

MINI-PS-100-240AC/2X15DC/1

Power supply unit

INTERFACE

Data sheet

100299_en_04

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1 Description

MINI POWER is the extremely slim power supply unit with constructional widths of 22.5 mm, 45 mm and 67.5 mm. In addition to a 24 V DC version with output currents of 1 A, 2 A and 4 A, special voltages with 5 V/3 A, ± 15 V/1 A and 10 V ... 15 V/2 A are also available.

Reliable startup of heavy loads is ensured by a power reserve of up to 100 % – the POWER BOOST.

The high operational reliability is thus dependably guaranteed in complex global networks as well. MINI POWER also functions in applications where static voltage dips, transient failures of the supply voltage or phase failure are to be expected.

Generously dimensioned capacitors guarantee a mains buffering time of more than 20 ms under full load.

Features

- Reliable power supply unit even at high ambient temperatures
- Reliable starting of difficult loads with static POWER BOOST power reserve
- Can be used worldwide in all industrial sectors due to a wide-range input and an international approval package
- High operating safety due to long mains buffering under full load and high MTBF (> 500,000 h)



DANGER OF EXPLOSION!

Only remove equipment when it is disconnected and not in the potentially explosive area.



DANGER

Components with dangerously high voltage and high stored energy are located in the device!
Never carry out work on live parts!
Depending on the ambient temperature and the load, the housing can become very hot!



Make sure you always use the latest documentation.
It can be downloaded from the product at www.phoenixcontact.net/catalog.

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3 Ordering data

Description	Type	Order No.	Pcs. / Pkt.
DIN rail power supply unit 2x15 V DC/1 A, primary-switched mode, slim design	MINI-PS-100-240AC/2X15DC/1	2938743	1

4 Technical data

Input data	
Nominal input voltage range	100 V AC ... 240 V AC
AC input voltage range	85 V AC ... 264 V AC
DC input voltage range	90 V DC ... 350 V DC
AC frequency range	45 Hz ... 65 Hz
DC frequency range	0 Hz
Current consumption	Approx. 0.6 A (120 V AC) Approx. 0.4 A (230 V AC) Approx. 0.8 A (90 V DC) Approx. 0.3 A (350 V DC)
Inrush current limitation	< 35 A (typical)
I^2t	4 A ² s
Power failure bypass	> 30 ms (120 V AC) > 150 ms (230 V AC)
Typical response time	< 1 s
Input fuse, integrated	2.5 A (slow-blow, internal)
Permissible backup fuse	6 A / 10 A / 16 A (characteristic B)
Output data	
Nominal output voltage	± 15 V DC ±1%
Output current	2x 1 A (-25 °C ... 60 °C) 2x 1.5 A (with POWER BOOST, -25°C ... 40°C permanent)
Derating	+60°C to +70°C: 5% per Kelvin
Current limitation	Approx 4.4 A (in the event of a short circuit)
Control deviation	< 2 % (change in load, static 10% ... 90%) < 3 % (change in load, dynamic 10% ... 90%) < 0.1 % (change in input voltage ±10%)
Efficiency	> 80 % (At 230 V AC and nominal values)
Ascent time	< 100 ms (typ.)
Residual ripple	< 30 mV _{PP} (20 MHz)
Peak switching voltages	< 20 mV _{PP} (20 MHz)
Connection in parallel	Yes, for assembling redundant systems and increasing efficiency
Connection in series	Yes
Resistance to reverse feed	17 V DC
DC OK active	
Status display	"DC OK" LED green

General data

Insulation voltage input/output	3 kV (routine test) 4 kV (type test)
Mounting position	horizontal DIN rail NS 35, EN 60715
Degree of protection	IP20
Protection class	II (in an enclosed control cabinet)
MTBF	
Type of housing	Polyamide PA, color: green
Dimensions W / H / D (state of delivery)	45 mm / 99 mm / 107 mm
Weight	0.25 kg

Ambient conditions

Ambient temperature (operation)	-25 °C ... 70 °C (> 60 °C derating)
Ambient temperature (storage/transport)	-40 °C ... 85 °C
Max. permissible relative humidity (operation)	95 % (at 25 °C, no condensation)
Vibration (operation)	< 15 Hz, amplitude ±2.5 mm in acc. with IEC 60068-2-6 15 Hz ... 150 Hz, 2.3g, 90 min.
Shock	30g in all directions in acc. with IEC 60068-2-27
Pollution degree in acc. with EN 50178	2
Climatic class	3K3 (in acc. with EN 60721)

