

PDR-240

DIN Rail

Made in Germany

240 (312) Watt Power Supply -25...+70 °C
85..264Vac active PFC & low inrush current

Short Specification:

- Metal housing
- 91.5% efficiency
- -25 °C...+70 °C ambient
- Free air convection
- Galvanic insulated
- Continuous short circuit protected
- Overload & low voltage protected
- Soft start & auto-recovery
- Hold up time >40ms
- Minimum load = 0A
- Electronic Inrush Current Limiter <7A
- EMI/EMS EN61000-6-2/3, EN55022 class B
- Active PFC: EN61000-3-2
- According to cUL60950, IEC(EN)60950-1
- Low voltage & overload control message
- Remote ON/OFF
- DIN Rail 35mm
- Screw terminals AWG20...AWG12
- High reliability, shock & vibration resistant
- Output Electrolytic Capacitors +125 °C

Smart start-up with critical loads:

- motor drives
- capacitive loads
- DC-DC-converters
- Batteries



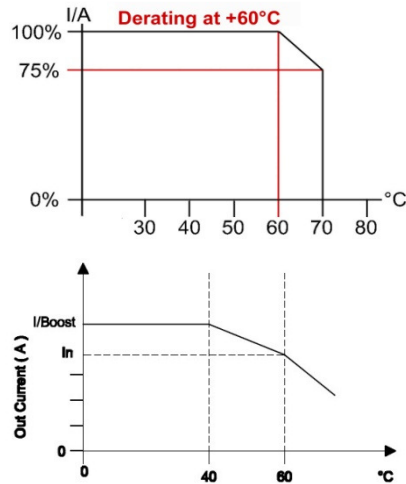
Single-Out: 9...18V,18...30V,30...43V,43..53V,53..72V



In accordance with IEC60950-1

AC Input	85...264Vac , 47...63Hz , 90...350Vdc				
AC Input Rating	100...240Vac , 115Vac <2.6A 230Vac <1.3A				
Rated DC Voltage Adjust	9...18Vdc(12V)	18...30Vdc(24V)	30...43Vdc(36V)	43...53Vdc(48V)	53...72Vdc(60V)
Over Voltage Protection	21Vdc	35Vdc	50Vdc	60Vdc	84Vdc
Rated DC Current (s. graph) 60 °C	15.0A (12Vdc)	10.0A (24Vdc)	6.7A (36Vdc)	5.0A (48Vdc)	4.0A (60Vdc)
Rated DC Current (s. graph) 40 °C	19.0A (12Vdc)	13.0A (24Vdc)	8.7A (36Vdc)	6.8A (48Vdc)	5.2A (60Vdc)
Power Boost for 60 seconds max. 60 °C	18.0A (12Vdc)	12.0A (24Vdc)	8.0A (36Vdc)	6.0A (48Vdc)	5.2A (60Vdc)
Ripple [mVpp] 230Vac	30 (20MHz)	30 (20MHz)	40 (20MHz)	50 (20MHz)	50 (20MHz)
Load regulation 0-100%	±0.5%	±0.2%	±0.2%	±0.2%	±0.2%

Tolerance Ua adjusted	± 0.5%
Transient Time	<1ms (10-100% , 100-10%)
Minimum Load	0 A
Efficiency	91.5% typical
Load Protection	1,2x I _{rated} , auto recovery
Short Circuit Protection	Yes
Temperature Controlled	Yes (see right graph)
Hold Up Time	> 40ms (100...230Vac input)
Inrush Current	< 7A (230Vac)
Softstart	50ms typical
Convection	Free air
Ambient Temperature	- 25 °C...+70 °C
Storage Temperature	- 40 °C...+85 °C
EMI	EN55022 class B / EN61000-3-2
EMS	EN61000-6-2,3 active PFC
Safety	cUL60950 , (IEC)EN60950-1
Safety class 1(A)	VDE0805, VDE0100
Air & Surface Leakage Paths	> 8mm
Input/Output	Galvanic insulated
DC Fail Relay (galv. insulated)	≤48Vdc/500mA , ≤30Vac/500mA
Relative Humidity	95% (25 °C) non-condensing
Pollution Degree	2 (EN50178)
Climaric Class	3k3 (EN60721)
MTBF rated	500000h (IEC61709)
Dimensions (HxWxD)	130x75x115mm
Weight	1200g
Connectors (AC & DC)	AWG20...AWG6
(see page 4)	IEC60664-1, IEC61984



