



PHI-CON

225 W AC-DC Power Supply PACO225A-Series

- 85 ... 264 V_{AC} / 120 ... 370 V_{DC} universal input
- Continuously short circuit-, over current-, over voltage- & over temperature protection
- 4 kV_{AC} input/output isolation
- EN 60601-1, ES 60601-1, Safety class II
- MTBF > 300000 h
- Active PFC
- Small outlines 2" x 4" x 1"
- Basic PCB with conformal coating



Model guide

Type	Output voltage		Output Current		Efficiency@ full load & V _{in} 230 V _{AC} [%] typ.	Capacitive load [μF] max.
	[V _{DC}] nom.	Adjust-range [V _{DC}]	Free air convection cooling [A]	Forced cooling 13 CFM...[A]		
PACO225A12S	12	11.8..12.6	11.67	18.75	93	6000
PACO225A15S	15	14.7..15.8	9.33	15	93	5000
PACO225A24S	24	23.5..25.2	5.83	9.4	94	3200
PACO225A27S	27	26.5..28.4	4.81	8.35	94	2400
PACO225A36S	36	35.3..37.8	3.88	6.25	94	2000
PACO225A48S	48	47.1..50.4	2.91	4.70	94	1600
PACO225A54S	54	52.5..55.5	2.59	4.17	94	1000

Specifications

Input		
Voltage range		85 .. 264 V _{AC} or 120 .. 370 V _{DC} Power derating see diagram
Frequency		47 .. 63 Hz
Full load input current		≤ 3 A @ 115 V _{AC} ≤ 2 A @ 230 V _{AC}
Inrush current		40 A typ. @ 115 V _{AC} 75 A typ. @ 230 V _{AC}
Standby power @ 230 V _{AC}		≤ 0.5 W
Power factor correction	115 V _{AC}	0.99 @ full load
	230 V _{AC}	0.95 @ full load
Hot plug		Not possible
Isolation		
Isolation voltage	Input to output	4000 V _{AC} (1 Minute, < 10 mA)
	Input to PE	1500 V _{AC} (1 Minute, < 10 mA)
	Output to PE	
Isolation resistance	Input to output	50 MΩ
	Input to PE	@ 500 V _{DC} , T _a 25±5 °C, RH 95 %, not condensation
	Output to PE	
Leakage current		≤ 0.1 mA @ 240 V _{AC} , 60 Hz, ≤ 0.5 mA single failure mode
Isolation level	Input to output	2xMOPP
	Input to PE	1xMOPP
	Output to PE	1xMOPP
Output		
Voltage tolerance		± 1 %, typ.
Minimum load		Not required
Line regulation		± 0.5 %, typ.
Load regulation @ 0 to 100 % load change		± 0.5 %, typ.
Ripple & noise (BW 20 MHz) @ Load 15..100 %	Vout: 12V	≤ 60 mVp-p,
	Vout: 54V	≤ 200 mVp-p
	All others	≤ 100 mVp-p
Hold up time @ V _{in} 230 V _{AC} , 25 °C	With fan	12 ms, typ.
	Without fan	16 ms, typ.
Start up delay time @ V _{in} 230 V _{AC} and full load		50 ms, typ.
Temperature coefficient		0.03 % / °C
Fan supply voltage output	PACO225A15S	24 V, ± 15%, 0.25 A
	All others	12 V, ± 15%, 0.5 A
Protection		
Short circuit		Continuous, auto recovery time <3s after the short circuit disappear
Over current		110 % of rated current

