

APD136

1 Output

19" DC/DC Converter, 50 / 65 Watt

PULS

- ◆ High efficiency: 80% (@ 48V)
- ◆ DCin wide range: 9...36V or 18...72V DC
- ◆ 8 HP plug in width
- ◆ H15 standard pinout
- ◆ Voltage isolation primary/secondary: 2.5kV
- ◆ Flexible load sharing
- ◆ Meets EMC standards IEC 1000-4 (IEC 801), VDE 0871/B and EN 55 022/B



Preliminary data sheet

DC/DC Converter APD136

This single-output, 19" rack-mounting unit has a wide-range DC/DC converter running in bridge mode, so achieving high efficiency across the total load and input range.

EMC compatibility is a major feature. The APD136 has low spurious noise, and noise suppression meets VDE 0871 class B. Noise immunity meets IEC 1000-4 (IEC 801) at the highest levels, even at full load.

Over-voltage and over-temperature protection avoid problems even in extreme operating conditions.

| Vin | Vout | Iout | Pout | Features | Order-No. |
|----------|-------|------|----------|-------------------|------------|
| 9...36V | 5.15V | 10A | max. 65W | Wide-range input, | APD136.205 |
| | 12V | 4.2A | max. 65W | OTP, OVP | APD136.211 |
| | 15V | 3.3A | max. 65W | | APD136.221 |
| | 24V | 2.1A | max. 65W | | APD136.231 |
| 18...72V | 5.15V | 10A | max. 50W | Wide-range input | APD336.405 |
| | 12V | 4.2A | max. 50W | OTP, OVP | APD336.411 |
| | 15V | 3.3A | max. 50W | | APD336.421 |
| | 24V | 2.1A | max. 50W | | APD336.431 |

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

Accessories: H15 connector, 6.3mm flat contacts:

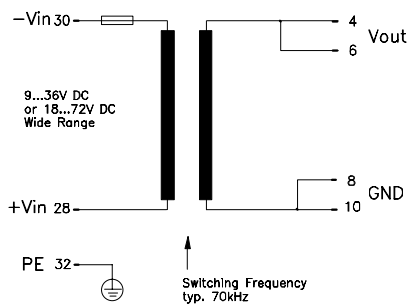
ZP100

H15 connector with soldering pins:

ZP120

Warranty: 2 years from date of delivery.

Schematic:



Output

| | APD136. | 205 to 231 | 405 to 431 | |
|-------------------------|-------------|-------------|------------|--|
| Voltage Vout | | | | Fixed. |
| Accuracy | max. ± 0.5% | ± 0.5% | | Tuning tolerance without load. |
| Sense lines | None | None | | Not available. |
| Minimum load | None | None | | Not necessary. |
| Output power Pout | max. 65W | 50W | | APD136.205 to 231: input voltage derating. |
| Noise, Ripple | max. 25mVpp | 20mVpp | | 20Hz...200kHz. |
| Including spikes | max. 25mVpp | 20mVpp | | 20Hz...20MHz. |
| Over-voltage protection | typ. 6.2V | 6.2V | | thresh. accuracy ± 8%. |
| Derating | | | | |
| · temperature | 1.5W/K | 1.5W/K | | +55° to +70°C Ta. |
| · input voltage | 1W/V | — | | 27...9V DC, see page 3. |
| Operating indicator | 1 green LED | 1 green LED | | On the front, Vout. |
| Isolation Vout to Vin | SELV | SELV | | EN 60 950, VDE 0805. |

The output is 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 (100),
the length includes the connector, see page 4.

