

DP153

1 Output

DIN Rail Power Supply, 40 to 60 Watt

- ◆ High efficiency: 87% (@ 24V)
- ◆ ACin 115/230V manual switch
- ◆ WxHxD = 40x130x120mm
- ◆ Parallel mode automatic load sharing (DP153.133)
- ◆ Meets EMV standards
EN 50081-1 (EN 55022/B), EN 50082-2
EN 61000-4 and NAMUR
- ◆ Design meets VDE 0551 (EN 60 742)



Data Sheet

The DP153 is a compact power supply for applications using controllers, sensors, and actuators in industrial plants and heavy machines. Output voltage is stable over the total load range, with excellent ripple and noise values of < 20mVpp @ 24V DC.

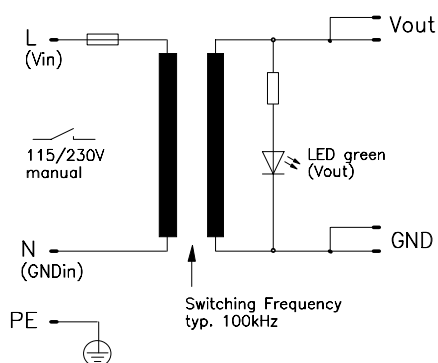
Low weight and small size allow quick single-handed installation on TS35 DIN rails.

The parallel-mode current sharing of the DP153.133 can improve output current performance.

The DP153 withstands line voltage disturbances according to EN 61000-4; VDE 0160 pulses (class 2 for total load range!) are filtered and regulated, so the load is not disturbed. The unit is protected against over-voltage and short-circuits.

Isolation is equivalent to safety transformers according to VDE 0551, and meets VBG 4.

Schematic:



| Vout | Iout | Pout | Features | Order-No. |
|-------|------|------|----------------------|-----------|
| 10V | 4A | 40W | OVP | DP153.110 |
| 12V | 4A | 48W | OVP | DP153.111 |
| 24V | 2.5A | 60W | OVP | DP153.131 |
| 24V | 2.5A | 60W | OVP, parallel mode | DP153.133 |
| 27.6V | 2A | 56W | OVP, Vout adjustable | DP153.141 |

Warranty: 2 years from date of delivery.

Output

| | | |
|--|------------------|--|
| Voltage Vout fixed | | DP153.110, 111, 131, 133. |
| Vout adjustable | min. ± 5% | DP153.141 only. |
| Accuracy | | Includes: production-adjustment, line regulation, and load regulation. |
| DP153.110, 111, 131 | max. ± 2% | |
| DP153.133 | max. ± 5% | |
| DP153.141 | max. ± 0.5% | |
| Sense lines | None | Not available. |
| Minimum load | None | Not necessary. |
| Output power Pout | max. 60W | Mounting side by side possible. |
| only DP153.133 | max. 48W | Per unit (@ parallel operation). |
| Noise, Ripple | max. 20mVpp | 20Hz...200kHz. |
| incl. spikes | max. 25mVpp | 20Hz...20MHz. |
| Over-voltage protection | typ. 1.15 x Vout | Threshold accuracy ± 4%. |
| Derating | 1W/K | +60° to +70°C Ta. |
| Operating 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. | | |

Mechanical: Al/Mg alloy housing, snap-on mounting for DIN rail TS35/7.5 (EN 50022), WxHxD = 40 x 130 x 120mm, the depth includes the DIN-rail mounting, see page 4.

Weight: App. 460g

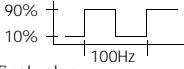
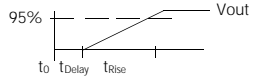
Screw terminals: Input 1 terminal, max. 2.5/4mm², output 2 terminals, each max. 2.5/4mm², see page 4.

Input

| | | |
|--------------------|--------------------------|---------------------------|
| Line input AC 1 | 100...127V AC | Switch position 115V. |
| · Range | 88...132V AC | Full spec. |
| | 80...150V AC | Derated, see page 2. |
| Line input AC 2 | 220...240V AC | Switch position 230V. |
| · Range | 187...264V AC | Full spec. |
| | 150...300V AC | Derated, see page 2. |
| Line frequency | 47...63Hz | DC or 400Hz, see page 2. |
| Input current rms. | max. 1.3Aeff. / 0.7Aeff. | @ 115 / 230V AC. |
| Noise suppression | EN 55 022/B | 10kHz...30MHz, conducted. |

