

APD346 3 Outputs

19" DC/DC Converter, 60 Watt



- High efficiency: 84% (@ APD346.122)
- DCin wide range: 30...90V DC
- 8 HP plug in width
- H15 standard pinout
- Voltage isolation primary secondary: 3.0kV
- Meets EMC standards
EN 50081-1 (EN 55022/B), EN 50082-2,
EN 61000-4, VDE 0160/2 and NAMUR



DC/DC Converter APD346

This triple-output DC/DC converter uses a two-step wide-range converter and an active MOSFET rectifier. It works over a wide range (30 - 90V DC) without any switch over.

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. Over-voltage and over-temperature protection avoid problems even in extreme working environments.

Each unit is tested with a voltage of 3kV (primary/secondary), 2.5kV (primary/PE) and 0.5kV (secondary/PE). This guarantees very high electrical safety.

Vout [DC]	Iout a/b*	Pout	Features	Order-No.	
Vout1	5.15V	8A / 12A	60W	Wide input range, PF, OTP, OVP	APD346.112
2	+12V	2A / 5A	60W		
3	-12V	2A / 5A	60W		
Max. total power:			60W		
Vout1	5.15V	8A / 12A	60W	Wide input range, PF, OTP, OVP	APD346.122
2	+15V	1.5A / 4A	60W		
3	-15V	1.5A / 4A	60W		
Max. total power:			60W		

"F" appended to Order No. means front panel 8 HP included and fitted.

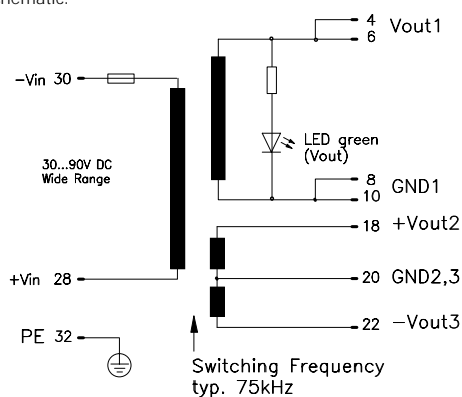
* Iout a: Current range with increased accuracy (see page 2).

* 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.

Schematic:



Output

Voltage Vout1,2,3		Fixed.
Accuracy Vout1	max. $\pm 0.5\%$	Includes production-adjustment with no load.
Vout2/3	max. $\pm 2.0\%$	
Sense lines	None	Not available.
Minimum load	None	Not necessary.
Output power Pout	max. 60W	Total power.
Pout1,2,3	max. 60W	Each, flexible load sharing.
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. $\pm 3.5\%$.
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.

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. 500g

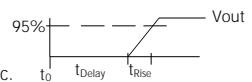
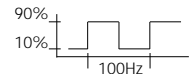
Connector: H15 (DIN 41612), coding option,
max. load per pin 11A @ 70°C.

Input

Line input DC	48 / 60V DC	Wide-range converter.
• Range	30...90V DC	Full spec.
Input current rms	max. 2.8Aeff.	@ 30V DC.
Noise suppression	EN 55 022/B	10kHz...30MHz, conducted.

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Output (continued)				APD346.112		APD346.122		
				5.15V	±12V	5V	±15V	
Voltage regulation								
· Line regulation		max.	%	± 0.1	± 0.1	± 0.1	± 0.1	30...90V DC.
· Load regulation stat.	ΔU_{stat}	max.	%	-0.7/1	0.2/3	-0.7/1	0.3/3.5	No load to full load, Iout a/b.
· Load regulation dyn.	ΔU_{dyn}	max.	%	± 3/5	± 0.8/3	± 3/5	± 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 ΔV_{out} is within < 0.5% of final value.
· Temperature coefficient		typ.	%/K	± 0.01		± 0.01		
Ripple		max.	mVpp	10	10	10	10	20Hz...200kHz, @ DC nom., Iout = 100%.
· incl. spikes		max.	mVpp	20	10	20	10	20Hz...20MHz, @ DC 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	350		350		After switch on.
Vout rise up time	t_{Rise}	typ.	ms	5		5		
On and off characteristic		max.	mV	300	—	300	—	Approximately monotonic.
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)

DC input range		V DC	30...90		Full spec.
Inrush current	max.	A	30		Wait min. 30s before switching on again (cold-start).
Internal fuse			5x20mm T4A/250V		In the -Vin line, as per IEC 127/2-5. To replace, see page 4.

