Switched mode power supply for DIN rail mounting type SMP21 DC24V/5A

Description

Switched mode power supply for rail mounting, with independent change-over of input voltages (AC 115/230 V), integral passive power factor compensation (PFC), high power reserve and optional parallel mode.

Features and Benefits

- The devices switches over automatically when connected to AC 115 V AC and 230 V
- Wide range inputs from AC 90 to 132 V at rated input voltage 115 V, and AC 180 to 264 V at rated input voltage 230 V
- Efficiency up to 86 %
- Integral passive power factor compensation
- Parallel mode for performance improvement (selectable by switch)

Typical applications

Process control, industrial switch- and controlgear, machine construction, telecommunication systems

Order numbering code

Type No.

SMP21 Single phase switch-mode power supply for rail mounting

- **Connector design**
  - **L** pcb mounting (preferred type)
  - **S** plug-in type
- **Terminal design**
  - **20** screw terminals
- **Output voltage**
  - **DC24V** DC 24 V
- **Output current**
  - **5 A**

SMP21-L20-DC24V-5A ordering example

Approvals and standards

Approval authority	Standards
UL	UL508, CSA C22.2 No. 107.1 (listed) UL 60950-1, CSAC22.2 No. 60950-1 (recognized)
TÜV Rheinland	EN 60950-1 / EN61558-1 / EN61558-2-16

EMC

EN 61000-6-3, EN 61000-6-2, EN 61204-3

SMP21-DC24V-5A
Version L20

Technical data (T_U = 25°C, U_B = AC 115 / 230 V, I_0 = 5A)

Operating data	
Input voltage ranges U_E	AC 90…132 V / AC 180…264 V
Operating voltage range U_B	AC 115 / 230 V
Effective output	120 W
Output voltage U_O	24 V SELV
Output current rating I_O	5 A
Efficiency	84 % min. / 86 % typically
General data	
Switching frequency	55 kHz
Insulation voltage between input and output input and protective conductor output and protective conductor	 AC 3000 V, DC 4242 V AC 1500 V, DC 2121 V AC 500 V, DC 710 V
Insulation resistance	100 MΩ (DC 500 V) between input and output
Ambient temperature	-35 °C…+71°C
Derating factor (see curve)	2.5 % / °C
Storage temperature	-40 °C…+85 °C
Relative humidity	20…95 % RH
MTBF to Bellcore, ed. 6	530,000 hours at 40°C, GB
Max. altitude in operation to IEC 60068-2-13	5000 m above sea level
Cooling	by convection
Mounting direction	wall-mounted (see dimensions)
Pollution degree	2
Input circuit	
Input rated voltage	AC 115 / 230 V
Input voltage ranges	AC 90…132 V / DC 180…264 V
Input current	0.83 A typically at $U_{B\,=}$ AC 230 V 2.2 A typically at $U_{B\,=}$ AC 115 V
Max. input current	1.4 A at U_B = AC 180 V 2.8 A at U_B = AC 90 V
Supply frequency	47...63 Hz

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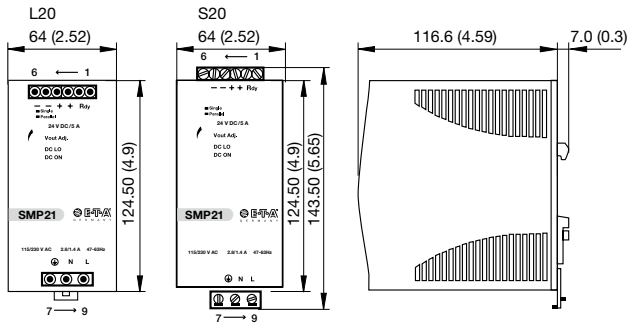
Technical data (T_U = 25°C, U_B = AC 115 / 230 V, I_0 = 5A)