Approvals

UL approvals	UL/C-UL listed UL 508 UL/C-UL Recognized UL 60950 UL/C-UL Listed UL 1604 Class I, Division 2, Groups A, B, C, D
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Conformance with EMC Directive 2004/108/EC
Noise immunity according to EN 61000-6-2

Electrostatic discharge	EN 61000-4-2	
	Housing	Level 3
	Contact discharge	8 kV
	Discharge in air	8 kV
	Comments	Criterion B
Electromagnetic HF field	EN 61000-4-3	
	Housing	Level 3
	Frequency range	80 MHz ... 1 GHz 10 V/m
	Field intensity	10 V/m
	Frequency range	1 GHz ... 2 GHz
	Field intensity	3 V/m
	Frequency range	2 GHz ... 2.7 GHz
	Field intensity	1 V/m
	Comments	Criterion A
Fast transients (burst)	EN 61000-4-4	
	Input	4 kV (level 4 - asymmetrical: conductor to ground)
	Output	2 kV (level 3 - asymmetrical: conductor to ground)
	Signal	1 kV (level 2 - asymmetrical: conductor to ground)
	Comments	Criterion B

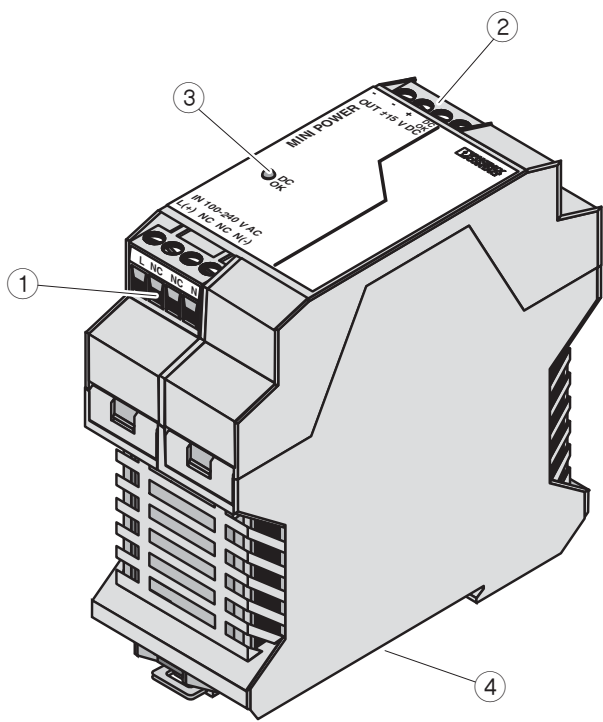
Conformance with EMC Directive 2004/108/EC
Noise immunity according to EN 61000-6-2

Surge current loads (surge)	EN 61000-4-5	
	Input	4 kV (level 4 - asymmetrical: conductor to ground) 2 kV (level 4 - symmetrical: conductor to conductor)
	Output	0.5 kV (level 1 - asymmetrical: conductor to ground) 0.5 kV (level 1 - symmetrical: conductor to conductor)
	Signal	0.5 kV (level 1 - asymmetrical: conductor to ground)
	Comments	Criterion B
Conducted interference	EN 61000-4-6	
	Input/Output/Signal	Level 3 - asymmetrical
	Frequency range	0.15 MHz ... 80 MHz
	Voltage	10 V
	Comments	Criterion A
Voltage dips	EN 61000-4-11	
	Input	(mains buffering > 20 ms)
	Comments	Criterion B

Emitted interference in acc. with EN 61000-6-3

Radio interference voltage in acc. with EN 55011	EN 55011 (EN 55022) Class B, area of application: Industry and residential
Emitted radio interference in acc. with EN 55011	EN 55011 (EN 55022) Class B, area of application: Industry and residential

5 Structure

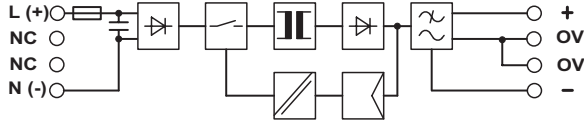


- 1 AC input
- 2 DC output
- 3 "DC OK" LED, green
- 4 Universal snap-on foot for EN DIN rails

