MINI-PS-100-240AC/24DC/1.3

Power supply unit

INTERFACE

Data sheet
102894_en_03

1 Description

MINI POWER power supplies for MCR technology
In measurement and control technology (MCR), modular electronics housing has become the industry standard. MINI POWER is the power supply unit to go with it. The devices are flexible, thanks to special voltages and special versions.

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 > 1,104,000 h (40 °C)

EXPLOSION HAZARD!
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 phoenixcontact.net/products.

2 Table of contents

3 Ordering data

Description	Type	Order No.	Pcs./Pkt.
Primary-switched MINI POWER power supply for DIN rail mounting, input: 1-phase, output: 24 V DC/1.3 A	MINI-PS-100-240AC/24DC/1.3	2866446	1

4 Technical data

Input data	
Nominal input voltage	100 V AC ... 240 V AC
Input voltage range AC	85 V AC ... 264 V AC
Input voltage range DC	90 V DC ... 350 V DC
AC frequency range	45 Hz ... 65 Hz
Frequency range DC	0 Hz
Current consumption	0.55 A (100 V AC) 0.23 A (240 V AC)
Inrush current limitation	< 15 A (< 0.6 A^2s)
I^2t	0.6 A^2s
Power failure bypass	> 20 ms (120 V AC) > 110 ms (230 V AC)
Typical response time	< 1 s
Protective circuit	Transient surge protection Varistor
Input fuse, integrated	1.25 A (slow-blow, internal)
Permissible backup fuse	B6 / B10 / B16

Output data	
Nominal output voltage	24 V DC ±1 %
Setting range of the output voltage	22.5 V DC ... 28.5 V DC (> 24 V DC, constant capacity restricted)
Output current	1.3 A (-25 °C ... 60 °C) 1.6 A (with POWER BOOST, -25°C ... 40°C permanent)
Active current limitation	Approx. 5 A (for short-circuit)
Max. capacitive load	Unlimited
Control deviation	< 1 % (change in load, static 10 % ... 90 %) < 3 % (change in load, dynamic 10 % ... 90 %) < 0.1 % (change in input voltage ±10 %)
Efficiency	> 85 % (for 230 V AC and nominal values)
Rise time	< 1.2 ms
Residual ripple	< 20 mV_{PP} (20 MHz)
Peak switching voltages	< 50 mV_{PP} (20 MHz)
Connection in parallel	Yes, for redundancy and increased capacity
Connection in series	Yes
Protection against surge voltage on the output	Yes, < 35 V DC
Resistance to reverse feed	35 V DC

DC OK active	
Output description	U_{OUT} > 21.5 V: High signal
Voltage	≤ 24 V
Status display	"DC OK" LED green / U_{OUT} > 21.5 V: LED lights up

General data

Insulation voltage input/output	4 kV (type test) 3 kV (Routine test)
Mounting position	horizontal DIN rail NS 35, EN 60715
Degree of protection	IP20
Protection class	II (in closed control cabinet)
MTBF (IEC 61709, SN 29500)	> 1104000 h (40°C)
Type of housing	Polyamide PA, color: green
Dimensions W / H / D (state of delivery)	22.5 mm / 99 mm / 107 mm
Weight	0.2 kg

Ambient conditions

Ambient temperature (operation)	-25 °C ... 70 °C (> 60 °C Derating: 2,5 %/K)
Ambient temperature (storage/transport)	-40 °C ... 85 °C
Max. permissible relative humidity (operation)	≤ 95 % (at 25 °C, non-condensing)
Vibration (operation)	< 15 Hz, amplitude ±2.5 mm (according to IEC 60068-2-6) 15 Hz ... 150 Hz, 2.3g, 90 min.
Shock	30g in each direction, according to IEC 60068-2-27
Pollution degree in acc. with EN 50178	2
Climatic class	3K3 (in acc. with EN 60721)

Standards

Electrical Equipment for Machinery	EN 60204-1 / Overvoltage category III
Electrical safety (of information technology equipment)	EN 60950-1/VDE 0805 (SELV)
Electronic equipment for use in electrical power installations	EN 50178/VDE 0160 (PELV)
SELV	EN 60950-1 (SELV) EN 60204 (PELV)
Safe isolation	DIN VDE 0100-410
Limitation of mains harmonic currents	EN 61000-3-2

Approvals

UL approvals	UL/C-UL listed UL 508 UL/C-UL Recognized UL 60950 UL ANSI/ISA-12.12.01 Class I, Division 2, Groups A, B, C, D (Hazardous Location) NEC Class 2 as per UL 1310

