

B&R Power Supply PS320

1. General Information

Features of the B&R power supply PS320:

- Input: 3 AC 400-500 V
- Output: 24-28 V / 490 W
- Power boost up to 600 W
- Seperate primary fuse not necessary
- Switchable operating mode (single/parallel)
- Switchable overload behavior options (fuse mode)
- Robust mechanics and EMC
- DIN rail mounting, unit holds even with vibrations or lateral pressure
- Clearly arranged and user-friendly
- Large, robust screw terminals
- Sealed metal housing
- Fine ventilation grid

This compact power supply unit is characterized by the variety of application possibilities and low system costs. The fact that the **external fuses are no longer necessary** is an advantage as it saves cost and space. The switchable **fuse mode** and the extremely comprehensive **certification package** including EN 60204 make the power supply PS310 the unit of choice.

At a competitive price, it also offers **25 A power boost, output noise suppression**, optional *single* or *parallel mode*, small dimensions, more than **500,000 hours MTBF** as well as easy installation. The unit can be connected to European and American power supply networks **without switching**.

2. Order Data

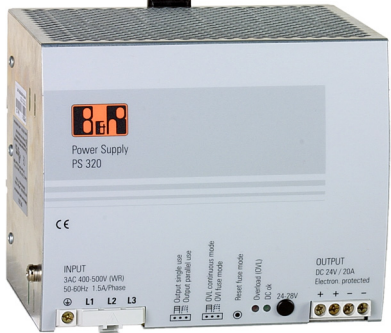
Model number	Short description	Figure
0PS320.1	24 VDC power supply, 3-phase, 20 A, input 400..500 VAC (3 phases), wide range, DIN rail mounting	

Table 1: PS320 - order data

3. Technical Data

Also see "Technical data" data sheet, which is delivered with the power supply.

Product ID	PS320
General Information	
C-UL-US Listed	Yes
Input	
Input voltage, nominal	3 AC 400-500 V, $\pm 15\%$, 47-63 Hz, suitable for IT power systems
Rated tolerances (continuous operation)	AC 340-576 V DC 450-820 V see "DC operation" on page 7 for operation with DC input voltage
Input current, nominal	3 x 1.5 A
Starting current	$<2.5 \text{ A eff.} / <7 \text{ A}_{pk}$ respectively
Fusing Internal External	Each phase is internally fused. External fusing is only necessary as required for input line protection.
2 phase operation	Operation is possible even if one phase fails. When high ambient temperature or high load, P_{out} is adjusted downwards. The red LED is on. See "Overload behavior" on page 5.
Harmonic current emissions	According to EN 61000-3-2
Transient immunity	Active transient filter incorporated. Therefore resistant to transients acc. to VDE 0160 / W2 (1300 V / 1.3 ms), over <i>entire</i> load range.
Hold-up time	$>11 \text{ ms}$ at 24.5 V / 20 A, V_{in} : AC 400 V