Inrush current at AC 115 V at AC 230 V	 24 A max. 48 A max.
Power loss (at U_B 230 V, I_0 5 A)	20 W typically
power factor compensation (passive)	typically 0.7
Output circuit	
Rated voltage U_0	DC 24 V SELV
Current rating I_0	5 A
Output voltage accuracy	0…+1 %
Min. load	0 %
Supply regulation	± 0.5 % at U_E min. … U_E max.
Load regulation Single mode Parallel mode	 ± 1 % ± 5 %
Voltage adjustment range	DC 22.5…28.5 V at 0.8 x I_0
Continuous load	5 A at U_0 = DC 24 V, 4.2 A at U_0 = DC 28.5 V
Power boost factor	typically 130 % (110%...145% see output curve)
Short circuit behaviour	U/I trip curve
exposure time	25 / 20 ms
ON delay at: resistive load capacitive load of 3.500µF	 1 s 1.5 s
Rise time at: resistive load capacitive load of 3.500µF	 150 ms 0.5 s
Release time	150 ms
Residual ripp	50 mV, spectrum = 20 MHz
Power back immunity	DC 35 V min.
Capacitive load	3,500 µF max.
Parallel mode	3 power supplies max. at 0.1 x I_0…0.9 x I_0

Technical data (T_U = 25°C, U_B = AC 115 / 230 V, I_0 = 5A)

Control and protection circuit	
Input protection	internal blade fuse T3.15 A / AC 250 V
Recommended back-up fuse	1-pole MCB, e.g. E-T-A type 4230
Current rating	6 A / 10 A → max. 20 A
Characteristic curve	B / C / D
Internal overvoltage protection	varistor
Available power (output RDY)	Contact closed at: DC 17.6...19.4 V
Insulation voltage Contact load at	DC 500 V (to output) DC 60 V / 0.3 A
Overvoltage protection	30…33 V at 0.8 x I_0
Output short circuit protection	by reduction of output voltage
Degree of protection	IP20
Physical data	
Dimensions (h x w x d) version L20 with screw terminals Version S20 with removeable plug	 124.5 x 64 x 123.6 mm (4.9 x 2.52 x 4.87 inches) 143.5 x 64 x 123.6 mm (5.65 x 2.52 x 4.87 inches)
Housing material:	metal
Mass	approx. 920 g
Vibration (random vibration, to IEC 60068-2-6)	mounted on symmetrical rail, 10 - 500 Hz, 2 g, on X, Y & Z axis, 60 minutes per axis
Shock (random to IEC 60068-2-6)	15 g (11 ms), 3 axes, 6 sides, 3 times per side

Dimensions

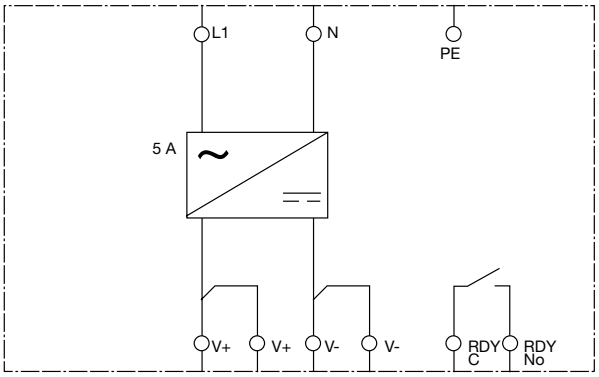


GENERAL TOLERANCE	
0.00 (0.00) - 30.00 (1.18)	±0.30 (0.01)
30.00 (1.18) - 120.00 (4.72)	±1.50 (0.06)
120.00 (4.72) - 400.00 (15.75)	±1.50 (0.06)

