HSR03201

DIN Rail

Made in Germany

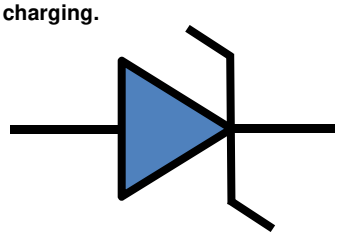
320 Watts N+1 Redundant Power Supply
115/230Vac Input Voltage – low inrush

Short Specification:

- Metal housing
- Up to 91% efficiency
- -20°C...+60°C full output power
- C/V curve down to 0V, no fold back
- Free air convection
- Galvanic insulated
- Continuous short circuit protected
- Overload & low voltage protected
- Open Circuit Proof
- Soft start & auto-recovery
- Hold up time >30ms
- Switching frequency typ. 100KHz
- EMI/EMS EN61000-6-2,3, EN55022 class B
- PFC: EN61000-3-2 class A
- IEC(EN)60950-1
- Series & parallel operation
- DIN Rail 35mm
- Screw terminals AWG21...AWG10
- 24 hours burn in test
- High reliability, shock & vibration resistant

O-Ring diode inside

Decoupling redundant or parallel operation and battery charging.



Models	Voltage	Current
HSR03201.24T	**24V**	**13.5A**
HSR03201.48T	**48V**	**6.7A**
HSR03201.60T	**60V**	**5.4A**

Phone +49(721)46596-0 - Fax +49(721)46596-77 - www.camtec-gmbh.com - info@camtec-gmbh.com

Technical Data Table

AC Input Range	85…132Vac / 184…265Vac, 47…63Hz, 250…375Vdc (set input selector to 230VAC)		
AC Nominal Input	115Vac <4.8A / 230Vac <2.2A		
Model Name	HSR03201.24T	HSR03201.48T	HSR03201.60T
Nominal Voltage	24V	48V	48V
Nominal Current	13.5A	6.7A	5.4A
Boost Current 60s	16.2A	8.1A	6.6A
Voltage Set Range	22,5…28,5V	34,2…39,6V	45,6…52,8V
Ripple 230Vac/20MHz	20mVpp	50mVpp	50mVpp
Stability Load Switch 0-100%	± 0.3%	± 0.1%	± 0.1%
Power	320W continuous		
Operation Failure Relay	Yes, break contact isolated up to 60Vdc		
Factory Adjust. Tolerance V_{out}	± 1%		
Load regulation	< ± 0.5% 10-100%, 100-10%		
Response to Load Change	<1ms 10-100%, 100-10%		
Short Circuit Protection	Continuous		
Open Circuit Proof	Continuous		
Efficiency	91% typical at 90% load		
Load Protection	1,2x I_{rated} with auto recovery		
Voltage Protection	140% of U_{out} with auto recovery		
Hold Up Time	> 30ms 230Vac		
Inrush Current	< 10.6Aeff / 15Apeak active inrush current limiter inside		
MCB (Circuit Breaker)	4A type-B 230Vac and 6A type-B 115Vac with 6kA each recommended		
Softstart	20ms typical		
Cooling	Natural convection		
Derating	+60°C…+70°C 2.5%/°C		
Ambient Temperature	- 20°C…+70°C		
Storage Temperature	- 40°C…+85°C		
EMI	EN55022 class B / EN61000-3-2		
EMS	EN61000-6-2,3		
Safety	EN60950-1, EN60204-1		
Safety class 1(A)	VDE0805, VDE0100		
Isolation Paths	> 8mm creepage distance & clearance paths		
Input to Output Isolation	3000Vac		
Input to Case Isolation	2000Vac		
Output to Case	500Vdc, models ≥60Vdc 2400Vdc		
MTBF EN61209	500.000h		
MTTF EN61209.SN29500	154.300h @ 40°C 24/7 85% load		
Environment	Humidity 90% non-condensing @ 25°C, climate class. 3k3, pollution rate II		
Altitude Operations	3000m NN / 9842 ft. above sea level		
Dimensions (HxWxD)	124x120x99.5mm		
ROHS	2011/65/EG confirmed		
REACH	EG No. 1907/2006 confirmed		
Weight	1200g		
Connectors Option (AC & DC)	Spring-type terminal with cable protection 0,5...6mm² 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, strip 4.5mm		