For further derating information see table page 3

Temperature Control:

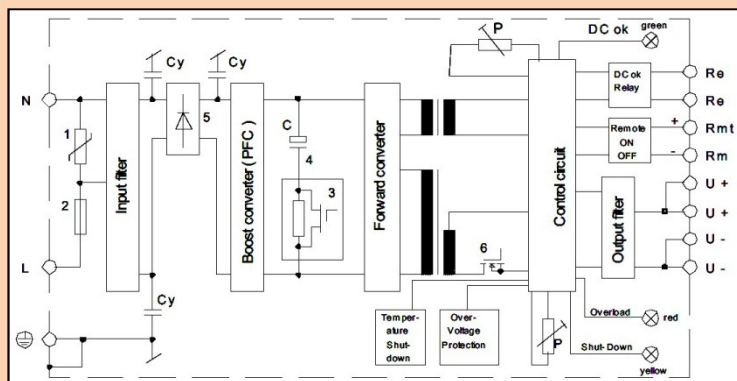
If the ambient temperature (ta) ≤40 °C the PDR provides I/Boost continuously and if ta ≤60 °C I_{rated} is provided continuously. If ta >60 °C derating continuously lowers V_{out} 2,5%/Kelvin. If ta >70 °C (or thermal overload occurs) the PDR shuts down. It auto-recovers when the device cools down to approved operation conditions.

Specification:

The PDR-240 DIN Rail power supply series is designed for worldwide electronics applications like machine building, railway, military and factory automation. Its regulated DC output with ripple/noise lower than 30mVpp and its high efficiency of 91.5% makes the PDR robust, economical and reliable. ProConnecting power supplies are traditionally made with high end low ESR electrolytic output capacitors with withstanding +125 °C temperature. Our capacities are rather designed over for longer lifetime and longer hold up times. The power boost of the PDR starts DC-loads and DC-motors reliable. The built in function diagnostics detects malfunctions. The galvanic insulated DC fail relay and remote on/off provides full control over the power supply unit. The PDR is short circuit and zero load stability protected. It is protected against high transient and provides very good interference resistance. Equal types of the PDR-240 can be operated in parallel or in series connection. We use IP20 stabile aluminium housings with ventilation slots in accordance to the demanding VDE norms.

The design meets EN(IEC)60950-1 and low voltage directive EN55022 Class B.

Block Diagram

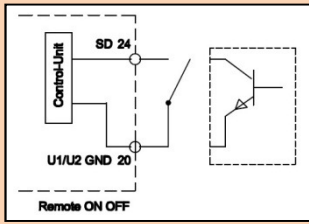


- 1) Transient suppressor (VDR)
 - 2) AC fuse
 - 3) Electronic Inrush Current Limiter
 - 4) Load Capacitor C
 - 5) Rectifier & Active PFC
- P Potentiometer

Complex sane filter technology using 2 varistors, noise suppression chokes and X1 capacitors, apply major transient resistance to the input filter. The synchron rectifier increases the efficiency of the APW crucial. Compared to diode rectifying the power dissipation drops to a minimum. The emission is much lower to result in a longer lifetime of the APW power supply.

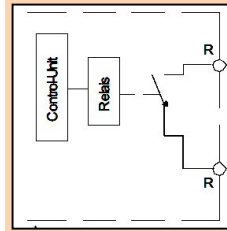
Overload: If 0.9xV_{out} applies to the outputs, the red LED lights and the DC-OK-Relay (Re) drops (control message). The green DC-OK LED is off.

