UNO-PS/1AC/24DC/150W

Primary-switched power supply unit

Data sheet
106261_en_02

1 Description

The UNO POWER power supply makes a worldwide impression thanks to maximum energy efficiency. Low idling losses (No Load) and the high degree of efficiency save energy.

Thanks to its high power density, the UNO POWER power supply unit is the ideal solution, particularly in compact control boxes.

Features

- Worldwide use thanks to input voltage range of 85 V AC ... 264 V AC
- Superior system availability through reliable power supply with 24 V DC ... 28 V DC
- Maximum energy efficiency thanks to optimized efficiency over the entire operating range of the power supply unit and low idling losses
- Particularly compact: 150 W of power from this narrow power supply, which is just 37 mm wide
- Reliable supply thanks to the high MTBF (Mean Time Between Failure) greater than 500 000 h (40°C)
- High operating range from -25 °C to 70 °C
- Idle and short-circuit-proof

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 UNO power supply for DIN rail mounting, input: 1-phase, output: 24 V DC/150 W	UNO-PS/1AC/24DC/150W	2904376	1

Accessories	Type	Order No.	Pcs./Pkt.
Redundancy module, 5 V - 24 V DC, 2 x 10 A, 1 x 20 A.	UNO-DIODE/5-24DC/2X10/1X20	2905489	1

Our range of accessories is being continually extended, our current range can be found in the download area.

4 Technical data

Input data	
Nominal input voltage	100 V AC ... 240 V AC
Input voltage range	85 V AC ... 264 V AC
AC frequency range	45 Hz ... 65 Hz
Current consumption	1.4 A (120 V AC) 0.8 A (230 V AC)
Inrush current limitation	< 50 A (typical)
I^2t	< 0.8 A^2s
Typical response time	< 1 s
Power failure bypass	> 20 ms (120 V AC) > 20 ms (230 V AC)
Protective circuit	Transient surge protection Varistor
Input fuse, integrated	2.5 A (slow-blow, internal)
Choice of suitable fuses	6 A ... 16 A (Characteristics B, C, D, K)

Input connection data	
Connection method	Screw connection
Conductor cross section, solid	0.2 mm^2 ... 2.5 mm^2
Conductor cross section, stranded	0.2 mm^2 ... 2.5 mm^2
Conductor cross section AWG/kcmil	24 ... 14
Stripping length	8 mm
Screw thread	M3
Tightening torque	0.5 Nm ... 0.6 Nm

Output data	
Nominal output voltage	24 V DC ±1 %
Setting range of the output voltage	24 V DC ... 28 V DC ±1 %
Output current	6.25 A (-25°C ... 55°C)
Derating	55 °C ... 70 °C (2.5%/K)
Control deviation	< 1 % (change in load, static 10 % ... 90 %) < 2 % (change in load, dynamic 10 % ... 90 %) < 0.1 % (change in input voltage ±10 %)
Rise time	< 0.5 s (U_{OUT} (10 % ... 90 %))
Residual ripple	< 40 mV_{PP} (with nominal values)
Connection in parallel	yes, with redundancy module
Connection in series	No
Protection against surge voltage on the output	≤ 35 V DC
Resistance to reverse feed	< 35 V DC

Output connection data	
Connection method	Screw connection
Conductor cross section, solid	0.2 mm^2 ... 2.5 mm^2
Conductor cross section, stranded	0.2 mm^2 ... 2.5 mm^2
Conductor cross section AWG/kcmil	24 ... 14
Stripping length	8 mm
Screw thread	M3
Tightening torque	0.5 Nm ... 0.6 Nm

Power consumption	
Efficiency	> 94 % (for 230 V AC and nominal values)
Maximum power dissipation NO-Load	< 1.2 W
Power loss nominal load max.	< 9.7 W

General data	
Insulation voltage input/output	4 kV AC (type test) 3 kV AC (routine test)
MTBF (IEC 61709, SN 29500)	> 868000 h (40°C)
Housing material	Polycarbonate
Foot latch material	Plastic POM
Dimensions W/H/D	37 mm / 130 mm / 125 mm
Weight	0.5 kg

Security	
Degree of protection	IP20
Protection class	II (in closed control cabinet)
SELV	EN 60950-1 (SELV) and EN 60204 (PELV)

Ambient conditions	
Ambient temperature (operation)	-25 °C ... 70 °C (> 55 °C Derating: 2,5 %/K)
Ambient temperature (start-up type tested)	-40 °C
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	2
Climatic class	3K3 (in acc. with EN 60721)
Inflammability class in acc. with UL 94 (housing)	V0