Electromagnetic Compatibility

Emissions according to EN 50081-1		EN 50081-2 is also satisfied
· Radio interference, EN 55011, EN 55022	Class B	Conducted 10kHz...30MHz.
Immunity according to EN 50082-2		EN 50082-1 is also satisfied
· Electrostatic discharge ESD, EN 61000-4-2	8kV direct discharge (level 4) 15kV air discharge (level 4)	To DCin, Vout and signal lines: length=1m.
· Radiated fields, EN 61000-4-3	10V/m (level 3)	Coupled to DCin line.
· Fast transients, EN 61000-4-4	4kV (level 4) 2kV (level 3) 2kV (level 4) cap. coupling 1kV (isolation class 3)	Coupled to DCout line.
· Surge transients, EN 61000-4-5	5kV	Common mode, unit on.
		Differential mode, unit on.
		Common mode, unit off.

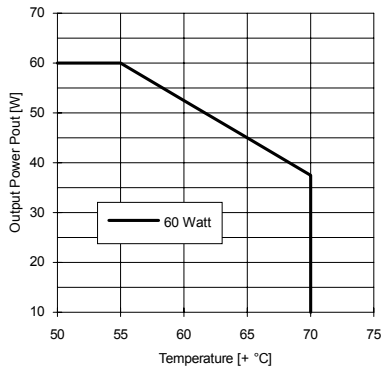
Protection

Unit protection		
· Overload	Yes	Total-power limit.
· Short-circuit proof	Yes	
· Open-circuit proof	Yes	
· Over-temp. (OTP) on heatsink	typ. +100° C typ. +98° C	Switch off. Switch on (automatically).
· Reverse battery prot.	Yes	Antiparallel diode and fuse.
Load protection		
· Over-voltage (OVP) Threshold	Yes typ. 6.0V	Switch off. Valid for Vout 1.
Accuracy	max. ± 3.5%	
Restart		After line disconnection, wait time 1 min.
Method		Switch off with self-holding.

Safety

Electrical safety		
· Test voltage (each unit) according to EN 60 950 for t = 2sec	3kV AC 2.5kV AC 500V AC	Primary / secondary. Primary / PE. Secondary / PE.
· Air- and leakage distance	6.4 / 8mm	Primary / secondary.
· 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.
· Safe low voltage	SELV	EN 60 950, VDE 0805, VDE 0160.
· Over-voltage class	II	VDE 0110 part 1, IEC 664.
Touch safety		
· Penetration protection	Finger test > Ø 3mm	VDE 0100 §6, EN 60 950, VBG4. e.g. screws, small parts etc.

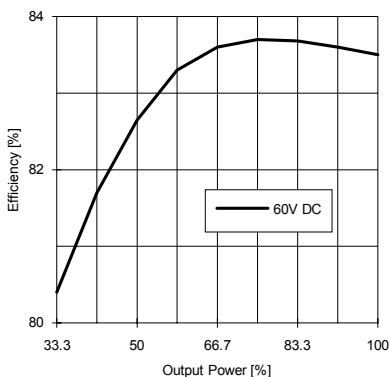
Typ. Derating over Temperature



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.

Typ. Efficiency



Efficiency and Power Loss

APD346.112	typ. 82% / 13W	@ 60V DCin, Iout = 100%.
APD346.122	typ. 84% / 11W	As above.

Reliability and Lifetime

MTBF according to Siemens standard SN29500		
typ.	260,000h	60VAC, 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.

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Fuse

The DC/DC converter 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

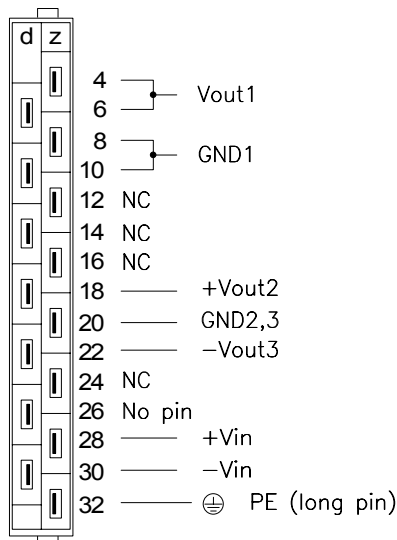
The unit is constructed for 19" systems:
Ensure that pin 4 of H15 connector is on top. For other installation considerations consult your representative. Ensure free air flow!