Remote On/Off



Enable a 10...30Vdc 20mA voltage signal to (Rmt/Rm) to shutdown the PDR, the yellow LED lights and 0V is distributed to the outputs. If the shutdown is short circuited or <math><500\text{mV}</math> are applied to (Rmt/Rm), the PDR „tickers“, the yellow LED flashes and 5V is distributed to the outputs. Disable the remote voltage to restart the PSU

DC o.k. Message

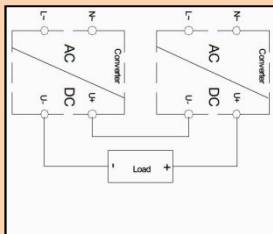


Low Voltage:

If adjusted Vout drops 10% the red LED lights and the DC-OK-Relay (Re) drops (control message). The green DC-OK LED is off.

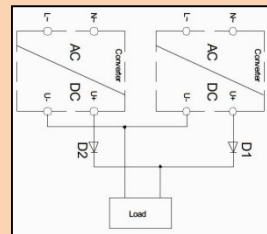
Overload: If $0.9 \times V_{out}$ applies to the outputs, the red LED lights and the DC-OK-Relay (Re) drops (control message). The green DC-OK LED is off. Vout o.k. = relay closed
Vout fail = relay open

Series Connection



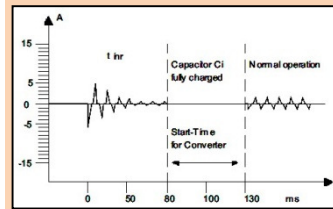
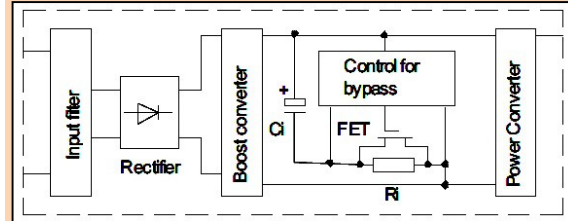
To increase the output power, equal PDR devices can be used series connected. Observe to safety directives when the output voltage achieves 60Vdc in sum.

Redundant Connection



To increase system availability up to five PDR can be used in parallel operation mode. Please make sure that wiring length from all units to the load is equal. Full redundant operation modes require external diodes. We suggest to use our RED00202 DIN-Rail N+1 redundant module für professional redundancy.

Inrush Current Limitation (Block Diagram)



While connecting the PDR to the AC wire network its inrush current is limited to <math><7\text{A}</math> (typ.). The start capacitors are loaded after 80ms and the PDR actuates. After passing softstart (active PFC) the power supply is ready for operation after a total of $t=130\text{ms}$.

Characteristics $V_i=230\text{Vac}$:
Peak Inrush Current = <math><7\text{A}</math> (typ.)
Peak Limiting Duration = 80ms

Power Boost and Temperature Behaviour

The PDR-240 operates in accordance to the V/C-characteristic line (see graph I/Boost on page 2). It has a determinate power reserve (boost): With ambient temperatures $\leq 40^\circ\text{C}$ the power boost is continuously available while with higher ambient temperatures it is available for a few minutes. When a DC short circuit or an overload occurs to the PDR-240, it is limited to I/Boost (see graph) but it is not shot down. The DC-voltage is lowered until the error is rectified. The V/C-line and the powerboost applies operation of critical loads, like DC-DC-converters, capacitive loads, drives and batteries, trustworthy.

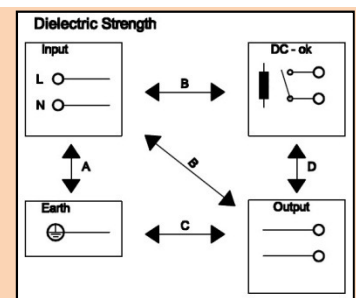
Output voltage/current ratio to ambient (U/I to $^\circ\text{C}$)