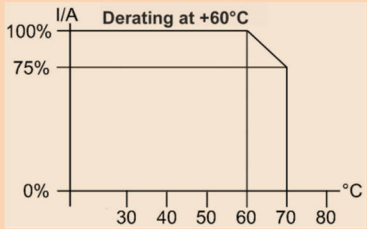
Technical Concept

The Camtec HSR03201 series is a high precision switch mode power supply for an upscale demand. The unit is voltage adjustable. It is engineered and manufactured by CAMTEC in Germany. The designed meets challenging applications like railway, complex drives, battery charging for DC-UPS, test-stands, machine-building and infrastructure projects. The power supply provides a low ripple-noise, a precise load-regulation and high efficiency up to 91%. High-end long-life capacitors guarantee an extended hold-up-time and an extraordinary lifetime of the power supply. The circuit design starts complex loads easily. The internal control circuit manages illegal operating conditions to prevent your system from damages. The HSR series features active high input transients with suppressor diodes, X2-capacitors and varistors. All inputs, outputs and feature connections are galvanic isolated. The design rules set value on extended interference immunity and safety. The unit is designed in accordance to the EN60950-1 and the EMC-compatibility to EN55022. Our engineering design is made in accordance to the CSA/UL60950-1 and the IEEE CB scheme rules. The power supply has a built-in O-ring decoupling diode, which decouples the devices from each other in parallel or redundant setup.

Overtemperature, Over Voltage Protection & Derating

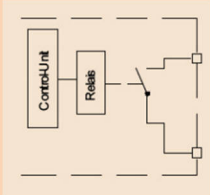
OT Over Temperature The maximum ambient temperature is +70°C. There is temperature protection inside the power supply. When the temperature exceeds a certain level the HSR03201 will be shut down. The unit provides an automatic restart when the temperature returns to applicable conditions.

OVP Over Voltage Protection Exceeding the OVP results into ticker mode. Resuming the failure causes automatic restart into normal operation.



DC-OK (Power Good Relay)

The DC ok relay indicates if the output voltage is low. The contact is galvanic insulated to the AC input and the DC output connections. The isolation covers the overall adjustment range of the HSR03201 series up to 60Vdc. If the DC voltage is ok the relay is closed. If the power supply unit is in false operation the relay is open.



C/V Current Voltage Behaviour

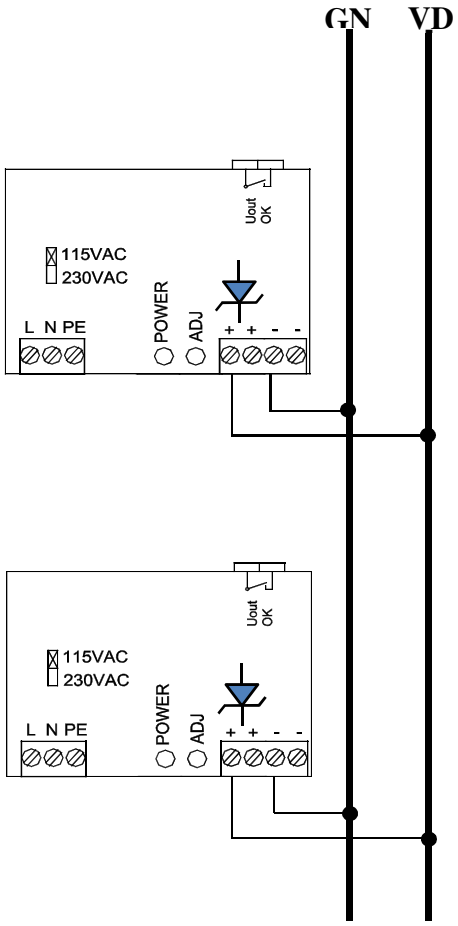
The HSR03201 series provides a good current voltage chart. It has no fold back or other abnormalities. The output voltage can drop down to zero volts when the power supply is overloaded. The unit delivers a stable and constant current to the outputs. When the output voltage is set to the maximum demanded value and the current limit reaches its margin, the output voltage drops down and the unit delivers constant current.