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Output (continued)

| | | | DP153. | .110 | .111 | .131 | .133 | .141 | |
|-------------------------------|---------------------|----------|--------|-----------------------------------|--------|--------|--------|--------|---|
| Voltage regulation: | | | | | | | | | |
| · Line regulation | | max. | % | ± 0.2 | ± 0.2 | ± 0.2 | ± 0.2 | ± 0.2 | 88...132V AC / 187...264V AC, I _{out} = 100%. |
| · Load regulation stat. | Δ U _{stat} | max. | % | ± 1.0 | ± 1.0 | ± 0.5 | ± 4.0 | ± 0.5 | I _{out} = 50%, Δ I _{out} = ±50%. |
| · Load regulation dyn. | Δ U _{dyn} | max. | % | ± 1.0 | ± 1.0 | ± 0.5 | ± 2.0 | ± 0.5 | Δ I _{out} = 10%...90%...10%, rise time dt = typ. 20μs. Till ΔV _{out} is within < 0.5% of final value. |
| Response time | t _s | max. | ms | 1 | 1 | 1 | 1 | 1 |  |
| · Temperature coefficient | | typ. | %/K | ± 0.01 | ± 0.01 | ± 0.01 | ± 0.01 | ± 0.01 | |
| Ripple | | max. | mVpp | 20 | 20 | 20 | 20 | 20 | 20Hz...200kHz, @ AC nom, I _{out} = 100%. |
| · incl. spikes | | max. | mVpp | 25 | 25 | 25 | 25 | 25 | 20Hz...20MHz, @ AC nom, I _{out} = 100%. |
| Current limitation | | | | | | | | | |
| · Threshold | | min/max. | A | 105% ... 120% of I _{out} | | | | | Fixed. |
| · Characteristic | | | | See graph on page 3 | | | | | |
| · Short-circuit | | max. | A | 180% of I _{out} | | | | | |
| Start delay | t _{Delay} | typ. | ms | 5 | | | | | After switch on. |
| V _{out} rise-up time | t _{Rise} | typ. | ms | 42 | | | | |  |
| On and off characteristic | | | | | | | | | Approximately monotonic. |
| Power back immunity | U _{Back} | max. | V | 1.2 x V _{out} | | | | | Unit off/on. |

Input (continued)

| | | | | |
|-------------------------|------|------|---|---|
| AC input range 1 / 2 | | V AC | 88...132 / 187...264 | Full spec. |
| DC input range | | V DC | 250...300 | Full spec. |
| Derated AC range 1 / 2 | | V AC | 80...88 / 150...187, 150 / 300 for 0.5s | |
| Derated DC range | | V DC | 176...250 | Power derating typ. 20% (no start below 196V). |
| | | 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 | 14 | Wait min. 30s before switching on again (cold-start), NAMUR standard met (T _a = 25° C). |
| Hold-up time | min. | ms | 34 | @ 88V AC, I _{out} = 100%. |
| | min. | ms | 46 | @ 187V AC, I _{out} = 100%, see figure on page 3. |
| Power factor λ | typ. | | 0.66 | @ 88V AC, I _{out} = 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 switch, position see page 4. |

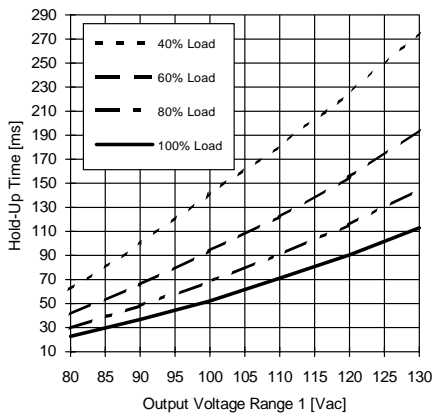
Logic Functions

| | | | | | | | |
|---|-------|------------------------------|---|---|-------|-----|---|
| Parallel operation, DP153.133 only | units | — | — | — | ∞ | — | No limit of number of units for DP153.133, 134. |
| · Current distribution | | — | — | — | Equal | — | Characteristic see page 3. |
| · Connection | | No additional wiring needed. | | | | | Use equal-length output cables. |
| V _{out} adjustable, DP153.141 only | min. | % | — | — | — | ± 5 | Trimmer position see page 4. |