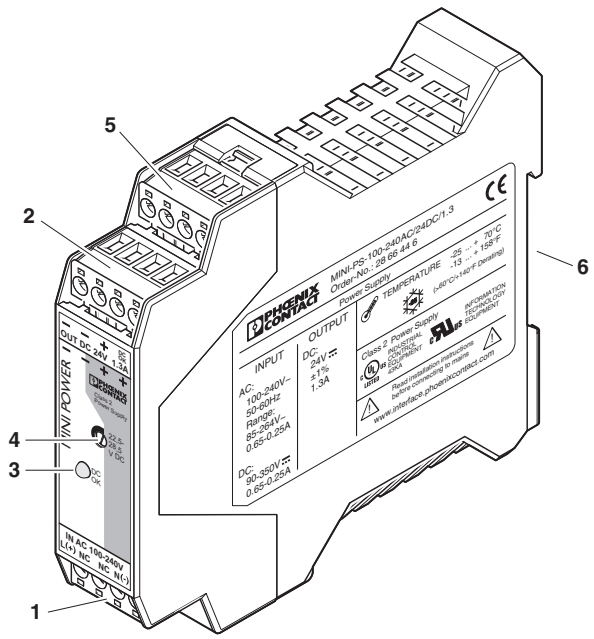
Current approvals/permissions for the product can be found in the download area under phoenixcontact.net/products.

Conformance with EMC Directive 2004/108/EC		
Noise immunity according to EN 61000-6-2		
Electrostatic discharge	EN 61000-4-2	
	Housing	Test Level 3
	Contact discharge	8 kV
	Discharge in air	8 kV
	Comments	Criterion B
Electromagnetic HF field	EN 61000-4-3	
	Housing	Test Level 3
	Frequency range	80 MHz ... 1 GHz
	Comments	Criterion A
Fast transients (burst)	EN 61000-4-4	
	Input	4 kV (Test Level 4 - asymmetrical: conductor to ground)
	Output	2 kV (Test Level 3 - asymmetrical: conductor to ground)
	Signal	2 kV (Test Level 3 - asymmetrical: conductor to ground)
	Comments	Criterion B
Surge current loads (surge)	EN 61000-4-5	
	Input	4 kV (Test Level 4 - asymmetrical: conductor to ground) 2 kV (Prüfschärfegrad 4 - symmetrisch: Leitung gegen Leitung)
	Output	0.5 kV (Test Level 1 - asymmetrical: conductor to ground) 0.5 kV (Prüfschärfegrad 1 - symmetrisch: Leitung gegen Leitung)
	Signal	1 kV (Test Level 2 - asymmetrical: conductor to ground)
	Comments	Criterion B
Conducted interference	EN 61000-4-6	
	Input/Output/Signal	Test Level 3 - asymmetrical
	Frequency range	0.15 MHz ... 80 MHz
	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

All technical specifications are nominal values and refer to a room temperature of 25 °C and 70 % relative humidity at 100 m above sea level.

5 Structure



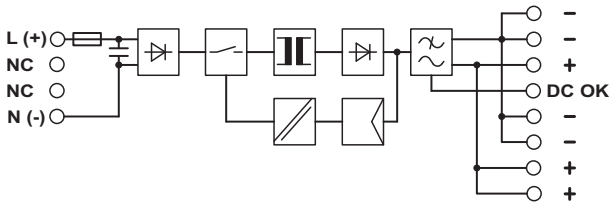
1 AC input
2 DC output
3 "DC OK" LED, green
4 22.5 V DC ... 28.5 V DC potentiometer
5 DC OK output active + DC-output
6 Universal snap-on foot: 35 mm DIN rail according to EN 60715

	[mm²]		AWG	[Nm]
	solid	stranded		Torque
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
Signal	0.2 - 2.5	0.2 - 2.5	24 - 12	0.5 - 0.6

Input data	
Nominal input voltage	100 V AC ... 240 V AC
Input voltage range AC	85 V AC ... 264 V AC
Input voltage range DC	90 V DC ... 350 V DC
AC frequency range	45 Hz ... 65 Hz
Frequency range DC	0 Hz
Input fuse, integrated	1.25 A (slow-blow, internal)
Connection method	Pluggable screw connection
Stripping length	7 mm

Output data	
Nominal output voltage	24 V DC ±1 %
Setting range of the output voltage	22.5 V DC ... 28.5 V DC (> 24 V DC, constant capacity restricted)
Output current	1.3 A (-25 °C ... 60 °C) 1.6 A (with POWER BOOST, -25°C ... 40°C permanent)
Connection method	Pluggable screw connection
Stripping length	7 mm

6 Block diagram



7 Safety notes

EXPLOSION HAZARD!