Table 2: PS320 - technical data

Product ID	PS320
Output	
Output voltage	DC 24-28 V can be adjusted using (covered) front panel potentiometer Default: 24.5 V $\pm$ 0.5% Adjustable range guaranteed
Voltage regulation	<2% static, jumper in <i>Single Mode</i> position
Ripple/noise	<30 mV _{pp} (<0.1%) incl. spikes (20 MHz bandwidth, 50 Ω measurement)
Overvoltage protection	33 V $\pm$ 10% switch to hiccup mode
Output noise suppression	Radiated EMI values below EN 50081-1 (Class B), even with long, unshielded output cables
Continuous loading T _{amb} =0 °C - 60 °C T _{amb} =0 °C -45 °C	With convection cooling 24.5 V / 20 A (490 W) respectively 28 V / 18 A (504 W) 24.5 V / 25 A (612 W) respectively 28 V / 22 A (616 W) Short-term (<1 min.) also at 60 °C
Protection functions	Output is protected against short-circuit, open circuit and overload
Derating	12 W/K (at T _{amb} =+60 °C to +70 °C)
Parallel operation	Yes, up to ten PS320 To achieve current sharing: - Plug jumper into position "Output parallel use". This alters the output V/I characteristics to be "softer" (25 V at 2 A, 24 V at 20 A). The output voltage can still be adjusted. - Missing jumper = "Single Use", i.e. "hard" characteristics
Power back immunity	Max. 35 V
Operation indicator	- Green LED on when V_{out} = set output voltage - Red LED on when V_{out} < set output voltage (when overload, overtemperature or overload with 2 phase operation occurs) - Red LED flashes after switch-off in the fuse mode
Efficiency, reliability	
Efficiency	Typ. 92% (24.5 V / 20 A, V _{in} _{nom})
Loss	Typ. 42 W(24.5 V / 20 A, V _{in} _{nom})
MTBF (reliability)	504,000 h acc. to Siemens standard SN 29500 (24.5 V / 20 A, AC 400 V, T _{amb} = +40 °C)
Life cycle (electrolytics)	The unit exclusively uses long-life electrolytics, specified for +105 °C High reliability because only 4 aluminum electrolytics and no small aluminum electrolytics are used.
Start / overload behavior	
Startup delay	Typ. 450 ms
Startup time	Approx. 5-20 ms, depending on load
Overload behavior	See "Overload behavior" on page 5
Overtemperature protection	
Continuous mode	Output voltage is adjusted downwards as long as overtemperature exists
Fuse mode	Unit remains switched off after overheating until restart (after cooling) (see "Restart" on page 5)

Table 2: PS320 - technical data (cont.)

Technical Data

Product ID	PS320
Connection	
Terminals	Robust screw terminals
Connection cross section Input / output	Solid: 1.5 - 6 mm ² / flexible: 1.5 - 4 mm ² 2 connectors per output
Current handling capacity	30 A per output
Grid Input Output	Distance between adjacent connectors: 9.52 mm 6.35 mm
Operational conditions	
Environmental temperature during operation	0 °C to +70 °C (starting at 60 °C derating)
Relative humidity during operation	Max. 95%, non-condensing
Storage and transport conditions	
Storage temperature	-25 to +85 °C
Relative humidity during storage	Max. 95%, non-condensing
Transport temperature	-25 to +85 °C
Relative humidity during transport	Max. 95%, non-condensing
Mechanical characteristics	
Dimensions Width Height Depth	150 mm 124 mm 121 mm (+ DIN rail)
Weight	1800 g
Housing	Robust sealed metal housing with fine ventilation grid (◇ 3.5 mm, IP20)
Installation	Mounting on DIN rail (TS35/7.5 or TS35/15, 1 to 1.5 mm thick), therefore: • Simple snap-on system • Sits safely and firmly on the DIN rail • No tools required for removal
Ventilation/cooling	Above/below 70 mm recommended Left/right 25 mm recommended
Special features	• All terminals are easy to reach because they are mounted on the front panel. • Input and output are separated from each other. • PVC insulated cables can be used for all connections; heat protection is not necessary.

Table 2: PS320 - technical data (cont.)

Specifications are valid for 3x400 VAC, +25 °C ambient temperature and 5 min run-in time, unless otherwise stated. They are subject to change without prior notice.

3.1 Overload behavior

Two different operating mode options, switchable by moving the front-panel jumper. If the jumper is missing, the unit is in fuse mode. The unit is delivered preset in continuous mode.

3.1.1 Continuous mode (continuous current)

- Jumper is in the "OVL cont. mode" position.
- When overload or short-circuit occurs, the unit continuously supplies current (see "Output characteristics" on page 9), no hiccup.

Advantage: The unit starts reliably even with heavy, non-linear loads (high capacities, DC-DC converters, motors). The high short-circuit current triggers downstream fuses and allows for selective configuration of electrical installations.

3.1.2 Fuse mode (switch-off after typ. 4 s)

- Jumper is in the "OVL fuse mode" position.
- When overload, short-circuit or overload with 2 phase operation occurs or in case of overtemperature for more than typ. 4 s, the unit switches off the output (residual voltage <3 V without load, average short circuit current <0.1 A)
- Definition of overload or short-circuit: The set output voltage in each case can no longer be maintained.
- The capacity to deliver current (Overload Design) (see "Output characteristics" on page 9) remains unchanged during the 4 s delay.
- **Red LED flashes** when switched off.