Standards	
Electrical Equipment for Machinery	EN 60204-1
Safety transformers for power supply units	EN 61558-2-16
Electrical safety (of information technology equipment - Safety - Part 1)	EN 60950-1/VDE 0805 (SELV)
Electronic equipment for use in electrical power installations	EN 50178/VDE 0160 (PELV)
SELV	EN 60950-1 (SELV) and EN 60204 (PELV)
Safe isolation	DIN VDE 0100-410
Limitation of mains harmonic currents	EN 61000-3-2
Network version/undervoltage	EN 61000-4-11
Information technology equipment - Safety (CB Scheme)	CB Scheme

Approvals	
UL approvals	UL Listed UL 508 UL/C-UL Recognized UL 60950

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		
	EN 61000-6-2 requirement	**Tested**
Electrostatic discharge EN 61000-4-2		
Housing contact discharge	4 kV (Test intensity 2)	6 kV (Test intensity 3)
Housing air discharge	8 kV (Test intensity 3)	8 kV (Test intensity 3)
Comments	Criterion B	Criterion B
Electromagnetic HF field EN 61000-4-3		
Frequency range	80 MHz ... 1 GHz	80 MHz ... 1 GHz
Test field strength	10 V/m (Test intensity 3)	10 V/m (Test intensity 3)
Frequency range	1.4 GHz ... 2 GHz	1 GHz ... 2 GHz
Test field strength	3 V/m (Test intensity 2)	10 V/m (Test intensity 3)
Frequency range	2 GHz ... 2.7 GHz	2 GHz ... 3 GHz
Test field strength	1 V/m (Test intensity 1)	10 V/m (Test intensity 3)
Comments	Criterion A	Criterion A
Fast transients (burst) EN 61000-4-4		
Input	2 kV (Test intensity 3 - asymmetrical)	4 kV (Test intensity 4 - asymmetrical)
Output	2 kV (Test intensity 3 - asymmetrical)	2 kV (Test intensity 3 - asymmetrical)
Comments	Criterion B	Criterion A
Surge current loads (surge) EN 61000-4-5		
Input	1 kV (Test intensity 2 - symmetrical) 2 kV (Test intensity 3 - asymmetrical)	2 kV (Test intensity 3 - symmetrical) 4 kV (Test intensity 4 - asymmetrical)
Output	0.5 kV (Test intensity 1 - symmetrical) 0.5 kV (Test intensity 1 - asymmetrical)	1 kV (Test intensity 2 - symmetrical) 2 kV (Test intensity 3 - asymmetrical)
Comments	Criterion B	Criterion A
Conducted interference EN 61000-4-6		
Input/output	asymmetrical	asymmetrical
Frequency range	0.15 MHz ... 80 MHz	0.15 MHz ... 80 MHz
Voltage	10 V (Test intensity 3)	10 V (Test intensity 3)
Comments	Criterion A	Criterion A

Key	
Criterion A	Normal operating behavior within the specified limits.
Criterion B	Temporary impairment to operational behavior that is corrected by the device itself.

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 Intended use

This power supply unit features IP20 protection and is intended for installation in housing. It is suitable for use in industrial applications.

6 Structure

6.1 Device elements

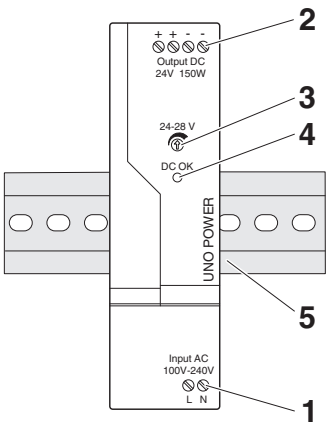


Figure 1 Device elements

1. Input voltage: Input AC L/N
2. Output voltage: Output DC+/-
3. Potentiometer, 24 V DC ... 28 V DC
4. Green LED: DC OK
5. Universal snap-on foot: 35 mm DIN rail according to EN 60715

6.2 Block diagram

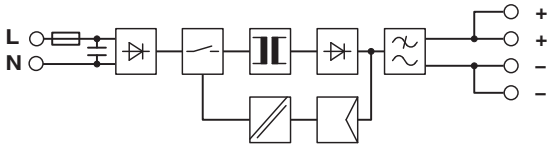


Figure 2 Block diagram

Element	Meaning
	Fuse
	Rectifier
	Switch
	Transformer
	Filter
	Electrically isolated signal transmission
	Regulation

7 Assembly

7.1 Unpacking

Before mounting the power supply unit, it must be checked for damage:

- Take the device out of its packaging.
- Check the device for any damage sustained during transport.
- Retain the package slip for future use.
- Dispose of packaging in an environmentally-friendly way.

7.2 Mounting the power supply unit

The power supply unit is intended for installation in a distributor box or control cabinet.