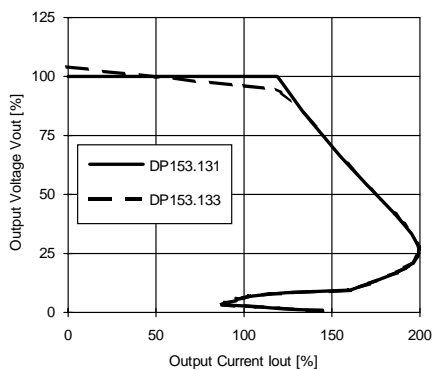
Electromagnetic Compatibility

| | | | | | | |
|--|--|--|--|--|--|---|
| Emissions according to EN 50081-1 | | | | | | EN 50081-2 is also satisfied |
| · Radio interference, EN 55011, EN 55022 | | | | | | For conducted emissions, 10kHz...30MHz, for radiated emissions, 30MHz...1000MHz, |
| Immunity according to EN 50082-2 | | | | | | EN 50082-1 is also satisfied |
| · Electrostatic discharge ESD | | | | | | |
| EN 61000-4-2 | | | | | | |
| · Radiated fields, EN 61000-4-3 | | | | | | 80MHz...1000MHz, ACin and Vout lines: I = 1m. |
| · Fast transients, EN 61000-4-4 | | | | | | Coupled to ACin line. |
| | | | | | | Coupled to DCout line. |
| | | | | | | Coupled to Vout lines. |
| · Surge transients EN 61000-4-5 | | | | | | Common mode, unit on. |
| | | | | | | Differential mode, unit on. |
| · Conducted disturb., ENV 50141 (draft of IEC 801-6) | | | | | | 150kHz...80MHz. |
| Immunity according to further standards | | | | | | |
| · Transient voltage, IEC 255 | | | | | | Common mode, unit off. |
| · NAMUR-prescription | | | | | | |
| · Transient resistance, VDE 0160 §5.3.1.1.2 | | | | | | Valid for total load range. |
| · Over-voltage resistance (PULS standard) | | | | | | Switch position 115 / 230V AC. |

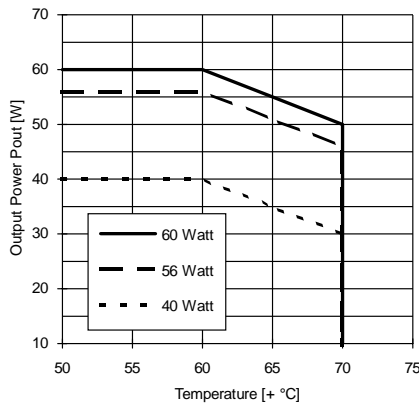
Minimum Hold-Up Time



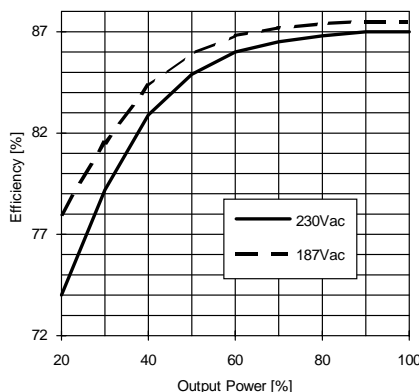
Typ. Output Characteristic



Typ. Derating over Temperature



Typ. Efficiency



Protection

| | | |
|--------------------------|------------|-------------------------------|
| Unit protection | | |
| • Overload | Yes | See current limit. |
| • Short-circuit proof | Yes | Automatic voltage recovery. |
| • Open-circuit proof | Yes | |
| • Over-temperature (OTP) | — | |
| • Reverse battery prot. | Yes | |
| • ACin range selection | Manual | Switch for 115/230V AC. |
| Load protection | | |
| • Over-voltage (OVP) | Yes | |
| Threshold | typ. 12.2V | DP153.110. |
| | typ. 14.2V | DP153.111. |
| | typ. 28.2V | DP153.131, DP153.133. |
| | typ. 31.2V | DP153.141. |
| Accuracy | max. ± 4% | |
| Method | | Independent second regulator. |

Safety

| | | |
|--|-------------------------------|--|
| Electrical safety | | |
| • Test voltage according to EN 60 950 for t = 2sec | 3kV AC 2.5kV AC 500V AC | Primary / secondary. Primary / PE. Secondary / PE. |
| • Air- and leakage distance | 6.4 / 8mm 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. 0.75mA | EN 60 950 (47...63Hz line) . |
| • 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 | VDE 0100 §6, EN 60 950, VBG4. |
| Penetration protection | > Ø 3mm | 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). |
| • Derated range | +60° ... +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

| | | |
|----------------|-----------------|---------------------------|
| DP153.110 | typ. 83% / 8.2W | @ 230V ACin, Iout = 100%. |
| DP153.111 | typ. 83% / 9.8W | As above. |
| DP153.131, 133 | typ. 87% / 9.0W | As above. |
| DP153.141 | 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 = +60° C, on/off cycle. |

