Technical Data Sheet

RACPRO1-T240 Series ◊ 3AC DIN-Rail Power Supply

240W ◊ Input: 400-480VAC nom. / 450V-815VDC

RECOM AC/DC Converter

FEATURES

- Slim Design (43mm) with 25° Push-In connectors
- Fast tool-less mounting and demounting
- Active Inrush Current Limitation
- 2-phase AC operation 2x350V to 2x575V
- DC-Input Range 430V to 815V/850V 10s
- Highest Efficiency up to 94.1%
- Full Power -40°C/+70°C, Boost Power 150%/5s
- Thermal Power Bonus 120%/45°C
- Highest Lifetime Expectancy 80.000h/40°C
- DC-OK Signal
- Reduced no load power consumption 0.8W to 1.1W
- SEMI F47-0706 Sec. 7.1 conform
- Made in Europe with 3 year warranty



Dimensions (HxWxD): 135.0 x 43.0 x 140.4mm (5.3 x 1.7 x 5.5 inch)
531g (1.17 lbs)

APPLICATIONS



SAFETY & EMC

RoHS² compliant 10 from 10 · Reach compliant · CE · IECEE CB SCHEME · cULus E224736 · cULus LISTED E470721

DESCRIPTION

The slim RACPRO1-T240 is a high reliability, three phase AC input, 24V/240W DIN rail mount power supply in extremely compact dimensions of 135 x 125mm with a width of only 43mm. It is specially designed for demanding applications in the harsh industrial automation field with an extended mains input surge immunity of up to 6kVAC and return voltage immunity >35V at the output making it suitable for safe operation against back feeding loads like decelerating motors and inductors. These units will deliver up to 240W over the full -40°C to +70°C ambient temperature range with only convection cooling. An Thermal Power Bonus of up to 288W at 45°C plus a power boost of up to 150% for 5s makes them suitable for powering highly inductive or capacitive loads. The unique and innovative modern design with 25° push-in connectors allows easy tool-less installation or replacement. The product is certified according to the global safety standards IEC/EN/UL 62368-1, IEC/EN/UL 61010-1 and IEC/EN/UL/CSA 61010-2-201. Electromagnetic radiated and conducted emissions are compliant to heavy industrial EN 61000-6-4 Class B emission standard and EN 61000-6-2 immunity standard.

SELECTION GUIDE

Part Number	Input Voltage Range [VAC]	Output Voltage nom. [VDC]	Adjustable Output Voltage [VDC]	Output Current nom. [A]	Efficiency (1) typ. [%]	rated Output Power (2) [W]
RACPRO1-T240/24	3x 320-575	24	24-28	10	94.1	240

Note1: Efficiency is tested at nominal input (400/480VAC) and full load at +25°C ambient.

Note2: Thermal Power Bonus 120% (T_{AMB}= 45°C max.), and Boost Power 150%/5sec max.; refer to **„Boost Power“**.

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ACCESSORIES

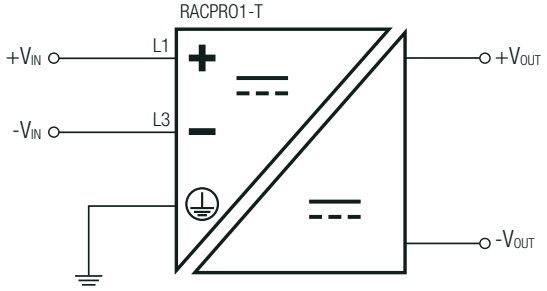
Part Number	Description	Datasheet Link
RACPRO1-4SP/24V/5A	electronic circuit breaker; 4-channel; input voltage DC 24 V adjustable output current 1.75-5.75A and selectable NEC Class 2 mode	RACPRO1-4SP/24V/5A.pdf
RACPRO1-4SP/24V/10A	electronic circuit breaker; 4-channel; input voltage DC 24 V; adjustable output current 3.5-11.5A	RACPRO1-4SP/24V/10A.pdf
RACPRO1-RD40	highly efficient n+1 redundancy or decoupling diode module 2 x 20A or 1 x 40A for power supplies with 12V, 24V or 48V output voltage	RACPRO1-RD40.pdf

BASIC CHARACTERISTICS (measured @ T_{AMB}= 25°C, 3AC 400VAC full load and after warm-up unless otherwise stated)