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!

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!

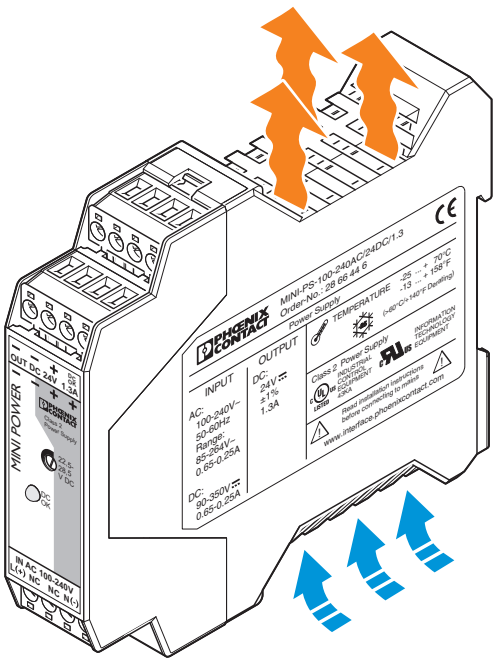
All output lines are dimensioned according to the maximum output current of the device or separately protected!

Sufficient convection must be guaranteed.

NOTE: 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.

8 Installation

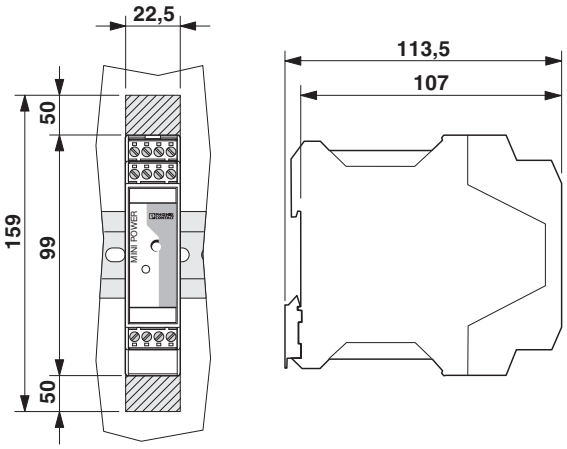


NOTE: Module can become damaged

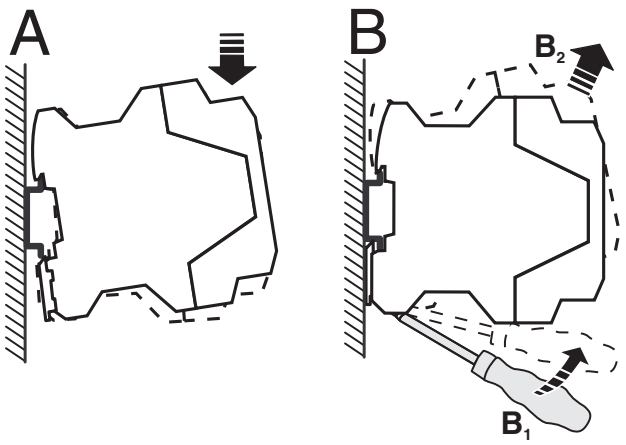
To ensure sufficient convection, we recommend the following minimum spacing be used between modules: 5 cm for vertical installation and 0 cm for horizontal installation.

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)



