This unit is designed to supply a variety of popular voltages for high-power rack-mounted applications. The output voltage is stable with ripple and noise below 120mVpp over the total range of up to 240W. The high-efficiency flyback converter provides for greater reliability and economy.

The design ensures line disturbance immunity according to EN 6100-4, and VDE 0160 pulses (class 2 over the total range!). The unit is also protected against over-voltage and short-circuits. Design and construction meet all relevant safety standards, such as EN 60950, VDE 805 and VBG 804.

The 48V and 60V versions are available for telecommunications and motor control applications.

---

**Data Sheet**

**Output**

<table>
<thead>
<tr>
<th>Vout</th>
<th>Iout</th>
<th>Pout</th>
<th>Features</th>
<th>Order-No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>12V</td>
<td>13A</td>
<td>156W</td>
<td>OVP</td>
<td>AP157.111</td>
</tr>
<tr>
<td>12V</td>
<td>13A</td>
<td>156W</td>
<td>OVP, PF, PG, SD</td>
<td>AP157.112</td>
</tr>
<tr>
<td>15V</td>
<td>12A</td>
<td>180W</td>
<td>OVP</td>
<td>AP157.121</td>
</tr>
<tr>
<td>15V</td>
<td>12A</td>
<td>180W</td>
<td>OVP, PF, PG, SD</td>
<td>AP157.122</td>
</tr>
<tr>
<td>24V</td>
<td>10A</td>
<td>240W</td>
<td>OVP</td>
<td>AP157.131</td>
</tr>
<tr>
<td>24V</td>
<td>10A</td>
<td>240W</td>
<td>OVP, PF, PG, SD</td>
<td>AP157.132</td>
</tr>
<tr>
<td>28V</td>
<td>8.5A</td>
<td>238W</td>
<td>OVP</td>
<td>AP157.141</td>
</tr>
<tr>
<td>48V</td>
<td>5A</td>
<td>240W</td>
<td>OVP</td>
<td>AP157.151</td>
</tr>
<tr>
<td>60V</td>
<td>4A</td>
<td>240W</td>
<td>OVP</td>
<td>AP157.161</td>
</tr>
</tbody>
</table>

*F* appended to Order-No. means: 14HP front panel included and fitted.

- Accessories: H15 connector, 6.3mm flat contacts: ZP100
- H15 connector with soldering pins: ZP120
- Warranty: 2 years from date of delivery.

**Input**

- Line input AC 1
  - Range: 100...120V AC
  - Switch position 115V.
  - 88...132V AC
  - 80...150V AC
  - Derated, see page 2.
- Line input AC 2
  - Range: 220...240V AC
  - Switch position 230V.
  - 187...264V AC
  - 150...300V AC
  - Derated, see page 2.
- Line frequency
  - 47...63Hz
  - DC or 400Hz, see page 2.
- Input current rms.
  - max. 6.0Aeff. / 2.8Aeff. @ 115/230V AC.
- Noise suppression
  - EN 55 022/B
  - 10kHz...30MHz, conducted.

Specifications are valid at 230V AC, unless otherwise stated. They are subject to change without prior notice.
### Output (continued)

<table>
<thead>
<tr>
<th>Voltage regulation:</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Line regulation</td>
<td>max.</td>
<td>%</td>
<td>± 0.2</td>
<td>± 0.2</td>
<td>± 0.2</td>
</tr>
<tr>
<td>Load regulation stat.</td>
<td>Δ Ustat</td>
<td>max.</td>
<td>%</td>
<td>± 0.75</td>
<td>± 0.75</td>
</tr>
<tr>
<td>Load regulation dyn.</td>
<td>Δ Udyn</td>
<td>max.</td>
<td>%</td>
<td>± 1.5</td>
<td>± 0.5</td>
</tr>
<tr>
<td>Response time</td>
<td>t</td>
<td>max.</td>
<td>µs</td>
<td>500</td>
<td>500</td>
</tr>
<tr>
<td>Temperature coefficient typ.</td>
<td>%/K</td>
<td>± 0.01</td>
<td>± 0.01</td>
<td>± 0.01</td>
<td>± 0.01</td>
</tr>
<tr>
<td>Ripple max.</td>
<td>mVpp</td>
<td>30</td>
<td>30</td>
<td>30</td>
<td>120</td>
</tr>
<tr>
<td>incl. spikes max.</td>
<td>mVpp</td>
<td>60</td>
<td>60</td>
<td>60</td>
<td>130</td>
</tr>
<tr>
<td>Current limitation:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Threshold min/max.</td>
<td>A</td>
<td>105% ... 125% of Iout</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Characteristic</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Short-circuit max.</td>
<td>A</td>
<td>200% of Iout</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Start delay</td>
<td>tdelay</td>
<td>typ.</td>
<td>ms</td>
<td>50</td>
<td></td>
</tr>
<tr>
<td>Vout rise-up time</td>
<td>trise</td>
<td>typ.</td>
<td>ms</td>
<td>35</td>
<td></td>
</tr>
<tr>
<td>On and off characteristic</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power back immunity</td>
<td>UBack</td>
<td>max.</td>
<td>V</td>
<td>1.2 x Vout</td>
<td></td>
</tr>
</tbody>
</table>