Parameter	Condition		Min.	Typ.	Max.
Nominal Input Voltage	50/60Hz		400VAC		480VAC
Operating Range [3]	3 phase operation		320VAC		575VAC
	2 phase operation		350VAC		575VAC
	DC operation refer to **„Connections for DC-operation“**	continuous	450VDC		815VDC
		10s max.			850VDC
Turn-on Voltage	prevents switching on during 1AC operation		310VAC		
	DC operation		440VDC		
Turn-off Voltage	AC operation		290VAC		
	DC operation		410VDC		
Input Current	AC operation	400VAC			3x 0.7A
		480VAC			3x 0.6A
	DC operation	500VDC			0.8A
Inrush Current	3AC 400VAC, cold start				10A
No Load Power Consumption	3AC 400VAC				0.8W
	3AC 500VAC				1.1W
Input Frequency Range			47Hz		63Hz
Nominal Output Voltage (factory set)				24VDC	
Minimum Load			0%		
Power Factor	full load		0.45		
Start-up time	2 & 3 phase operation, 400VAC			37ms	50ms
Rise time				23ms	30ms
Hold-up time	400VAC			15ms	
	480VAC			30ms	
Internal Operating Frequency				65kHz	
Ripple and Noise	20MHz bandwidth				1% of nom V_{OUT}

Note3: The products were submitted for safety files at AC and DC-Input operation. (350V-575VAC and 450-600VDC)
If input voltage is >500VDC consider an external fuse according to applicable standards.
2phase operation is not included in the safety approvals. Additional tests might be necessary when the complete application has to be approved according to UL 62368-1, 61010-1 and UL 61010-2-201.

Connections for DC-operation



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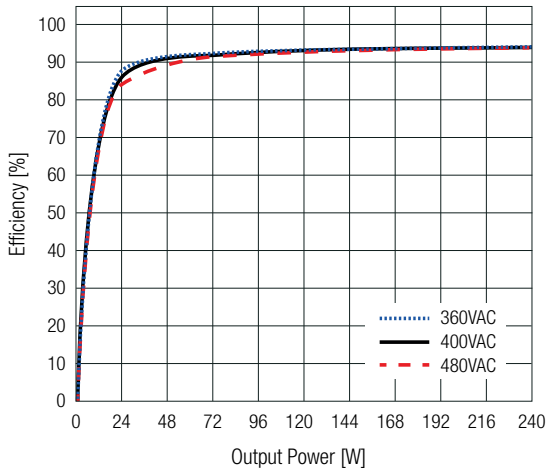
RACPRO1-T240 Series ◊ 3AC DIN-Rail Power Supply

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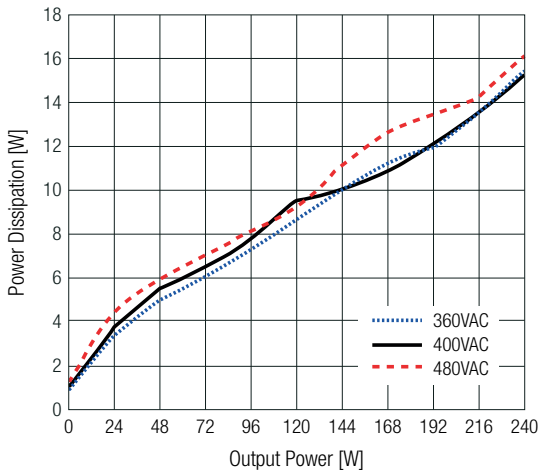
RECOM AC/DC Converter

BASIC CHARACTERISTICS (measured @ T_{AMB}= 25°C, 3AC 400VAC full load and after warm-up unless otherwise stated)

Efficiency vs. Load



Power Dissipation vs. Load



ADDITIONAL FEATURES

Parameter	Condition	Value
Output Voltage Adjustability [4]	on-board potentiometer	24-28VDC
Boost Power	refer to **„Boost Power“**	150% for 5s
DC-OK LED	LED green	output voltage ok, normal mode
	LED off	abnormal mode, no operation or failure
Signal Contact	closed	normal mode
	open	abnormal mode, no operation or failure
Signal Contact Rating	do not connect signaling contact to hazardous voltages	30VDC/0.1A

Note4: When input voltage is below 350VAC, the output voltage is limited to 24VDC.
Make sure that the maximum rated output power will not be exceeded when trimming up.

