

## AP246 2 Outputs 19" Power Supply, 60 Watt

- ◆ High efficiency: 84%
- ◆ ACin wide range: 85...265V AC  
DCin wide range: 95...300V DC
- ◆ 8 HP plug in width
- ◆ H15 standard pinout
- ◆ Full power rail sharing
- ◆ Meets EMC standards  
EN 55022 class B, EN 61000-6-2  
EN 61000-4-X, VDE 0160/2 and NAMUR



### Power Supply AP246

This dual-output power supply uses a two-step wide-range converter. It works 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 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 +12V        | 3A / 5A    | 60W  | Wide input range, OTP, OVP             | AP246.111 |
| 2 -12V            | 3A / 5A    | 60W  |  |           |
| Max. total power: |            | 60W  |  |           |
| Vout1 +15V        | 2.5A / 4A  | 60W  | Wide input range, OTP, OVP, readjusted | AP246.122 |
| 2 -15V            | 2.5A / 4A  | 60W  |  |           |
| Max. total power: |            | 60W  |  |           |

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

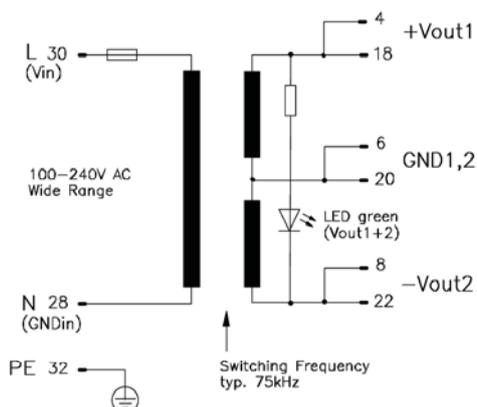
\* Iout a: Current range with increased accuracy.

\* Iout b: maximum output current.

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

Warranty: 2 years from date of delivery.

Schematic:



### Output

|                         |                    |  |
|-------------------------|--------------------|--|
| Sum voltage             | Vout1+2            | Fixed.                                       |
| Accuracy                | Vout1 max. ± 0.5%  | Includes production-adjustment without load. |
|                         | Vout2 max. ± 0.5%  |  |
| Sense lines             | None               | Not available.                               |
| Minimum load            | None               | Not necessary.                               |
| Output power            | Pout max. 60W      | Total power.                                 |
|                         | Pout1,2 max. 60W   | Each.  |
| Noise, Ripple           | max. 3.5 / 4.0mVpp | 20Hz...200kHz, Iout a/b.                     |
| incl. spikes            | max. 4.5 / 6.0mVpp | 20Hz...20MHz, Iout a/b.                      |
| Over-voltage protection | typ. 1.15 x Vout   | Threshold accuracy ± 3.5%.                   |
| Derating                | 1.5W/K             | +55° to +70°C Ta.                            |
| Operating indicator     | 1 green LED        | On the front, sum voltage Vout1+2.           |
| Isolation               | Vout to Vin SELV   | EN 60 950, VDE 0805.                         |

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 (100mm), the length includes the connector, see page 4.

Weight: App. 550g

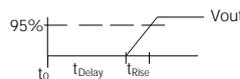
Connector: H15 (DIN 41612), coding option, max. load per pin 11A @ 70° C.

### 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           | 95...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   | 10kHz...30MHz, conducted. |

