

Power supply units STEP-PS

For supply of Bender devices with
a supply voltage of DC 24 V



Power supply units STEP-PS

For supply of Bender devices with
a supply voltage of DC 24 V



Power supply unit STEP-PS/1 AC/24 DC/0.5 (12 W)



Power supply unit STEP-PS/1 AC/24 DC/1.75 (40 W)



Power supply unit STEP-PS/1 AC/24 DC/4.2 (100 W)

Device features

- Easy DIN rail and wall mounting
- Maximum energy efficiency thanks to low idling losses
- Fast commissioning with LED function monitoring
- High operational reliability thanks to long power failure buffering under full load and high MTBF (> 500,000 h)
- Can be used worldwide in all industrial sectors due to a wide-range input and an international approval package
- Wide temperature range from -25 °C to +70 °C
- Can be connected in parallel to increase power

Product description

The compact design of the STEP POWER generation power supply units makes them especially suitable for installation distributors and flat control panels. The power supply units are available with DC 24 V output voltage in various performance classes and widths. Their high degree of efficiency and the low idling losses make for high energy efficiency. The power supply unit series is used for power supply of Bender devices.

Approvals and certifications

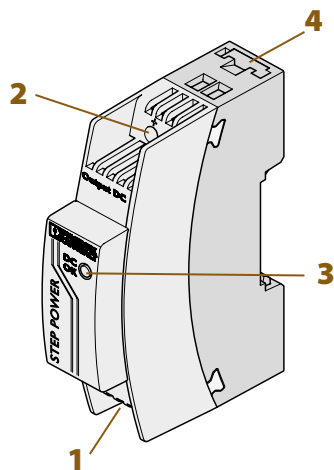


Ordering details

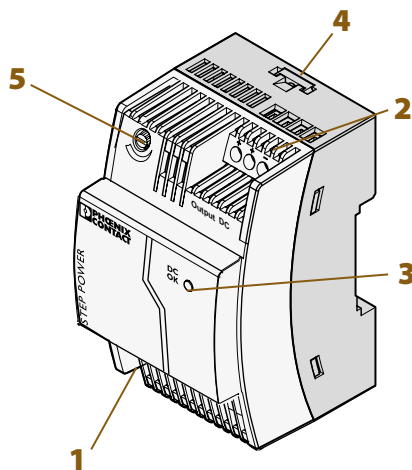
Rated input voltage U_{IN}		Rated voltage	Type	Art. No.
AC	DC	DC		
85 ... 264 V, 45 ... 65 Hz	95 ... 250 V	24 V	STEP-PS/1 AC/24 DC/0.5	B 9405 3110
			STEP-PS/1 AC/24 DC/1.75	B 9405 3111
			STEP-PS/1 AC/24 DC/4.2	B 9405 3112

Operating elements

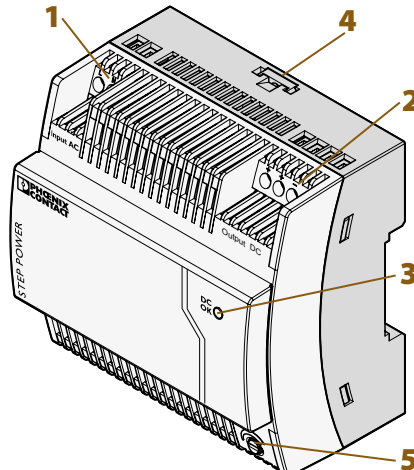
STEP-PS/1AC/24DC/0.5 (12 W)



STEP-PS/1AC/24DC/1.75 (40 W)



STEP-PS/1AC/24DC/4.2 (100 W)



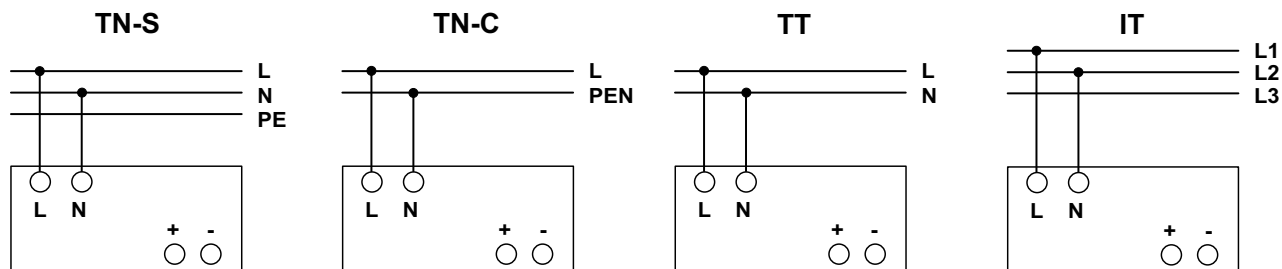
- 1 - AC input
- 2 - DC output
- 3 - "DC OK" LED
- 4 - Universal snap-on foot for EN DIN rails and for wall mounting
- 5 - Potentiometer DC 22.5...29.5 V

Indication

The "DC OK" LED enables evaluation of the function of the power supply directly on site.

