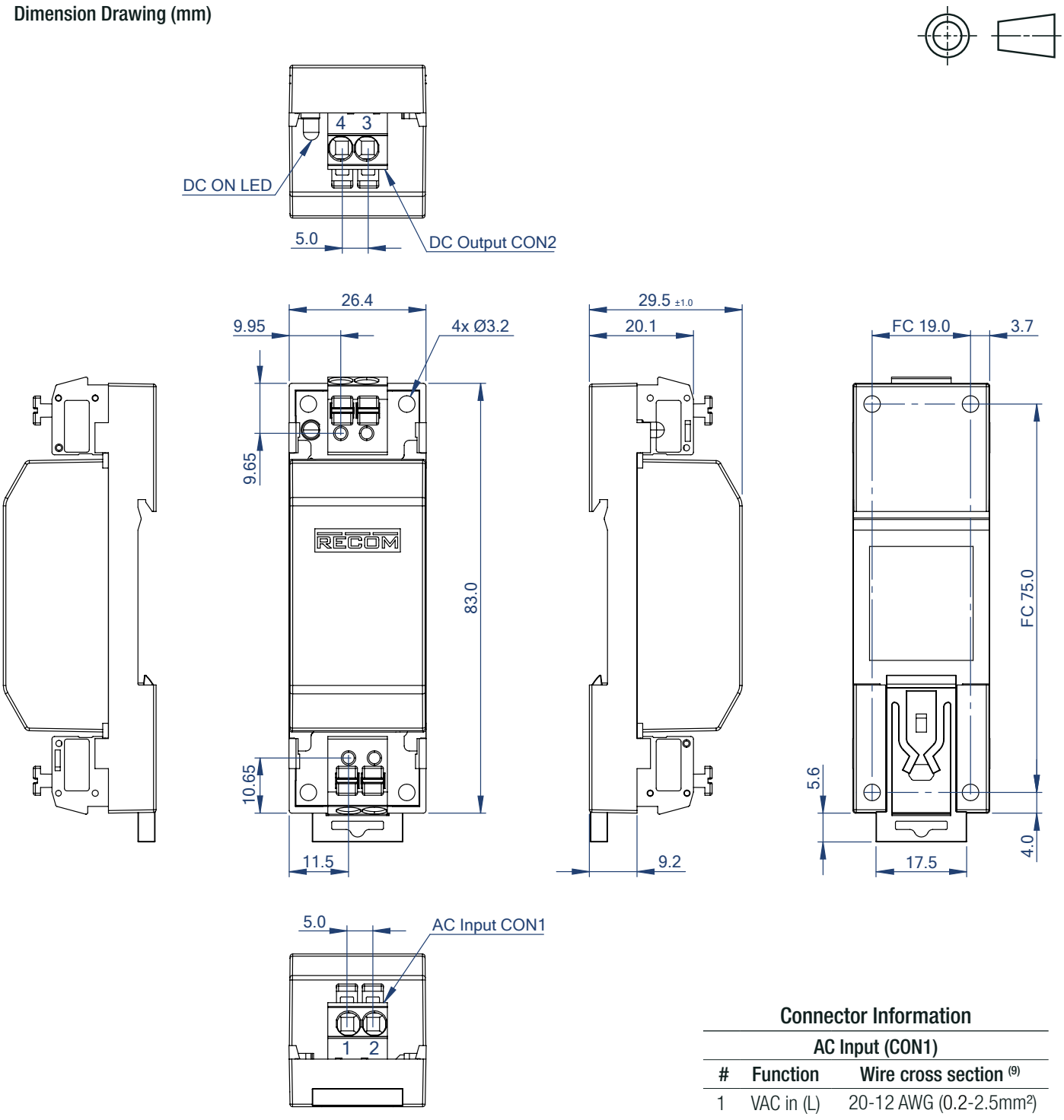
EMC Compliance according to EN55032	Condition	Standard / Criterion
Electromagnetic compatibility of multimedia equipment – Emission Requirements	O/P either floating or connected to GND	EN55032:2015+A11:2020, Criteria B

DIMENSION & PHYSICAL CHARACTERISTICS

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

DIMENSION & PHYSICAL CHARACTERISTICS

Dimension Drawing (mm)



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 (0.2-2.5mm²)
4	-Vout	Usable wire: solid/stranded

FC= Fixing centers

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.

