

# AP486

## 4 Outputs

### 19" Power Supply, 130 Watt



- High efficiency: 83%
- ACin wide range: 88...265V AC
- DCin wide range: 100...300V DC
- 12 HP plug in width
- H15 standard pinout
- Power rail sharing
- Over Temperature Protection (OTP)
- Meets EMC standards: VDE 0160/2, EN 61000-4 NAMUR, EN 50081-1 (EN 55022/B) and EN 50082-2



EN 60 950  
EN 60 601-1

## Power Supply AP486

This 4-output power supply uses a two-step wide-range converter. It operates over a wide range (88 - 265V AC) without any switch over. Hold-up time is 210ms at 230V AC and load distribution is flexible.

EMC compatibility is a major feature. It has low spurious noise, and noise suppression meets VDE 0871 class B.

Noise immunity meets EN 61000-4 and VDE 0160 class 2, even at full load. Over-voltage and over-temperature protection avoid problems in extreme working environments.

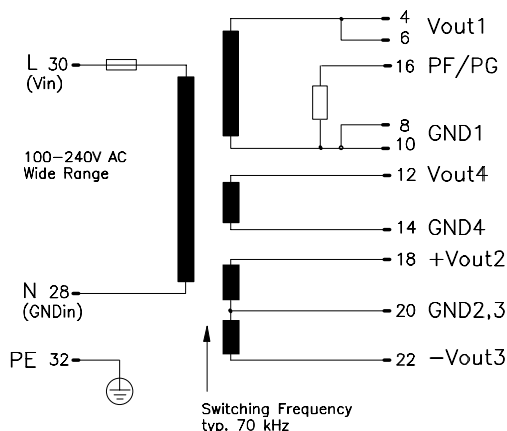
Vout [DC]	Iout	Pout	Features	Order-No.
Vout 1	<b>5.15V 10A</b>	51.5W	PF, OVP, OTP	<b>AP486.112</b>
2	<b>+12V 4A</b>	48W		
3	<b>-12V 4A</b>	48W		
4	<b>24V 5A</b>	120W		
Max. total power:		130W		
Vout 1	<b>5.15V 10A</b>	51.5W	PF, OVP, OTP	<b>AP486.122</b>
2	<b>+15V 4A</b>	60W		
3	<b>-15V 4A</b>	60W		
4	<b>24V 5A</b>	120W		
Max. total power:		130W		

"F" appended to Order No. means front panel 12HP included and fitted.

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

Warranty: 2 years from date of delivery.

Schematic:



### Output

Parameter	Value	Notes
Voltage Vout1,2,3,4	Fixed.	Includes: production-adjustment, line regulation, and load regulation.
Accuracy	Vout1 max. ± 2% Vout2/3 max. ± 2% (.112: + 4%) Vout4 max. ± 2%	
Sense lines	None	
Minimum load	0.5A	To reach the specified values.
Output power Pout	max. 130W	Total power.
Noise, Ripple Vout1/2/3/4 incl. spikes	max. 20mVpp max. 30mVpp	20Hz...200kHz. 20Hz...20MHz.
Over-voltage protection	typ. 6.2V	Threshold accuracy ± 8%.
Derating	3 W/K	+55° to +70°C Ta.
Operating indicator	4 green LED	On the front, Vout1,2,3,4.
Isolation Vout to Vin	SELV	EN 60 950, VDE 0805.

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

### Input

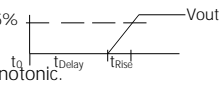
Parameter	Value	Notes
Line input AC	100...240V AC	Wide-range converter.
• Range	88...265V AC	Full spec.
Line input DC	275V DC	Wide-range converter.
• Range	100...300V DC	Full spec.
Line frequency	47...63Hz	DC or 400Hz, see page 2.
Input current rms.	max. 2.6A / 1.4A	@ 115 / 230V AC.
Noise suppression	EN 55 022/B	10kHz...30MHz.

Mechanical: 12HP/3U board (DIN 41494), Al/Mg alloy cover for component side, plastic cover for bottom side, LxWxH = 171.93 x 60.96 x 100mm, the length includes the connector, see page 4.