Weight: App. 400g

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

Input

| | APD136. | 205 to 231 | 405 to 431 | |
|-----------------------|------------|-------------|-------------|---------------------------|
| Line input DC voltage | | 12 / 24V DC | 48 / 60V DC | Wide-range converter. |
| · Range | | 9...36V DC | 18...72V DC | Full spec. |
| DC-input current rms. | max. 6.7A | | | @ 9V DC. |
| Noise suppression | EN55 022/B | | | 10kHz...30MHz, conducted. |

APD136♦ 1 Output ♦ 19" DC/DC Converter ♦ 50 / 65 Watt

| Output (continued) | | APD136. | | .205 | .211 .221 | .231 | .405 | .411 .421 | .431 |
|---------------------------|--------------------------|---------|------|--------------|--------------|------|--------------|--------------|---|
| Voltage regulation: | | | | | | | | | |
| • Line regulation | | max. | % | 0.1 | | | 0.1 | | 9...36 or 18...72V DC. |
| • Load regulation stat. | ΔU_{stat} | max. | % | - 0.6 | | | - 0.6 | | Minimum load... full load, Vin = 12/24 or 48V DC. |
| • Load regulation dyn. | ΔU_{dyn} | max. | % | ± 4.5 | | | ± 4.5 | | 10%...90%...10% load change. |
| Response time | t_s | max. | ms | 5 | | | 5 | | Till ΔV_{out} is within < 0.5% of final value. |
| • Temperature coefficient | | typ. | %/K | ± 0.015 | | | ± 0.015 | | |
| Ripple | | max. | mVpp | 25 | | | 20 | | 20Hz...200kHz, DCnom, @ Iout = 100%. |
| • incl. spikes | | max. | mVpp | 25 | | | 20 | | 20Hz...20MHz, DCnom, @ Iout = 100%. |
| Current limitation | | | | | | | | | |
| • Threshold | | typ. | W | 58 | | | 60 | | Fixed, total power. |
| | | typ. | W | 50 | | | | | 9...12V DC. |
| • Short-circuit | | typ. | A | 20 | | | 20 | | No foldback till Vout = 3V, below that periodic restarts. |
| Start delay | t_{Delay} | typ. | s | < 0.3 | | | < 0.6 | | After switch on. |
| On and off characteristic | | | | No overshoot | | | No overshoot | | Approximately monotonic. |
| Load capacity | | max. | μF | 10,000 | | | 10,000 | | Do not exceed for safe start up. |

Input (continued)

| | | | | | |
|------------------|------|------|------------------|--------------------|--|
| DC input range | | V DC | 9...36 | 18...72 | Full spec, input voltage derating. |
| Derated DC range | | V DC | 8...9 | 17...18 | APD136.205 to .231: no start below 9V, max. 1 minute, APD136.405 to .431: no start below 18V, max. 5 minutes. |
| Inrush current | max. | A | 225 @ 12/24V DC | 48 @ 48V DC | APD136.205 to .231: no NTC, APD135.405 to .431: with cold-start. |
| Internal fuse | | | 5x20mm T10A/250V | 5x20mm T3.15A/250V | In the -Vin line, as per IEC127/2-5, to replace, see page 4. |

Electromagnetic Compatibility

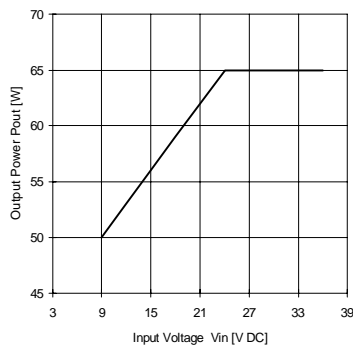
| | | | | | |
|--|--|--|--|--|--|
| Emissions | | | | | |
| • Radio interference, VDE 0871, EN 55011, EN 55022 | | | Class B | | Conducted 10kHz...30MHz. |
| Immunity | | | | | |
| • Electrostatic discharge ESD, EN 61000-4-2 (IEC 801-2) | | | 8kV direct discharge (level 4) 15kV air discharge (level 4) | | |
| • Radiated fields, IEC 801-3 | | | 10V/m (level 3) | | To DCin, Vout and signal lines: length=1m. |
| • Fast transients, EN 61000-4-4 (IEC 801-4) | | | 4kV (level 4) 2kV (level 3) 2kV (level 4) cap. coupling | | Coupled to DCin line. Coupled to DCout line. Coupled to Vout and signal lines. |
| • Surge transients, IEC 1000-4-5 | | | 2kV (isolation class 3) 1kV (isolation class 3) | | Common mode, unit on. Differential mode, unit on. |