REGULATIONS (measured @ T_{AMB}= 25°C, 3AC 400VAC full load and after warm-up unless otherwise stated)

Parameter	Condition	Value
Output Accuracy		±1.0% max.
Line Regulation	low line to high line, full load	±0.1% typ.
Load Regulation	0% to 100% load	±0.4% typ.
Max. Capacitive Load (start-up)		20mF
Transient Response	10-100% load	±3.0% typ.
	recovery time	100ms typ.

PROTECTIONS (measured @ T_{AMB}= 25°C, 3AC 400VAC full load and after warm-up unless otherwise stated)

Parameter	Type	Value
Internal Input Fuse	DC compliant	2x T5A, slow-blow
Easy Fuse Tripping	refer to **„Easy Fuse Tripping“**	250%/20ms
External Input Protection	3-phase circuit breaker with a minimum of 6A and a maximum of 16 A, characteristic B or C; or a circuit breaker for motor protection with a maximum of 16A, trip class 10	
Short Circuit Protection (SCP)		hiccup mode, auto recovery
Over Voltage Protection (OVP)	SELV output	35VDC, latch off
Return Voltage Immunity	continuous	35VDC
	<5 min	38VDC
Absorbing Energy		1.5J
Over Voltage Category (OVC)		OVC II (5000m)
		OVC III (2000m)
Over Current Protection (OCP)	<5 sec	>150% of rated load current, hiccup mode, auto recovery
	<20ms [5]	>250% of rated load current, hiccup mode, auto recovery
Class of Equipment		Class I with PE connection

Note5: V_{OUT}= 19VDC min.

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RECOM AC/DC Converter

PROTECTIONS (measured @ T_{AMB}= 25°C, 3AC 400VAC full load and after warm-up unless otherwise stated)

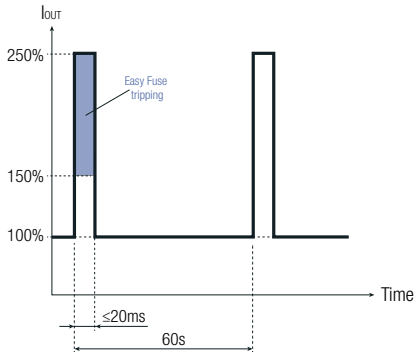
Parameter	Type		Value
Isolation Voltage (safety certified) [6]	tested for 1 minute	I/P to O/P	4kVAC / 5kVDC
		I/P to PE	1.6kVAC / 2.5kVDC
		O/P to PE	500VAC / 700VDC
Isolation Resistance	I/P to O/P		4.5MΩ min.
Insulation Grade			reinforced
Input/Output Separation [7]			SELV/ES1
Earth Leakage Current	400VAC/50Hz		0.65mA typ.

Note6: For repeat Hi-Pot testing, reduce the time and/or the test voltage

Note7: The product has been tested in accordance with EN IEC 61010-2-201:2024, and the output circuit complies with the generally applicable requirements and limits for Safety Extra-Low Voltage (SELV) as defined in IEC 60364-4-41. By additionally connecting the output circuit to earth in accordance with the relevant standards, the output circuit can be designated as a PELV circuit.

Easy Fuse tripping

(400V-480VAC or 500VDC; -40°C to +60°C max.)



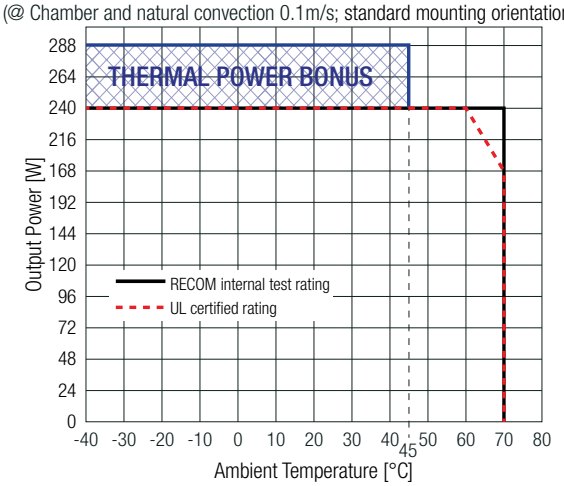
ENVIRONMENTAL (measured @ T_{AMB}= 25°C, 3AC 400VAC full load and after warm-up unless otherwise stated)