Weight: App. 800g

## Output (continued)

				AP486.112			AP486.122			
				5.15V	±12V	24V	5.15V	±15V	24V	
Voltage regulation:										
· Line regulation		max.	%	0.3	4 (0.2)	1	0.3	4 (0.2)	1	88...265V AC, minimum load at Vout1, Iout = 100% (60%).
· Load regulation stat.	$\Delta U_{stat}$	max.	%	±1	-0.5	-3	±1	-0.5	-3	Iout = 50%, $\Delta I_{out} = \pm 50\%$ , minimum load at Vout1, @ 230 V AC.
· Load regulation dyn.	$\Delta U_{dyn}$	max.	%	±7	±1	±1.5	±7	±1	±1.5	10%...90%...10% load change, rise time dt = typ. 20 $\mu$ s.
Response time	$t_s$	max.	ms	1	0.3	1	1	0.3	1	Till $\Delta V_{out}$ is within < 0,5% of final value.
· Temperature coefficient		typ.	%/K	0.015			0.015			
Ripple										
		max.	mVpp	15	3	30	15	3	30	20Hz...200kHz, 230V AC, Iout = 100%.
		max.	mVpp	25	120 (3)	90	25	120 (3)	90	20Hz...200kHz, 88V AC, Iout = 100% (60%).
· incl. spikes		max.	mVpp	35	10	35	35	10	35	20Hz...20MHz, 230V AC, Iout = 100%.
		max.	mVpp	35	120 (10)	90	35	120 (10)	90	20Hz...20MHz, 88V AC, Iout = 100% (60%).
Current limitation										
· Threshold Vout1		typ.	A	14			14			Fixed.
· Threshold Vout1/2/3/4		typ.	W	145			145			Fixed, total power, exceeding leads to switch off with periodic restart.
· Current at overload		max.	A	18	14	7	18	11	7	
Minimum load Vout1		max.	A	0.5			0.5			Dependent on current at Vout2,3,4 and Vin.
Start delay	$t_{Delay}$	typ.	ms	750			750			After switch on. 95%
Vout rise-up time	$t_{Rise}$	typ.	ms	10			10			Without C-Load.
On and off characteristic										Approximately monotonic.



## Input (continued)

AC input range	V AC	88...265	Full spec.
DC-input range	V DC	100...300	Full spec.
Derated AC range	V AC	70...88	Diff. values for hold-up time, input current, ripple and Pout; for details contact supplier, (no start below 100V).
Derated DC range	V DC	85...100	
	V DC	300...380	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 current.
In-rush current	max. A	70	Wait min. 30s before switching on again, (cold-start).
Hold-up time	min. ms	15	@ 88V AC, Iout = 100%.
	min. ms	130	@ 196V AC, Iout = 100%, see page 3.
Power factor $\lambda$	typ.	0.65	@ 98V AC, Iout = 100%.
Internal fuse		5x20mm T4A/250V (IEC127/2-5)	To replace, see page 4.
Input range selection		Wide range	

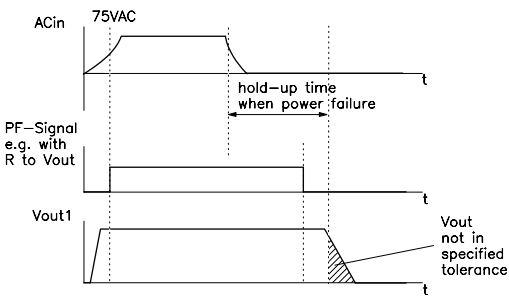
## Logic Functions

Power Fail signal PF		Power fail + Vout1 watch	Open-collector signal ( $I_{max} = 5mA$ ), see pg. 3
· PF low		5ms before Vout1 < 4.75V	
· PF high, if		ACin > 75V AC and Vout1 > 4.7V	
Hold-up time			See diagram on page 3, Iout = 100%.
· from power failure to PF-signal	min. ms	7	@ 88V ACin.
· from PF-signal	min. ms	5	

