Switching Power Supplies
3-Phase RACPRO1 Series

Overview

The slim RACPRO1 series is a high-reliability, three-phase AC input, DIN rail mount power supply. It is specially designed for demanding applications in the harsh industrial automation field. The unique and innovative modern design with 25-degree push-in connectors allows easy tool-less installation or replacement.

Features

- Slim design with 25-degree push-in connectors
- Fast tool-less mounting and demounting
- Active inrush current limitation
- Thermal power bonus 120%/45°C
- 3-year warranty

RACPRO1-T240/24

3-Phase Switching Power Supplies

Part Number	Price	Output Voltage Range	Input Voltage Range	Output (Adjustable)	Efficiency	Dimensions H x W x D mm [in]	Weight gram [lb]	Drawing Link
RACPRO1-T240/24	$140.00	24-28 VDC	320-575 VAC 450-815 VDC	24 VDC @ 10A/240W	94.1% @ 480 VAC	135 x 43 x 140.4 [5.3 x 1.7 x 5.5]	531 [1.17]	PDF
RACPRO1-T480/24	$190.00	24-28 VDC		24 VDC @ 20 A/480W	95% @ 480 VAC	135 x 52 x 155.7 [5.3 x 2.0 x 6.1]	768 [1.69]	PDF
RACPRO1-T480/48	$190.00	48-56 VDC		48 VDC @ 10A/480W	94% @ 480 VAC			PDF
RACPRO1-T960/24	$275.00	24-28 VDC		24 VDC @ 40A/960W	96% @ 480 VAC	135 x 80 x 155.7 [5.3 x 3.15 x 6.1]	1140 [2.51]	PDF
RACPRO1-T960/48	$275.00	48-56 VDC		48 VDC @ 20A/960W	97% @ 480 VAC			PDF

3-Phase Switching Power Supplies

Part Number	Input/Output Cage Clamp								Push-in Signal Terminal *			
	Function	AWG	mm^2	Wire Stripping Length	Function	AWG	mm^2	Wire Stripping Length	Function	AWG	mm^2	Wire Stripping Length
RACPRO1-T240/24	L1, L2, L3	24-8	0.25-6	12-13mm	+1, +2 (Vout)	24-8	0.25-6	12-13mm	Signal	24-16	0.25-1.5	8-9mm
	PE				-1, -2 (Vout)							
RACPRO1-T480/24	L1, L2, L3				+1, +2 (Vout)							
	PE				-1, -2 (Vout)							
RACPRO1-T480/48	L1, L2, L3				+1, +2 (Vout)							
	PE				-1, -2 (Vout)							
RACPRO1-T960/24	L1, L2, L3				+1, +2 (Vout)	18-4	0.75-25	18-20mm	Signal (13, 14)			
	PE				-1, -2 (Vout)							
RACPRO1-T960/48	L1, L2, L3				+1, +2 (Vout)							
	PE				-1, -2 (Vout)							

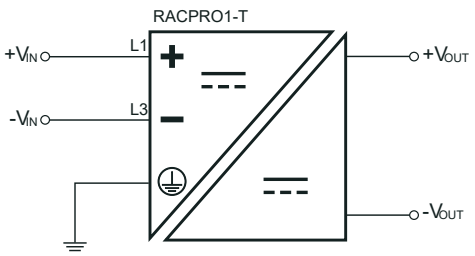
*** Do not connect to hazardous voltages.**
Ferrules are required for stranded wire.

Switching Power Supplies 3-Phase T240 Model RACPRO1 Series

Specifications		
Models		***T240***
Nominal Input Voltage		400 to 480 VAC @ 50/60 Hz
Operating Range [1]	***3-Phase***	320 to 575 VAC
	2-Phase	350 to 575 VAC
	DC Operation (Refer to Connections for DC Operation Diagram)	Continuous 450 to 815 VDC 10s maximum 850 VDC
Turn-on Voltage	***AC Operation***	Minimum 310 VAC (prevents switching on 1AC operation)
	DC Operation	Minimum 440 VDC
Turn-off Voltage	***AC Operation***	Minimum 290 VAC
	DC Operation	Minimum 410 VDC
Input Current	***400 VAC***	Maximum 3x 0.7A
	480 VAC	Maximum 3x 0.6A
	500 VDC	Maximum 0.8A
Inrush Current		Maximum 10A (3AC 400 VAC, cold start)
No Load Power Consumption		Maximum 0.8W (3AC 400 VAC) Maximum 1.1W (3AC 500 VAC)
Input Frequency Range		47 to 63 Hz
Nominal Output Voltage		Typical 24 VDC (factory set)
Minimum Load		0%
Power Factor		Minimum 0.45 at full load
Start-up Time		Typical 37ms maximum 50ms (2&3 phase operation, 400 VAC)
Rise Time		Typical 23ms maximum 30ms
Hold-up Time	***400 VAC***	Typical 15ms
	480 VAC	Typical 30ms
Internal Operating Frequency		Typical 65 kHz
Ripple and Noise		Maximum 1% of nom V_{out} (20 MHz bandwidth)
Housing Material		Polycarbonate/aluminum
Agency Approvals		cULus File NMTR.E470721, CE

