This power supply is designed to meet a wide range of applications. Output voltage is stable with ripple and noise below 30mVpp over the total range of up to 60W. The high-efficiency flyback converter provides for greater reliability and economy.

Multiple supplies can be used in parallel to increase system power without extra control wiring, as the current is automatically shared between units (AP153.133 only).

The design ensures immunity to disturbances according to EN 61000-4, and VDE 0160 pulses (class 2 for total range!). The unit is also protected against overvoltage and short-circuits. Construction and design meet all relevant safety standards such as EN 60950, VDE 0805 and VBG 804.

AP153
1 Output
19" Power Supply, 48 to 60 Watt

- High efficiency: 87% (@ 24V)
- ACin 115/230V manual switch
- 6 HP plug in width
- H15 standard pinout
- Parallel mode automatic load sharing (@ AP153.133)
- Meets EMC standards EN 50081-1 (EN 55022/B), EN 50082-2, EN 61000-4, VDE 0160/2 and NAMUR

Data Sheet

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Schematic:

Vout lout Pout Features Order-No.
12V 4A 48W OVP AP153.111
12V 4A 48W OVP, PF, PG, SD AP153.112
15V 3.5A 53W OVP AP153.121
15V 3.5A 53W OVP, PF, PG, SD AP153.122
24V 2.5A 60W OVP AP153.131
24V 2.5A 60W OVP, PF, PG, SD AP153.132
24V 2.5A 60W OVP, parallel mode AP153.133
27.6V 2A 56W OVP, Vout adjustable AP153.141

Output
Voltage Vout fixed
Vout adjustable
Accuracy
AP153.111 to 132 max. ± 5% All except AP153.141.
AP153.133 max. ± 2% Ap153.141 only.
AP153.141 max. ± 0.5%

Sense lines None Not available.
Minimum load None Not necessary.
Output power Pout max. 60W Mounting side by side possible.
AP 153.133 only max. 48W Per unit @ parallel operation.

Noise, Ripple
max. 30mVpp 20Hz...200kHz.
Including spikes max. 65mVpp 20Hz...20MHz.

Over-voltage protection typ. 1.15 x Vout Threshold accuracy ± 4%
Derating 1W/K +55°C to +70°C Ta.
Operational indicator 1 green LED On the front.
Isolation Vout to Vin SELV EN 60 950, VDE 0805.

The output is protected against open-circuit, short-circuit, and overload.

Input
Line input AC 1
· Range 100...120V AC Switch position 115V.
· Full spec. 88...132V AC
80...150V AC Derated, see page 2.
220...240V AC Switch position 230V.
187...264V AC Full spec.
150...300V AC Derated, see page 2.

Line input AC 2
· Range 47...63Hz DC or 400Hz, see page 2.
· Line frequency 1.34Aeff. / 0.7Aeff. @ 115/230V AC.
· Input current rms. 10Hz...30MHz, conducted.
· Noise suppression 100kHz...30MHz, conducted.

Specifications valid for Vin = 230 V AC, Tamb = +25°C, and 5 min run-in time, unless otherwise stated. They are subject to change without prior notice.
### AP153  19" Power Supply  48 to 60 Watt

#### Output (continued)

<table>
<thead>
<tr>
<th>AP153</th>
<th>.111</th>
<th>.122</th>
<th>.131</th>
<th>.132</th>
<th>.133</th>
<th>.141</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage regulation:</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>· Line regulation max.</td>
<td>%</td>
<td>± 0.2</td>
<td>± 0.2</td>
<td>± 0.2</td>
<td>± 0.2</td>
<td>88...132V AC / 187...264V AC, Iout = 100%</td>
</tr>
<tr>
<td>· Load regulation stat. max.</td>
<td>%</td>
<td>± 0.5</td>
<td>± 0.5</td>
<td>± 4.0</td>
<td>± 0.5</td>
<td>Iout = 50%, Δ Iout = ± 50%</td>
</tr>
<tr>
<td>· Load regulation dyn. max.</td>
<td>%</td>
<td>± 0.5</td>
<td>± 0.5</td>
<td>± 2</td>
<td>± 0.5</td>
<td>Δ Iout = 10% ...90%...10%, 90% rise time dt = typ. 20µs, Till ΔVout is within &lt; 0.5% of final value</td>
</tr>
<tr>
<td>· Response time tᵣ max.</td>
<td>ms</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
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</tr>
<tr>
<td>· Temperature coefficient typ. %/K</td>
<td></td>
<td>± 0.01</td>
<td>± 0.01</td>
<td>± 0.01</td>
<td>± 0.01</td>
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<tr>
<td>Ripple max.</td>
<td>mVpp</td>
<td>30</td>
<td>25</td>
<td>25</td>
<td>25</td>
<td>20Hz...200kHz, @ACnom, Iout = 100%</td>
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<tr>
<td>· Incl. spikes max.</td>
<td>mVpp</td>
<td>65</td>
<td>55</td>
<td>55</td>
<td>55</td>
<td>20Hz...20MHz, @ACnom, Iout = 100%</td>
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<tr>
<td>Current limitation:</td>
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<tr>
<td>· Threshold min/max. A</td>
<td>105% ... 120% of Iout</td>
<td></td>
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<tr>
<td>· Characteristic</td>
<td></td>
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<tr>
<td>· Short-circuit max. A</td>
<td>180% of Iout</td>
<td></td>
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<tr>
<td>Start delay t_delay typ. ms</td>
<td>5</td>
<td></td>
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<tr>
<td>Vout rise-up time t_rise typ. ms</td>
<td>40</td>
<td></td>
<td></td>
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<tr>
<td>On and off characteristic</td>
<td></td>
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<tr>
<td>Power back immunity U_back max. V</td>
<td>1.2 x Vout</td>
<td></td>
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</tr>
</tbody>
</table>