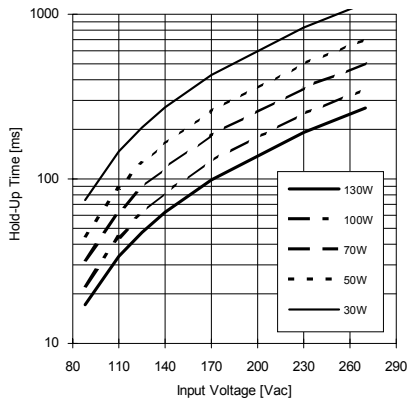
## Electromagnetic Compatibility

Emissions according to 50081-1		Class B	EN 50081-2 is also satisfied
· Radio interference, EN 55 011, EN 55 022			Conducted 10kHz...30MHz.
Immunity according to 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)	
· Radiated fields, EN 61000-4-3		10V / m (level 3)	ACin, Vout and signal lines: length = 1m.
· Fast transients, EN 61000-4-4		4kV (level 4) 2kV (level 3) 2kV (level 4) cap coupling	Coupled to ACin line. Coupled to DCout line.
· Surge transients, EN 61000-4-5		4kV (isolation class 4) 2kV (isolation class 4)	Coupled to Vout and signal lines.
· Transient voltage, IEC 255		5kV	Common mode, unit on.
· NAMUR-prescriptions		Satisfied	Differential mode, unit on.
· Over-voltage resistance (PULS standard)		300V AC / 0.5s	Common mode, unit off.

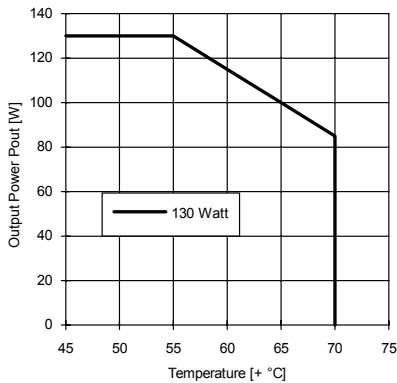
## PF-Signal and Hold-Up Time



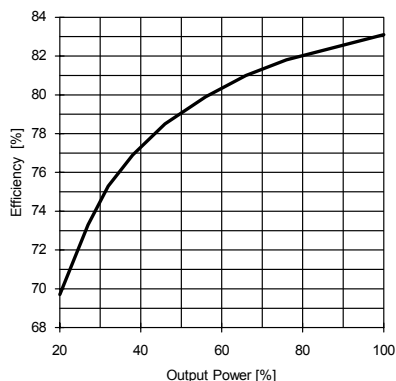
## Min. Hold-Up Time



## Typ. Derating over Temperature



## Typ. Efficiency



## Protection

### Unit protection

· Overload	Yes	Total-power limit.
· Short-circuit proof	Yes	Auto restart.
· Open-circuit proof	Yes	
· Over-temp. (OTP)	typ. +105° C typ. +100° C	Transformer temp, switch off, Transformer temp, switch on, (automatically).
· Reverse battery prot.	Yes	
· ACin range selection	Wide range	

### Load protection

· Over-voltage (OVP)	Yes	
Threshold	typ. 6.2V	Valid for Vout 1.
Accuracy	max. ± 8%	
Method		By thyristor.

## Safety

### Electrical safety

· Test voltage (each unit) according to EN 60 950	3kV AC 2.5kV AC 500V AC	Primary / secondary. Primary / PE. Secondary / PE.
· Air- and leakage distance	6.4 / 8mm 3.2 / 4mm	Primary / secondary. 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. 0.45mA	EN 60 950 (47-63 Hz line) .
· 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.
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## 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	1 HP	Both sides of the unit.
Cooling	Normal convection	Do not 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

AP486.112	typ. 83% / 27W	@ 230V ACin, Iout = 100%.
AP486.122	typ. 83% / 27W	As above.

## Reliability and Lifetime

MTBF according to Siemens standard SN29500	typ. 200,000h	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.

## 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

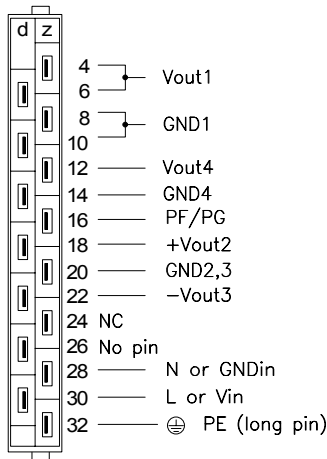
The unit is constructed for 19" systems:  
Ensure that pin 4 of H15 connector is on top. For other installation considerations consult your representative. Ensure free air flow.

## Dimensions and Connections

19" board, with Al/Mg alloy cover on component side, and a plastic cover on the bottom side. 12HP plug in width. See figure below for dimensions.