	[mm ²]		AWG	[Nm] Torque
	solid	stranded		
Input	0.2 - 2.5	0.2 - 2.5	24 - 12	0.5 - 0.6
Output	0.2 - 2.5	0.2 - 2.5	24 - 12	0.5 - 0.6

Input data	
Nominal input voltage range	100 V AC ... 240 V AC
AC input voltage range	85 V AC ... 264 V AC
DC input voltage range	90 V DC ... 350 V DC
AC frequency range	45 Hz ... 65 Hz
DC frequency range	0 Hz
Input fuse, integrated	2.5 A (slow-blow, internal)
Type of connection	Pluggable screw connection
Stripping length	7 mm
Output data	
Nominal output voltage	± 15 V DC ±1%
Output current	2x 1 A (-25 °C ... 60 °C) 2x 1.5 A (with POWER BOOST, -25°C ... 40°C permanent)
Type of connection	Pluggable screw connection
Stripping length	7 mm

6 Block diagram



7 Safety notes



DANGER OF EXPLOSION!

Only remove equipment when it is disconnected and not in the potentially explosive area.

DANGER

Components with dangerously high voltage and high stored energy are located in the device!

Never carry out work on live parts!

Depending on the ambient temperature and the load, the housing can become very hot!

Cover termination area after installation in order to avoid accidental contact with live parts (e. g., installation in control cabinet).



CAUTION:

Before startup please ensure:

The mains connection has been carried out by a competent person and protection against electric shock is guaranteed!

The device can be disconnected outside the power supply unit in accordance with the regulations as in EN 60950 (e.g. through primary side line protection)!

All feed lines are sufficiently protected and dimensioned!

All output lines are dimensioned according to the maximum output current of the device or separately protected!

Sufficient convection must be guaranteed.



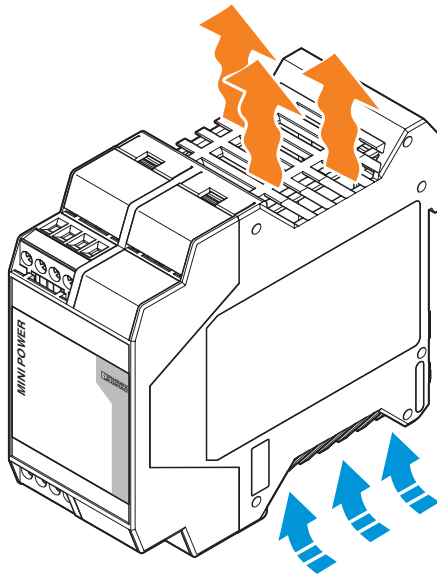
ATTENTION: Danger if used improperly

The power supply units are built-in devices. The device may only be installed and put into operation by qualified personnel. The corresponding national regulations must be observed.

Note: Electrical damage

Plug connectors may only be connected/disconnected when under no load.

8 Installation



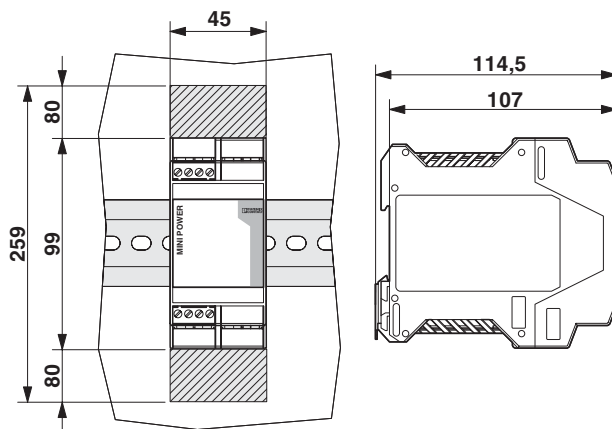
ATTENTION: Module can become damaged

To ensure sufficient convection, we recommend the following minimum spacing be used between modules: 8 cm in a vertical direction.