Connections

AC Main Input	**DC Mains**	**Outputs**
L - wire	DC + voltage	DC-ok power good relay
N - wire	DC + voltage	DC-ok power good relay
PE - wire	DC - voltage	
	DC – voltage	

Parallel Operation & Decoupling

To increase the overall power of the power supply, two or more devices of the same model with the same output voltage may be operated in parallel. To avoid any issues, make sure the cable lengths and cable cross-sections of all power supplies to the star point are identical.
The power supply has a built-in O-ring decoupling diode, which decouples the devices from each other in parallel or redundant setup. The internal diode is fix connected to the DC mains.



When a breakdown occurs to one of the involved power supplies, the remaining units will immediately take the complete load over. When the setup is correct, no delay or loss in the DC supply circuit can happen.

The built-in decoupling diode of the HSR03201 ensures that a shortcut in the DC-section of a faulty PSU will not short circuit the DC supply in the system. The O-rig diode also offers equal load distribution under normal operation. This can increase system lifetime and availability. The power good relay contact allows to check if the involved HSR03201 are online.

To avoid any issues in a setup we recommended setting the output voltages accurately to the same level. Always use equal cabling length and cross section for all the DC supply wires to allow equal power distribution from ohmic losses.

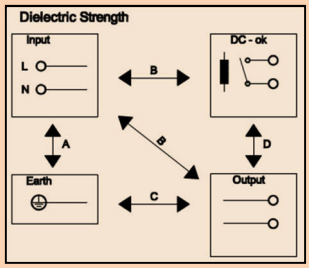
Safety Test

	T	A	B	C [1]	D
Type Test	60s	2500Vac	3000Vac	500Vdc	3000Vac
Factory Test	5s	2000Vac	2000Vac	500Vdc	2000Vac
Field Test	2s	2000Vac	2000Vac	500Vdc	2000Vac

[1]) ≥60Vdc = 2400Vdc

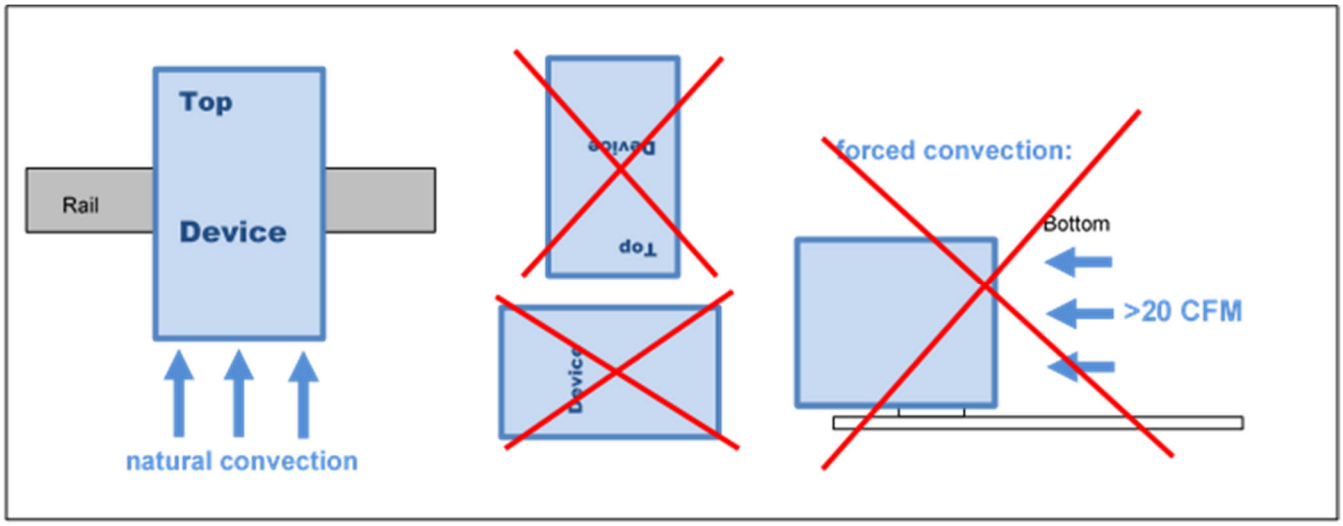
Type test and factory tests are conducted by the manufacturer. Do not repeat the test in field. Field test rules:

a) Use approriate test equipment which apply the voltage with a slow ramp
b) Connect L1 and N together, as well as all output poles
c) Use only AC test-voltages with 50/60Hz. The output voltage is floating and has no ohmic reference to ground.
d) If testing output voltages are ≥60Vdc remain to security directives. Use only isolated screw drivers to adjust output voltages.