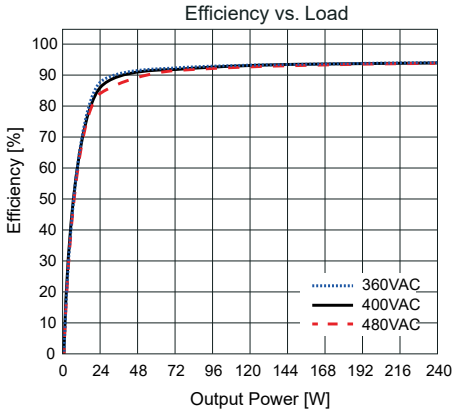
[1] The products were submitted for safety files at AC and DC-Input operation. (350V-575 VAC and 450-600 VDC) If input voltage is >500 VDC consider an external fuse according to applicable standards. 2-phase operation is not included in the safety approvals. Additional tests might be necessary when the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

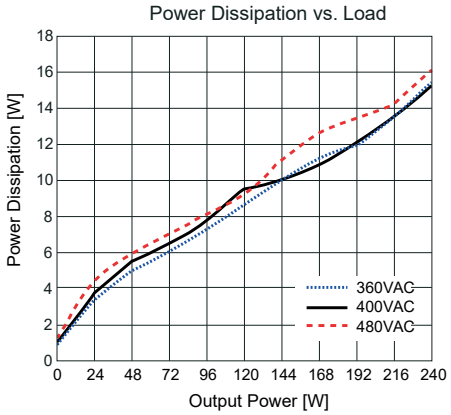
Connections for DC Operation



Switching Power Supplies 3-Phase T240 Model RACPRO1 Series

Characteristic Curves





Additional Features		
Parameter	***Condition***	***Value***
Output Voltage Adjustability (1)	On-board potentiometer	24-48 VDC
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	30 VDC / 0.1A

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

Regulations		
Parameter	***Condition***	***Value***
Output Accuracy	—	Maximum ±1.0%
Line Regulation	Low line to high line, full load	Typical ±0.1% .
Load Regulation	0 to 100% load	Typical ±0.4%
Max. Capacitive Load (start-up)	—	20mF
Transient Response	10 to 100% load	Typical ±3.0%
	Recovery time	Typical 100ms

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

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Protections		
Parameter	***Type***	***Value***
Internal Input Fuse	DC compliant	2x T15A, slow-blow
Easy Fuse Tripping	—	250% / 20ms
External Input Protection	—	16A C-characteristic circuit breaker
Short Circuit Protection (SCP)	—	Hiccup mode, auto recovery
Over Voltage Protection (OVP)	SELV output	35 VDC, latch off
Return Voltage Immunity	Continuous	35 VDC
	< 5 min	38 VDC
Absorbing Energy	—	1.5J
Over Voltage Category (OVC)	—	OVCII
Over Current Protection (OCP)	< 5 sec	> 150% of rated load current, hiccup mode, auto recovery
	< 20ms (1)	> 250% of rated load current, hiccup mode, auto recovery
Class of Equipment	—	Class I with PE connection
Isolation Voltage (safety certified) (2)	I/P to O/P (tested for 1 minute)	3.5 kVAC / 5 kVDC
	I/P to PE (tested for 1 minute)	1.6 kVAC / 2.5 kVDC
	O/P to PE (tested for 1 minute)	500 VAC / 700 VDC
Isolation Resistance	I/P to O/P	4.5 MΩ minimum
Insulation Grade	—	Reinforced
Earth Leakage Current	480 VAC / 60Hz	3.5 mA maximum

Measured @ T_{AMB}= 25°C, 3AC 400 VAC full load and after warm-up unless otherwise stated.
(1) V_{OUT} = 19 VDC min.
(2) For repeat Hi-Pot testing, reduce the time and or the test voltage

Environmental		
Parameter	***Condition***	***Value***
Operating Ambient Temperature Range	At natural convection (0.1m/s)	-40 to 70°C [-40 to 158°F]
Operating Altitude	—	Recognized by safety agency for sate operation up to 5000m. High altitude operation maybe impact the performance and lifetime.
Operating Humidity	Non-condensing	95% RH max.
Pollution Degree	—	2
IP Rating	—	IP20
Shock	According to IEC 60068-2-27 Fa (non-operating)	15G/11ms, 3 times (positive/negative) in all axis
Vibration	According to IEC 60068-2-6 Fc (non-operating)	5 - 8.4 Hz @ 3.5mm deflection 8.4 -150Hz @ 2G, 10 cycles /axis(min-max-min); 1 octave/min
MTBF	According to EN/IEC 61709 (SN29500)	1.015 x 10^3 hours
Design Lifetime	T_{AMB}= 40°C @ 100% Load	80 x 10^3 hours