Parameter	Condition		Value
Operating Ambient Temperature Range	@ natural convection (0.1m/s)	with derating	-40°C to +70°C
		without derating	refer to **„Derating Graph“**
Operating Altitude [8]			5000m
Operating Humidity	non-condensing		95% RH max.
Pollution Degree			PD2
IP Rating			IP20
Shock	acc. to IEC 60068-2-27 Fa	non-operating	15G/11ms, 3 times (positive/negative) in all axis
Vibration	acc. to IEC 60068-2-6 Fc	non-operating	5–8.4Hz: displacement increasing from 3.5mm to 14mm peak-to-peak 8.4–150Hz: constant acceleration 2G, 10 cycles/axis (min-max-min), 1 octave/min
MTBF	according to EN/IEC 61709 (SN29500), T_{AMB}= 40°C		1.015 x 10^3 hours
Design Lifetime	T_{AMB}= 40°C @ 100% Load		80 x 10^3 hours

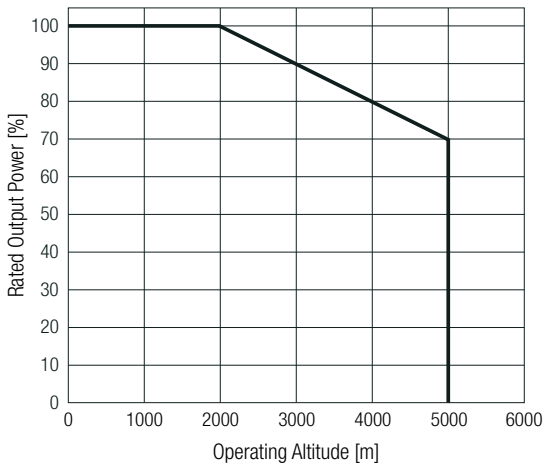
Note8: Recognized by safety agency for safe operation up to 5000m. High altitude operation may impact the performance and lifetime

Derating Graph

(@ Chamber and natural convection 0.1m/s; standard mounting orientation)



Altitude Derating

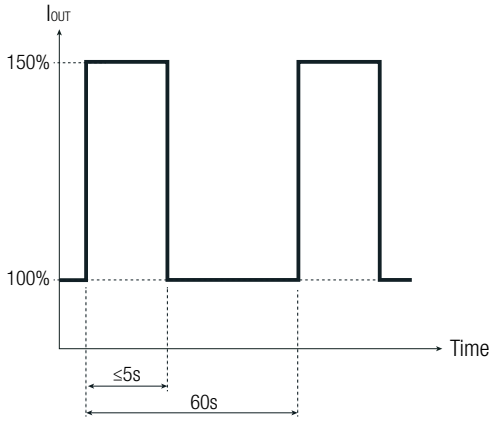


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ENVIRONMENTAL (measured @ T_{AMB}= 25°C, 3AC 400VAC full load and after warm-up unless otherwise stated)

Boost Power

(400V-480VAC or 500VDC; -40°C to +60°C max.)



SAFETY & CERTIFICATIONS

Certificate Type (Safety)	Report Number	Standard
Audio/Video, information and communication technology equipment - Part 1: Safety requirements (CB)	24TH0201_62368-1_0	IEC62368-1:2018 3rd Edition
Audio/Video, information and communication technology equipment - Part 1: Safety requirements		EN IEC 62368-1:2020+A11:2020
Audio/Video, information and communication technology equipment - Part 1: Safety requirements	E224736-A6031-UL	UL62368-1:2019 3rd Edition CAN/CSA-C22.2 No. 62368-1-19 3rd Edition
Electrical Equipment For Measurement, Control, and Laboratory Use; Part 1: General Requirements (CB)	4TH0201_61010-1_0	IEC61010-1:2010+A1:2016 3rd Edition
Electrical Equipment For Measurement, Control, and Laboratory Use; Part 1: General Requirements		EN61010-1:2010+A1:2019
Electrical Equipment For Measurement, Control, and Laboratory Use; Part 1: General Requirements	E470721-Vol5-Sec1	UL61010-1:2012 3rd Edition CAN/CSA-C22.2 No. 61010-1-12 3rd Edition
Electrical Equipment For Measurement, Control, and Laboratory Use; Part 2-201: Particular requirements for control equipment (CB)	24TH0201_61010-2-201_0	IEC61010-2-201:2017 2nd Edition
Electrical Equipment For Measurement, Control, and Laboratory Use; Part 2-201: Particular requirements for control equipment		EN IEC 61010-2-201:2018
Electrical Equipment For Measurement, Control, and Laboratory Use; Part 2-201: Particular requirements for control equipment	E470721-Vol5-Sec1	UL61010-2-201:2018 2nd Edition CAN/CSA-C22.2 No. 61010-2-201:2018-02-01
RoHS2		RoHS 2011/65/EU + AM2015/863