Mounting and Installation

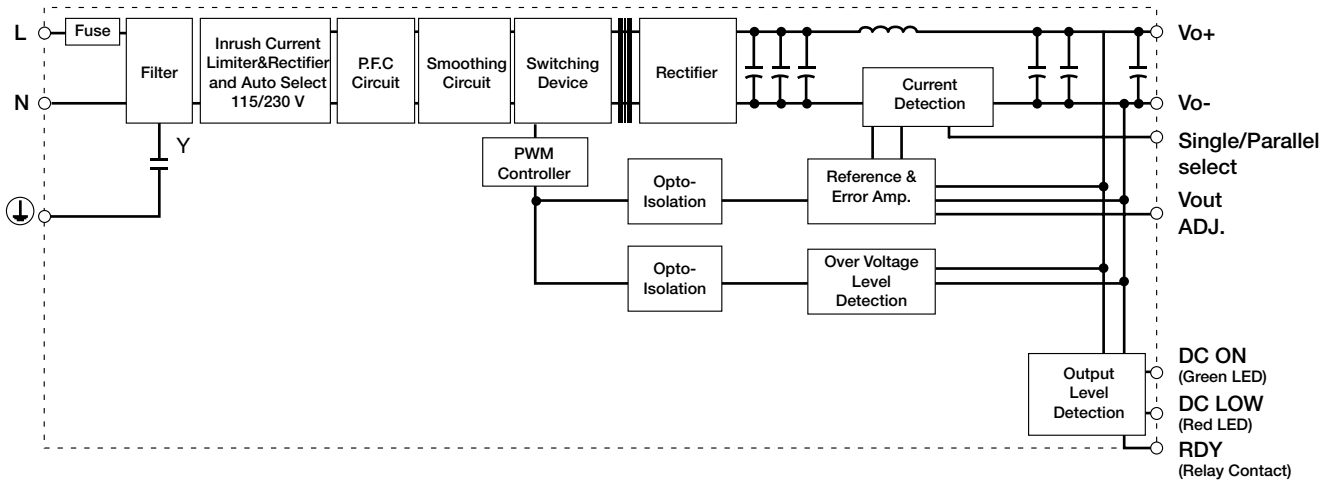
Mounting	snap onto DIN rail (TS35/7.5 or TS35/15)
Ventilation / cooling	normal air convection, recommended distance on each side 25 mm
Mounting position	wall-mounted with the input terminals pointing downwards (see dimensions)
Version L20 with screw terminals:	
Screw terminals	input terminal AWG24-10 (0.2 mm² – 4 mm²) flexible/rigid output terminal AWG24-10 (0.2 mm² – 4 mm²) flexible/rigid
Tightening torque	input connector 1 Nm max. Output terminal 0.6 Nm max.
Wire stripping length	8 mm
Version S20 with removeable plug	
Screw terminals	input terminal AWG24-10 (0.2 mm² – 4 mm²) flexible/rigid output terminal AWG24-10 (0.2 mm² – 4 mm²) flexible/rigid
Tightening torque	input connector 0.5 Nm max. Output connector 0.8 Nm max.
Wire stripping length	4…5 mm

Pin assignment - Display - Controls

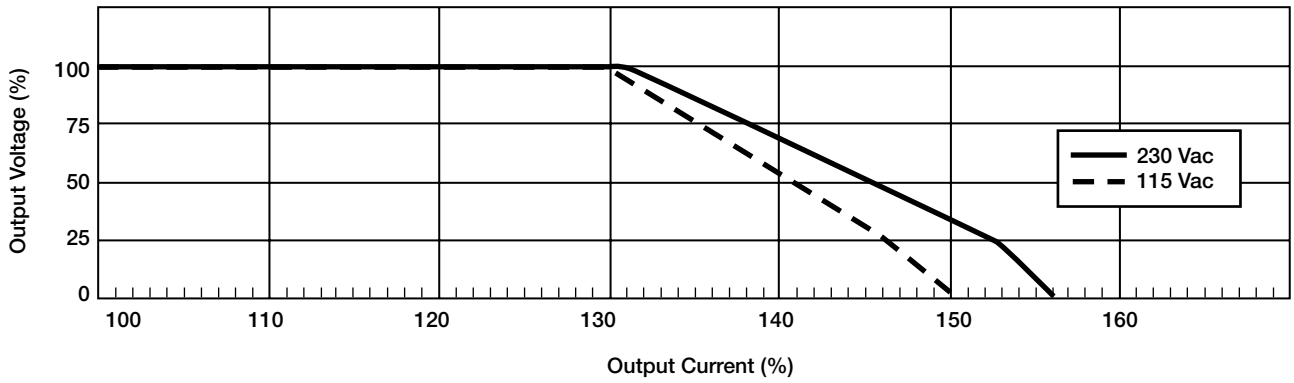


pin no.	name	Description
1	RDY	limit value DC ON, relay contact (make contact)
2		
3.4	V +	output voltage +
5.6	V -	output voltage -
7	PE	earth conductor
8	L	Input voltage, phase conductor (not polarised with DC input voltage)
9	N	Input voltage, neutral conductor (not polarised with DC input voltage)
	DC ON	visual status indication with LED
	DC LO	DC LOW output voltage LED indication
	Vout Adj	potentiometer for adjustment of output voltage U_0
	S/P	change-over switch single / parallel mode

