UNO-PS/350-900DC/24DC/60W

Primary-switched DC/DC converter



Data sheet
107461_en_01

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1 Description

UNO POWER DC/DC converter – for photovoltaic applications

The UNO POWER DC/DC converter is specifically designed for photovoltaic applications. It supports direct field installation thanks to the DC wide range input.

Due to its compact dimensions and large DC wide range input, the UNO POWER DC/DC converter is the ideal solution, especially in compact control boxes.

Features

- Ideal for use in photovoltaic systems, thanks to large DC wide range input from 300 V DC ... 1000 V DC
- Superior system availability through reliable power supply with 24 V DC
- Maximum energy efficiency thanks to optimized efficiency over the entire operating range of the power supply unit and low idling losses
- Simplified approval: UL 1741 certified
- Reliable supply thanks to the high MTBF (Mean Time Between Failure) greater than 1 160 000 h (40°C)

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

2 Table of contents

1 Description ... 1
2 Table of contents ... 2
3 Ordering data ... 3
4 Technical data ... 4
5 Intended use ... 8
6 Structure ... 8
6.1 Device elements ... 8
6.2 Block diagram ... 8
7 Assembly ... 9
7.1 Unpacking ... 9
7.2 Installing the DC/ DC converter ... 9
7.3 Mounting on a DIN rail ... 11
7.4 Normal mounting position ... 11
8 Installing the DC/DC converter ... 11
8.1 Safety regulations and installation notes ... 11
8.2 Device connections ... 12
8.3 Connecting cables ... 12
9 Operating behavior of the DC/DC converter ... 13
9.1 Normal operation ... 13
9.2 Overload response ... 13
9.3 Behavior at ambient temperatures > 55°C ... 13
9.4 Behavior in the case of alternative mounting positions ... 14
10 Operating the DC/DC converter ... 17
10.1 Function monitoring ... 17
10.2 Parallel operation of DC/DC converters ... 18
11 Removal ... 18
11.1 Removing the DC/DC converter ... 18
11.2 Notes on disposal ... 18

3 Ordering data

Description	Type	Order No.	Pcs./Pkt.
Primary-switched UNO DC/DC converter with wide range input, for DIN rail mounting, input: 350 ... 900 V DC, output: 24 V DC/60 W	UNO-PS/350-900DC/24DC/60W	2906300	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
Fuse terminal block, for cartridge fuse insert 10.3 x 38 mm, cross section: 1.5 - 25 mm², AWG: 16 - 4, width: 18 mm, color: Black	UK 10,3-HESI 1000V	3211236	10



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	350 V DC ... 900 V DC
Input voltage range	300 V DC ... 1000 V DC
Current consumption	0.19 A (350 V DC) 0.07 A (1000 V DC)
Inrush current limitation	< 1 A (typical)
I^2t	< 0.38 A^2s
Typical response time	< 1 s
Choice of suitable circuit breakers	1 A (Characteristic gPV or comparable)

Input connection data	
Connection method	Screw connection
Conductor cross section, solid	0.2 mm² ... 2.5 mm²
Conductor cross section, flexible	0.2 mm² ... 2.5 mm²
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 %
Output current	2.5 A (-25°C ... 55°C)
Derating	55 °C ... 70 °C (2.5%/K)
Control deviation	< 1 % (change in load, static 10 % ... 90 %) < 3 % (Dynamic load change 10 % ... 90 %, 10 Hz) < 0.1 % (change in input voltage ±10 %)
Rise time	< 1 s (U_{OUT} (10 % ... 90 %))
Residual ripple	< 20 mV_{PP} (with nominal values)
Connection in parallel	yes, with redundancy module
Connection in series	No
Protection against internal overvoltage	≤ 35 V DC
Feedback resistance	< 35 V DC

Output connection data	
Connection method	Screw connection
Conductor cross section, solid	0.2 mm² ... 2.5 mm²
Conductor cross section, flexible	0.2 mm² ... 2.5 mm²
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	> 90 %
Maximum power dissipation in no-load condition	< 0.5 W
Power loss nominal load max.	< 6.5 W

General data	
Insulation voltage input/output	8 kV DC (type test) 3 kV DC (routine test)
MTBF (IEC 61709, SN 29500)	> 1160000 h (40°C)
Housing material	Polycarbonate
Foot latch material	POM (Polyoxymethylen)
Dimensions W/H/D	55 mm / 90 mm / 84 mm
Weight	0.3 kg