### Input (continued)

<table>
<thead>
<tr>
<th>AC input range 1 / 2</th>
<th>V AC</th>
<th>88...132 / 187...264</th>
<th>Full spec.</th>
</tr>
</thead>
<tbody>
<tr>
<td>DC input range</td>
<td>V DC</td>
<td>250...300</td>
<td>Full spec. (Voltage Selector at ‘230V’!)</td>
</tr>
<tr>
<td>Derated AC range 1 / 2</td>
<td>V AC</td>
<td>80...88 / 150...187 / 150 / 300 for 0.5s</td>
<td>Power loss typ. 20% (no start below 196V).</td>
</tr>
<tr>
<td>Derated DC range</td>
<td>V DC</td>
<td>176...250</td>
<td>Full spec. but air- and leakage distances not longer than stated in VDE 0805.</td>
</tr>
<tr>
<td>Frequency range</td>
<td>Hz</td>
<td>47...63</td>
<td>Full spec.</td>
</tr>
<tr>
<td>Derated frequency range</td>
<td>Hz</td>
<td>63...400</td>
<td>Increase leakage currents.</td>
</tr>
<tr>
<td>In-rush current max.</td>
<td>A</td>
<td>50</td>
<td>Wait min. 30s before switching on again (cold-start), NAMUR standard met (Ta = 25° C).</td>
</tr>
<tr>
<td>Hold-up time min.</td>
<td>ms</td>
<td>24</td>
<td>18</td>
</tr>
<tr>
<td>Power factor λ</td>
<td>typ.</td>
<td>0.67</td>
<td></td>
</tr>
<tr>
<td>Internal fuse</td>
<td>5x20mm</td>
<td>T8A/250V (IEC127/2-5)</td>
<td>Manual (230V AC set at factory)</td>
</tr>
<tr>
<td>Input range selection</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Logic Functions

- Power Fail signal PF
  - PF high if
  - Hold-up time
    - from Power failure to PF-signal min. ms 23 15 15 15
    - from PF-signal min. ms 5 5 5 5
  - PG-signal
  - PG high if
  - SD remote switch off

### Electromagnetic Compatibility

- Emissions according to EN 50081-1
- Radio interference, EN 55011, EN 55022
- Immunity according to EN 50082-2
- Electrostatic discharge ESD, EN 61000-4-2
- Radiated fields,EN 61000-4-3
- Fast transients, EN 61000-4-4
- Surge transients, EN 61000-4-5
- Transient voltage, IEC 255
- NAMUR-prescription
- Transient resistance, VDE 0160 §5.3.1.1.2
- Over-voltage resistance (PULS standard)
Protection

Unit protection
- Overload: Yes, See current limit.
- Short-circuit proof: Yes, Auto restart.
- Open-circuit proof: Yes
- Over-temperature (OTP): —
- Reverse battery protect: Yes
- ACin range selection: Manual, Switch for 115/230V AC.

Load protection
- Over-voltage (OVP) Yes
  - Threshold typ. 15.0V AP157.111, 112.
  - typ. 18.0V AP157.121, 122.
  - typ. 29.0V AP157.131, 132.
  - typ. 32.0V AP157.141.
  - typ. 58.0V AP157.151.
  - typ. 70.0V AP157.161.
- Accuracy max. ±4%

Safety

Electrical safety
- Test voltage 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 Ι VDE 0106 part 1, IEC 536.
- PE resistance < 0.1Ω VDE 0805.
- Protection system IP20 DIN 40050, IEC 529.
- Leakage current max. 0.75mA EN 60 950 (47...63Hz line).
- Safe low voltage SELV EN 60 950, VDE 0805, VDE 0160.
- Over-voltage class ΙΙ 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. 6...+70°C Ta (measured at 1cm distance).
  - Derating range +55...+70°C Ta.
- Storage temperature typ. ~20...+100°C Ta.
- Humidity max. 95% Non-condensing.
- Mechanical usage Vertical See page 4.
- Lateral spacing 1HP To neighbouring units on the component side only, at full load.
- 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

Type: AP157.111 and .112 typ. 87% / 23W @ 230V ACin, lout = 100%.
- AP157.121 and .122 typ. 87% / 27W As above.
- AP157.131 to .141 typ. 88% / 33W As above.
- AP157.151 typ. 88% / 33W As above.
- AP157.161 typ. 88% / 33W As above.

Reliability and Lifetime

MTBF according to Siemens standard SN29500 typ. 300,000h 230VAC, lout = 100%, +40°C Ta.
- Only long life (>2,000hr@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.
Important: Use non-conductive (plastic) guide rails only; conductive rails would inadmissibly reduce leakage distance.

Dimensions and Connections
19" board, with Al/Mg alloy cover on component side, and a plastic cover on the bottom side. 14HP plug in width. See figure below for dimensions.

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

Fuse and Connections
Do not obstruct air flow!

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

Accessory ZP510
Installation set for mounting on DIN rail.

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