# AP246 ♦ 2 Outputs ♦ 19" Power Supply ♦ 60 Watt

## Output (continued)

|                           |                   |      |         | AP246.111                | AP246.122                |  |
|---------------------------|-------------------|------|---------|--------------------------|--------------------------|--|
| Voltage regulation        |                   |      |         |                          |                          |  |
| · Line regulation         |                   | max. | %       | ± 0.1                    | ± 0.1                    | 85...265V AC, I <sub>out</sub> = 100%.   |
| · Load regulation stat.   | $\Delta U_{stat}$ | max. | %       | ± 2.5 / 3.5              | ± 0.3 / 0.4              | I <sub>out1</sub> full load...I <sub>out2</sub> full load and reverse, I <sub>out</sub> a/b, for other power rail sharing see graph on page 3. |
| · Load regulation dyn.    | $\Delta U_{dyn}$  | max. | %       | ± 1 / 1                  | ± 1 / 1.5                | 10%...90%...10% load change, I <sub>out</sub> a/b, rise time dt = typ. 20 $\mu$ s.   |
| Response time             | $t_s$             | max. | ms      | 3                        | 3                        | Till $\Delta V_{out}$ is within < 0.5% of final value.   |
| · Temperature coefficient |                   | typ. | %/K     | ± 0.01                   | ± 0.01                   |  |
| Ripple                    |                   | max. | mVpp    | 5 / 8                    | 3.5 / 4                  | 20Hz...200kHz, @ AC nom., I <sub>out</sub> = 100%, I <sub>out</sub> a/b.   |
| · incl. spikes            |                   | max. | mVpp    | 6 / 10                   | 4.5 / 6                  | 20Hz...20MHz, @ AC nom., I <sub>out</sub> = 100%, I <sub>out</sub> a/b.  |
| Current limitation        |                   |      |         |                          |                          |  |
| · Threshold               |                   | typ. | W       | 66                       | 66                       | Fixed, total power.  |
| · Short-circuit           |                   | max. | A       | 1.4 x I <sub>out</sub> b | 1.4 x I <sub>out</sub> b | Switch off with periodic restart.  |
| Start delay               | $t_{Delay}$       | typ. | ms      | 400                      | 400                      | After switch on.   |
| Vout rise up time         | $t_{Rise}$        | typ. | ms      | 30                       | 30                       |   |
| On and off characteristic |                   |      |         |                          |                          | Approximately monotonic.   |
| Power back immunity       | $U_{back}$        | max. | V       | 1.1 x V <sub>out</sub>   | 1.1 x V <sub>out</sub>   | Sum voltage, unit off/on.  |
| Load capacity             |                   | max. | $\mu$ F | 2 x 5,000                | 2 x 5,000                | Do not exceed for safe start up.   |

## Input (continued)

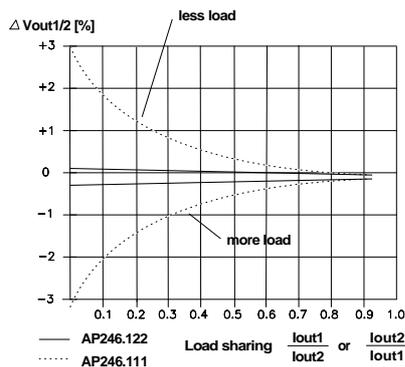
|                         |           |      |    |                       |  |   |
|-------------------------|-----------|------|----|-----------------------|--|---|
| AC input range          |           | V AC |    | 85...265              |  | Full spec.  |
| DC input range          |           | V DC |    | 95...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, I <sub>out</sub> = 100%, see graph on page 3.                      |
|                         |           | min. | ms | 40                    |  | @ 110V AC, I <sub>out</sub> = 100%, see graph on page 3.                      |
|                         |           | min. | ms | 25                    |  | @ 90V AC, I <sub>out</sub> = 100%, see graph on page 3.                       |
| Power factor            | $\lambda$ | typ. |    | 0.65                  |  | @ 98V AC, I <sub>out</sub> = 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            |  |   |

## Electromagnetic Compatibility

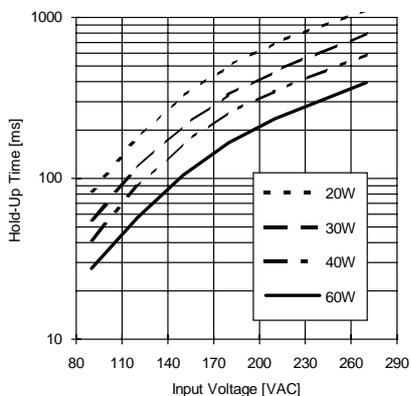
|   |  |  |  |  |  |  |
|---|--|--|--|--|--|--|
| Emissions                                   |  |  |  | EN 61000-3-2 Harmonics, EN 61000-3-3 Flicker |  |  |
| · Radio interference, EN 55011, EN 55022    |  |  |  | Class B                                      |  | Conducted 10kHz...30MHz.                     |
|   |  |  |  | Class A                                      |  | Radiated 30MHz-1GHz                          |
| Immunity according to EN 61000-6-2          |  |  |  |  |  | EN 61000-6-1 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)                              |  | To ACin, Vout and signal lines: length = 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.                  |
| · 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                               |  |  |

