

# HSD04801 480W DIN-Rail Power Supply 3-Phase



## Features:

- Metal housing
- Up to 92% efficiency
- -20°C...+60°C full output power
- Natural convection
- Galvanic insulated
- Continuous short circuit protected
- Overload & low voltage protected
- Soft start & auto-recovery
- Hold up time >12ms
- Temperature control
- Electronic Inrush Current Limiter 3,5Aeff
- Minimum load = 0A
- Switching frequency typ. 100KHz
- EMI/EMS EN61000-6-2,3, EN55022 class B
- IEC(EN)60950-1, EN60204-1 prepared
- Series & parallel operation
- DIN Rail 35mm
- Screw terminals AWG20...AWG6
- 24 hours burn in test
- High reliability, shock & vibration resistant

Model	Voltage [V]	Current [I]	Voltage Set Range
HSD04801.24T	24Vdc	20,0A	22,5-28,5Vdc
HSD04801.36T	36Vdc	13,3A	32,8-38,0Vdc
HSD04801.48T	48Vdc	10,0A	45,6-52,8Vdc
HSD04801.60T	60Vdc	08,0A	57,0-66,0Vdc



### Technical description

**The Camtec HSD models are precision DIN-rail power supplies „Made in Germany“. These power supplies are designed for high reliable power systems.**

For more than 20 years the Camtec Power Supplies manufactures high-end switch mode power supplies in Germany. A field breakdown of below 4 sigma over a 10 years period under review approves our ambitious quality concept. Each manufactured Camtec product passes several 100% random tests for each detailed function and a full-load Burn-In test.

Although it is not required from the safety norms our production applies a routine safety test to each manufactured device, even if it is an extra low-voltage model. The components in the assembled device pass stress aging to achieve an even level and to prevent from delayed failures. Our internal product engineering guidelines provide a clear target: Camtec product reputation must say „mount and forget“. Quality is never a mere promise for our team.

The HSD DIN-rail power supplies provide low noise and ripple, 2 and 3-phase operation, and an absolute precise setting at high load changes. With an efficiency up to 92% the devices are highly energy efficient.

Equipped with high-end capacitors of outstanding lifetime our power supplies guarantee a very long and reliable operation time. The circuit design of the HSD series allows cope playing with complex loads. The internal protection circuits protect the power supply and the connected system, even in exceptional situations. The HSD series is protected from high transients by strong filters with high energy efficiency. All inputs and outputs and the interface are electrically isolated. The design specifications call for the highest standards of safety and interference suppression. The device was developed in accordance with the requirements of IEC/CSA/UL60950-1 and the EMC standards EN55022 Class B.

The natural air cooling system allows maintenance free operation.

### Technical Data Table

AC Input Range	3xAC 340-575Vac / 2xAC 340-575Vac			
AC Input Nominal	3xAC 400-500Vac (1.5-1.1A) / 2xAC 400-500Vac (1.5-1.1A)			
AC Input Frequency	47-63Hz			
DC Input Range	450-820Vdc (1,6-0.9A)			
DC Output	24Vdc	36Vdc	48Vdc	60Vdc
DC Output Set Range	22,5-28,5Vdc	32,8-38,0Vdc	45,6-52,8Vdc	57,0-66,0Vdc
DC Current -20°C...+60°C	20.0A	13.3A	10.0A	8.0A
DC Current -20°C...+40°C	22.0A	14.6A	11.0A	8.8A
DC Current Boost -20°C...+60°C	24.0A	16.0A	12.0A	9.6A
Over Voltage OVP	32Vdc	50Vdc	56Vdc	84Vdc
Ripple Noise 400-500VAC 20MHz	50mVpp	80mVpp	100mVpp	120mVpp
Failure Relay Power OK	<48Vdc/500mA (galvanic insulated <60Vdc), ensure enforced protection above 60Vdc			
Continuous Power 3x AC P <sub>nom</sub>	3xAC 400-500Vac = 480Wmax, -20°C...+60°C			
Continuous Power 2x AC P <sub>nom</sub>	2xAC 400-500Vac = 360Wmax, -20°C...+60°C			
Cooling	Natural cooling			
Efficiency	Up to 92% 400Vac at full load			
Short Circuit Resistance	Yes			
Open Circuit Protected	Yes			
Base Load (OCP)	Not required (open circuit protected)			
Load Regulation	< ± 0,5% 10-100% / 100-10%			
Load Regulation Time	<1ms at load change 10-100%			
Temperature Control	Yes, thermal shutdown & auto recovery (+70°C, outside measuring point distance 10mm)			
Hold Up Time	>15ms 230Vac mains buffering at full load			
Inrush Current Protection	< 3.5Aeff <5A peak (400-500Vac) active electronic inrush protection (no simple NTC)			
Recommended MCB	≥1,5A Char-B 10kA Icn according to IEC60989 @ 230Vac			
Soft Start	typ. 5ms			
Ambient Temperature	- 20°C...+70°C operating, derating 2,5%/°C >60°C			
Storage Temperature	- 40°C...+85°C			
Ambient Conditions	Humidity 95% non-condensing @ 25°C, climate class 3K3, pollution degree 2			
ROHS	2011/65/EU conform			
REACH	EG No. 1907/2006 conform			
EMI	EN55022 conducted class B, radiated class A			
EMS	EN61000-6-2,3			
Safety	EN60950-1, EN60204-1 prepared			
Safety Class I	VDE0805, VDE0100			
Maximum Operation Altitude	3000m (9842 ft.) above sea level			
Isolation Input to Output	3000Vac			
Isolation Input to Case	2500Vac			
Isolation Output to Case	500Vdc, ≥60Vdc= 2400Vdc			
Isolation Failure Relay	<48Vdc/500mA (galv. isolated <60Vdc)			
MTBF (IEC61709)	600000h (Meantime Between Failures: statistic time between failures after repairs)			
MTTF (IEC61709)	152012h (Meantime To Failure: statistic time to ever fails)			
Dimensions (HxWxD)	130x150x118.5mm			
Weight	1900g			
AC-Input & DC-Output Connections	Spring-type terminal with cable protection 0,5...6mm <sup>2</sup> 21...10AWG according with IEC/EN60664-1, IEC/EN61984 Use copper conductors only. Tightening torque per terminal block is 0.5 - 0.6 Nm / 4.5 - 5.3 lbf-in			