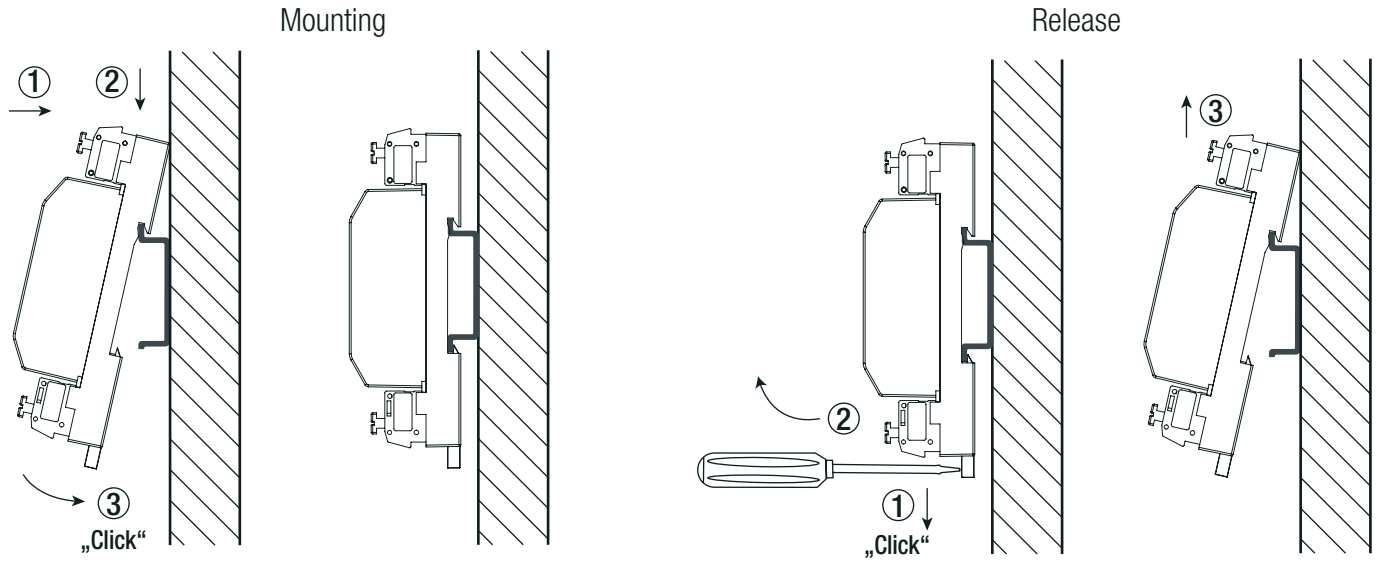
Note10: For DIN-Rail mounting, follow the instructions under **„Mounting Instruction“**