	State 1	State 2
"DC OK" LED	on	off
Cause	Output voltage > 21.5 V	Output voltage < 21.5 V or no voltage at the output
Meaning	Output voltage and output current are OK	The device is in operation but there is a fault at the load, the current consumption is greater than I_1 or the output is short-circuited. The device is out of operation since no mains voltage has been connected, the fuse on the primary side has tripped or the device is faulty.

Connection to different systems



Technical data

Input data

Nominal input voltage range	AC 100...240 V
AC input voltage range	AC 85...264 V
DC input voltage range	DC 95 V...250 V
AC frequency range	45...65 Hz
DC frequency range	0 Hz

STEP-PS/1AC/24DC/0.5 (12 W)

Current consumption	approx. 0.28 A (AC 120 V) approx. 0.13 A (AC 230 V)
Inrush current limitation	< 15 A (typical)
I^2t	< 0.1 A ² s
Power failure buffering	> 15 ms (AC 120 V) > 90 ms (AC 230 V)
Typical turn-on time	< 0.5 s
Input fuse, integrated	1.25 A (slow acting, internal)

STEP-PS/1AC/24DC/1.75 (40 W)

Current consumption	approx. 0.6 A (AC 120 V) approx. 0.3 A (AC 230 V)
Inrush current limitation	< 15 A (typical)
I^2t	< 0.6 A ² s
Power failure buffering	> 25 ms (AC 120 V) > 150 ms (AC 230 V)
Typical turn-on time	< 0.5 s
Input fuse, integrated	3.15 A (slow acting, internal)
Recommended back-up fuse for line protection	6 A 10 A 16 A (characteristic B)

STEP-PS/1AC/24DC/4.2 (100 W)

Current consumption	approx. 1.3 A (AC 120 V) approx. 0.8 A (AC 230 V)
Inrush current limitation	< 15 A (typical)
I^2t	< 1 A ² s
Power failure buffering	> 20 ms (AC 120 V) > 100 ms (AC 230 V)
Typical turn-on time	< 0.5 s
Input fuse, integrated	4 A (slow acting, internal)
Recommended back-up fuse for line protection	6 A 10 A 16 A (characteristic B)

Output data

Nominal output voltage	DC 24 V $\pm$ 1 %
------------------------	-------------------

STEP-PS/1AC/24DC/0.5 (12 W)

Output current	0.5 A (-25...+55 °C) 0.55 A (-25...40 °C permanent) 1 A (maximum output current)
Control deviation	< 1 % (change in load, static 10...90 %) < 2 % (change in load, dynamic 10...90 %) < 0.1 % (change in input voltage $\pm$ 10 %)
Efficiency	> 84 % (for AC 230 V and nominal values)
Residual ripple	< 20 mV _{SS} (20 MHz)
Peak switching voltages	< 30 mV _{SS} (20 MHz)
Connection in parallel	yes, for increased power
Connection in series	yes
Protection against internal overvoltages	yes, limited to approx. DC 35 V
Resistance to reverse feed	$\leq$ DC 35 V

STEP-PS/1AC/24DC/1.75 (40 W)

Setting range of the output voltage	DC 22.5 V...29.5 V (> 24 V constant power)
Output current	1.75 A (-25...70 °C) 1.9 A (-25...40 °C permanent) 3.75 A (maximum output current)
Derating	above +55 °C: 2.5 % per kelvin
Control deviation	< 1 % (change in load, static 10...90 %) < 2 % (change in load, dynamic 10...90 %) < 0.1 % (change in input voltage $\pm$ 10 %)
Maximum power loss nominal load	5 W
Maximum power dissipation idling	0.7 W
Efficiency	> 89 % (for AC 230 V and nominal values)
Ascent time	< 0.5 s (U_{OUT} 10...90 %)
Residual ripple	< 35 mV _{SS} (with nominal values)
Switching transients	< 35 mV _{SS} (with nominal values)
Connection in parallel	yes, for increased power
Connection in series	yes
Overvoltage protection against internal overvoltages	yes, limited to approx. DC 35 V
Resistance to reverse feed	max. DC 35 V