The power supply unit is designed for convection cooling. Maintain a minimum distance from other devices in order to ensure convection cooling.

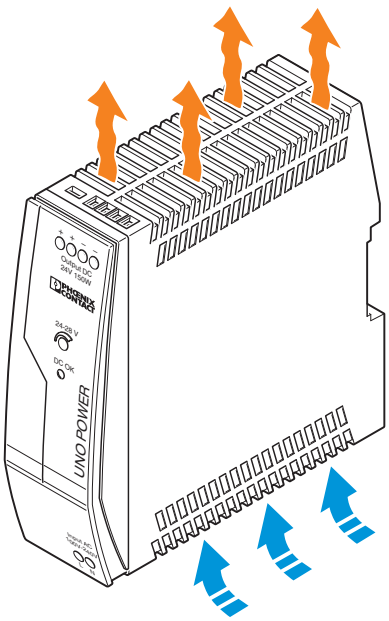


Figure 3 Convection

Please note the following before mounting the power supply unit:

- The minimum distance from other devices that must be observed in order to ensure convection cooling is: 30 mm vertically, 0 mm horizontally

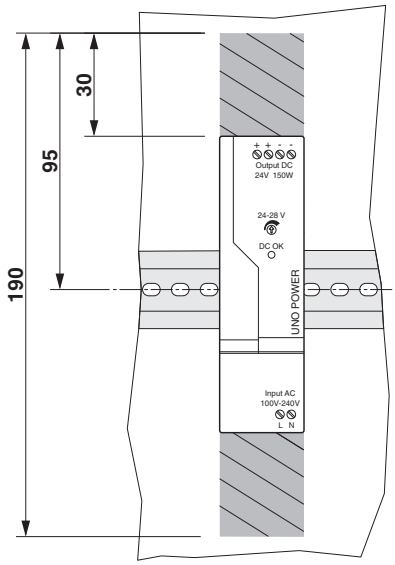


Figure 4 Locked areas

– The device dimensions

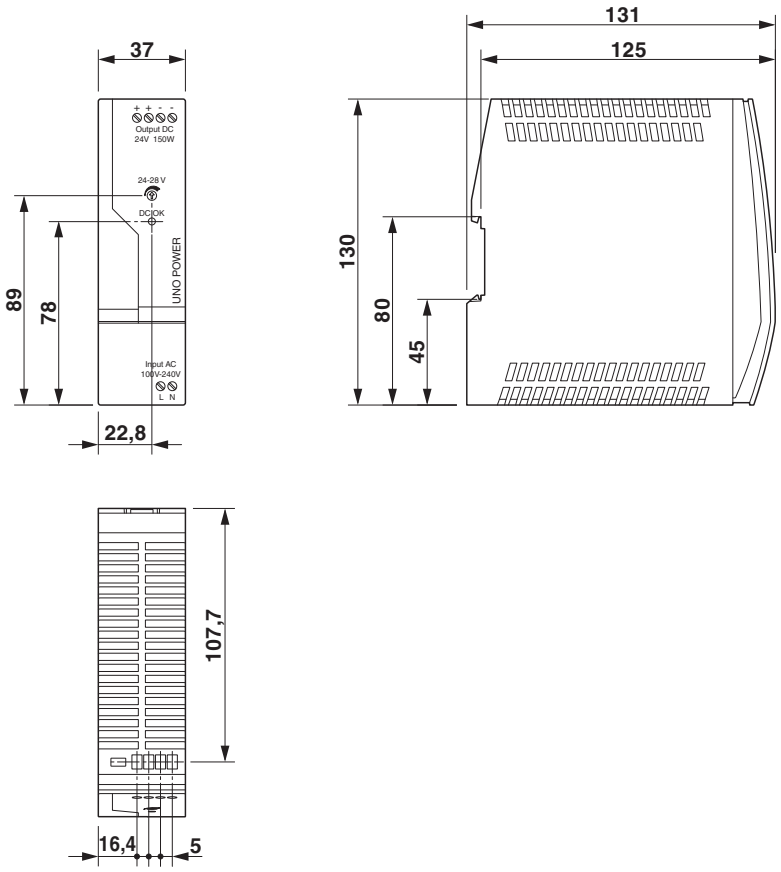


Figure 5 Device dimensions

7.3 Mounting on a DIN rail

The power supply unit can be installed on all 35 mm DIN rails according to EN 60715.