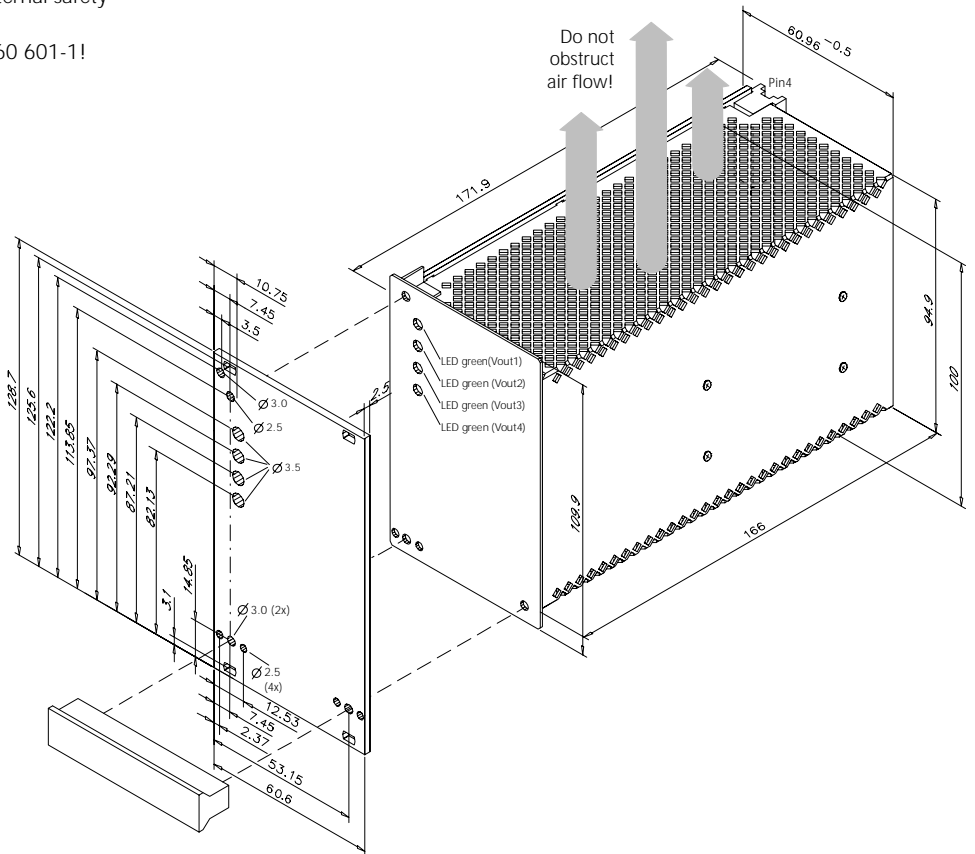
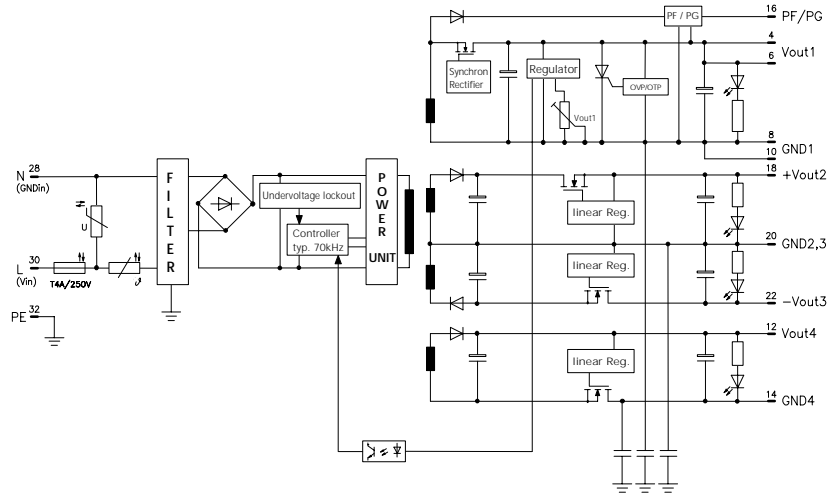
### Caution:

- Do not remove any screws on box, as internal safety connections could be disconnected!
- For medical use, install according to EN 60 601-1!  
This means for example:
  - double-pole-protection,
  - PE-resistance to case < 0.2Ω.



H15 pinout (DIN 41612)  
NC = No Connection - Do not use!

## Schematic



## Modifications (contact supplier)

Other output voltages.  
Lower cost versions.

## Accessory ZP510

Installation set for mounting on DIN rail.