STEP-PS/1AC/24DC/4.2 (100 W)

Setting range of the output voltage	DC 22.5...29.5 V (> 24 V constant power)
Output current	4.2 A (-25...70 °C) 4.4 A (-25...40 °C permanent) 6.5 A (maximum output current)
Derating	above +55 °C: 2.5 % per kelvin
Control deviation	< 1 % (change in load, static 10...90 %) < 2 % (change in load, dynamic 10...90 %) < 0.1 % (change in input voltage $\pm$ 10 %)
Maximum power loss nominal load	13.2 W
Maximum power dissipation idling	0.7 W
Efficiency	> 88 % (for AC 230 V and nominal values)
Ascent time	< 0.5 s (U_{OUT} 10...90 %)
Residual ripple	< 25 mV _{SS} (with nominal values)
Peak switching voltages	< 25 mV _{SS} (with nominal values)
Connection in parallel	yes, for increased power
Connection in series	yes
Overvoltage protection against internal overvoltages	yes, limited to approx. DC 35 V
Resistance to reverse feed	max. DC 35 V

Power consumption

STEP-PS/1AC/24DC/0.5 (12 W)

Maximum power dissipation idling	< 0.3 W
Maximum power loss nominal load	< 2.2 W

STEP-PS/1AC/24DC/1.75 (40 W)

Maximum power dissipation idling	5 W
Maximum power loss nominal load	0.7 W

STEP-PS/1AC/24DC/4.2 (100 W)

Maximum power dissipation idling	13.2 W
Maximum power loss nominal load	0.7 W

LED status indicator

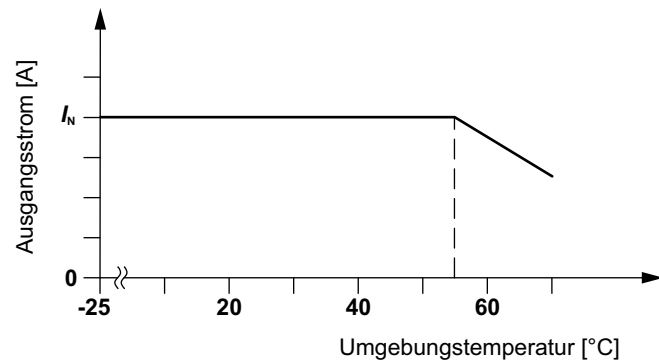
Status display	"DC OK" LED green/ U_{OUT} > 21.5 V: LED lights up < 21.5 V: LED off
----------------	---

Environmental conditions

Ambient temperature (operation)	-25...70 °C (> 55 °C derating)
Ambient temperature (storage/transport)	-40...85 °C
Max. perm. humidity (operation)	$\leq$ 95 % (at 25 °C, no condensation)
Vibration (operation)	< 15 Hz, amplitude $\pm$ 2.5 mm acc. to IEC 60068-2-6 15...150 Hz, 2.3 g, 90 min.
Shock	30 g in all directions, acc. to IEC 60068-2-27
Pollution degree acc. to EN 50178	2
Classification of climatic conditions	3K3 (acc. to EN 60721)