1 Output ♦ 19" DC/DC Converter ♦ 50 / 65 Watt ♦ APD136

Protection

| | | |
|-------------------------|------------|------------------------------|
| Unit protection | | |
| • Overload | Yes | Total-power limit. |
| • Short-circuit proof | Yes | |
| • Open-circuit proof | Yes | |
| • Over-temp. (OTP) | typ. +90°C | Switch off. |
| (internal temperature) | typ. +88°C | Switch on. |
| • Reverse battery prot. | Yes | Antiparallel diode and fuse. |
| Load protection | | |
| • Over-voltage (OVP) | Yes | Switch off. |
| Threshold | typ. 6.2V | APD136.205 and .405 only. |
| Accuracy | max. ± 8% | |
| Restart | | Periodic. |

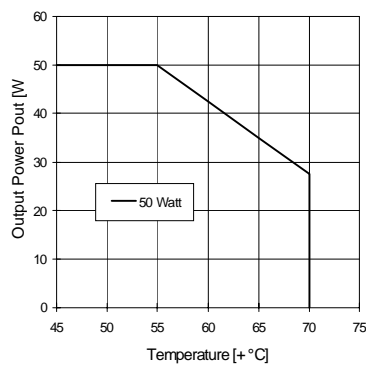
Typ. Derating over Input Voltage
(APD136.205 to .231 only)



Safety

| | | |
|-----------------------------|-------------|--------------------------------|
| Electrical safety | | |
| • Test voltage (each unit) | 2.5kV AC | Primary / secondary. |
| according to EN 60 950 | 25kV AC | Primary / PE. |
| for t = 2sec | 500V AC | Secondary / PE. |
| • Air- and leakage distance | 3 or 4mm | 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 | | |
| • Finger test | Finger test | VDE 0100 §6, EN 60 950, VBG4. |
| • Penetration protection | > Ø 3mm | e.g. screws, small parts etc. |

Typ. Derating over Temperature



Operation and Ambient Area

| | | |
|-----------------------|----------------------|--------------------------------|
| Application class | KSF | DIN 40040. |
| Operation temperature | max. -25° ... +70°C | Ta (measured at 1cm distance). |
| • Derating range | +55° ... +70°C | Derating. |
| Storage temperature | typ. -25° ... +100°C | Ta. |
| Humidity | max. 95% | Non-condensing. |
| Mechanical usage | Vertical | See page 4. |
| • Lateral spacing | — | 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

| | | |
|-------------------|------------------|------------------------|
| APD136.205 to 231 | typ. 78% / 14.1W | @ 24V DCin, Pout = 50W |
| APD136.405 to 431 | typ. 80% / 12.5W | @ 48V DCin, Pout = 50W |

Reliability and Lifetime

| | | |
|---|-----------------------|--|
| MTBF according to Siemens standard SN29500 | typ. To be discovered | @12/24V DC (.211) or @ 48V DC (.411), 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
Page 3 / APD136_26.Apr.96

This technical information is valid for +25°C ambient temperature and 5 min. run in time, unless otherwise stated.

APD136 ♦ 1 Output ♦ 19" DC/DC Converter ♦ 50 / 65 Watt

Fuse

The unit has electronic protection against external short-circuits. In case of an internal defect or confusing the input lines, a fuse disconnects the unit.

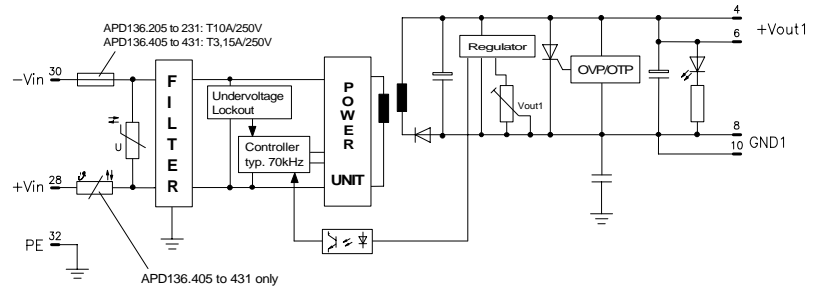
The fuse can be found on the component side of the unit below the label. It can be replaced by using a screw driver.