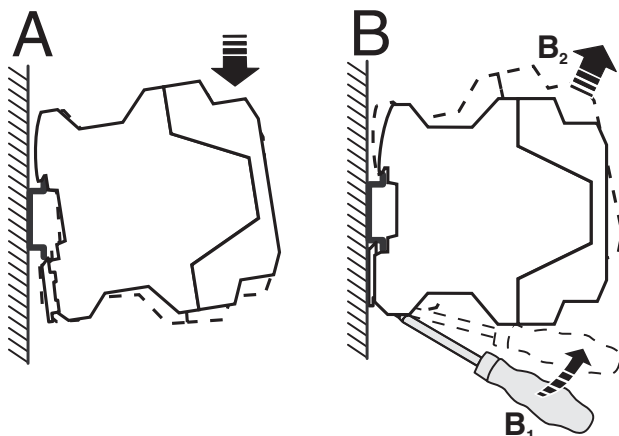


The power supply unit can be snapped onto all DIN rails in acc. with EN 60715.

9 Mounting position



Mounting position: Installation depth 107 mm (+ DIN rail)



Assembly

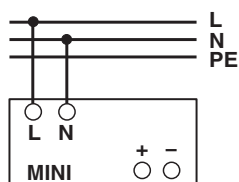
Position the module with the DIN rail guide on the upper edge of the DIN rail, and snap it in with a downward motion.

Removing

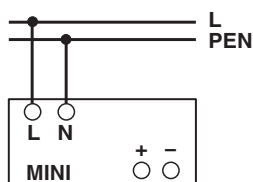
Pull the snap lever open with the aid of a screwdriver and slide the module out at the lower edge of the DIN rail.

10 Connection to various systems

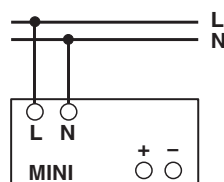
TN-S



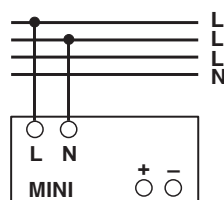
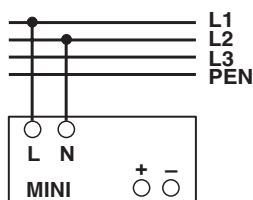
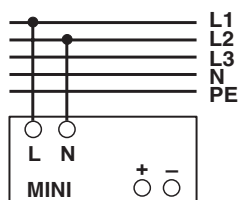
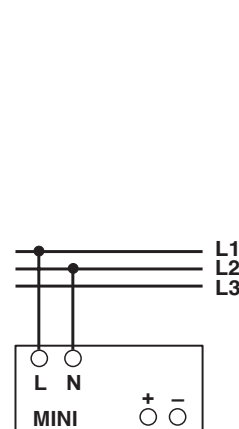
TN-C



TN-C



IT



The 100 V AC ... 240 V AC connection is made using the L and N screw connections.

The device can be connected to 1-phase AC networks or to two of the phase conductors of three-phase systems (TN, TT or IT networks in acc. with VDE 0100-300/IEC 60364-3) with nominal voltages of 100 V AC ...240 V AC.



ATTENTION: Module can become damaged

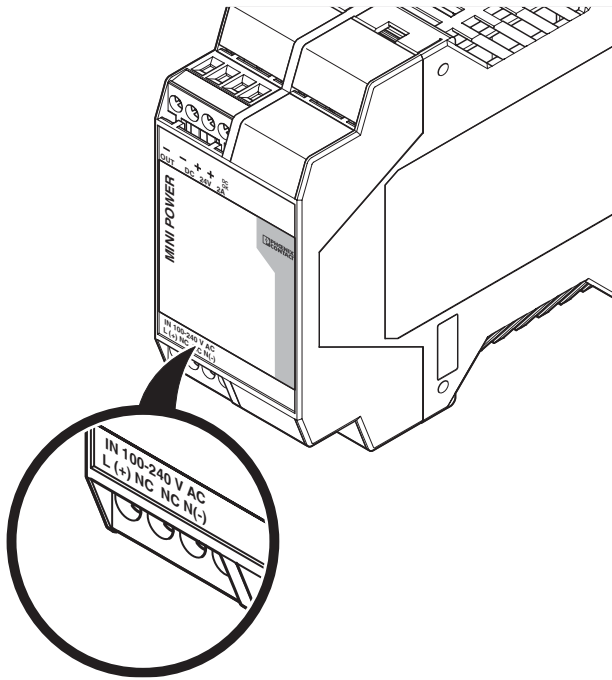
In order to comply with the UL certification, use copper cables that are designed for operating temperatures of $> 75^{\circ}\text{C}$.