Security	
Degree of protection	IP20
Protection class	II
SELV	IEC 60950-1 (SELV) and EN 60204-1 (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	18 ms, 30g, in each space direction (according to IEC 60068-2-27)
Degree of pollution	2
Climatic class	3K3 (in acc. with EN 60721)
Inflammability class in acc. with UL 94 (housing)	V0

Approvals	
UL approvals	UL 1741 IEC 62109-1

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

Conformance with EMC Directive 2014/30/EU		
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 Level 3)	6 kV (Test Level 3)
Housing air discharge	8 kV (Test Level 3)	8 kV (Test Level 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	10 V/m
Frequency range	1.4 GHz ... 2 GHz	1 GHz ... 2 GHz
Test field strength	3 V/m	10 V/m
Frequency range	2 GHz ... 2.7 GHz	2 GHz ... 3 GHz
Test field strength	1 V/m	10 V/m
Comments	Criterion A	Criterion A
Fast transients (burst) EN 61000-4-4		
Input	2 kV (Test Level 3 - asymmetrical)	4 kV (Test Level 4 - asymmetrical)
Output	2 kV (Test Level 3 - asymmetrical)	2 kV (Test Level 3 - asymmetrical)
Comments	Criterion B	Criterion B
Surge current loads (surge) EN 61000-4-5		
Input	1 kV (Test Level 2 - symmetrical) 2 kV (Test Level 3 - asymmetrical)	2 kV (Test Level 3 - symmetrical) 4 kV (Test Level 4 - asymmetrical)
Output	0.5 kV (Test Level 1 - symmetrical) 0.5 kV (Test Level 1 - asymmetrical)	1 kV (Test Level 2 - symmetrical) 2 kV (Test Level 3 - asymmetrical)
Comments	Criterion B	Criterion B
Conducted interference EN 61000-4-6		
Frequency range	10 kHz ... 80 MHz	10 kHz ... 80 MHz
Voltage	10 V (Test Level 3)	10 V (Test Level 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 DC/DC converter features IP20 protection and is intended for installation in housing. It is suitable for use in industrial applications.

6 Structure

6.1 Device elements

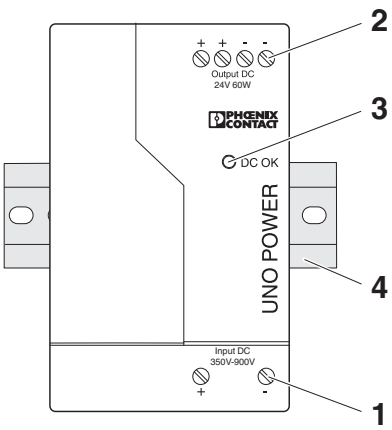


Figure 1 Device elements

1. Input voltage: Input DC +/-
2. Output voltage: Output DC+/-
3. Green LED: DC OK
4. Universal snap-on foot: 35 mm DIN rail according to EN 60715

6.2 Block diagram

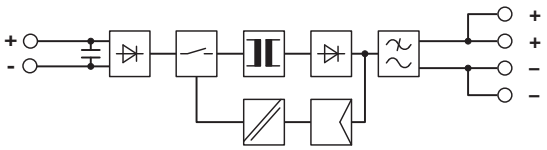


Figure 2 Block diagram

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

7 Assembly

7.1 Unpacking

Before mounting the DC/DC converter, 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 Installing the DC/ DC converter

The DC/DC converter is intended for installation in a distributor box or control cabinet.

The DC/DC converter is designed for convection cooling. Maintain a minimum distance from other devices in order to ensure convection cooling.

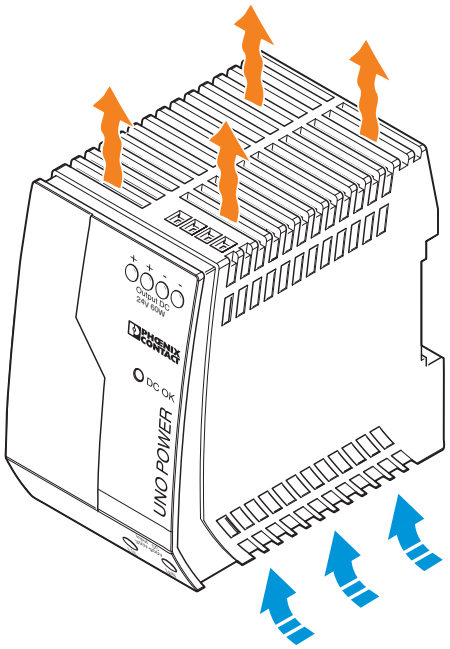


Figure 3 Convection

Please note the following before mounting the DC/DC converter:

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

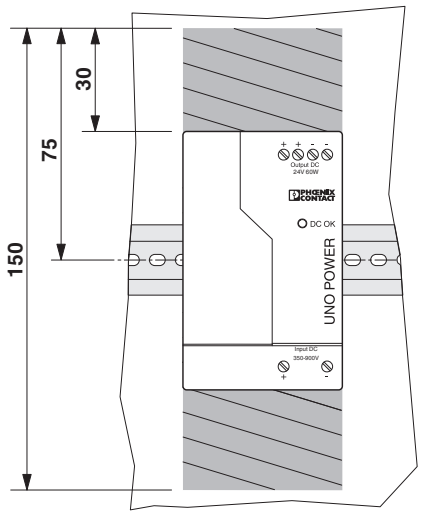


Figure 4 Locked areas

– The device dimensions

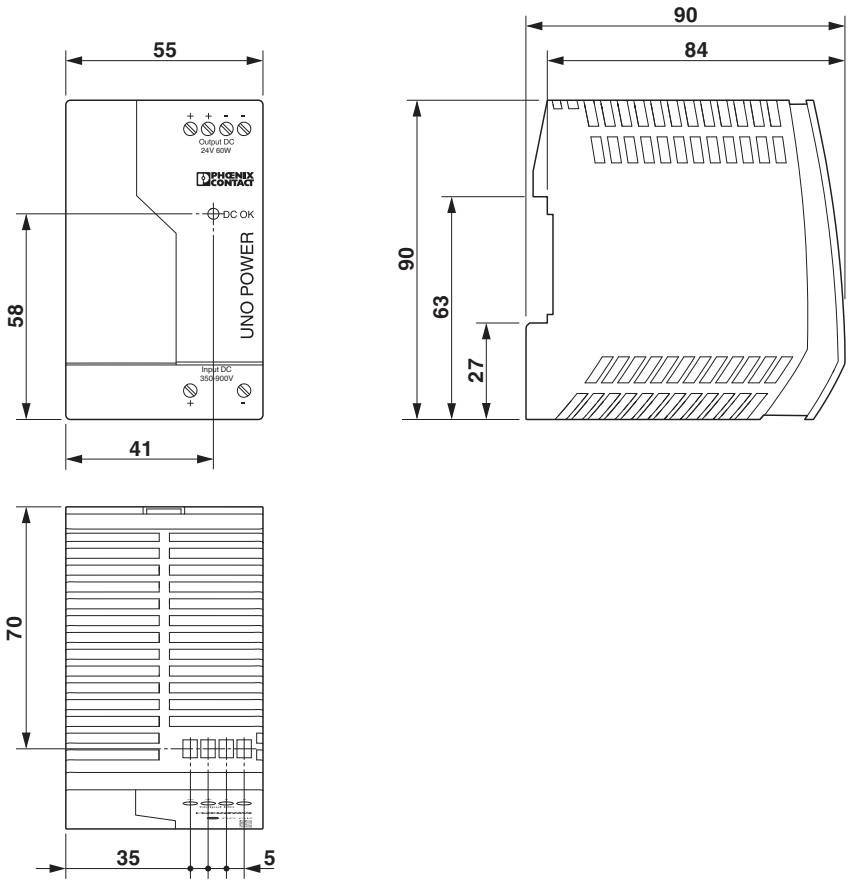


Figure 5 Device dimensions

7.3 Mounting on a DIN rail

The DC/DC converter can be installed on all 35 mm DIN rails according to EN 60715.

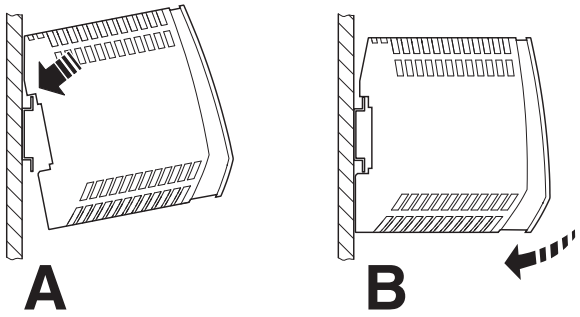


Figure 6 Mounting on a DIN rail

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 DC/DC converter is installed in a mounting position other than the normal mounting position, the output power must be reduced.