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:

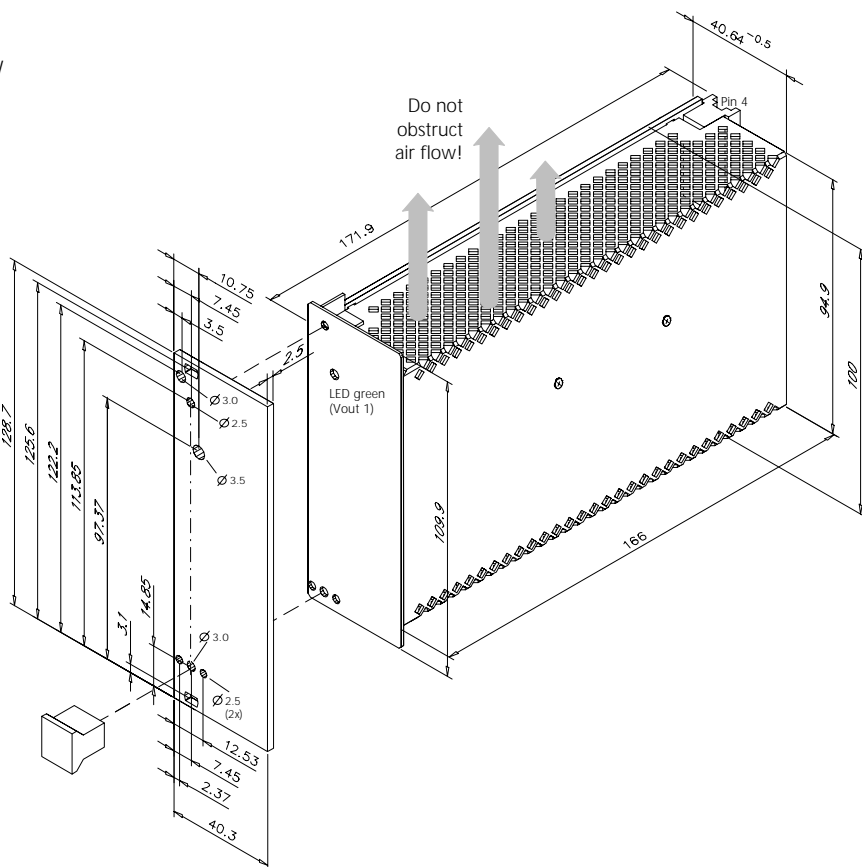
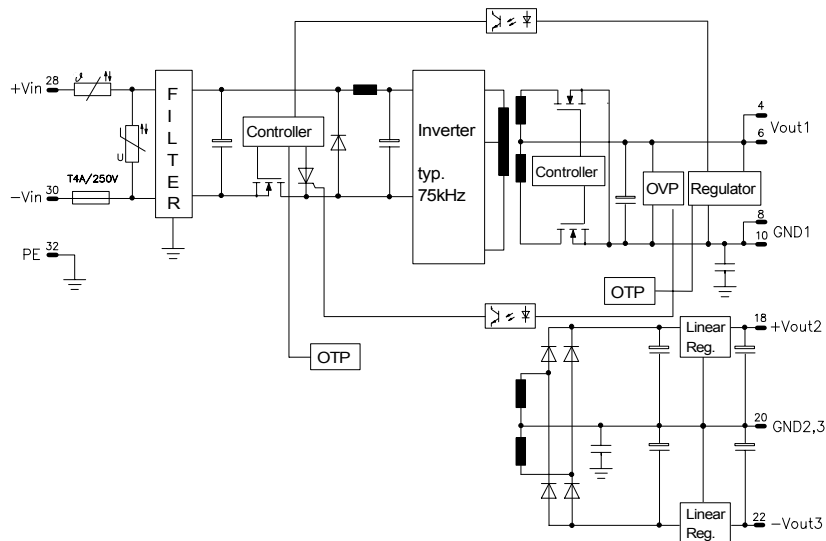
Do not remove any screws on box, as internal safety connections could be disconnected!



H15 pinout (DIN 41312)

NC = No Connection - Do not use!

Schematic



Modifications (contact supplier)

Lower cost versions.

Accessory ZP510

Installation set for mounting on DIN rail.