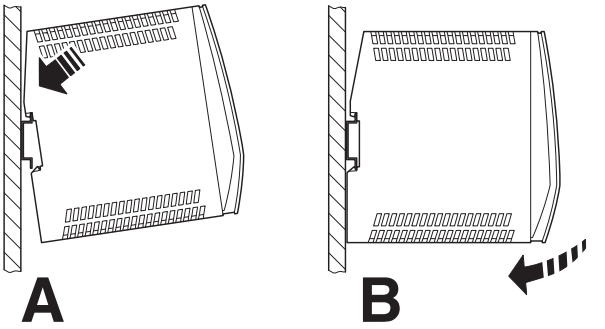


Figure 6 Mounting on a DIN rail

7.4 Normal mounting position

When installed, the input terminal blocks must be at the bottom and the output terminal blocks at the top.

If the power supply unit is installed in a mounting position other than the normal mounting position, the output power must be reduced.

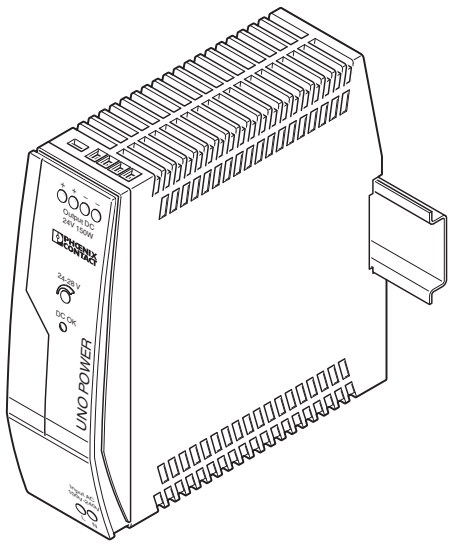


Figure 7 Normal mounting position

8 Installing the power supply unit

8.1 Safety regulations and installation notes

WARNING: risk of electric shock!

Only professionals may install, start up, and operate the device. Observe the national safety and accident prevention regulations.

Prior to installation, disconnect the input voltage and make sure that it cannot be switched on again unintentionally.

Mains connection must be performed by specialist personnel and protection against electric shock ensured.

Make sure that the device can be switched off outside the power supply according to the regulations in EN 60950 (e.g., by line protection on the primary side).

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

Protect the device against ingress by foreign bodies, e.g., paper clips or metal parts.

WARNING: risk of electric shock!

Make sure that all supply lines are sufficiently dimensioned and have sufficient fuse protection.

Make sure that all output cables are dimensioned accordingly for the maximum device output current or have separate fuse protection.

WARNING: risk of electric shock!

Never open or repair the device yourself.

Internal fuses will only blow in the event of device malfunction. Do not modify or attempt to repair the device. Send the device to the factory for examination.

8.2 Mains connection

The device can be connected to single-phase AC or three-phase power grids (TN-S, TN-C, TT, and IT) while considering the nominal input voltage.

For operation on two of the phase conductors of a three-phase system, an isolating facility for all poles must be provided.

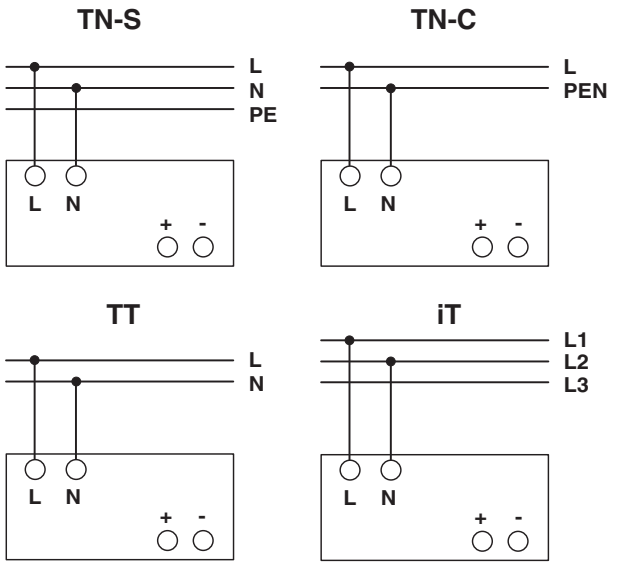


Figure 8 Network types

8.3 Device connections

Screw connection for input AC L/N

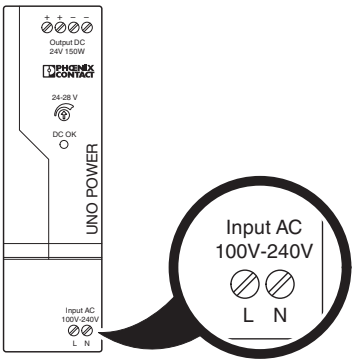


Figure 9 Screw connection for input AC L/N

Screw connection for output DC +/-

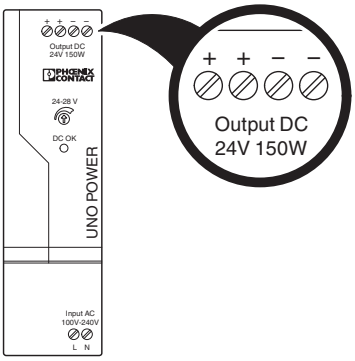


Figure 10 Screw connection for output DC +/-

8.4 Connecting cables

Use copper cables with an operating temperature > 75°C (ambient temperature < 55°C) and > 90°C (ambient temperature < 75°C).