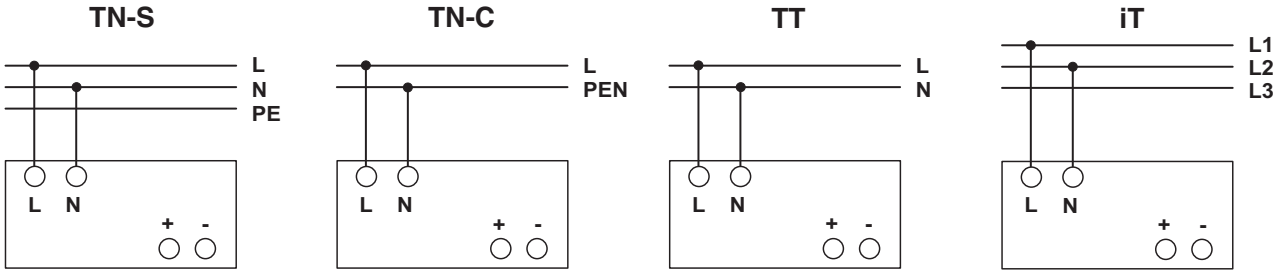
Assembly

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



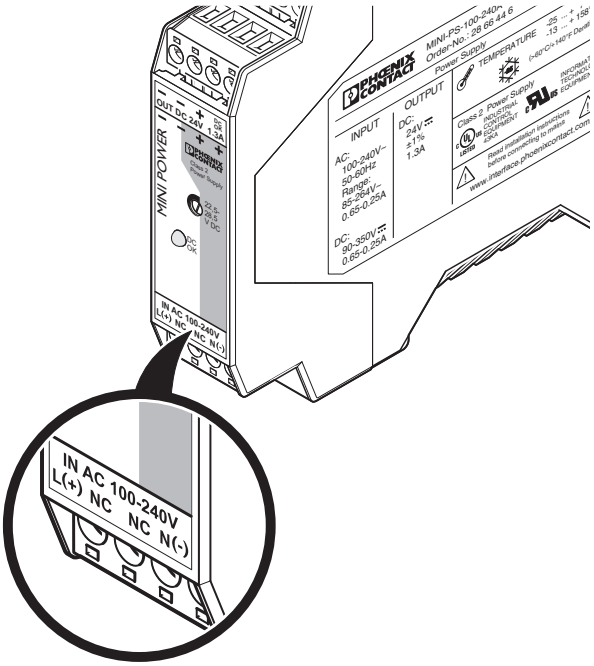
The 100 V AC ... 240 V AC connection is made using the L and N screw connections.
The device can be connected to 1-phase AC networks or to two of the phase conductors of three-phase systems (TN, TT or IT networks in acc. with VDE 0100-300/IEC 60364-3) with nominal voltages of 100 V AC ...240 V AC.

NOTE: Module can become damaged

In order to comply with the UL certification, use copper cables that are designed for operating temperatures of > 75°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 °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



NOTE: 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.

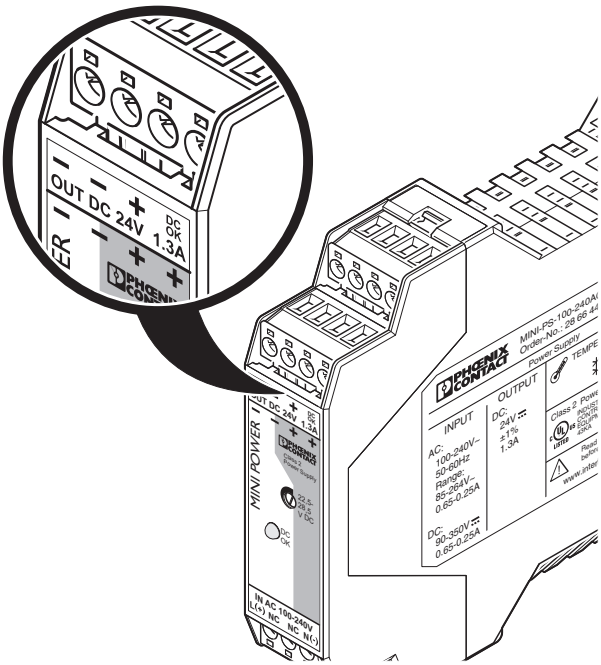
Protection of the primary side

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).

12 Output



NOTE: 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.

The connection is made using the "+" and "-" screw connections on the screw connection of the DC output. At the time of delivery, the output voltage is 24 V DC. The output voltage can be set on the potentiometer.

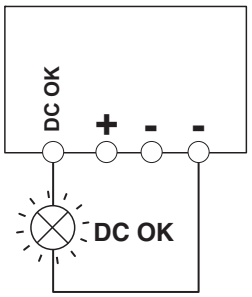
Protection of the secondary side

The device is electronically protected against short-circuit and idling. In the event of a malfunction, the output voltage is limited to 35 V DC.

13 Signaling

For function monitoring, there is the active DC OK switching output and the DC OK LED.

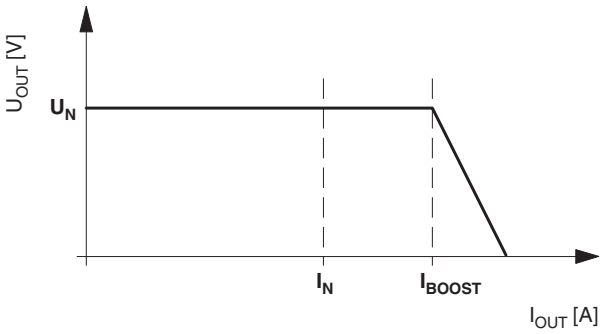
	State 1	State 2
"DC OK" LED	ON	OFF
Active DC OK switching output	U = +24 V (in reference to "–")	U = 0 V (in reference to "–")
Meaning	Normal operation of the power supply unit (U_{OUT} > 21.5 V)	1. The output voltage is less than 21.5 V. There is a secondary consumer short-circuit or overload. 2. There is no input voltage or there is a device fault.