Over voltage protection (Output voltage turn off, re-power on for recover)	Vout: 12V	≤ 16 V
	Vout: 15V	≤ 20 V
	Vout: 24V	≤ 32 V
	Vout: 27V	≤ 35 V
	Vout: 36V	≤ 50 V
	Vout: 48V	≤ 60 V
	Vout: 54V	≤ 60 V
Safety standards		EN-, IEC-, UL 62368-1, EN 60335-1, EN 61558-1 EN-, ES 60601-1
Safety Class I		PE Must be connected
Safety Class II		PE Must be not connected
EMC		
CE	EN 55032, CISPR 32	Class B (category I, with PE)
RE	EN 55032, CISPR 32	Class A (category II, without PE)
RE	EN 55032, CISPR 32	Class B
Harmonic current	EN-, IEC 61000-3-2	Class A & Class D
ESD	EN-, IEC 61000-4-2	Contact ±8 kV Perf. Crit. A
		Air ±15 kV Perf. Crit. A
RS	EN-, IEC 61000-4-3	10 V/m Perf. Crit. A
EFT	EN-, IEC 61000-4-4	±4 kV Perf. Crit. A
Surge	EN-, IEC 61000-4-5	±2 kV, ±4kV Perf. Crit. A
CS	EN-, IEC 61000-4-6	10 Vrms Perf. Crit. A
Voltage dips, short interruptions and voltage variations immunity EN-, IEC 61000-4-11		0 % ... 70 % Perf. Crit. B
General		
Reliability MTBF MIL-HDBK-217 @ 25 °C		> 300000 h
Environmental		
Operating ambient temperature		-40 ... 70 °C
Storage temperature		-40 ... 85 °C
Power derating		see diagram
Storage humidity		10..90 %
Operating humidity		20..90 %
Altitude operating & storage		5000 m
Cooling (see derating diagram)		Free air convection, Forced cooling 13 CFM
Physical		
Dimensions		50.8 x 101.6 x 25.4 mm
Weight		175 g
Case material		Non (Open frame)
Soldering temperature & Time		Wave: ≤ 265 °C duration, ≤ 10 s Manual: ≤ 370 °C duration, ≤ 5 s

Note:

1. All specifications were measured at T_a 25 °C, humidity < 75 %, nominal input voltage (230 V_{AC}) and rated output load unless otherwise specified.
2. All EMC parameters were tested on a metal plate with a thickness of 1 mm and a length of 360 mm x 360 mm. The power supply must be combined with the connection devices to confirm electromagnetic compatibility.
3. See also notes on page 4.

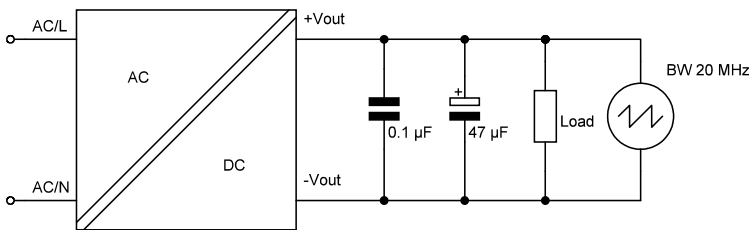


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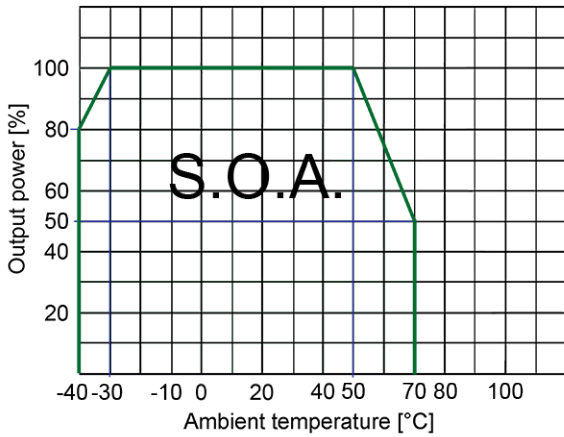
225 W AC-DC Power Supply PACO225A-Series

Part number information										
PHI-CON	AC/DC-Converter open Frame	Output Power		Series	Output voltage		Rev.	Output		Option
P	ACO	225	225 W	A	12	12 V	-	S	single	blanc
					15	15 V				C
					24	24 V				
					27	27 V				
					36	36 V				
					48	48 V				
					54	54 V				
Example:	PACO225A12S	PHI-CON AC/DC Converter, open frame, Pout: 225 W, Vout: 12 V, single output,								