Connection		Approvals and certifications	
Connection type	screw connection	STEP-PS/1AC/24DC/0.5 (12W)	
Connection properties		UL approvals	UL/C-UL Listed UL 508
Rigid/flexible	0.2 ... 2.5 mm ²		UL/C-UL Recognized UL 60950
Conductor sizes (AWG)	24 ... 12		NEC Class 2 as per UL 1310
Tightening torque	0.6 ... 0.8 Nm		UL/C-UL Listed ANSI/ISA-12.12.01 Class I, Division 2, Groups A, B, C, D
Stripping length	6.5 mm	STEP-PS/1AC/24DC/1.75 (40W)	
Other		UL approvals	UL/C-UL Listed UL 508
Insulation voltage input/output	AC 4 kV (type test) AC 2 kV (routine test)		UL/C-UL Recognized UL 60950
Insulation voltage input/PE	AC 3.5 kV (type test) AC 2 kV (routine test)		NEC Class 2 as per UL 1310
Insulation voltage output/PE	DC 500 V (routine test)	Shipbuilding sector	Germanischer Lloyd
Degree of protection	IP20	STEP-PS/1AC/24DC/4.2 (100W)	
Protection class	II	UL approvals	UL/C-UL Listed UL 508
MTBF (IEC 61709)	500000 h		UL/C-UL Recognized UL 60950
Enclosure material	polycarbonate	Shipbuilding sector	Germanischer Lloyd
Foot latch material	plastic POM		
Dimensions W/H/D (state of delivery)			
STEP-PS/1AC/24DC/0.5 (12 W)	18/90/61 mm		
STEP-PS/1AC/24DC/1.75 (40 W)	54/90/61 mm		
STEP-PS/1AC/24DC/4.2 (100 W)	90/90/61 mm		
Weight			
STEP-PS/1AC/24DC/0.5 (12 W)	100 g		
STEP-PS/1AC/24DC/1.75 (40 W)	200 g		
STEP-PS/1AC/24DC/4.2 (100 W)	400 g		
Standards			
Electrical equipment of machines	EN 60204		
Safety isolating transformers for switch mode power supplies	IEC 61558-2-17		
Electrical safety (of information technology equipment)	IEC 60950-1/VDE 0805 (SELV)		
Electronic equipment for use in power installations	EN 50178/VDE 0160 (PELV)		
Protective extra-low voltage	IEC 60950-1 (SELV) and EN 60204 (PELV)		
Protective separation	DIN VDE 0100-410		
	DIN VDE 0106-1010		
Protection against electric shock	DIN 57100-410		
Protection against electric shock, basic requirements for protective separation in electrical equipment	DIN VDE 0106-101		
Limits for harmonic current emissions	EN 61000-3-2		
STEP-PS/1AC/24DC/1.75 (40W) and STEP-PS/1AC/24DC/4.2 (100 W)			
Certificate	CB Scheme		

Temperature behaviour



At an ambient temperature of up to +55 °C the device supplies the continuous output current I_N . In the case of ambient temperatures above +55 °C the output power must be reduced by 2.5 % per kelvin increase in temperature. The device does not switch off at ambient temperatures above +70 °C or thermal overload. The output power is reduced as much as necessary to provide device protection. After it has cooled down, the output power is increased again.

Parallel operation

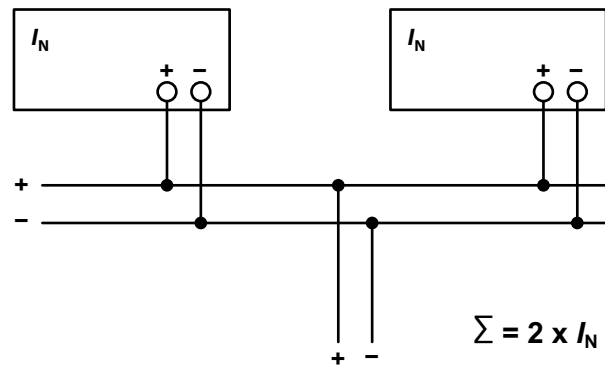
Devices of the same type can be connected in parallel to increase the power. By default upon delivery, no further adjustments are required.

If the output voltage is adjusted, a uniform current distribution is guaranteed by setting all parallel operated power supply units to exactly the same output voltage.

To ensure symmetrical current distribution we recommend that all cable connections from the power supply unit to the busbar are of the same length and have the same cross section!

Depending on the system, for parallel connection of more than two power supplies a protective circuit should be installed at each individual device output (e.g. decoupling diode, DC fuse or circuit breaker). This prevents high return currents in the event of a secondary device fault.

Increased power



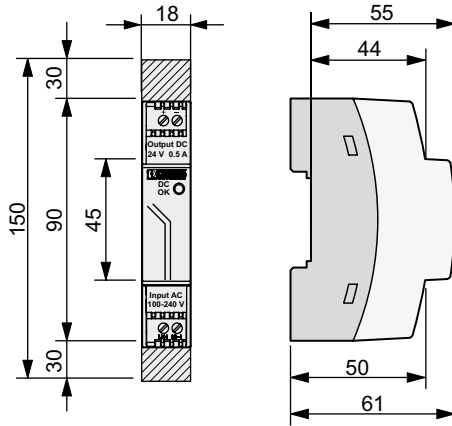
For n devices connected in parallel, the output current can be increased to $n \times I_N$. Parallel connection for increasing power is used when extending existing installations. A parallel connection is recommended if the power supply does not cover the current consumption of the most powerful load. Otherwise, the loads should be divided between individual devices that are independent from one another.