## 2 Outputs ♦ 19" Power Supply ♦ 60 Watt ♦ AP246

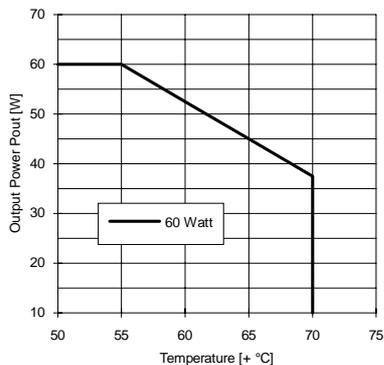
### Typ. Voltage Deviation at Full Load



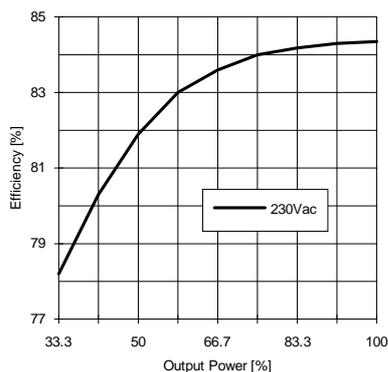
### Min. Hold-Up Time



### 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) on heatsink | typ. +100° C<br>typ. +98° C | Switch off.<br>Switch on (automatically). |
| · Reverse battery prot.        | Yes                         |   |
| · ACin range selection         | Wide range                  |   |

#### Load protection

|                                |   |             |
|--------------------------------|---|-------------|
| · Over-voltage (OVP) Threshold | Yes   | Switch off. |
|                                | typ. 28.6V (Vout1+2)  | AP246.111.  |
|                                | typ. 34.4V (Vout1+2)  | AP246.122.  |
| Accuracy                       | max. ± 3.5%   |             |
| Restart Method                 | After line disconnection, wait time 1 min.<br>Switch off with self-holding. |             |

### Safety IEC 60950-1, EN 60950-1, UL 60950-1

#### Electrical safety

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

#### Touch safety

|                          |                        |  |
|--------------------------|------------------------|--|
| · Penetration protection | Finger test<br>> Ø 3mm | VDE 0100 §6, EN 60 950-1, VBG4.<br>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

|                    |                  |                           |
|--------------------|------------------|---------------------------|
| AP246.111 and .121 | typ. 84% / 11.4W | @ 230V ACin, Iout = 100%. |
|--------------------|------------------|---------------------------|

### Reliability and Lifetime

|   |               |                                       |
|---|---------------|---------------------------------------|
| MTBF according to Siemens standard SN29500                          | typ. 310,000h | 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. |

### PULS Munich

Tel.: +49 (0)89 / 92 78-2 44  
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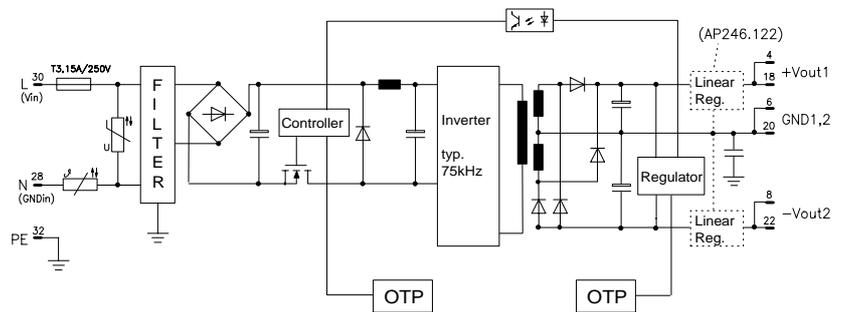
This technical information is valid for +25° C ambient temperature and 5 minutes run in time, unless otherwise stated.