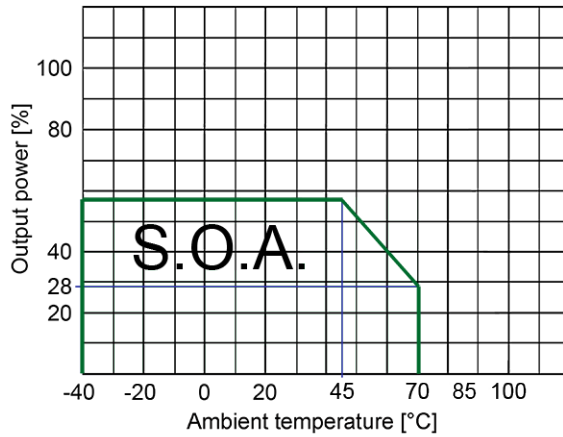
Figure 1 Output ripple and noise measure circuit



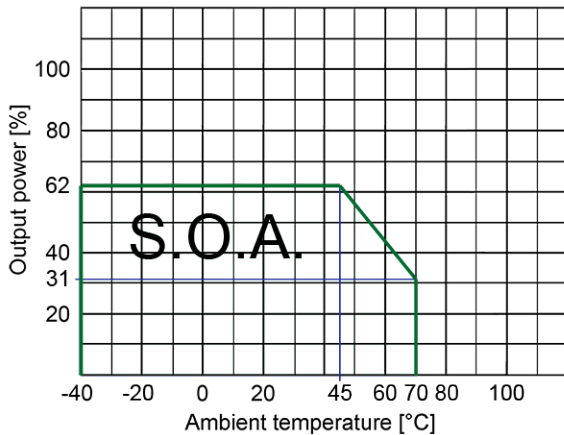
Temperature vs output current derating diagram
all PACO225AxxS at airflow 13 CFM



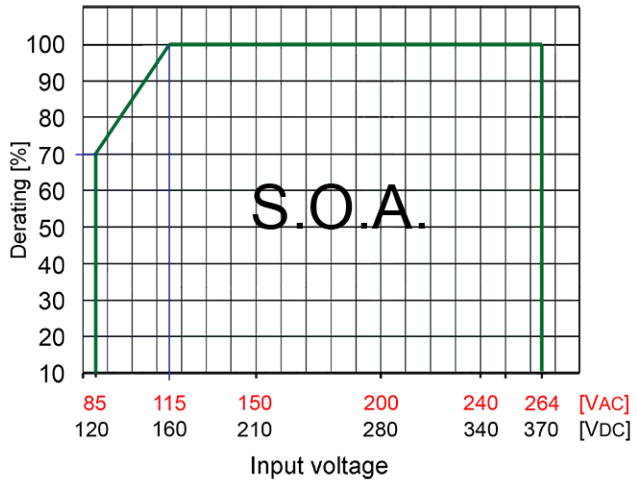
PACO225A27S Temperature vs output current
derating diagram at natural air convection



All others temperature vs output current
derating diagram at natural air convection