Conformity with EMC guideline 2004/108/EG

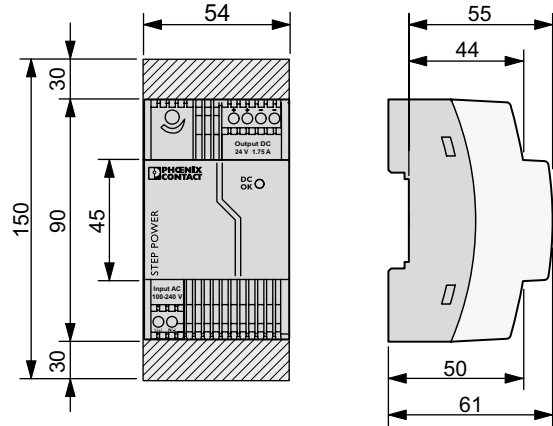
Noise immunity according to EN 61000-6-2		
Electrostatic discharge EN 61000-4-2	Enclosure	Level 3
	Contact discharge	±6 kV (contact discharge)
	Discharge in air	±8 kV (air discharge)
	Comments	Criterion B
Electromagnetic HF field EN 61000-4-3	Enclosure	Level 4
	Frequency range	80 MHz...3 GHz
	Field intensity	10 V/m
	Comments	Criterion A
Fast transients (burst) EN 61000-4-4	Input	4 kV (level 4 - asymmetrical))
	Output	2 kV (level 3 - asymmetrical))
	Comments	Criterion B
Surge current loads (surge) EN 61000-4-5	Input	4 kV (asymmetrical: conductor to earth) 2 kV (symmetrical: conductor to conductor)
	Output	2 kV (level 3 - asymmetrical: conductor to earth) 1 kV (level 3 - symmetrical: conductor to conductor)
	Comments	Criterion B
Conducted interference EN 61000-4-6	Input/Output	Level 3 – asymmetrical
	Frequency range	10 kHz...80 MHz
	Voltage	10 V
	Comments	Criterion A
Voltage dips EN 61000-4-11	Input	(Power failure buffering > 20 ms)
	Note	Criterion A
Emitted interference according to EN 61000-6-3		
Radio interference voltage acc. to EN 55011		EN 55011 (EN 55022) class B used in industry and domestic environment / EMC 1
Emitted radio interference acc. to EN 55011		EN 55011 (EN 55022) class B used in industry and domestic environment / EMC 1

Dimension diagrams

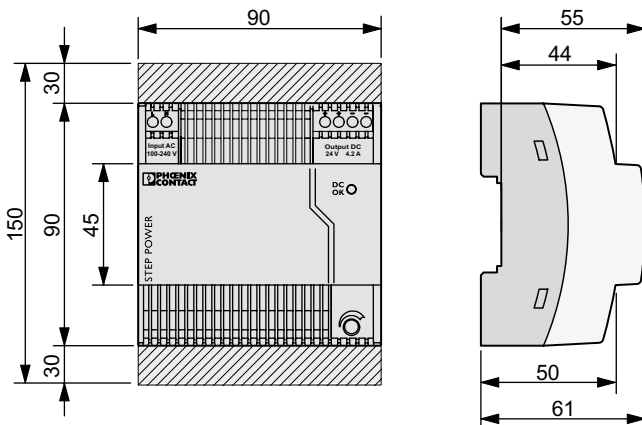
STEP-PS/1AC/24DC/0.5 (12 W)



STEP-PS/1AC/24DC/1.75 (40 W)



STEP-PS/1AC/24DC/4.2 (100 W)



Bender GmbH & Co. KG

P.O. Box 1161 • 35301 Grünberg • Germany
 Londorfer Straße 65 • 35305 Grünberg • Germany
 Tel.: +49 6401 807-0 • Fax: +49 6401 807-259
 E-mail: info@bender.de • www.bender.de



BENDER Group

Contact Information



Solutions for industries
and automation

Quad Industry GmbH

Barmer Str. 62a, 42899, Remscheid,
Germany

Tel: +49 (30) 994-04-988

Fax: +49 (30) 994-04-987

Mail: sales@quad-instruments.com
services@quad-instruments.com



www.quad-instruments.com/contacts



www.quad-instruments.com/services

We reserve the right to make technical changes or modify the contents of this document without prior notice. With regard to purchase orders, the agreed particulars shall prevail. ABB does not accept any responsibility whatsoever for potential errors or possible lack of information in this document.

We reserve all rights in this document and in the subject matter and illustrations contained therein. Any reproduction, disclosure to third parties or utilization of its contents – in whole or in parts – is forbidden without prior written consent of ABB.

© Copyright 2018 ABB.

All rights reserved.