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.

Schematic

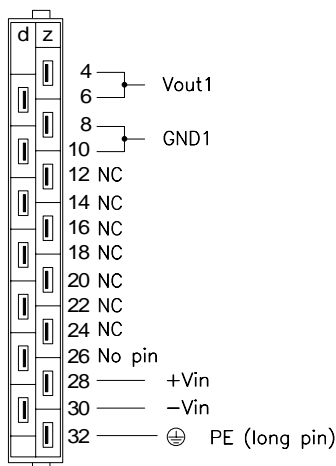


Dimensions and Connections

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

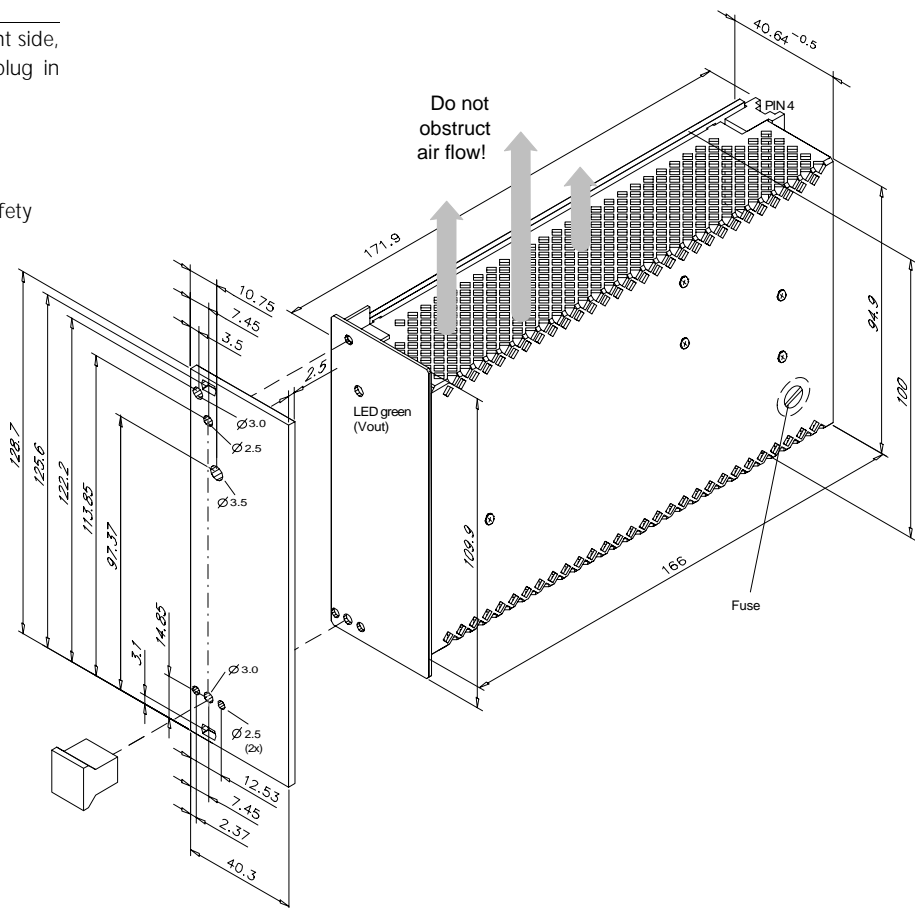
Caution:

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



H15 pinout (DIN 41612)

NC = No Connection - Do not use!



Modifications (contact supplier)

Lower cost versions.

Accessory ZP510

Installation set for mounting on DIN rail.