### Stock Numbers

Model (DIN-Rail standard)	Voltage	Part Number	Purchase Order Number
HSD04801.24T	24V	304.1055.001	3041055001CA
HSD04801.36T	36V	304.1055.007	3041055007CA
HSD04801.48T	48V	304.1055.008	3041055008CA
HSD04801.60T	60V	304.1055.009	3041055009CA
Option 3520037 Connector for Power OK Relay Connection	Optional connector for use with the Uout-OK relay contacts. Spring-type terminal with cable protection 0,2...4mm <sup>2</sup> 24...12AWG according with IEC/EN60664-1, IEC/EN61984. Use copper conductors only. Tightening torque per terminal block is 0.4 - 0.5 Nm / 3.6 - 4.4 lbf-in		

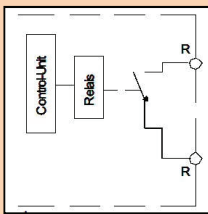
## Manual and Technical Details

### Input Connection (Screw Terminal AWG20-6 / 0.5-16mm<sup>2</sup>)

Pin	Name	Type	Function	Remarks
1	PE	-	Earth	Protective Earth PE must be connected before taking device into operation!
2	L1	Input	Phase 1	With 2 phase operation 40% derating nominal power = 330W
3	L2	Input	Phase 2	
4	L3	Input	Phase 3	

### Output Connection (Screw Terminal AWG20-6 / 0.5-16mm<sup>2</sup>)

Pin	Name	Type	Function	Remarks
1	+	Output	Vout +	-
2	+	Output	Vout +	
3	-	Output	Vout -	
4	-	Output	Vout -	
5	Uout OK	Relay	Opener	<48Vdc/500mA, galvanic separation <60Vdc, >60Vdc no save contact separation
6	Uout OK	Relay	Opener	



#### Power Good Control

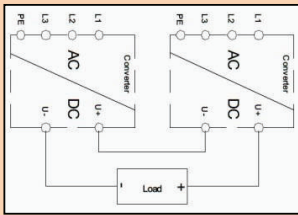
##### Low Voltage:

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 <math>0.9 \times V\_{out}</math> applies to the outputs, the red LED lights and the DC-OK-Relay (Re) drops (control message). The green DC-OK LED is off. Galvanic separation >60Vdc.

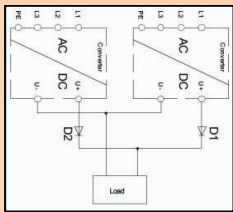
Vout o.k. = relay closed

Vout fail = relay open



#### Series Operation

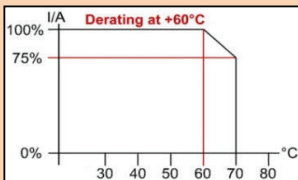
To increase the output power, equal HSD devices can be used series connected. Observe to safety directives when the output voltage can achieve over 60Vdc in sum.