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

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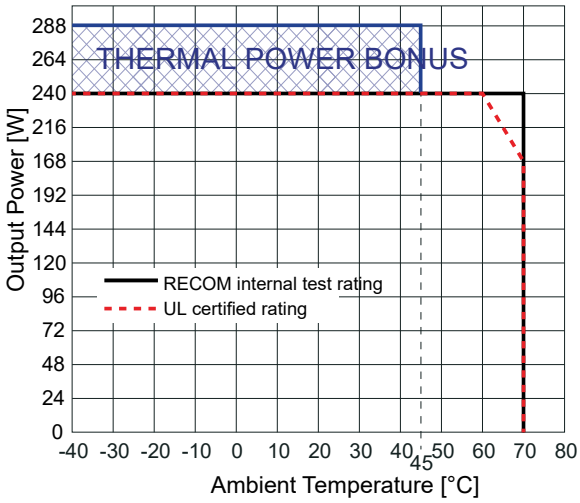
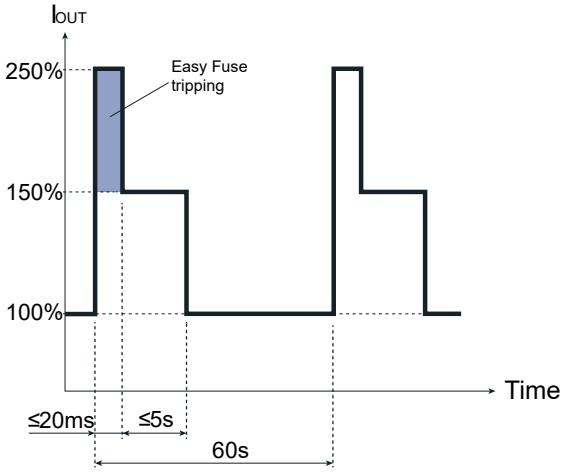
Derating Graph

(@ Chamber and natural convection 0.1m/s)



Boost Power Graph

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

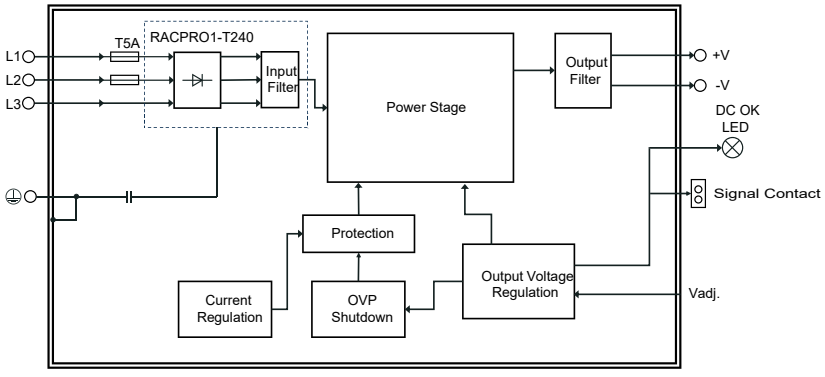


Easy fuse tripping is designed to trip a fuse in the event of a short circuit. Once the fuse has tripped, the current returns to its normal operation value. The impulse that causes easy fusing tripping happens independently of the power boost.

Phase Redundancy

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

Block Diagram



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Safety & Certifications RACPRO1 Series		
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	Pending	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	Pending	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	Pending	UL61010--2-201:2018 2nd Edition CAN/CSA-C22.2 No. 61010-2-201: 2018-02-01-12
RoHS2	—	RoHS 2011/65/EU + AM2015/863

EMC Compliance according to IEC/EN61000-6-4/6-2 RACPRO1 Series		
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 (80-6000MHz)	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-L3-L2-L3 ±2.5kV L1-PE,L2-PE, L3-PE: ± 6kV DC-/Output Port: Vout(+) - Vout(-), DC-OK(13-14): ±1kV Vout(+)-PE, Vout(-)-PE: ±2kV	IEC/EN61000-4-5:2014+A1:2017, Criteria A
Immunity to conducted disturbances, induced by radio-frequency fields	10Vrms (0.15-80 MHz)	IEC61000-4-6:2013, Criteria A EN61000-4-6:2014, Criteria A
Power Magnetic Field Immunity	30A/m, 50/60 Hz	EN6100-4-8:2010 Criteria A
Voltage Dips (400 VAC, 50Hz)	100% 5 cycles 70% 10 cycles 40% 25 cycles 30% 25 cycles	IEC61000-4-11:2004+A1:2017, Criteria B
Voltage Interruptions (400 VAC, 50Hz)	100% 250 cycles	IEC61000-4-11:2004+A1:2017, Criteria B
Limits of Harmonic Current Emissions	—	EN IEC 61000-3-2:2019
Limits of Voltage Fluctuations & Flicker	—	IEC61000-3-3:2013+A1:2017