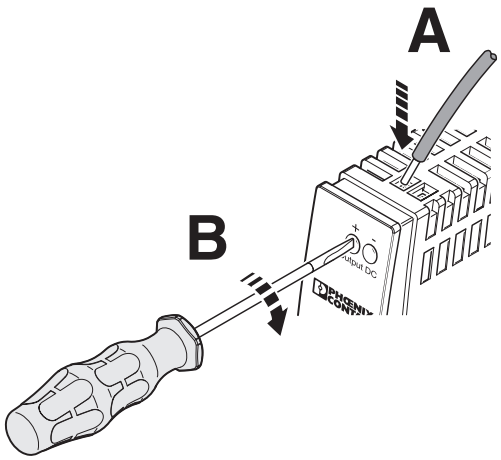


Figure 11 Connecting cables

1. Connect the supply lines to the input AC L/N connection terminal blocks.
2. Connect the output cables to the output DC +/- connection terminal blocks.

The power supply unit is operational as soon as the input terminal blocks are supplied with voltage.

9 Operating behavior of the power supply unit

9.1 Normal operation

In normal operation, the loads are supplied with a constant output voltage of 24 V DC.

9.2 Overload response

The power supply operates according to the characteristic curve shown in the figure. In the event of an overload ($I > I_N$), the device reduces the output voltage. If the output voltage drops below U_N x 0.8, the output current is also reduced. In the event of a higher overload, the power supply constantly limits the output current to I_N x 0.5. If the overload is rectified, the device continues running in nominal operation.

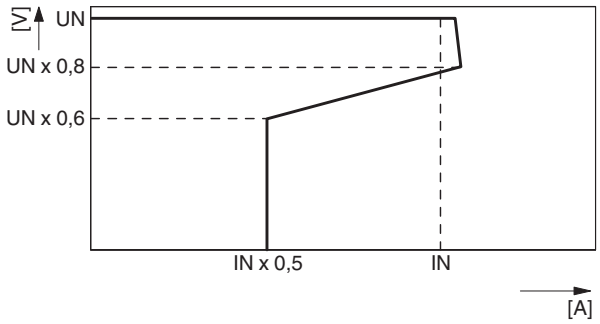


Figure 12 Output characteristic curve

9.3 Behavior at ambient temperatures > 55°C

At an ambient temperature of up to 55 °C, the power supply unit supplies the nominal output current. At ambient temperatures upwards of 55 °C, the output power must be reduced by 2.5 % per Kelvin temperature increase (temperature-dependent derating).

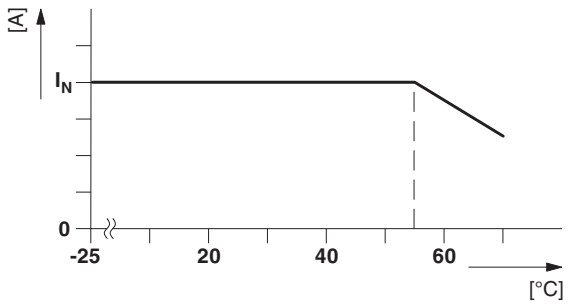


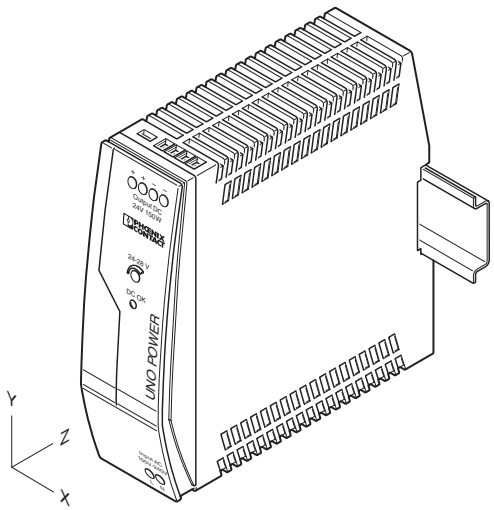
Figure 13 Temperature-dependent derating