EMC Compliance according to IEC/EN61000-6-4/6-2	Condition		Standard / Criterion
Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity standard for industrial environments			IEC/EN61000-6-2:2019
Electromagnetic compatibility (EMC) - Part 6-3: Generic standards - Emission standard for residential area			IEC/EN 61000-6-3:2021
ESD Electrostatic discharge immunity test	Air: ±8kV; Contact: ±6kV		IEC61000-4-2:2008, Criteria A EN61000-4-2:2009, Criteria A
Radiated, radio-frequency, electromagnetic field immunity test	10V/m (80-1000MHz)		IEC/EN61000-4-3:2006+A2:2010, Criteria A
Fast Transient and Burst Immunity	AC Power Port: ±4kV DC-Output Port: ±2kV		IEC/EN61000-4-4:2012, Criteria A
Surge Immunity	AC-Power Port:	L1-L2, L1-L3, L2-L3: ±2.5kV L1-PE,L2-PE,L3-PE: ±6kV	IEC/EN61000-4-5:2014+A1:2017, Criteria A
	DC-Output Port:	Vout(+) - Vout(-): ±1kV Vout(+)-PE, Vout(-)-PE: ±1kV	
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, 50/60Hz		EN61000-4-8:2010, Criteria A
Voltage Dips	400VAC, 50Hz	100%, 5 cycle; 70%, 10 cycles; 40%, 25 cycles; 30%, 25 cycles	IEC61000-4-11:2004+A1:2017, Criteria B
Voltage Interruptions	400VAC, 50Hz	100%, 250 cycles	IEC61000-4-11:2004+A1:2017, Criteria B
Voltage Sag	80% of 3x 400VAC, 1000 ms 70% of 3x 400VAC, 500 ms 5% of 3x 400VAC, 200 ms		SEMI F47-0706, Sec. 7.1 procedure per EN 61000-4-11, Criteria A

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240W ◊ Input: 400-480VAC nom. / 450V-815VDC

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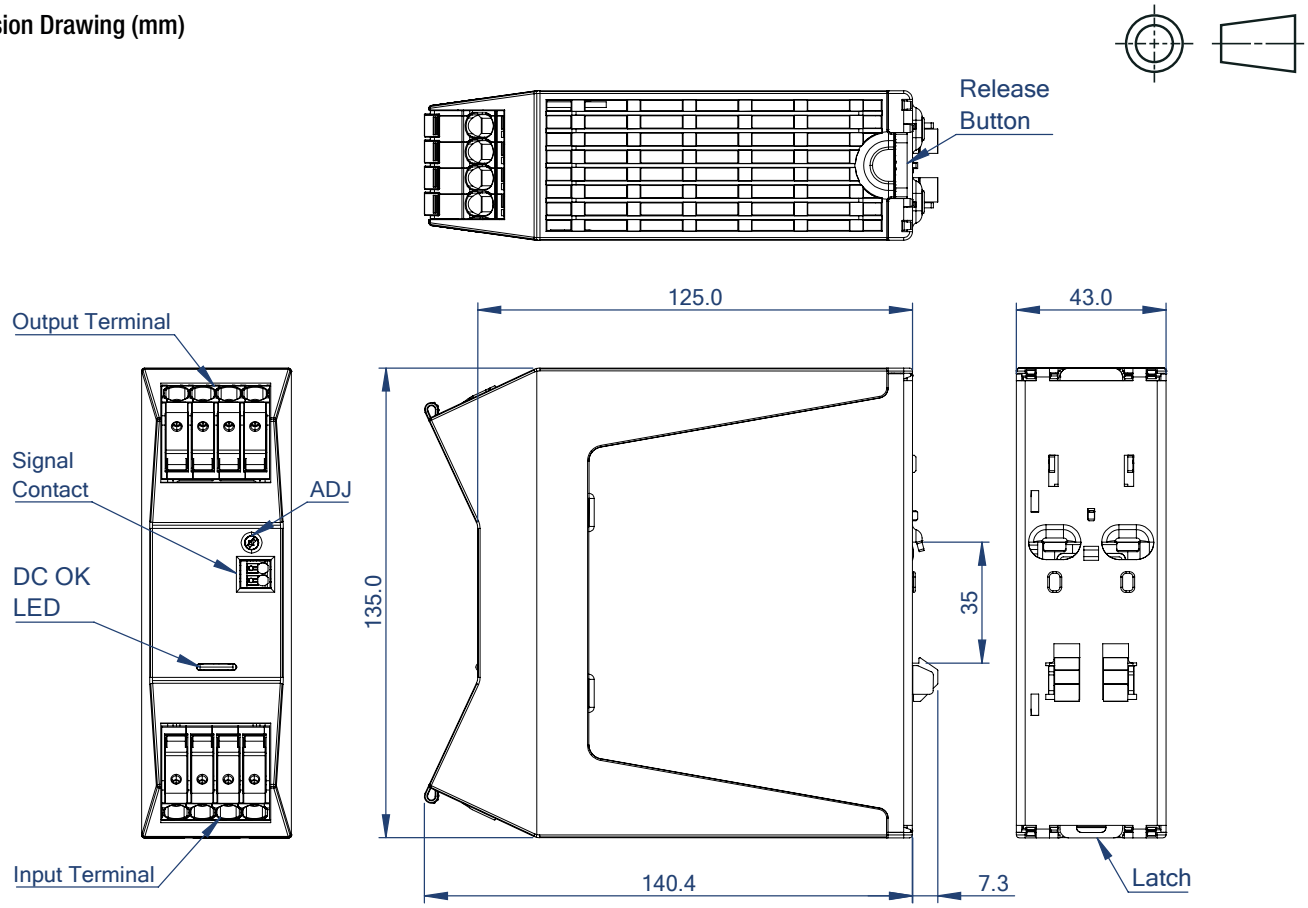
SAFETY & CERTIFICATIONS