Features: With some applications, the fuse mode can replace the usual fusing on the secondary side. The fuse mode has closer tolerances than thermal triggers. The release delay time of typ. 4 s ensures that motors can be reliably operated.

3.1.3 Restart

- By pressing the reset button on the unit's bottom panel.
- By disconnecting from the supply voltage and restarting the unit after >1 min.

4. Dimensions

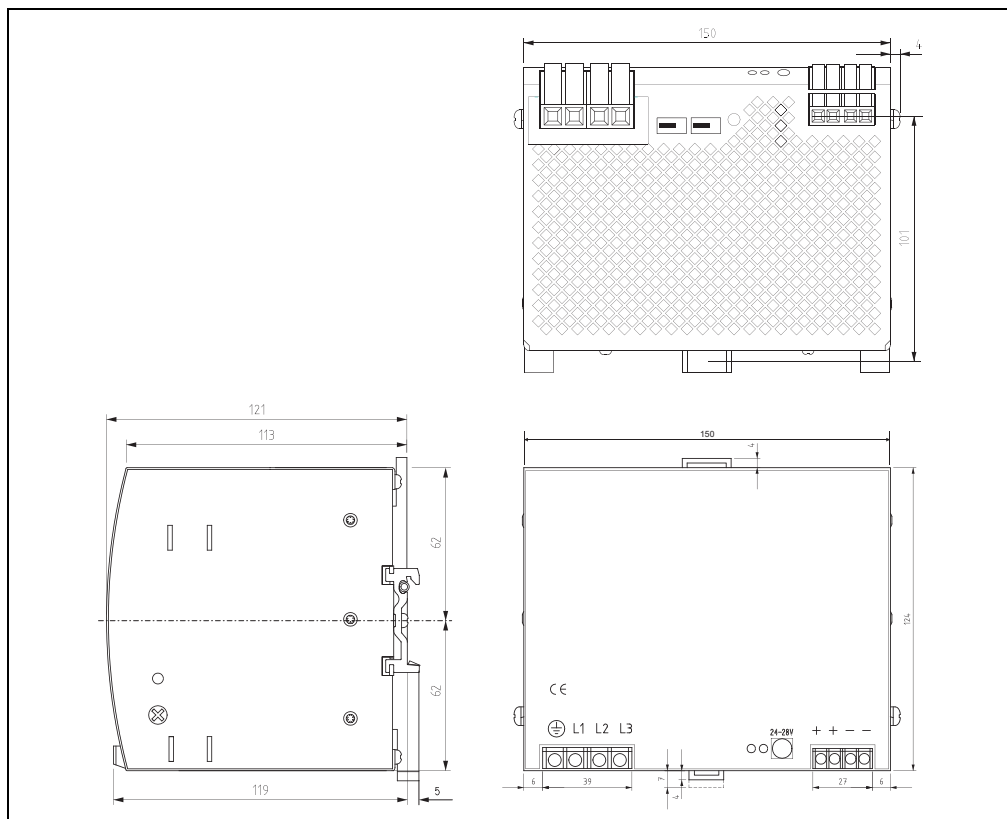


Figure 1: PS320 - dimensions

5. Installation

Also see the basic installation manual "Installation and Operation". The basic installation manual is delivered with each power supply.

6. DC operation

The B&R switching power supplies work internally on the primary side with DC voltage. As a result, the DC voltage is possible as an alternative to AC voltage on the power supply terminals. The amount of DC input voltage for continuous operation and for permissibly higher short-term values is specified in the technical data.

Limitations may occur due to the combination of the electrical design of the power supply (e.g. the converter principle used) and the method of DC voltage supply (e.g. the grounding conditions). The following examples illustrate some conditions under which limitations are produced and in which circumstances the values specified in the technical data apply.

Note:

The pins on L1, L2 and L3 can be assigned any way and do not have to follow a specific pattern.

