AP346
3 Outputs
19" Power Supply, 60 Watt

- **High efficiency: 82%**
- **ACin wide range: 85...265V AC**
  DCin wide range: 88...300V DC
- **8 HP plug in width**
- **H15 standard pinout**
- **Full power rail sharing / no min. load**
- **Meets EMC standards**
  EN 50081-1 (EN 55022/B),EN 50082-2, NAMUR and EN 61000-4

EN 60 950

Power Supply AP346

This triple-output power supply uses a two-step wide-range converter and an active MOSFET rectifier. It operates over a wide range (100 - 240V AC) without any switch over.

Hold-up time is up to 250ms at 230V AC. Load distribution is flexible; there is no minimum load and the full power of 60W can be delivered from any one output.

EMC compatibility is a major feature. It has low spurious noise, and noise suppression meets EN 55022 class B. Noise immunity meets EN 61000-4 and VDE 0106 class 2, even at full load.
Over-voltage and over-temperature protection avoid problems even in extreme working environments.

Vout [DC]		Iout a/b*	Pout	Features	Order-No.
Vout1	**5.15V**	**8A / 12A**	60W	Wide input range,	**AP346.112**
2	**+12V**	**2A / 5A**	60W	PF, OTP, OVP	
3	**–12V**	**2A / 5A**	60W		
Max. total power:			60W		
Vout1	**5.15V**	**8A / 12A**	60W	Wide input range,	**AP346.122**
2	**+15V**	**1.5A / 4A**	60W	PF, OTP, OVP	
3	**–15V**	**1.5A / 4A**	60W		
Max. total power:			60W		

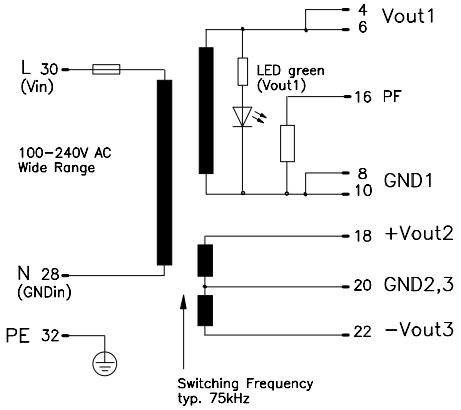
"F" appended to Order No. means front panel 8 HP included and fitted.
* Iout a: Current range with increased accuracy (see page 2).
* Iout b: maximum output current (see page 2).

Accessories: H15 connector, 6.3mm flat contacts: **ZP100**
H15 connector with soldering pins: **ZP120**

Warranty: 2 years from date of delivery.

See the web for current data sheet version:
www.puls-power.de

Schematic:



Output

Voltage Vout1,2,3				Fixed.
Accuracy	Vout1	max.	± 0.5%	Includes production-adjustment
	Vout2/3	max.	± 2.0%	with no load.
Sense lines			None	Not available.
Minimum load			None	Not necessary.
Output power	Pout	max.	60W	Total power.
	Pout1,2,3	max.	60W	Each.
Noise, Ripple	Vout1	max.	10mVpp	20Hz...200kHz.
	Vout2,3	max.	10mVpp	20Hz...200kHz.
incl. spikes	Vout1	max.	20mVpp	20Hz...20MHz.
	Vout2,3	max.	10mVpp	20Hz...20MHz.
Over-voltage protection		typ.	6.0V	Vout1, threshold accur. ± 3,5%.
Derating			1.5W/K	+55° to +70°C Ta.
Operating indicator			1 green LED	On the front, Vout1.
Isolation	Vout to Vin		SELV	EN 60 950, VDE 0805.
	Vout1 to Vout2/3		500V AC	

All outputs are protected against open-circuit, short-circuit, and overload.