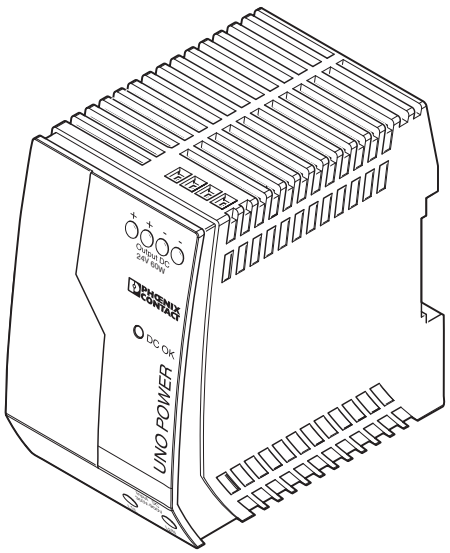


Figure 7 Normal mounting position

8 Installing the DC/DC converter

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 Device connections

Screw connection for input DC +/-

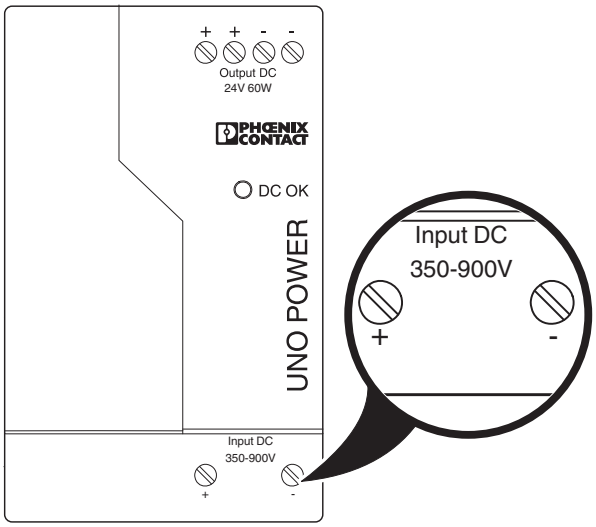


Figure 8 Screw connection for input DC +/-

Screw connection for output DC +/-

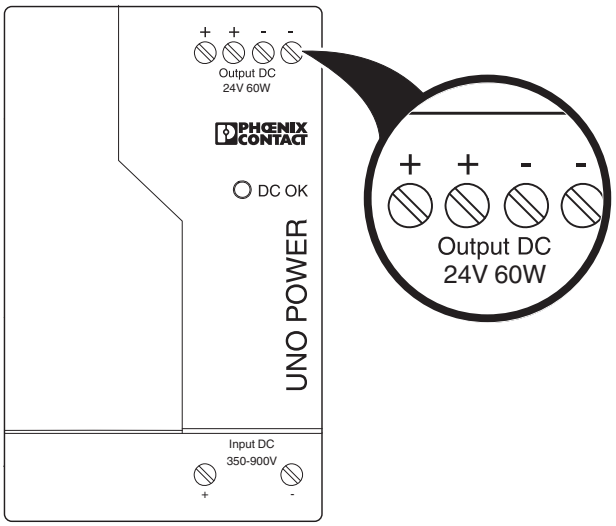


Figure 9 Screw connection for output DC +/-

8.3 Connecting cables

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

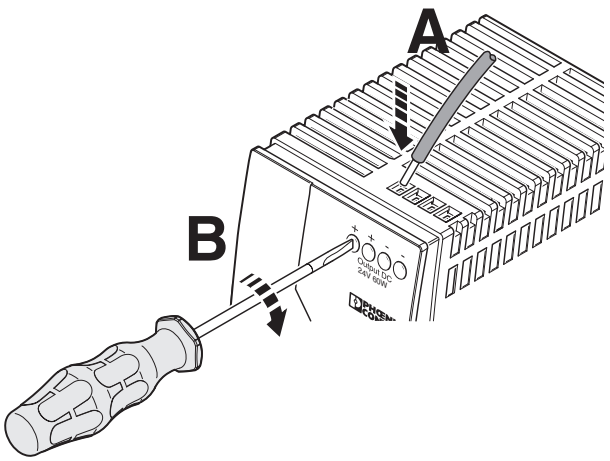


Figure 10 Connecting cables

1. Connect the supply lines to the input DC +/- screw connections.
2. Connect the output cables to the output DC +/- connection terminal blocks.

The DC/DC converter is operational as soon as the input terminal blocks are supplied with voltage.

9 Operating behavior of the DC/DC converter

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 DC/DC converter 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 DC/DC converter constantly limits the output current to I_N x 0.5. If the overload is rectified, the device continues running in nominal operation.