#### Redundant N+1 & Parallel Operation

To increase system availability up to five HSD 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 like our RED00202 DIN-Rail N+1 redundant module für pro redundancy.

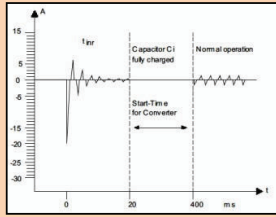
For redundant or parallel operation set the small switch below the Power-LED from single to parallel operatio. The parallel mode of the switch tilts the C/V line alittle bit. The power supply switches smoother and the power distribution is better balanced between the involved modules.



#### Ambient Operation & Over Temperature Protection Shutdown

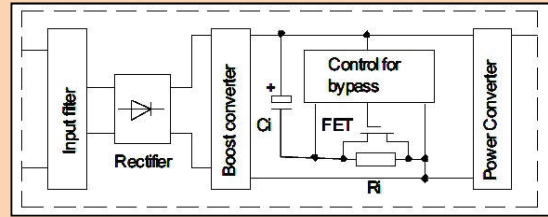
The maximum ambient temperature during operation is + 70°C. If the over temperature protection is activated, the power supply is switched off. It automatically returns into operation with soft start when the temperature achieves normal values. The measuring point is 10mm outside the power supply. The power supply unit starts automatically when it has cooled down.

### Inrush Current Limitation



While connecting the HSD to the AC wire network its inrush current is limited to  $<5A_{peak}/3,5A_{effective}$ . The start capacitors are loaded after 20ms and the HSD actuates. After passing softstart the power supply is ready for operation after a total of  $\Delta t=400ms$ .

**Characteristics  $V_i=400Vac$ :**  
 Peak Inrush Current =  $<14,4A_{eff}$ .  
 Peak Limiting Duration = 20ms

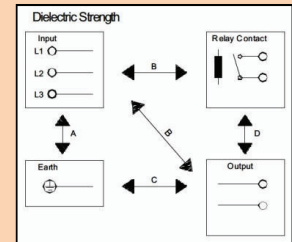


### Electrical Safety (Factory-Test / Fieldtest Owner)

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,L2 and L3 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  $\geq 60Vdc$  remain to security directives. Use only isolated screw drivers to adjust output voltages.



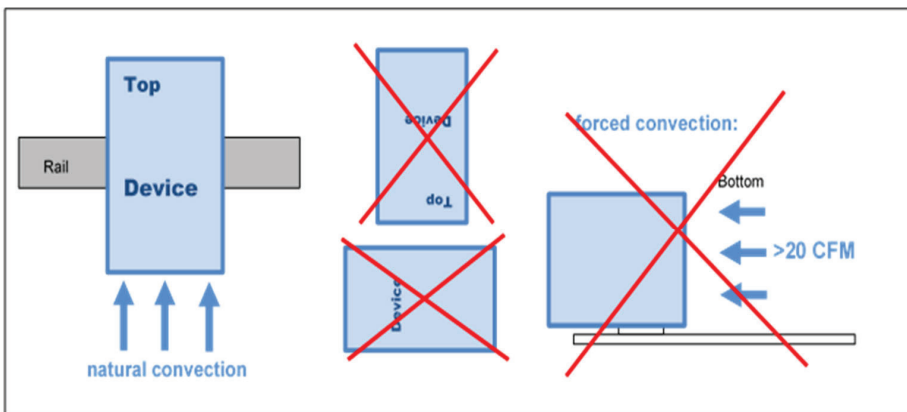
Optional Coating (option C):

On demand we offer the HSD-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.

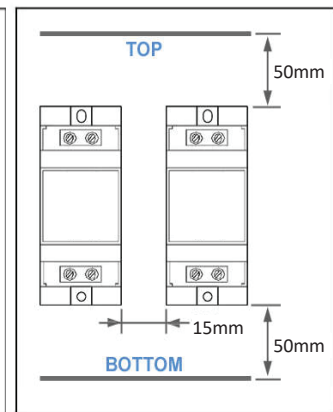
Peters SL 1306 N-FLZ (transparent) IEC60216-1 2001, IPC-CC-830B, UL listed as permanent coating FileNo.: E80315 , UL94V-0