6.1 DC mains, grounded minus pin

Maximum DC input voltage limited: $V_{\max} = \text{DC } 670 \text{ V}$

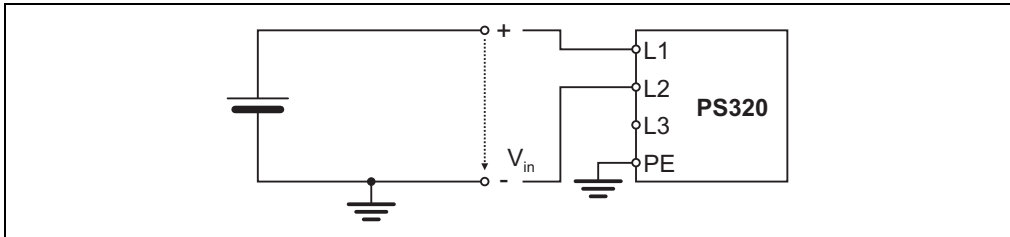


Figure 2: DC mains, grounded minus pin

6.2 DC mains, grounded plus pin

Maximum DC input voltage limited: $V_{\max} = \text{DC } 510 \text{ V}$

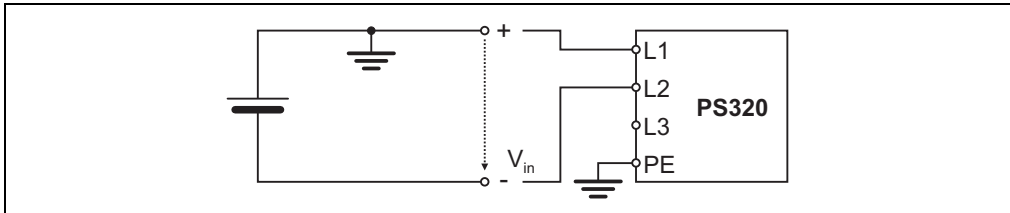


Figure 3: DC mains, grounded plus pin

6.3 DC mains, grounded neutral point

No limitation: $V_{\max} = \text{DC } 820 \text{ V}$ (see "Technical Data" on page 2)

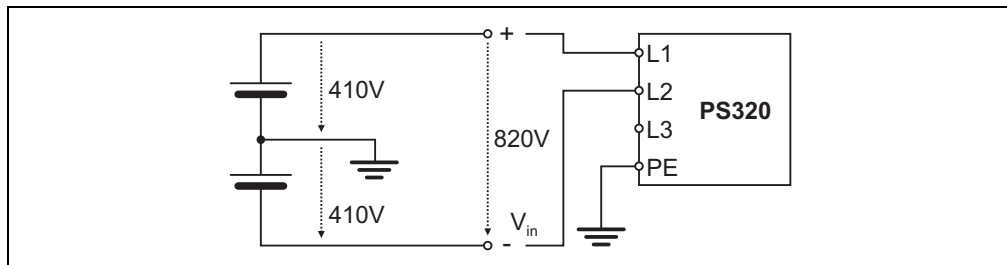


Figure 4: DC mains, grounded neutral point

6.4 Rectified 3-phase mains, grounded external conductor

No limitation if power supply is designed for grounded external conductors (IT power systems).

DC input voltage (see "Technical Data" on page 2): $V_{\max} = \text{DC } 820 \text{ V}$

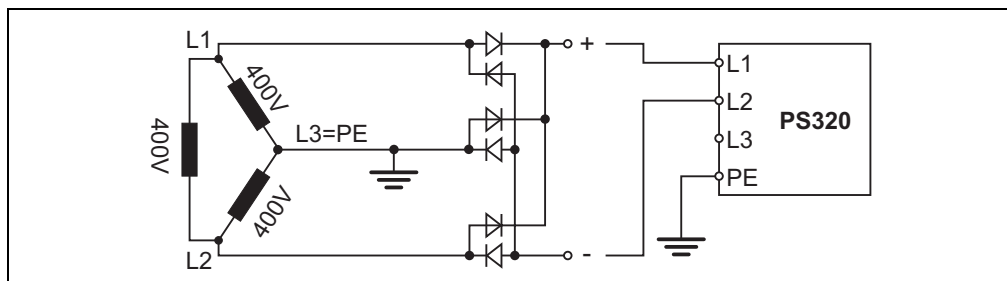


Figure 5: Rectified 3-phase mains, grounded external conductor

6.5 Rectified 3-phase neutral mains, grounded neutral

No limitation: $V_{\max} = \text{DC } 820 \text{ V}$ (see "Technical Data" on page 2)