EMC Compliance according to IEC/EN61000-6-4/6-2	Condition	Standard / Criterion
Limits of Harmonic Current Emissions		EN IEC 61000-3-2:2019
Limits of Voltage Fluctuations & Flicker		EN61000-3-3:2013+A1:2017

DIMENSION & PHYSICAL CHARACTERISTICS

Parameter	Type	Value
Material	chassis	polycarbonate (UL94 V-0) / aluminum
Dimension (HxWxD)		135.0 x 43.0 140.4mm 5.3 x 1.7 x 5.5 inch
Weight		531g 1.17 lbs

Dimension Drawing (mm)



Tolerance: ±0.5mm

Input & Output Cage Clamp (9)

Function	AWG	mm²
L1, L2, L3	24-8	0.25-6
PE ⏚	24-8	0.25-6
+1, +2 (Vout)	24-8	0.25-6
-1, -2 (Vout)	24-8	0.25-6
Wire stripping length: 12-13mm		

Push-In Signal Terminal (9, 10)

Function	AWG	mm²
Signal (13,14)	24-16	0.25-1.5
Wire stripping length: 8-9mm		

Wire Pull-Out Test Force - Input & Output Clamp

Standard	Conductor Size	Test Force
UL 1059 / UL 486E	24 AWG	13.4 N
	12 AWG	60 N
IEC 60947-7-4	0.2mm²	10 N
	6mm²	80 N
	10mm²	90 N

Note9: It is recommended to use flexible (stranded) or solid cables with the above mentioned cross-section.
Use copper conductors designed for an operating temperature of at least 90°C. Supported copper conductor categories: Class 1, 2 and 5

Note10: Do not connect signaling contact to hazardous voltages. Ferrules are required for flexible cables.

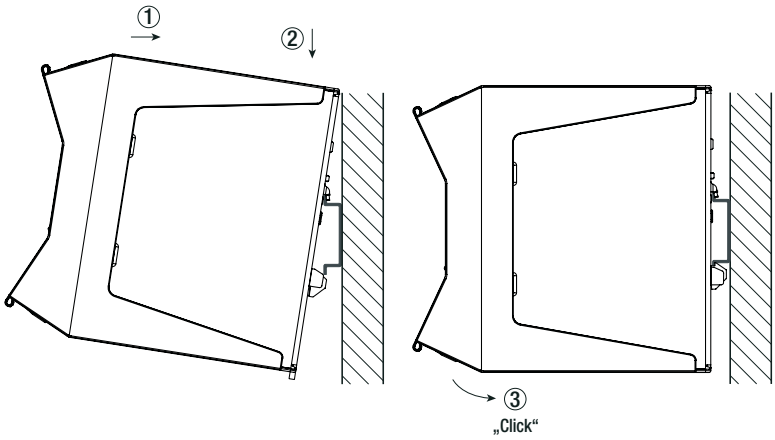
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INSTALLATION & APPLICATION