Derating vs input voltage

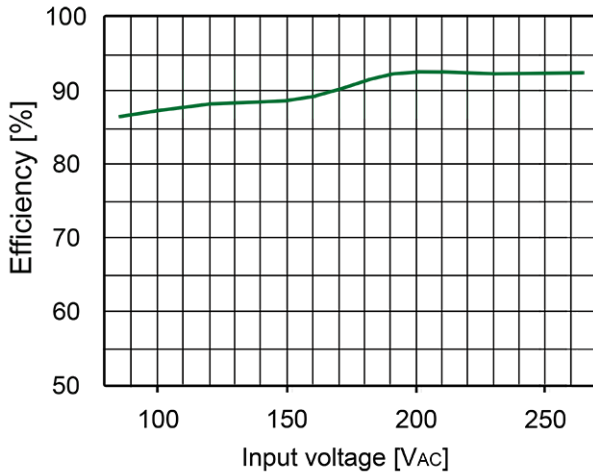




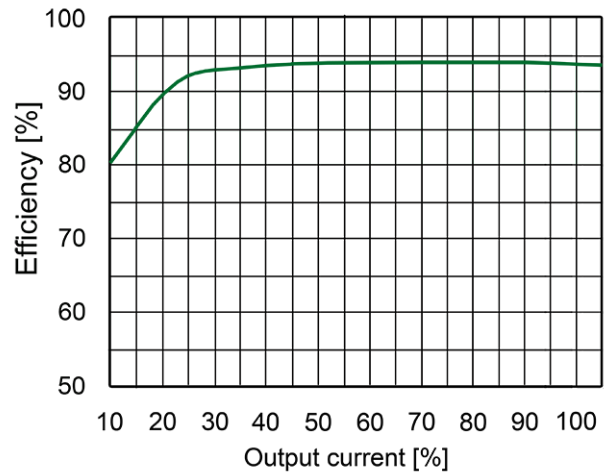
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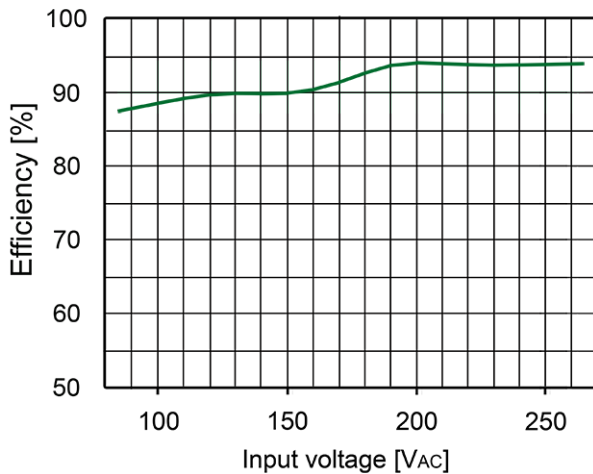
PACO225A12S Efficiency vs input voltage at full load



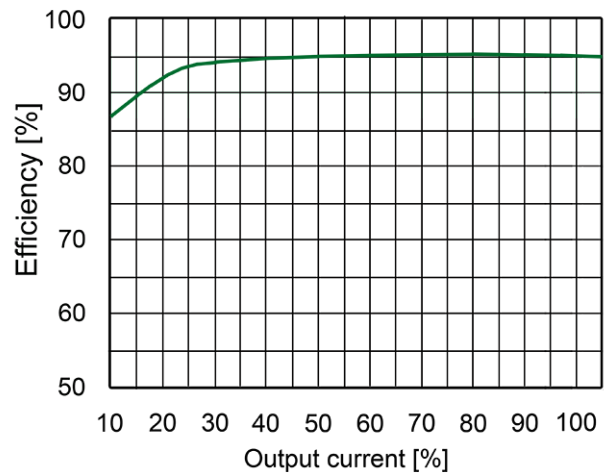
PACO225A12S Efficiency vs load at Vin 230 VAC



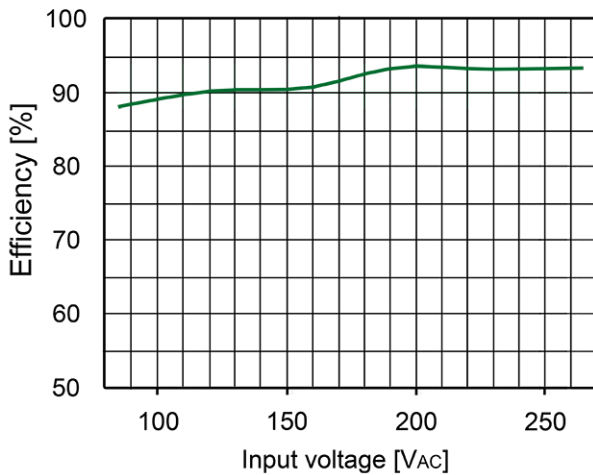
PACO225A24S Efficiency vs input voltage at full load