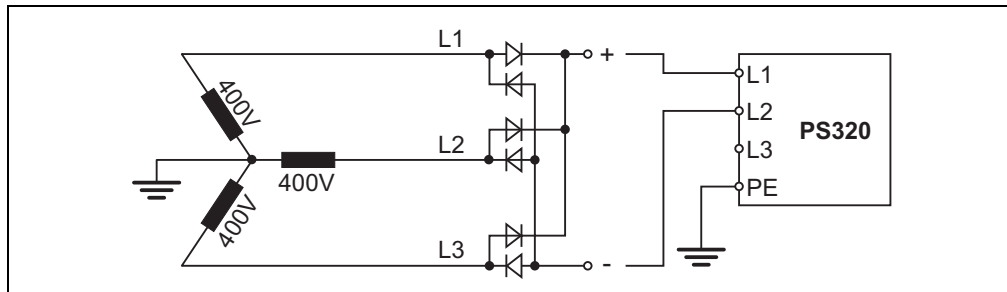


Figure 6: Rectified 3-phase neutral mains, grounded neutral

7. Diagrams

7.1 Output characteristics

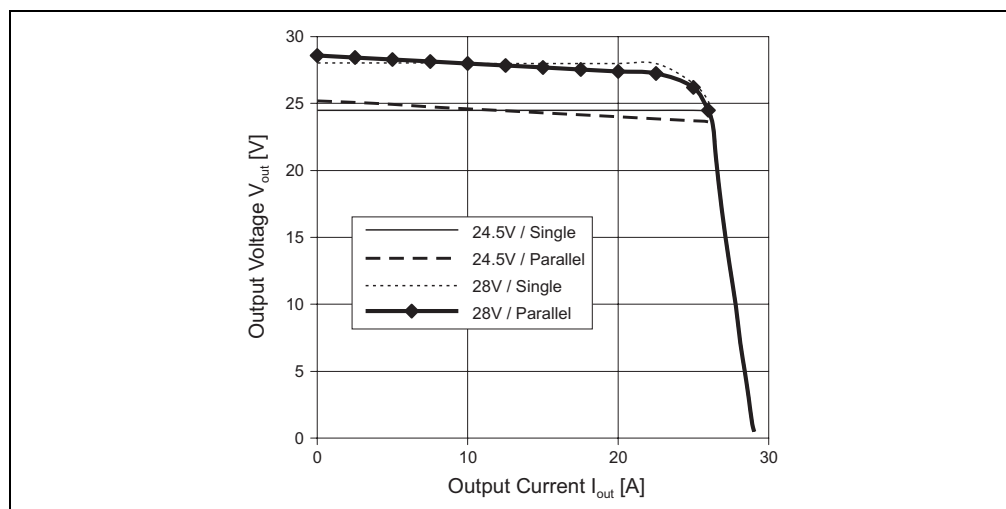


Figure 7: PS320 - output characteristics (typ.)