# AP246 ♦ 2 Outputs ♦ 19" Power Supply ♦ 60 Watt

## 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.

## Schematic



## Installation for Operating

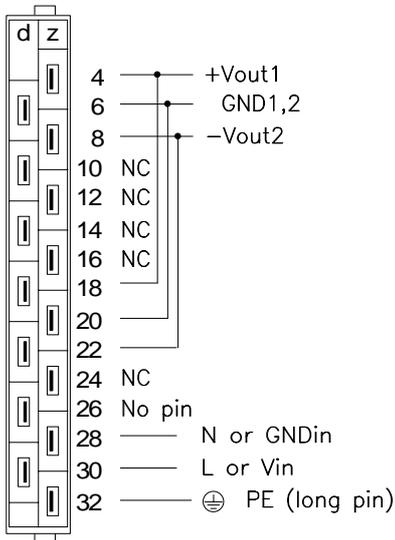
The unit is constructed for 19" systems: Ensure that pin 4 of H15 connector is on top. For other installation considerations consult your representative. Ensure free air flow!

## Dimensions and Connections

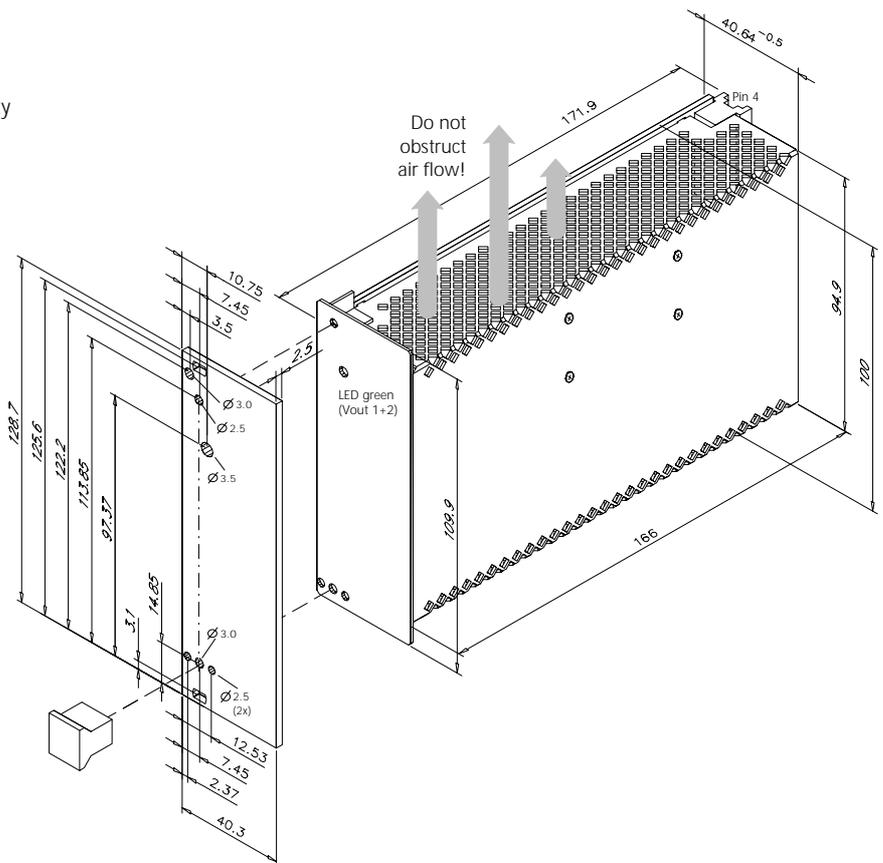
19" board, with Al/Mg alloy cover on component side, and a plastic cover on the bottom side. 8HP plug in width. See figure below for dimensions.

### 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!



## Modifications (contact supplier)

With PF-Signal.  
AP246.111 also readjusted.  
Lower cost versions.

## Accessory ZP510

Installation set for mounting on DIN rail.