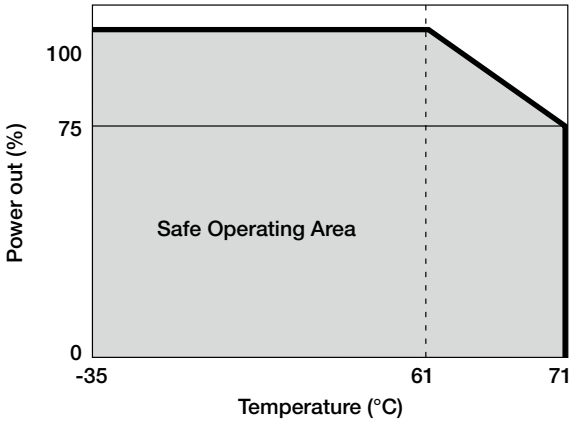
Schematic diagram



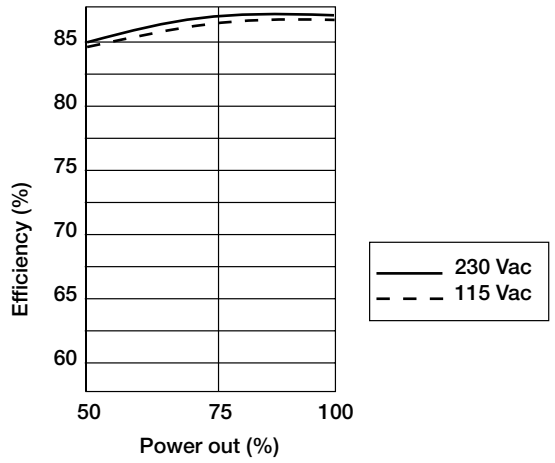
Typical output trip curve



Derating curve

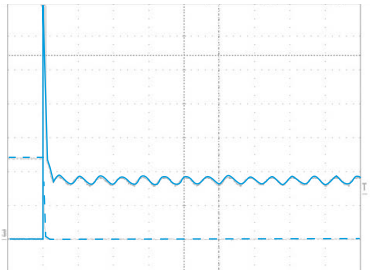


Typical efficiency curve



Current-voltage curve

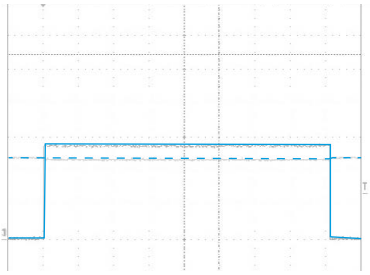
current-voltage-curve ➞ short circuit



current: — 5 A / Div
voltage: - - - 10 V / Div
time 20 ms / Div.