Input

Line input AC		100...240V AC	Wide-range converter.
· Range		85...265V AC	Full spec.
Line input DC		275V DC	Wide-range converter.
· Range		88...300V DC	Full spec.
Line frequency		47...63Hz	DC or 400Hz, see page 2.
Input current rms	max.	1.5A	@ 85V AC.
Noise suppression		EN 55 022/B	

Mechanical: 8HP / 3U board (DIN 41494),
Al/Mg alloy cover for component side,
plastic cover for bottom side,
LxWxH = 171.93 x 40.64 x 110mm,
the length includes the connector, see page 4.

Weight: App. 570g

Connector: H15 (DIN 41612), coding option,
max. load per pin 11A @ 70° C.

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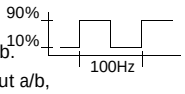
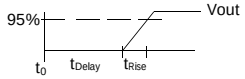
Output (continued)

				AP346.112 5.15V	AP346.112 ±12V	AP346.122 5V	AP346.122 ±15V	
Voltage regulation								
· Line regulation		max.	%	± 0.1	± 0.1	± 0.1	± 0.1	85...265V AC, Iout = 100%.
· Load regulation stat.	ΔU_{stat}	max.	%	–0.7/1	± 0.2/3	–0.7/1	± 0.3/3.5	Iout = 0%, ΔIout = +100%, Iout a/b.
· Load regulation dyn.	ΔU_{dyn}	max.	%	± 5/8	± 0.8/3	± 5/8	± 1/2	10%...90%...10% load change, Iout a/b, rise time dt = typ. 20µs.
Response time	t_s	max.	ms	1	1.5	1	1.5	Till ΔVout is within < 0.5% of final value.
· Temperature coefficient		typ.	%/K	± 0.01		± 0.01		
Ripple		max.	mVpp	10	10	10	10	20Hz...200kHz, @ AC nom., Iout = 100%.
· incl. spikes		max.	mVpp	20	10	20	10	20Hz...20MHz, @ AC nom., Iout = 100%.
Current limitation								
· Threshold		typ.	W	66		66		Fixed, total power.
· Short-circuit		max.	A	1.4 x Iout b		1.4 x Iout b		Switch off with periodic restart.
Start delay	t_{Delay}	typ.	ms	500		500		After switch on.
Vout rise up time	t_{Rise}	typ.	ms	15		15		
On and off characteristic		max.	mV	+300	0	+300	0	
Power back immunity	U_{back}	max.	V	—	—	—	—	Parallel operation with decoupling diodes only
Load capacity		max.	µF	20,000	2x2,000	20,000	2x2,000	Do not exceed for safe start up.





Input (continued)

AC input range	V AC	85...265	Full spec.
DC input range	V DC	88...300	Full spec.
Derated AC range	V AC	75...85, 300 for 0.5s	
Derated DC range	V DC	300...370	Full spec, but air- and leakage distances not longer than stated in VDE 0805.
Frequency range	Hz	47...63	Full spec.
Derated frequency range	Hz	63...400	Increased leakage currents.
In-rush current	max. A	20	Wait min. 30s before switching on again (cold-start).
Hold-up time	min. ms	250	@ 230V AC, Iout = 100%, see figure on page 3.
	min. ms	40	@ 110V AC, Iout = 100%, see figure on page 3.
	min. ms	25	@ 90V AC, Iout = 100%, see figure on page 3.
Power factor λ	typ.	0.65	@ 98V AC, Iout = 100%.
Internal fuse		5x20mm T3.15A/250V	In the L line, as per IEC 127/2-5. To replace, see page 4.
Input range selection		Wide range	

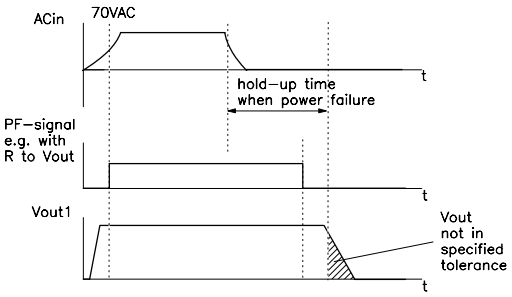
Logic Functions

PF-signal			Power fail	Open-collector (I_{max} = 5mA), see figure on page 3.
· PF high if			ACin > 80V AC	Open-collector.
Hold-up time				See diagram on page 3, Iout = 100%.
· from power failure to PF-signal	min.	ms	245	@ 230V ACin.
	min.	ms	45	@ 110V ACin.
	min.	ms	25	@ 90V ACin.
· from PF-signal	min.	ms	5	
Vout 2 and Vout 3 serial mode		V	5 ... + 24	5 ... + 30	See installation hints.