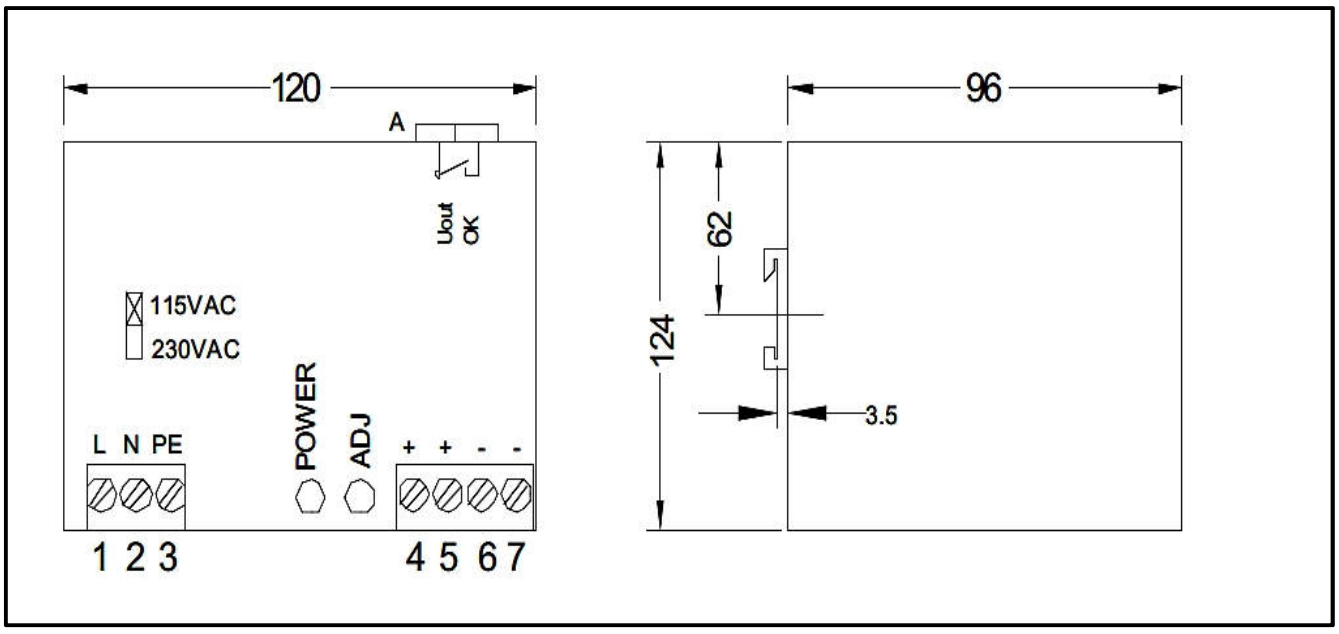


Mechanics & Installation Instruction of the HSR03201

Stable metal/aluminium housing IP20. To allow adequate convection, a free air space of 50mm (top/bottom) and 5mm (sidewalls) is required; and to active devices 15mm space from the sidewalls. Patented 35mm DIN-Rail bracket meet EN60275. It is easy to mount/dismount while snaping it onto the 35mm DIN-Rail - no tools necessary.
Other mounting direction then shown are not evaluated from our engineering team and may need a power derating or it can cause a derating of the product life time.



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



Ordering Codes

Model (DIN-Rail standard)	Information	Camtec Article Number
HSR03201.24T	24V	3041094017CA
HSR03201.48T	48V	3041094018CA
HSR03201.60T	60V	3041094019CA
Connector Power Good **	2pole, 10 pcs per pack, lead space 5,08mm	3520037

** Note that the power good contact connectors are not a part of the power supply and require separate order

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 (CB). We recommend the use of a 4A type-B for 230Vac and 6A type-B for 115Vac. 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 cause 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 15 minutes run-in @ full load / 25°C / 230Vac 50/60Hz, as otherwise stated.