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Fuse

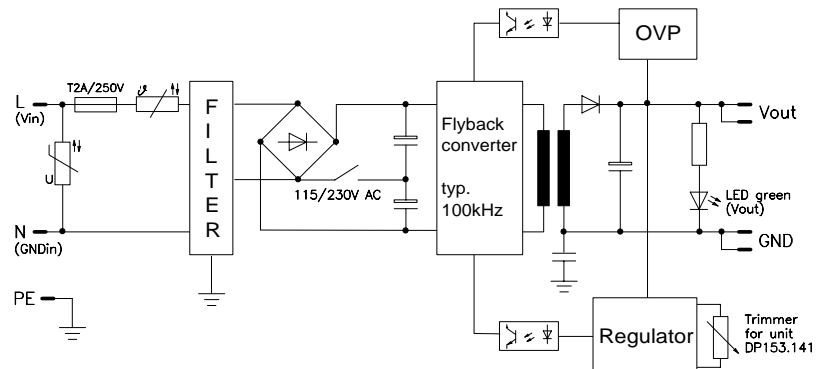
The PSU has electronic protection against external short-circuits. In case of an internal defect, a fuse disconnects the unit. It can only be replaced by opening the unit which should be done by the supplier.

Installation for Operating

Install DIN rail TS35/7.5 horizontally, ensuring correct orientation.

For other installation considerations consult your representative. Ensure free air flow.

Schematic



Dimensions and Connections

Fully enclosed Al/Mg alloy housing. All mechanical dimensions are in mm.

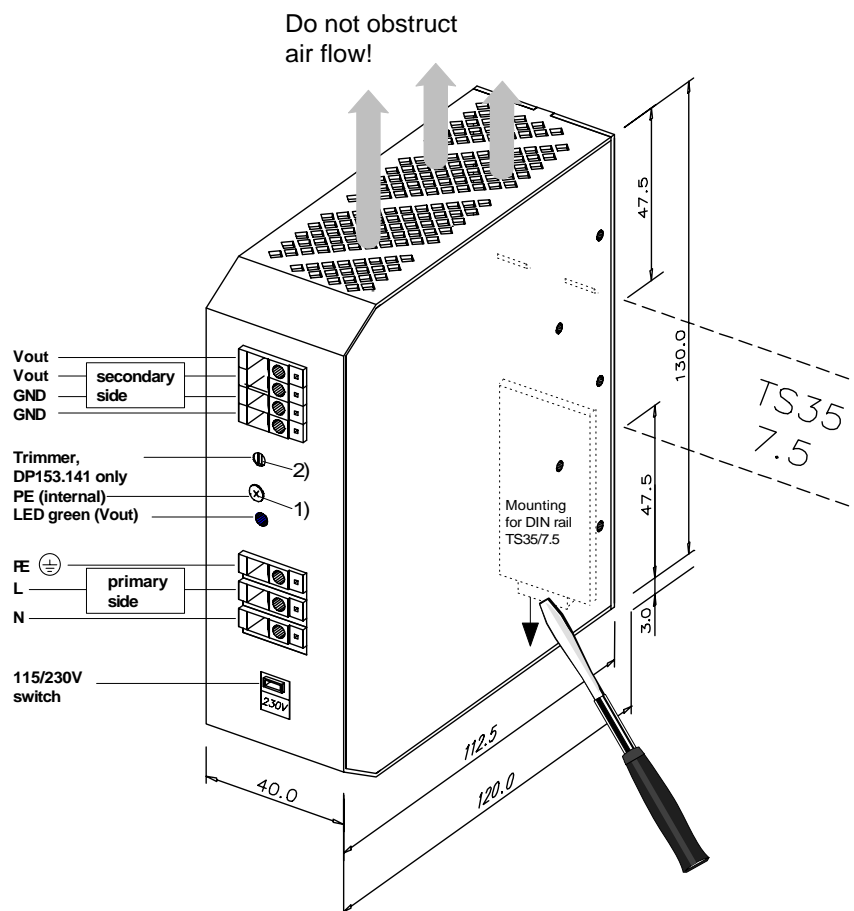
- 1) Do not remove PE screw.
- 2) Trimmer for adjustment of Vout at DP153.141 (min. $\pm 5\%$).

Screw terminals:

On the front side. These accept wire of up to 4mm² cross section (single-core cable) or 2.5mm² cross section (multi-core flex).

Remove 9 to 15 mm of insulation from wire.

Take care of standards which must be satisfied, e.g. VDE 0100 or EN 60950.



Caution:

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

Modifications (contact supplier)

Other output voltages.

Other DC input voltages.

Lower cost versions.