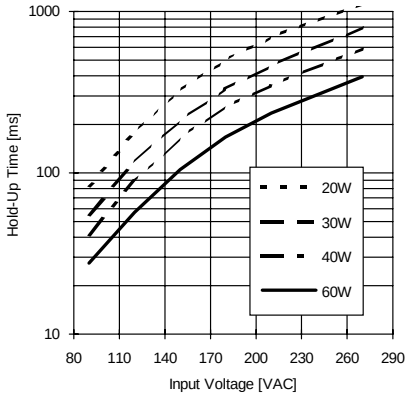
Electromagnetic Compatibility

Emissions according to EN 50081-1		EN 50081-2 is also satisfied.
· Radio interference, EN 55011, EN 55022	Class B	
Immunity according to EN 50082-2	No degradation of performance	EN 50082-1 is also satisfied.
· Electrostatic discharge ESD	8kV direct discharge (level 4)	
	15kV air discharge (level 4)	
· Radiated fields, EN 61000-4-3	10V/m (level 3)	80MHz...1000MHz, ACin, Vout and signal lines: l = 1m.
· Fast transients, EN 61000-4-4	4kV (level 4)	Coupled to ACin line.
	2kV (level 3)	Coupled to DCout line.
	2kV (level 4) cap. coupling	Coupled to Vout and signal lines.
· Surge transients, EN 61000-4-5	4kV (isolation class 4)	Common mode, unit on.
	2kV (isolation class 4)	Differential mode, unit on.
· Conducted disturb., ENV 50141 (draft of IEC 801-6)	10V (level 3)	150kHz...80MHz.
Immunity according to further standards		
· Transient voltage, IEC 255	5kV	Common mode, unit off.
· NAMUR-prescription	Satisfied	
· Transient resistance, VDE 0160 §5.3.1.1.2	750V / 1.3ms (class 2)	Valid for total load range.
· Over-voltage resistance (PULS standard)	300V AC / 0.5s	

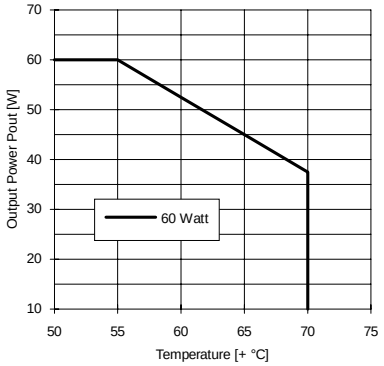
PF-Signal and Hold-Up Time



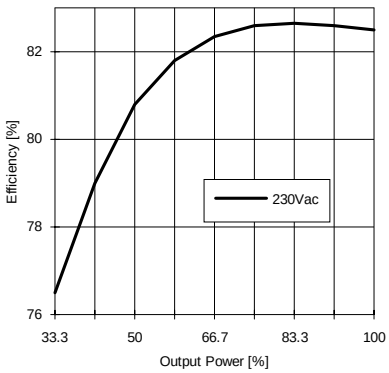
Min. Hold-Up Time



Typ. Derating over Temperature



Typ. Efficiency



Protection

Unit protection			
· Overload		Yes	Total-power limit.
· Short-circuit proof		Yes	Auto restart after 400ms.
· Open-circuit proof		Yes	
· Over-temp. (OTP)	typ.	+100° C	Switch off.
on heatsink	typ.	+98° C	Switch on (automatically).
· Reverse battery prot.		Yes	
· ACin range selection		Wide range	
Load protection			
· Over-voltage (OVP)		Yes	Switch off.
Threshold	typ.	6.0V	Valid for Vout 1.
Accuracy	max.	± 3.5%	
Restart			After line disconnection, wait time 1 min.