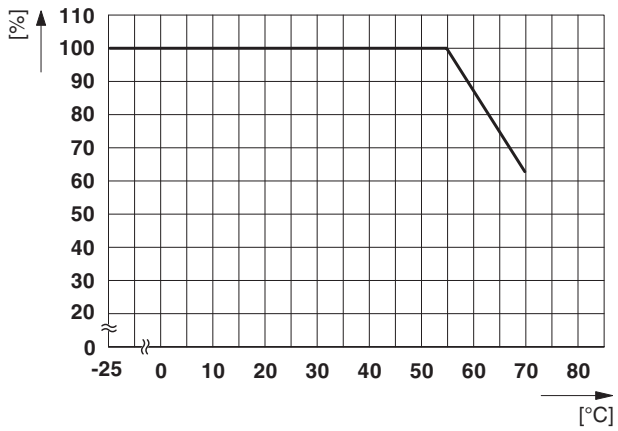
9.4 Behavior in the case of alternative mounting positions

For mounting positions that differ from the normal mounting position, the output power must be reduced (position-dependent derating).

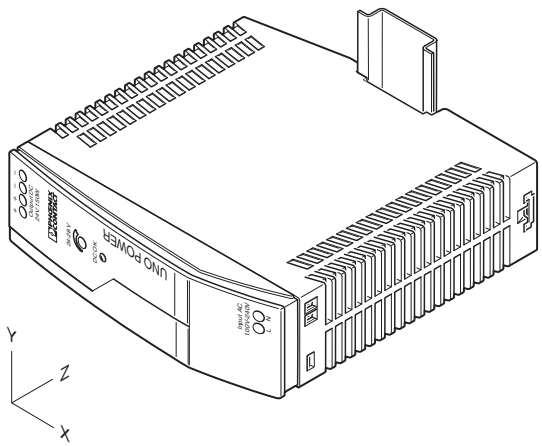
The characteristic curve can be used to determine the maximum output power to be drawn for each ambient temperature for different mounting positions.