Mounting Instruction

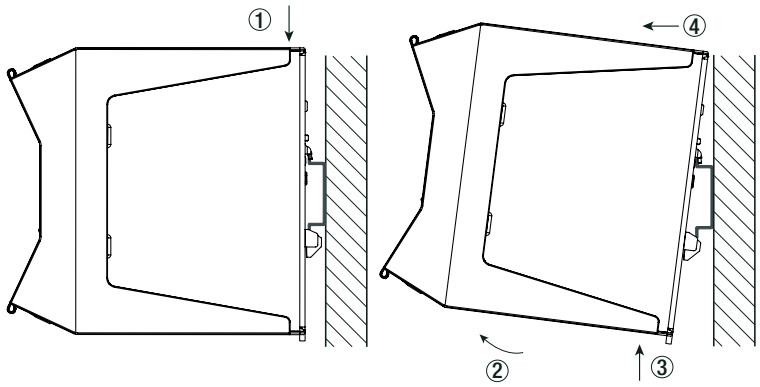
Mounting Rail: Standard TS35 DIN Rail in accordance with EN 60715.

Mounting



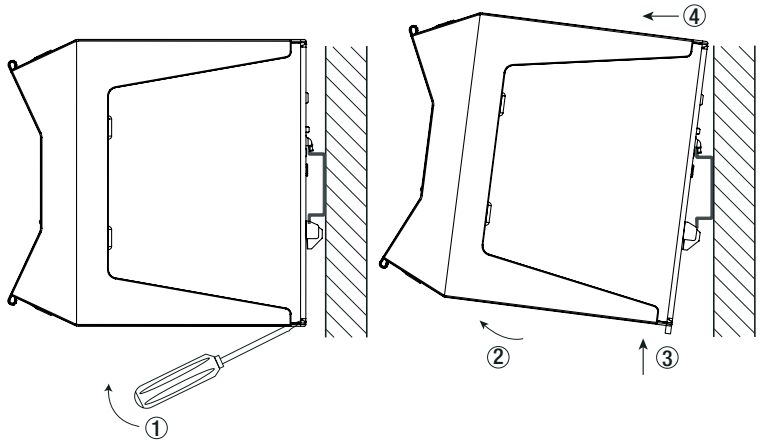
1. Place the device on the DIN rail with a slight upward tilt. Snap the device into the DIN rail.
2. Now tilt the device downwards until it reaches the lower part of the DIN rail.
3. Press the lower part of the device firmly against the rail until the device locks into position on the DIN rail.
4. To make sure it is securely locked in place, give the device a gentle shake.

Release Option 1 (tool-less)



1. Press the unlock button on the top of the device to release the latch from the rail.
2. While pushing the button, slightly tilt the device forward.
3. Pull the device away from the DIN rail by pushing it up
4. Remove the power supply completely from the rail.

Release Option 2 (by using a screwdriver)



1. Pull the DIN rail latch by using a screwdriver OUT of the device and HOLD it.
2. Tilt the bottom of the device OUT.
3. Pull the device away from the DIN rail by pushing it up.
4. Remove the power supply completely from the rail.

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INSTALLATION & APPLICATION

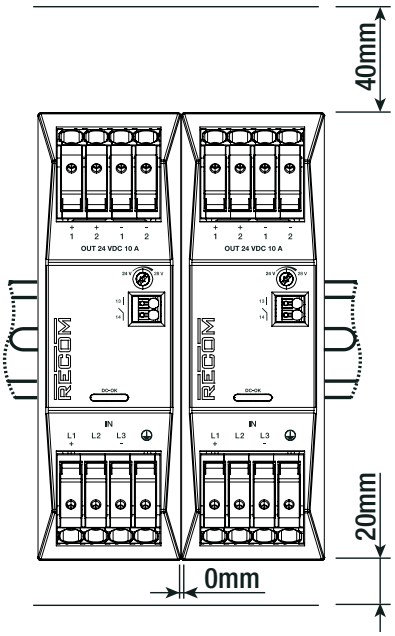
Installation Instructions

To guarantee sufficient convection cooling, keep a distance of 40mm above and 20mm below the device.

For vertical mounting the device should be installed with the input terminal on the bottom (= standard orientation).

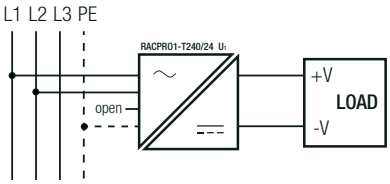
For all other mounting orientations, the maximum output power must be reduced by 15% of the nominal power.