Safety

Electrical safety			
· Test voltage (each unit)		3kV AC	Primary / secondary.
according to EN 60 950		2.5kV AC	Primary / PE.
for t = 2sec		500V AC	Secondary / PE.
· Air- and leakage distance		6.4 / 8mm	Primary / secondary.
		4mm	Primary / PE.
· Isolation resistance	min.	5MΩ	VDE 0551.
· Protection class		I	VDE 0106 part 1, IEC 536 .
· PE resistance		< 0.1Ω	VDE 0805.
· Protection system		IP20	DIN 40050, IEC 529.
· Leakage current	max.	0.1mA	EN 60 950 (47...63Hz line) .
· Safe low voltage		SELV	EN 60 950, VDE 0805, VDE 0160.
· Over-voltage class		II	VDE 0110 part 1, IEC 664.
Touch safety		Finger test	VDE 0100 §6, EN 60 950, VBG4.
· Penetration protection		> ∅ 3mm	e.g. screws, small parts etc.

Operation and Ambient Area

Application class		KSF	DIN 40040.
Operation temperature	max.	0° ... +70°C	Ta (measured at 1cm distance).
· Derating range		+55° ... +70°C	Derating, see diagram.
Storage temperature	typ.	–20° ... +100°C	Ta.
Humidity	max.	95%	Non-condensing.
Mechanical usage		Vertical	See page 4.
· Lateral spacing		None	No gap needed.
Cooling		Normal convection	Don't obstruct air flow.
Dirt protection level	max.	2	VDE 0110 part 1.
Vibration		0.075mm	IEC 68-2-6 (10...60Hz).
Shock		11ms / 15g	IEC 68-2-27 (3 shocks).
Operation Height	max.	2,000m	Above sea level.

Efficiency and Power Loss

AP346.112	typ.	81% / 14W	@ 230V ACin, Iout = 100%.
AP346.122	typ.	82% / 13W	As above.

Reliability and Lifetime

MTBF according to Siemens			
standard SN29500	typ.	260,000h	230VAC, Iout = 100%, +40°C Ta.
Only long life (>2,000h @ 105° C) electrolytic capacitors are used.			
Function test		100%	Test certificate enclosed.
In-circuit test		Yes	
Run-in (burn-in)		24h	Full load, Ta = +55° C, on/off cycle.

This technical information is valid for +25° C ambient temperature and 5 minutes run in time, unless otherwise stated.

Fuse

The PSU has electronic protection against external short-circuits. In case of an internal defect, a fuse disconnects the unit. It can only be replaced by opening the unit which should be done by the supplier.

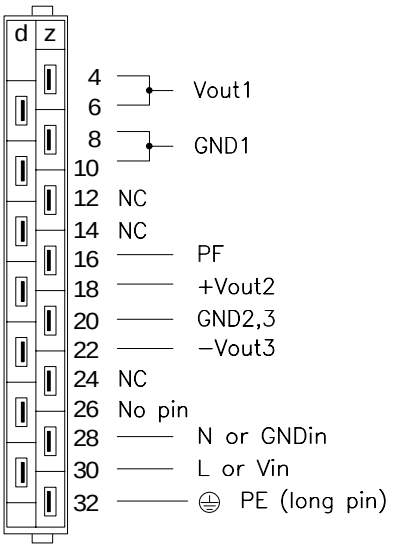
Installation for Operating

The unit is constructed for 19" systems:
Ensure that pin 4 of H15 connector is on top. For other installation considerations consult your representative. Ensure free air flow!