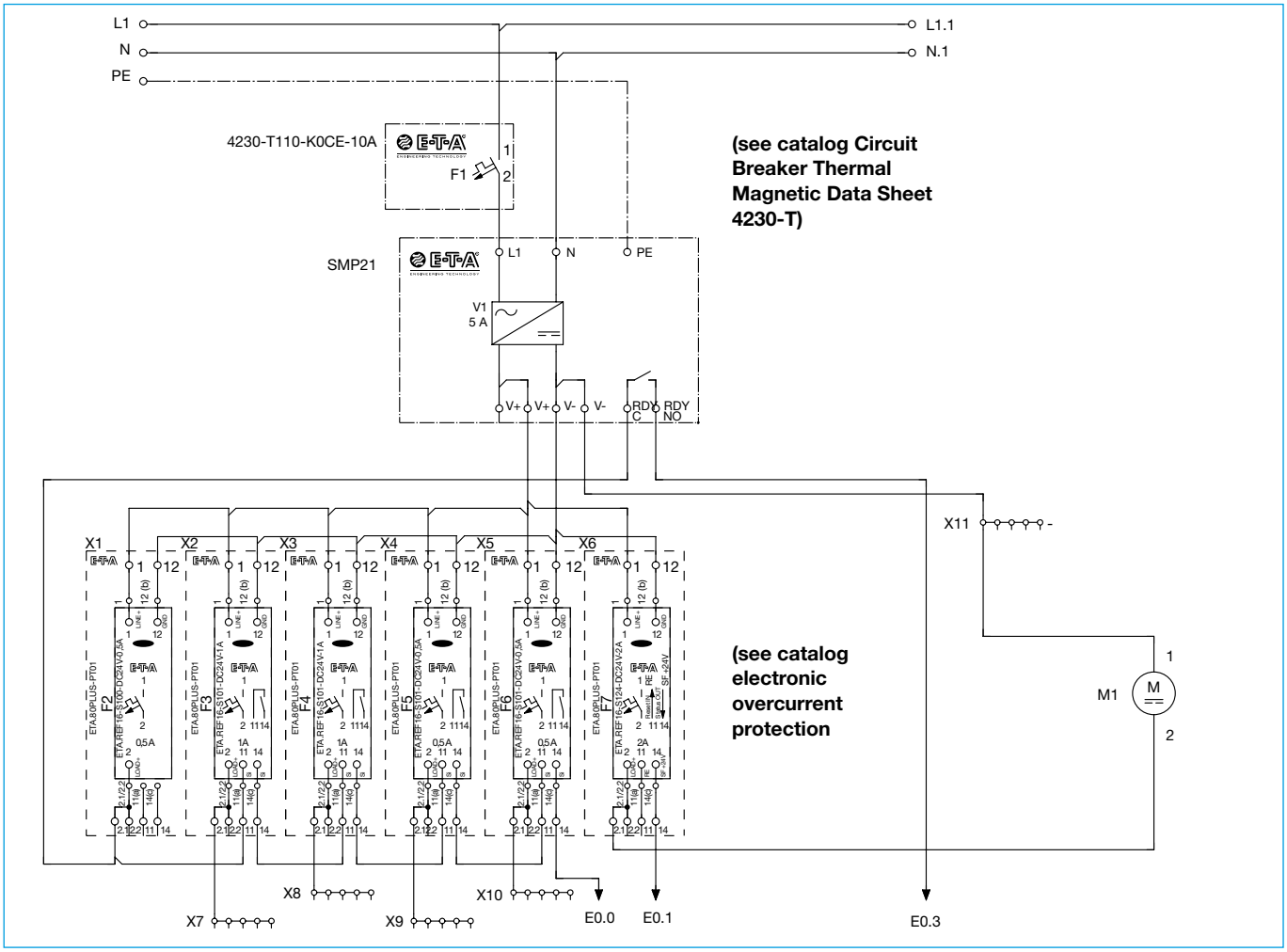
Current-voltage curve

current-voltage-curve short circuit ➞ output
REF16-S101-DC24V-4A



current: — 2 A / Div
voltage: - - - 10 V / Div
time 20 ms / Div.

Application example with protection by 4230-T and REF16-S



Notes for installation

- The power distribution system must only be installed by qualified personnel.
- Only after expert installation must the device be supplied with power.
- The user has to ensure that the cable cross section complies with the applicable current rating.
- The national standards (e.g. for Germany DIN VDE 0100) have to be observed for installation and selection of feed and return cables.
- Recommended circuit breaker for the primary input cable protection: E-T-A type 4230 IN max. 20 A
- Recommended selective overcurrent protection for the secondary output protection: E-T-A types ESS.., ESX.., und REF…
- In addition special precautions must be taken in the system or machine (e.g. use of a safety PLC) which reliably prevent an automatic re-start of parts of the system (cf. Machinery Directive 2006/42/EU and EN 60204-1, Safety of Machinery). In the event of a failure (short circuit/overload) the load circuit will be disconnected by the circuit breaker/protector or the switched mode power supply.

All dimensions without tolerances are for reference only. E-T-A reserves the right change specifications at any time in the interest of improved design, performance and cost effectiveness, the right to make changes in these specifications without notice is reserved. Product markings may not be exactly as the ordering codes. Errors and omissions excepted.