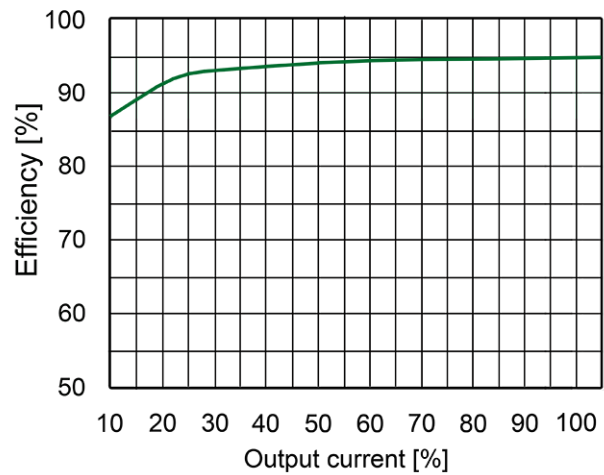
PACO225A24S Efficiency vs load at Vin 230 VAC



PACO225A48S Efficiency vs input voltage at full load



PACO225A48S Efficiency vs load at Vin 230 VAC

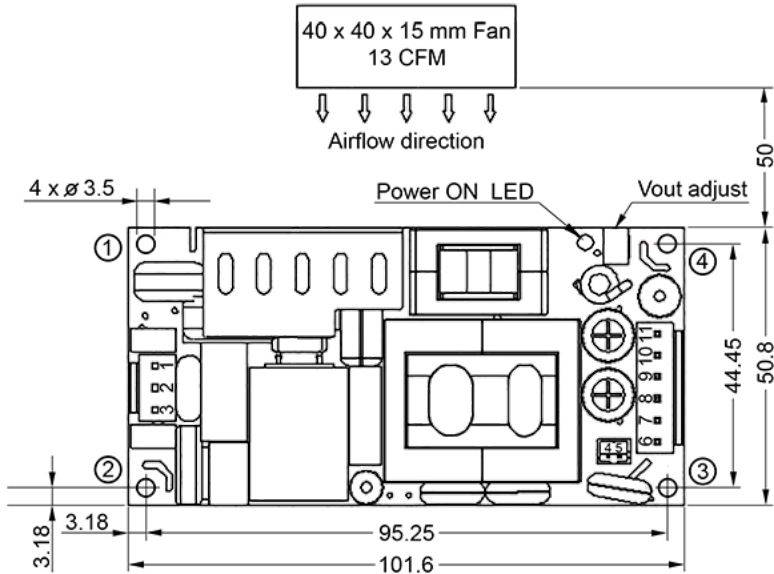




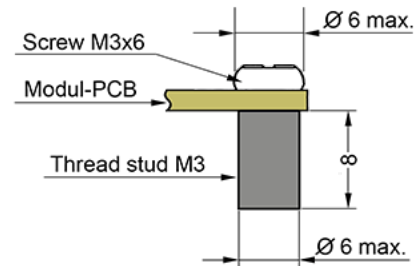
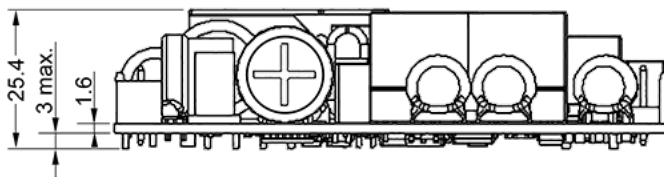
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Mechanical dimensions



Unit in mm
General tolerances ± 1 mm



Connector pin assignment			
Pin	Function	Modul connector	User connector
1	AC In/N (-Vin)	B3P-VH	Housing: VHR-3M Terminals: SVH-21T-P1.1
2	Not connected		
3	AC In/L (+Vin)		
4	Fan -V	Housing Series: PH B2B-PH-K-S	Header: PHR-2 Terminal: SPH-002T-P0.5S
5	Fan +V		
6, 7, 8	- Vout	B6P-VH	Housing: VHR-6N or VHR-6M Terminals: SVH-21T-P1.1
9, 10, 11	+ Vout		

All connectors JST (Japan Solderless Terminals) or equivalent

Note:

- Do not use the power supply of the fan to supply other devices!
- The layout of the device is for reference only, please refer to the actual product.
- The recommended safety distance between the edge of the PCB and the user components should be ≥ 10 mm.
- For safety class I systems, the metal bolts at hole positions 1 and 3 must be connected to PE (protective earth).
- For safety class II systems, the conductor surfaces at hole positions 1 and 3 must be connected together.

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