### Mounting Instructions

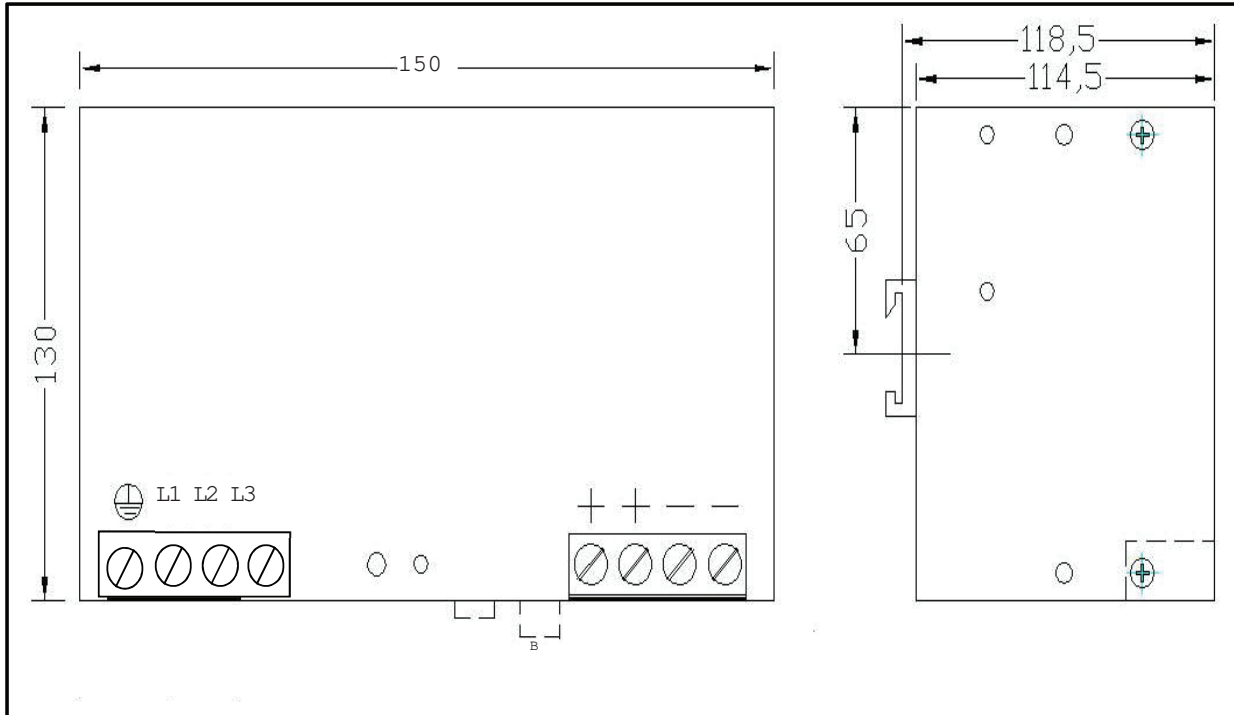
Stable metal/aluminium housing IP20. Follow the mounting restrictions to allow maximum lifetime of the product and to prevent from tripping the internal temperature protection. The HSD is an active device. The distance between a HSD and the next active or temperature sensitive device shall be 15mm or larger. The distance between a HSD and the next passive device shall be 5mm or larger. Make sure that the ventilation holes below and above the unit are not blocked to allow free air convection of 50mm above and below the unit. You can use the DIN-Rail installation with our patented 35mm DIN-Rail clamp according to EN60275. No tools are necessary to mount or dismount the device from a DIN-rail.



Mounting Instruction: recommended airflow space below and above is 50mm (2 Inch)



(Fig.11 mounting distances)



**Safety regulations: Please read these instructions completely before using the equipment. Keep these instructions on to hand. The device may only be operated by trained specialist staff.**

**Installation:**

- 1) The device is designed for devices and systems that meet the standard requirements for hazardous voltages, power and fire prevention.
- 2.) Installation and service only by trained persons. The AC power must be switched off. The work is to be labeled; accidental reconnection of the system must be prevented.
- 3.) Opening the device, its modification, loosening bolts or operation outside the specified herein specification or in an unsuitable environment, has the immediate loss of warranty to follow. We disclaim any responsibility for any resulting damage to persons or things.
- 4.) Note: The device must not be operated without an upstream circuit breaker (MCB). We recommend the use  $\geq 1,5A$  Char-B 10kA. It is prohibited to use the unit without PE. It may be necessary upstream device has a power switch.

**Warning:**

**Non-compliance can result in fire and serious injury or death.**

1. Operate the appliance without PE connection.
2. Before connecting the device to the AC network, make wires free of voltage and assure accidently switch on.
3. Allow neat and professional cabling.
4. Never open nor try to repair the unit. Inside are dangerous voltages that can acause electrical shock hazard.
5. Avoid metal pieces or other conductive material to fall into the item
6. Do not operate the device in damp or wet conditions
7. Do not operate the unit under EX-conditions



All parameters base on 5 minutes run-in @ full load / 25°C / 230Vac 50/60Hz, as otherwise stated.