In order to comply with EN 60950/UL 60950, flexible cables require ferrules. To safely connect a device, the ferrules should have a length of at least 10 mm. To achieve a reliable and shockproof connection, strip the connecting ends according to section "Structure".

In order to comply with the UL approval, use copper cables that are designed for operating temperatures $> 75^{\circ}\text{C}$.

In order to comply with EN 60950/UL60950, flexible cables require ferrules. In order to fulfill GL requirements, unused terminal spaces must be closed. Strip the connection ends as per the table in the chapter "Structure" for a reliable and shockproof connection.

11 Input



ATTENTION: Module can become damaged

If an internal fuse is triggered, there is a device malfunction. In this case, the device must be inspected in the factory.

The 100 ... 240 V AC connection is established using the L and N screw connections.

Protection of the primary side

The device must be installed in acc. with the regulations as in EN 60950. It must be possible to disconnect the device using a suitable isolating facility outside the power supply.

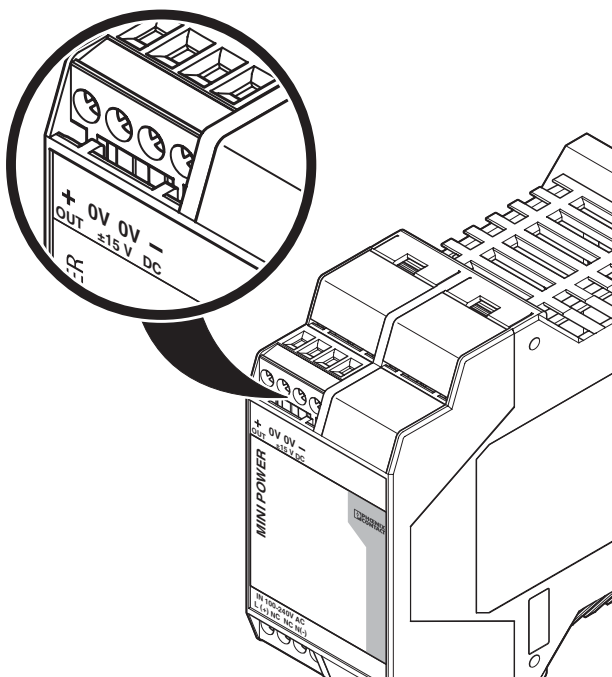
The primary side line protection, for example, is suitable. For device protection, there is an internal fuse. Additional device protection is not necessary.

Permissible backup fuse for mains protection

Power circuit-breaker 6 A, 10 A or 16 A, characteristic B (or identical function).

In DC applications, a suitable fuse must be connected.

12 Output



ATTENTION: Module can become damaged

Make sure that all output lines are dimensioned according to the maximum output current or are separately protected. The cables on the secondary side must have sufficiently large cross sections in order to keep the voltage drops on the lines as low as possible.

Connection is made using the "+" and "-" screw connections on the screw connection of the DC output.

Protection of the secondary side

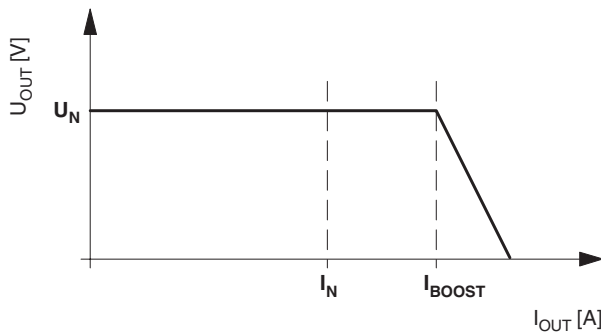
The device is electronically short-circuit-proof and idling-proof. In the event of an error, the output voltage is limited to a maximum of 17 V DC.

13 Signaling

The DC OK-LED is available for function monitoring.

	State 1	State 2
"DC OK" LED	ON	OFF
Meaning	Normal operation of the power supply unit ($U_{OUT} > 13.5 \text{ V}$)	1. The output voltage is less than 13.5 V. There is a secondary consumer short circuit or overload. 2. There is no mains voltage or there is a device fault.