Dimensions and Connections

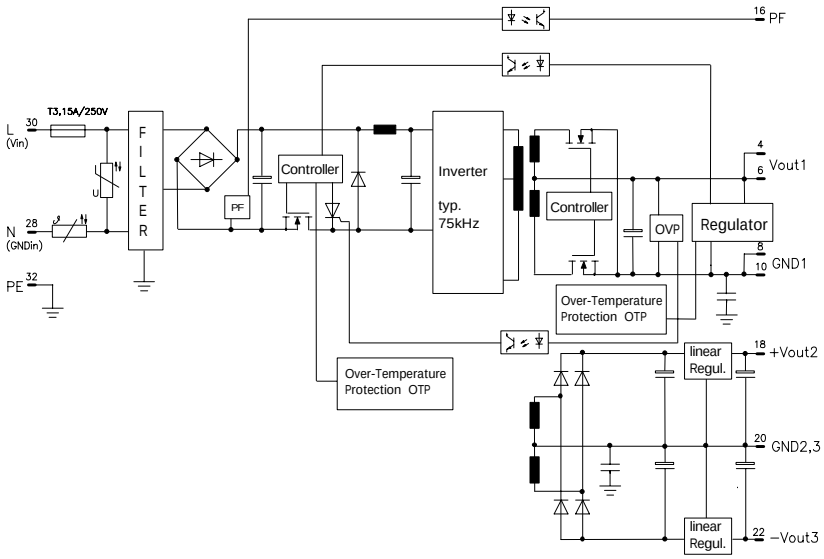
19" board, with Al/Mg alloy cover on component side, and a plastic cover on the bottom side. 8HP plug in width. See figure below for dimensions.

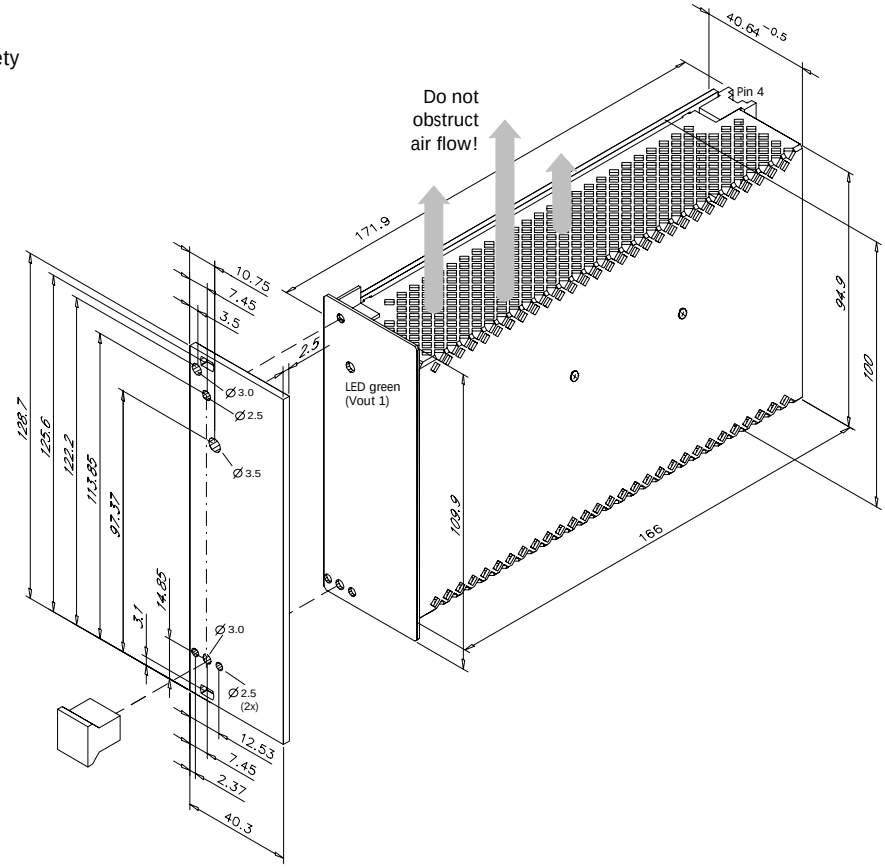
Caution:
Do not remove any screws on box, as internal safety connections could be disconnected!



H15 pinout (DIN 41312)
NC = **N**o **C**onnection - Do not use!

Schematic





Modifications (contact supplier)

Without PF-Signal.
Lower cost versions.

Accessory ZP510

Installation set for mounting on DIN rail.