Uout	40°C/Iout	60°C/Iout	Uout	40°C/Iout	60°C/Iout
9Vdc	19,0A	15,0A	32Vdc	9,8A	7,5A
12Vdc	19,0A	15,0A	34Vdc	9,2A	7,1A
15Vdc	17,1A	13,5A	36Vdc	8,7A	6,7A
18Vdc	15,6A	12,0A	40Vdc	7,8A	6,0A
20Vdc	14,7A	11,3A	46Vdc	6,8A	5,2A
22Vdc	13,9A	10,7A	53Vdc	5,9A	4,5A
24Vdc	13,0A	10,0A	60Vdc	5,2A	4,0A
26Vdc	12,0A	9,2A	65Vdc	4,8A	3,7A
28Vdc	11,2A	8,6A	72Vdc	4,3A	3,3A
30Vdc	10,4A	8,0A			

Test	Time	A	B	C	D
Type Test	60s	2500Vac	3000Vac	500Vdc	500Vdc
Factory Test	5s	2000Vac	2000Vac	500Vdc	500Vdc
Field Test	2s	2000Vac	2000Vac	500Vdc	500Vdc

Type test and factory tests are conducted by the manufacturer. Do not repeat the test in field. Field test rules:

- Use appropriate test equipment which apply the voltage with a slow ramp
- Connect L1 and N together, as well as all output poles
- Use only AC test-voltages with 50/60Hz. The output voltages is floating and has no ohmic reference to ground.
- If testing output voltages are $\geq 60\text{Vdc}$ remain to security directives. Use only isolated screw drivers to adjust output voltages.



Function Table and Messages

Indicators	DC-ok LED green	Overload LED red	Shutdown LED yellow	DC-ok Relay
Normal operation	On	Off	Off	Closed
Powerboost	On	Off	Off	Closed
Overload ($0.9 \times V_{out}$)	Off	On	Off	Open
Shutdown with open contact	On	Off	Off	Closed
Shutdown with 10...30Vdc	Off	Off	On	Open
Shutdown with $<500\text{mVdc}$	Off	Pulse	Pulse	Open
Temperature shutdown	Off	Off	Off	Open
Input voltage low or fail	Off	Off	Off	Open

Terminal Connects:

SK1
1 = L
2 = N
3 = GND

SK2
1 = DC +
2 = DC -
3 = DC -
4 = DC -

SK3
A= Remote On/Off (shutdown)
B= DC-OK Relay

Screw terminal order codes:
DC-fail-relay & Shutdown, one plug for each required (each package = 10 pcs)
Art.No.: 3520037 (2 pins)

Optional Coating (option C):

We offer the PDR-Series with optional coating. It is to be used in e.g. dusty, dirty, high humidity, or in awaiting quick temperature changes. Short circuit and corrosion at print board lines and at solder points can be prevented. The coat itself is a transparent acrylic resin. It is procured with a robotics varnishing machine.

Peters SL 1306 N-FLZ (transparent) IEC60216-1 2001, IPC-CC-830B, UL listed as permanent coating FileNo.: E80315, UL94V-0

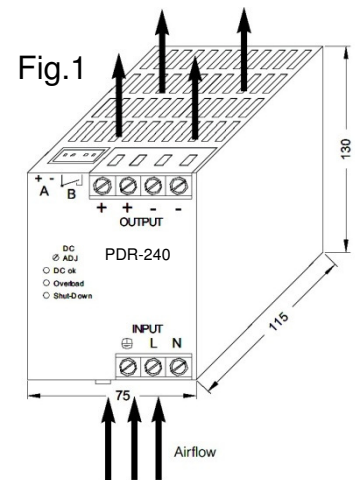
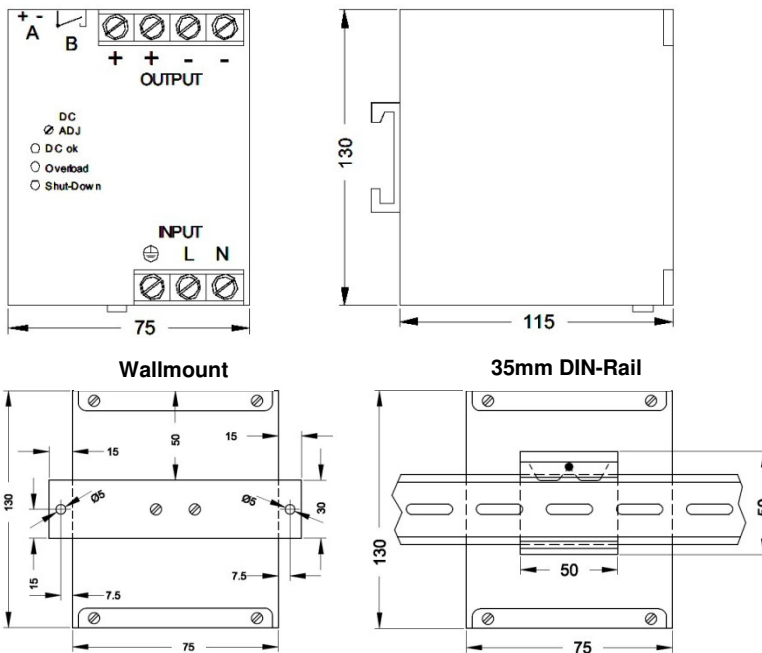
Order Codes:

PDR02401.12T 9...18Vdc DIN-Rail	PDR02401.12W 9...18Vdc Wallmount
PDR02401.24T 18...30Vdc DIN-Rail	PDR02401.24W 18...30Vdc Wallmount
PDR02401.36T 30...43Vdc DIN-Rail	PDR02401.36W 30...43Vdc Wallmount
PDR02401.48T 43...53Vdc DIN-Rail	PDR02401.48W 43...53Vdc Wallmount
PDR02401.60T 53...72Vdc DIN-Rail	PDR02401.60W 53...72Vdc Wallmount

Options to be added to the order-code:
C coating
Order samples:
PDR02401.24TC DIN-Rail+Coating
PDR02401.24WC Wallmount+Coating

Mechanics & Installation of the PDR02401:

Stable metal/aluminium housing IP20. To allow adequate convection, a free air space of 50mm (top/bottom) and 5mm (sidewalls) is required for the PDR-240; for active devices 15mm space from the PDR-sidewalls. For free air convection it is necessary to install the PDR horizontal (**Figure 1**). You can use the DIN-Rail installation (equipped standard) with our patented 35mm DIN-Rail bracket according to EN60275. It is easy to mount/dismount while snapping it onto the 35mm DIN-Rail without any tools necessary. It is a wallmount fastener available as option, too.



Connectors (IEC60664-1, IEC61984)		
Wiring	Solid	Flexible
AC-Input & DC-Outputs	0,5...6mm ² 20...10 AWG	0,5...4mm ² 20...12AWG
Rated Current	30A	30A
Signal	0,2...2,5mm ²	0,2...2,5mm ²
Outputs (A,B)	24...14 AWG	24...14 AWG

Safety Instructions: Please read all warnings and advices carefully before installing or operating the PDR. Retain this operation manual always ready to hand. The PDR must be installed by specialist staff only.

Installation:

- 1.) The PDR is designed for systems fulfilling the safety norms of dangerous voltages/energy and fire prevention
- 2.) Installation is restricted to specialists only, make sure that the AC wire system is free of voltage
- 3.) Opening the PDR, making any modifications to it, dismantling any screws from it, operating the PDR out of specification and/or using it in appropriate area will inevitably result in losing manufactureres guarantee; we decline taking any responsibility for risk of damages caused to someones health or to any installed system.
- 4.) Attention: The PDR has an internal input fuse. It is necessary to wire an automatic circuit braker to the line. We suggest to use a 10A-type with B-characteristic. It is verboten to operate the PDR without protective earth wired. It essential to install a line switch before the PDR.

Warnings:

Disregard these warnings can cause fire, electric shock, serious accident and death.

1. Never operate the PDR without Protective Earth Conductor
2. Before connecting the PDR to the AC wire system make all wires free of voltage and assure accidently switch on
3. Allow neat and professional cabling
4. Never open nor try to repair the PDR by yourself. Inside are dangerous voltages that can cause electric shock hazard.
5. Avoid metal pieces or other conductive material to fall into the PDR
6. Do not operate the PDR under damp or wet conditions
7. It is verboten to operate the PDR under Ex conditions or in Ex-Area