Active signal output

The 24 V DC signal is applied between the "DC OK" and "-" connecting terminal blocks and can carry up to 20 mA. When the output voltage drops below 21.5 V DC, this signal output signals by switching from "active high" to "low".
The DC OK signal is decoupled from the power output. It is thus not possible for parallel switched devices to provide external supply.
The 24 V DC signal can be directly connected to a logic input for evaluation.

14 Function



Output characteristic curve

The device can supply a nominal output current of 1.3 A with ambient temperatures of up to 60°C. At an ambient temperature of up to 40°C, the device supplies a continuous output current of 1.6 A. At temperatures up to 60°C, the POWER BOOST provides a transient output current of 1.6 A for a few minutes. In the event of a higher load, the operating point follows the U/I characteristic curve depicted in the figure.

In the case of overload or short-circuit, the full output current I_{BOOST} is supplied permanently with reduced output voltage, the device does not switch off. As soon as the overload or short-circuit is no longer present, the full secondary voltage is once again available.

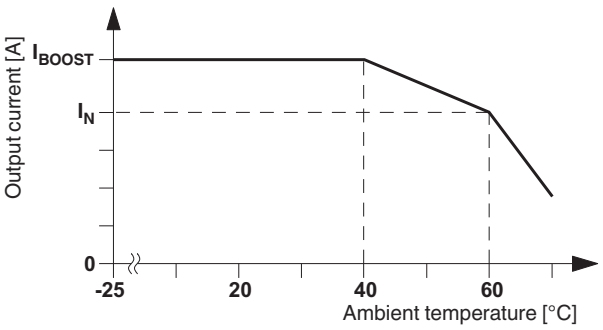
The U/I characteristic curve ensures that both heavily capacitive loads and devices with DC/DC converters in the primary circuit can be fed without problems using MINI POWER.

Downstream fuses are triggered reliably. Selectivity in the design of your system is guaranteed at all times.

U_N = 24 V

I_N = 1.3 A

I_{BOOST} = 1.6 A



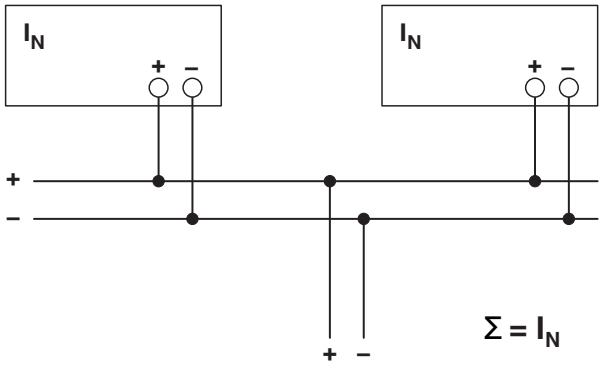
Thermal behavior

The device can supply a nominal output current of 1.3 A with ambient temperatures of up to 60°C. At an ambient temperature of up to 40°C, the device supplies a continuous output current of 1.6 A. At temperatures up to 60°C, the POWER BOOST provides a transient output current of 1.6 A for a few minutes.

For ambient temperatures above 60°C, the output current must be reduced by 2.5% 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.

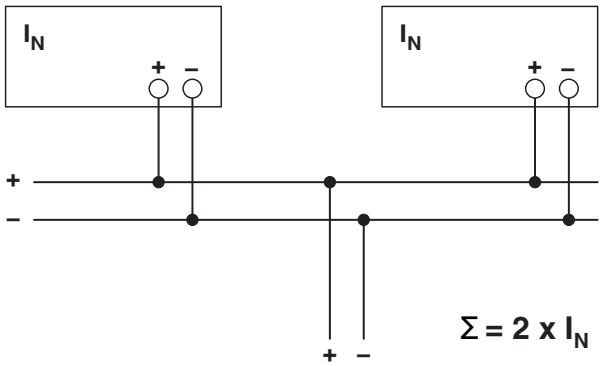
Parallel operation

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 the supply of systems which make especially high requirements on the operational safety. If a fault occurs in the primary circuit of the first power supply unit, the second device automatically takes over the entire power supply, without interruption, and vice versa. For this reason, the power supply units to be connected in parallel are dimensioned in such a way that the total current requirement of all consumers can be completely covered by one power supply unit. 100 % redundancy makes external decoupling diodes necessary (QUINT-DIODE/40, Order No. 2938963)!



Increased performance

For n parallel connected devices, the output current can be increased to n x 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.