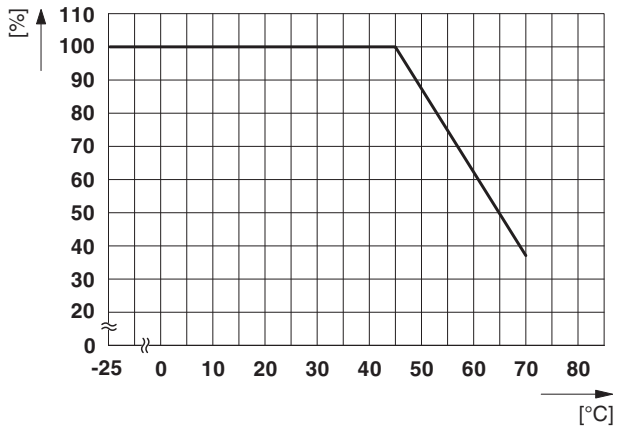
Normal mounting position



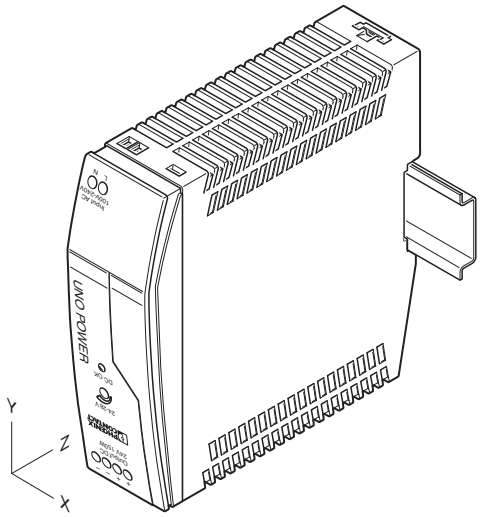


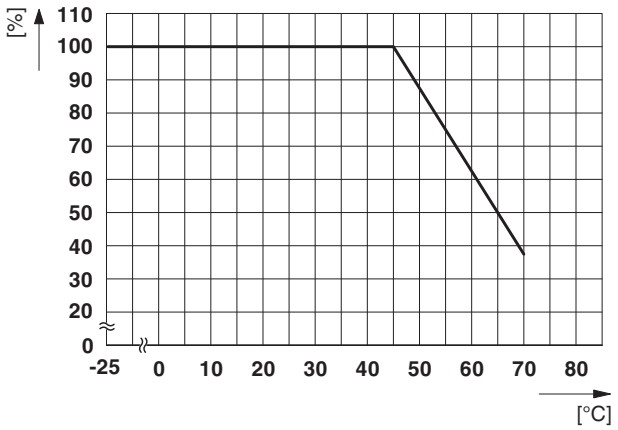
Rotated mounting position 90° X-axis



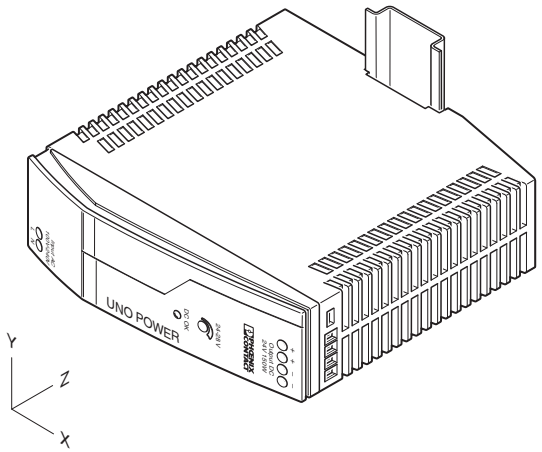


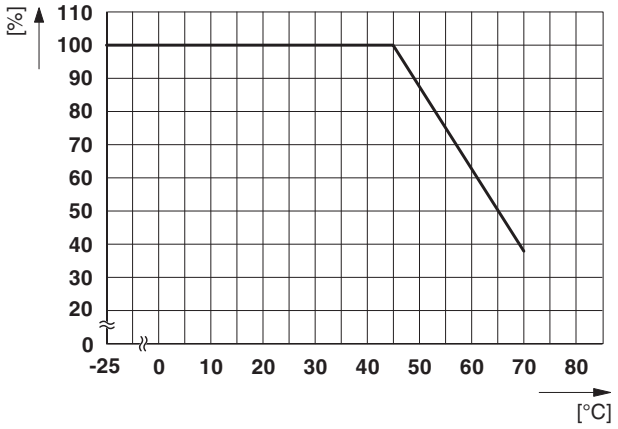
Rotated mounting position 180° X-axis



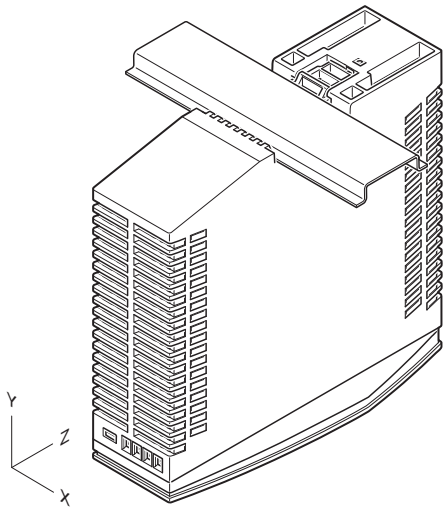


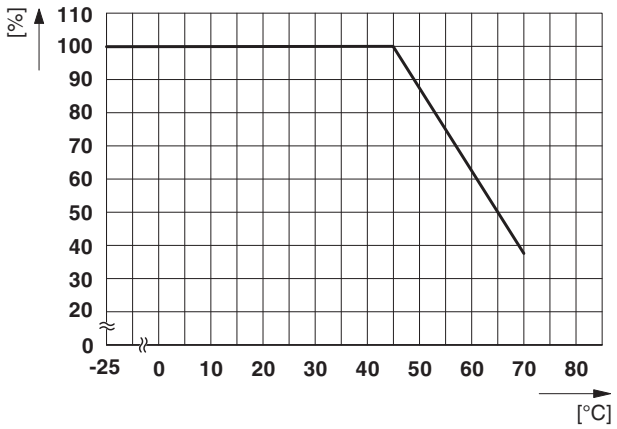
Rotated mounting position 270° X-axis



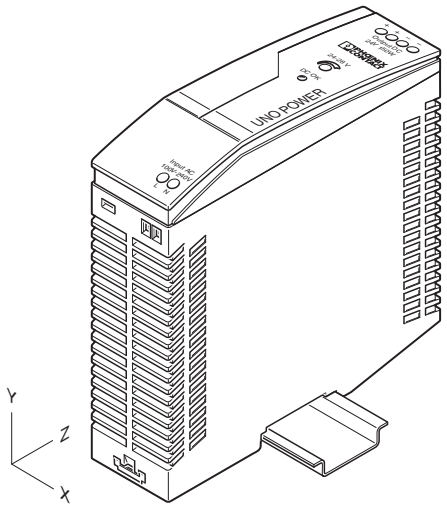


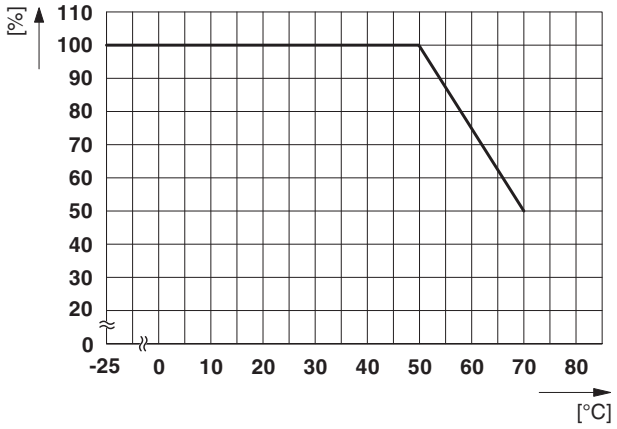
Rotated mounting position 90° Z-axis





Rotated mounting position 270° Z-axis





10 Operating the power supply unit

10.1 Function monitoring

DC OK LED

The DC OK LED is available for visual function monitoring of the power supply unit.