#### Input (continued)

| AC input range 1 / 2 V AC | 88...132 / 187...264 | Full spec. |
| DC input range V DC | 250...300 | Full spec. (Voltage Selector at '230V') |
| Derated AC range 1 / 2 V AC | 80...88 / 150...187, 150 / 300 for 0.5s | Power loss typ. 20% (no start below 196V) |
| Derated DC range V DC | 176...250 | 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 | Increase leakage currents |
| In-rush current according to NAMUR max. A | 14 | 14 | 14 | 14 | Wait min. 30s before switching on again (cold-start) |
| Hold-up time min. ms | 31 | 29 | 29 | 29 | @ 88V AC, Iout = 100% , see graph on page 3 |
| Power factor λ typ. | 0.63 |  @ 187V AC, Iout = 100% |
| Internal fuse | 5x20mm T2A/250V (IEC127/2-5) | To replace, see page 4 |
| Input range selection | Manual (230V AC set at factory) 115/230V AC switch, position see page 4 |

#### Logic Functions

| Power Fail signal PF | Power Fail ACin > 76/142V AC |
| PF high if | Open-collector signal  | I_max = 5mA |
| Hold-up time | @187V ACin, Iout = 100% , Vout ≥ 0.95 x Vrated. |
| from Power failure to PF-signal min. ms | 33 | 30 | 30 | 30 |  |
| from PF-signal min. ms | 5 | 5 | 5 | 5 |  |
| PG-signal | Output voltage within tolerance 0.95 x Vnom |
| PG high if | Unit off |
| SD remote switch off | SD+ and SD- connected |
| Parallel operation for AP153.133 | No limit of number of AP153.133 |
| · Current distribution | Characteristics see page 3 |
| · Connection | Use equal-length output cables |
| Vout adjustable for AP153.141 min. % | No additional wiring needed |

#### Electromagnetic Compatibility

| Emissions according to EN 50081-1 | Class B |
| Radio interference, EN 55011, EN 55022 | EN 50081-2 is also satisfied |
| Immunity according to EN 50082-2 | Conducted 10kHz...30Hz |
| Electrostatic discharge ESD, EN 61000-4-2 | EN 50082-1 is also satisfied |
| Radiated fields, EN 61000-4-5 | 8kV direct discharge (level 4) |
| Fast transients, EN 61000-4-4 | 15kV air discharge (level 4) |
| Surge transients, EN 61000-4-5 | 10kV/m (level 3) To ACin, Vout and signal lines: length = 1m |
| Transient voltage, IEC 255 | 4kV (level 4) Coupled to ACin line |
| NAMUR-prescription | 2kV (level 3) Coupled to DCout line |
| Transient resistance, VDE 0160 §5.3.1.1.2 | 4kV (level 4) cap. coupling |
| Over-voltage resistance (PULS standard) | 2kV (isoaltion class 4) Common mode, unit on. |
| 90% | 5kV (isoaltion class 4) Differential mode, unit on. |
| Satisfied | Common mode, unit off. |
| 750V / 1.3ms (class 2) | Valid for total load range |
| 150/300V AC / 0.5s | Switch position 115 / 230V AC |

Specifications valid for Vin = 230 V AC, Tamb = +25°C, and 5 min run-in time, unless otherwise stated. They are subject to change without prior notice.
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
  
  typ. 17.2V AP153.121, 122.
  typ. 28.2V AP153.131, 132, 133.
  typ. 31.2V AP153.141.
  
  Accuracy max. ±4%
  Method Independent second regulator.

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 / secondary.
- 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.

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.
- 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

API153.111 and 112 typ. 83% / 9.8W @ 230V ACin, Iout = 100% .
API153.121 and 122 typ. 84% / 10W As above.
API153.131, 132, 133 typ. 87% / 9W As above.
API153.141 typ. 87% / 8.2W As above.

Reliability and Lifetime

MTBF according to Siemens standard SN29500 typ. 300,000h 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. 6HP plug in width. See figure below for dimensions.

1) Do not remove any screws on box, as internal safety connections could be disconnected!
2) Vout adjustable at trimmer on AP153.141 (in the unit, able to be reached through the grill, min. ± 5%)

Additional module:
Powerfail
Powergood
Shutdown
Flyback converter
typ. 100kHz
Regulator
OVP

Schematic

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

Modifications (contact supplier)
Other output voltages.
Other DC input voltages.
Lower cost versions.

Accessory ZP510
Installation set for mounting on DIN rail.