Tolerance: xx.x= ±0.5mm
xx.xx= ±0.25mm

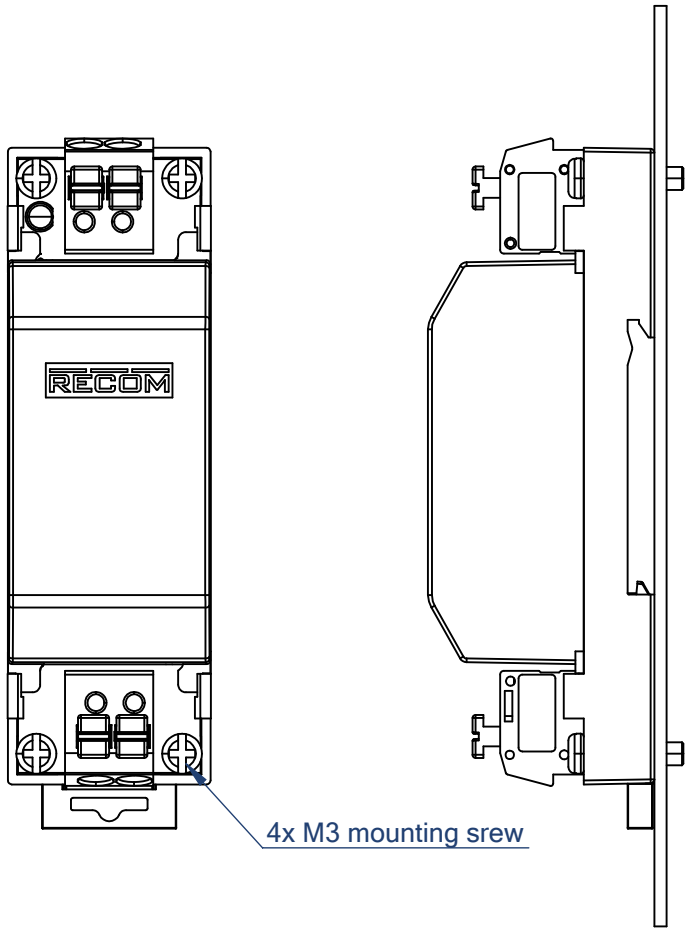
INSTALLATION & APPLICATION

Mounting Instruction

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



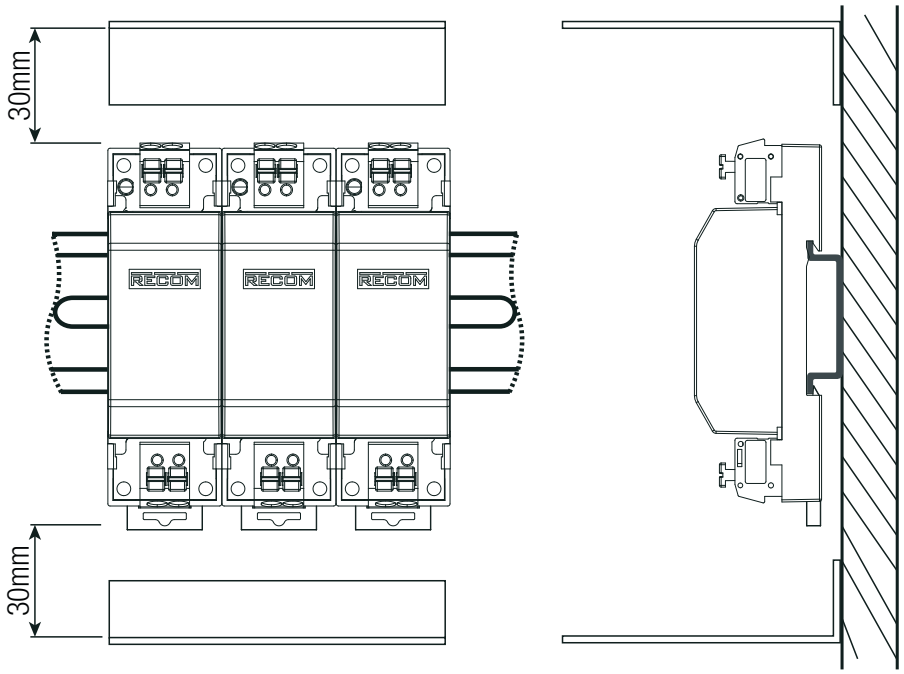
Mounting Instruction with screws



Recommended mounting tightening torque= 0.7Nm

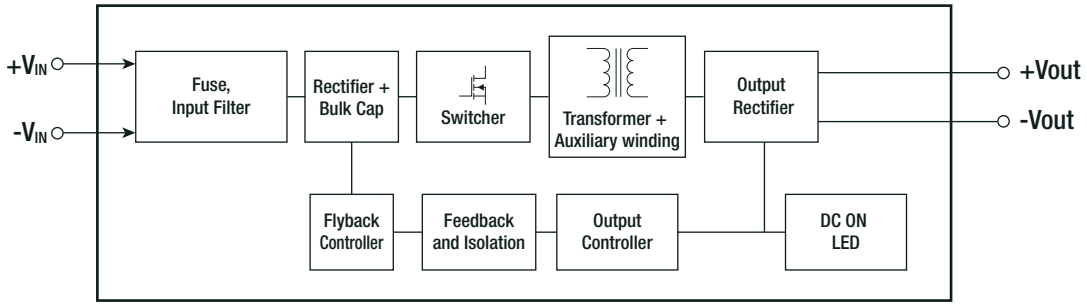
INSTALLATION & APPLICATION

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	Type	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.