No space between supplies are required.



Phase redundancy

1) If one phase fails, operation is still guaranteed. (2-phase operation)



Series Operation

1) Only use PSU with the same type and performance class with identical parameters.
2) To increase the DC output voltage, connect 2 or more power supply units in series. (RECOM recommended 3 units max.)
3) Therefore, negative output terminal "-1" of the first power supply unit must be connected to the positive output terminal "+1" of the second power supply unit and routed to the load. Depending on the common output-side earth reference point of the power supply unit, see below examples:
4) **ATTENTION**:
   Leakage current, EMI, inrush current, harmonics will increase when using multiple power supplies.

2 PSU's in series:	**Figure 1**	**Figure 2**	**Figure 3**
RACPRO1-T240/24	+48Vdc	-48Vdc	±24Vdc

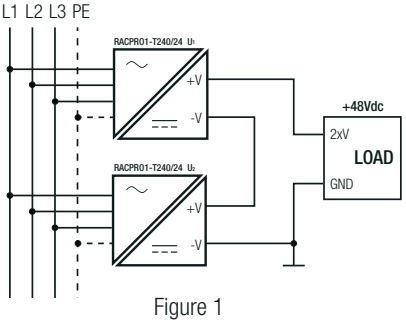


Figure 1

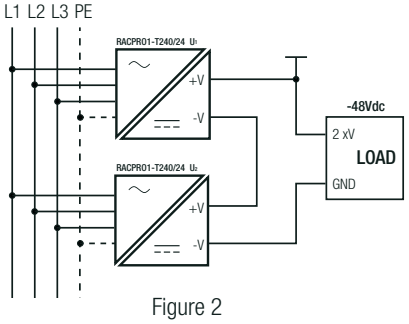


Figure 2

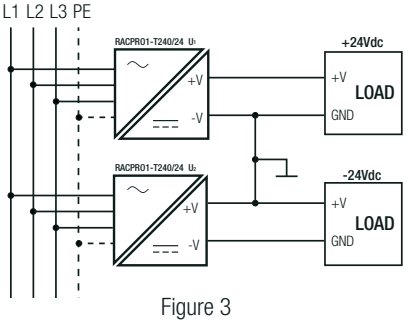


Figure 3

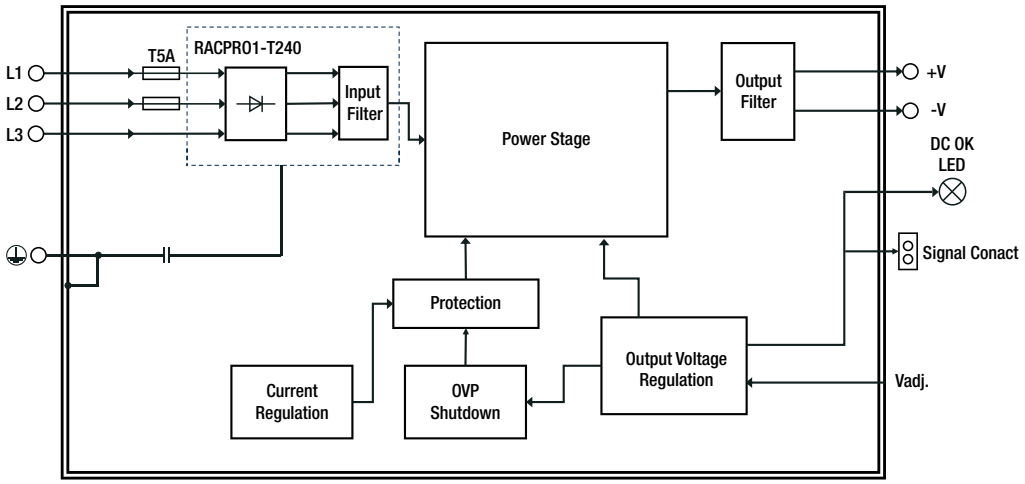
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240W ◊ Input: 400-480VAC nom. / 450V-815VDC

RECOM AC/DC Converter

BLOCK DIAGRAM



PACKAGING INFORMATION

Parameter	Type	Value
Packaging Dimension (LxWxH)	cardboard box	175 x 166 x 59mm
Packaging Quantity		1 pc
Storage Temperature Range		-40°C to +85°C
Storage Humidity	non-condensing	85% 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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