7.2 Efficiency

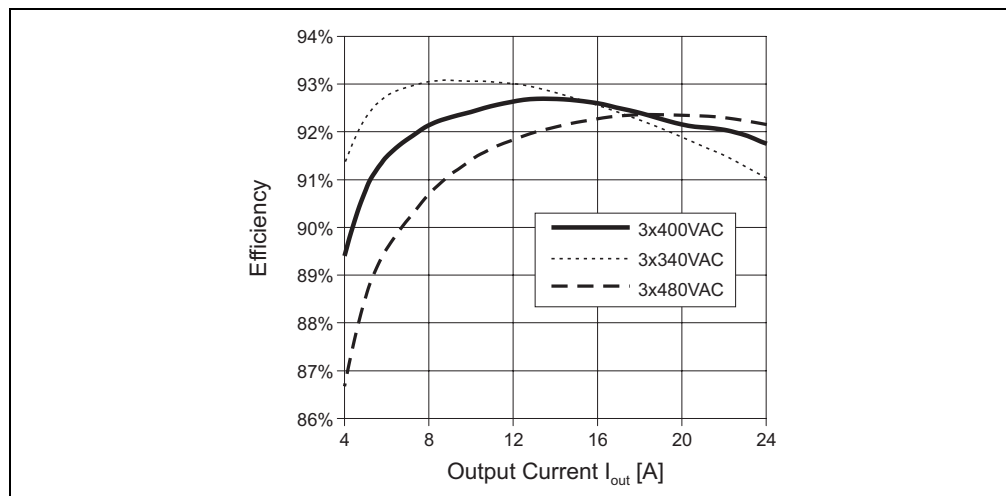


Figure 8: PS320 - efficiency (typ., at $V_{out} = 24$ V)

7.3 Hold-up time

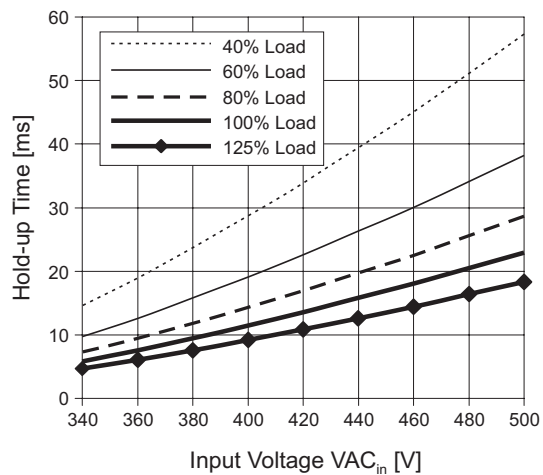


Figure 9: PS320 - hold-up time (min., at $V_{out} = 24.5$ V)

8. Standards and Certifications

Electromagnetic emissions (EME)	EN 50081-1 (includes EN 50081-2) Class B (EN 55011, EN 55022) conducted and radiated noise, incl. Annex A, thanks to noise suppression
Immunity to disturbances Static discharge (ESD) Electromagnetic radiated fields Burst, coupled to: AC _{in} lines DC _{out} lines Surge transients Differential (L ₁ ->PE) Common mode (L ₁ ->L ₂ /N) Conducted noise immunity Mains breaks Transient immunity	EN 61000-6-2 (includes EN 55024) EN 61000-4-2, Level 4 (withstands 8 kV direct discharge, 15 kV air discharge) EN 61000-4-3, Level 3 (10 V/m), ENV 50204 (10 V/m) EN 61000-4-4, Level 4 (4 kV) EN 61000-4-4, Level 3 (2 kV) EN 61000-4-5, Installation class 4 (4 kV) (SLD2.5: class 3 (2 kV)) EN 61000-4-5, Installation class 4 (2 kV) (SLD2.5: class 3 (1 kV)) EN 61000-4-6, Level 3 (10 V, 150 kHz-80 MHz) EN 61000-4-11 Transient resistance according to VDE 0160 / W2 over entire load range
Safe low voltage	SELV (EN 60950, VDE0100/T.410), PELV (EN 50178)
Protection class/degree	Class I (EN 60950) / IP20 (EN 60529)
The power supply PS320 complies with all major safety certifications for EU (EN 60950, EN 60204-1), USA (UL 1950, UL508 LISTED), Canada (CUL/CSA-C22.2 No 60950), CB Scheme (IEC 60950), and meets the European Standard for electronic equipment in electrical power installations EN 50178.	
 EMC and w Volt. Directive Guidelines  UL1950 E137006 CUL/CSA-C22.2 No 950-M90  UL508 LISTED IND. CONT. EQ. 18 WM, 60°C  IEC60950  EN60950 EN 50178 IEC 50081-1 EN 61000-6-2	

Table 3: PS320 - standards and certifications