14 Function



Output characteristic curve

The device makes a nominal output current of 1 A available up to an ambient temperature of 60 °C. At an ambient temperature of up to 40 °C, the device supplies a continuous output current of 1.5 A. In the event of a stronger load, the working point passes the U/I characteristic curve shown in the figure.

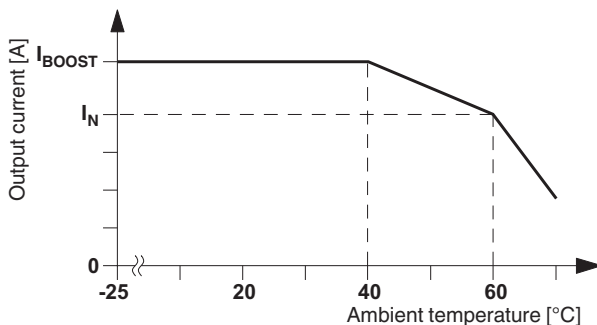
In the event of overload or short circuit, the full I_{BOOST} output current is permanently made available with decreased output voltage and the device does not switch off. As soon as the overload or short-circuit is eliminated, the full secondary voltage is made available again.

The U/I characteristic curve ensures that both heavily capacitive loads and devices with DC/DC converters in the primary circuit can be supplied by the MINI POWER without problems.

$$U_N = 15 \text{ V}$$

$$I_N = 1 \text{ A}$$

$$I_{BOOST} = 1.5 \text{ A}$$

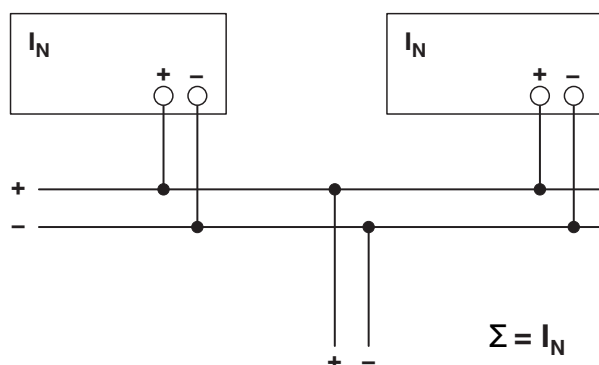


Thermal behavior

The device makes a nominal output current of 1 A available up to an ambient temperature of 60 °C. In the case of ambient temperatures of up to 40 °C, the device supplies a continuous output current of 1.5 A. The POWER BOOST is available for some minutes. For ambient temperatures above 60 °C, the output current must be reduced by 5 % per Kelvin increase in temperature. From 70 °C onwards or in the case of thermal overload, the device reduces the output capacity for its own protection, and returns to normal operation when it has cooled down.

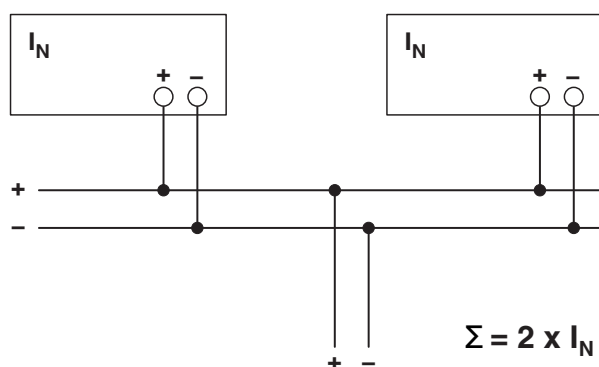
Parallel operation

Devices of the same type can be connected in parallel to increase both redundancy and power. By default upon delivery, no further adjustments are required. If the output voltage is adjusted, a uniform distribution of power 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 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.



Redundant operation

Redundant circuits are suitable for supplying systems, which place particularly high demands on operational safety. If a fault occurs in the primary circuit of the first power supply unit, the second device automatically takes over the complete power supply without interruption, and vice versa. For this purpose, the power supply units to be connected in parallel must be large enough that the total current requirements of all loads can be fully met by one power supply unit. External decoupling diodes are required for 100% redundancy (TRIO-DIODE/12-24DC/2X10/1X20, Order No. 2866514).



Increased performance

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

A maximum of five devices can be connected in parallel.