Status 1	Status 2	
DC OK LED	lit	OFF
Meaning	Output voltage > 21.5 V	Output voltage < 21.5 V DC, overload mode or no mains voltage
State description	The device is operating, output voltage and output current are OK	The device is in operation, but there is a fault on the side of the consumer; the current consumption is greater than IN or the output is short-circuited. The device is out of operation because there is no mains voltage, the fuse on the primary side has been triggered, or the device is faulty.
Corrective		Remove the error at the load, use a more powerful power supply unit, connect a power supply unit of the same type parallel to the existing device, remove the short circuit, apply mains voltage, enable the fuse again or replace the power supply unit.

10.2 Operating power supply units in parallel

Power supply units of the same type can be connected in parallel to increase both redundancy and power.

To ensure symmetrical current distribution, all cable connections from the power supply unit to the busbar must be the same length and have the same conductor cross section.

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.

Using a redundancy module, it is possible for two power supply units of the same type that are connected in parallel on the output side for redundancy to be decoupled from one another.

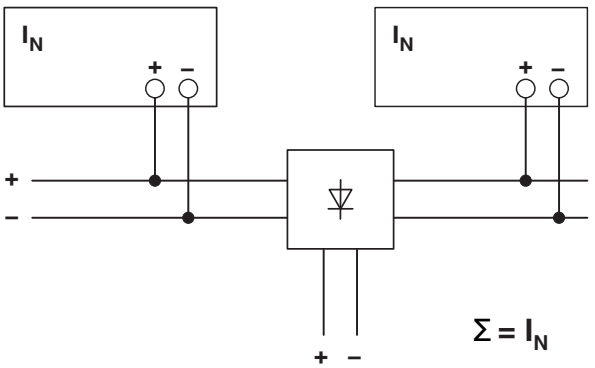


Figure 14 Redundant circuit with redundancy module

Increased performance

Power supply units of the same type can be connected in parallel to increase the power to n x I_N. Parallel connection is recommended if existing systems are to be extended and the power supply unit that is installed here does not cover the current consumption of the most powerful load. Otherwise, the loads should be distributed between individual devices that are independent of one another.

Using a redundancy module, it is possible for two power supply units of the same type that are connected in parallel on the output side to increase power to be decoupled from one another.

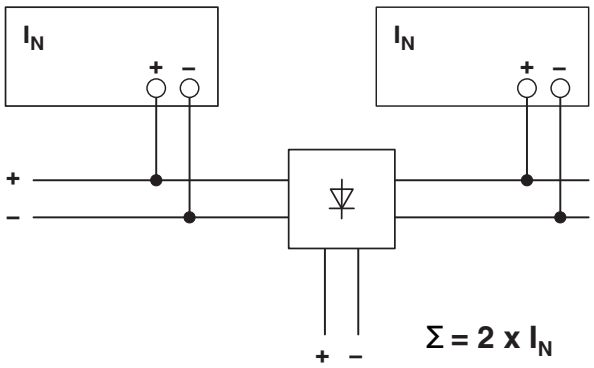


Figure 15 Parallel connection to increase power with a redundancy module

11 Removal

11.1 Removing the power supply unit

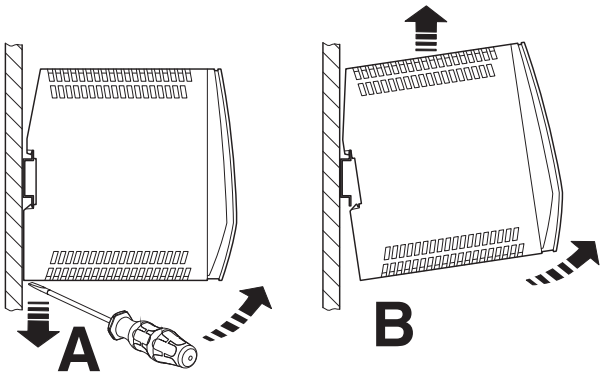


Figure 16 Removal

11.2 Notes on disposal

Do not dispose of the power supply unit with household waste. It should be disposed of in accordance with the currently applicable national regulations.