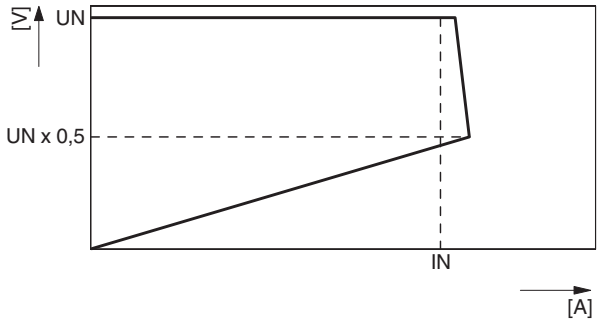


Figure 11 Output characteristic curve

9.3 Behavior at ambient temperatures > 55°C

At an ambient temperature of up to 55°C, the DC/DC converter 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).

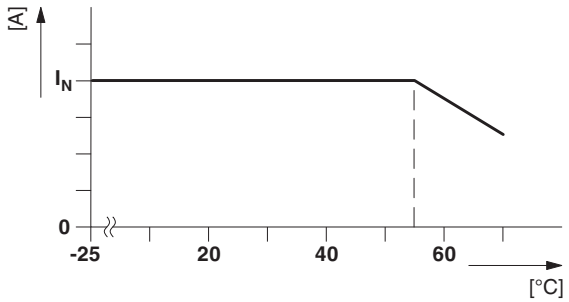


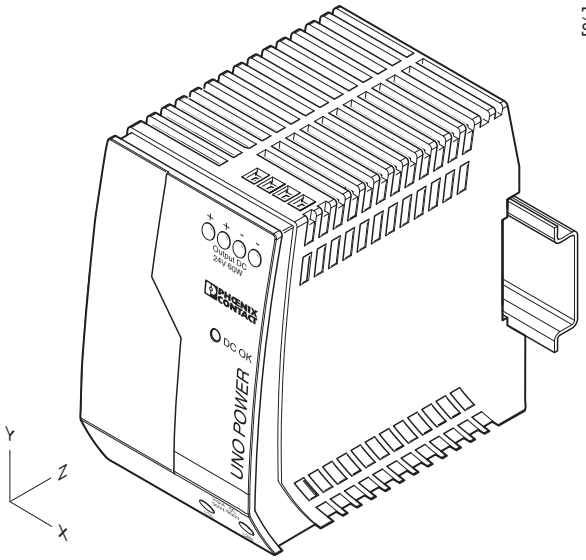
Figure 12 Temperature-dependent derating

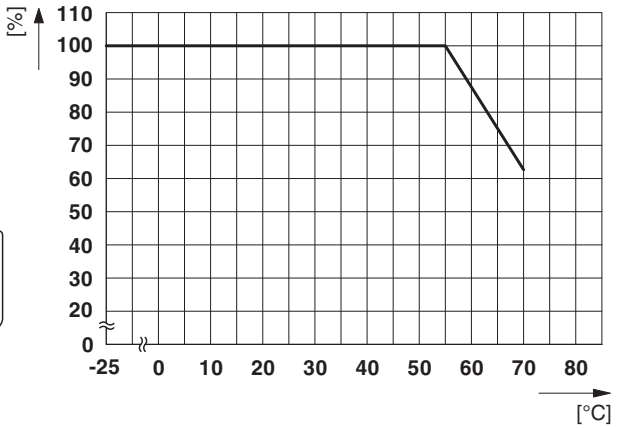
9.4 Behavior in the case of alternative mounting positions

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

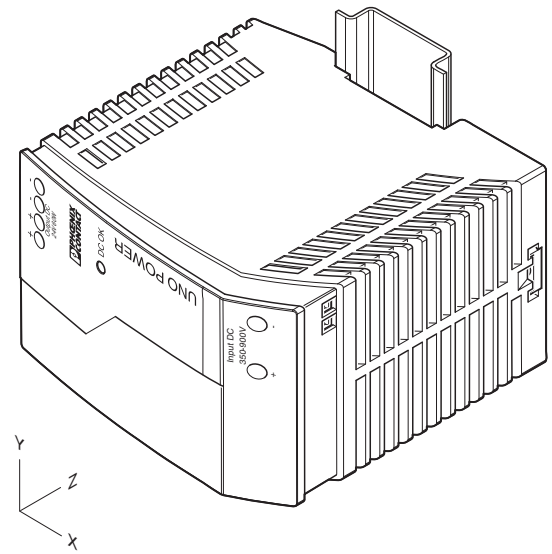
The characteristic curve can be used to determine the maximum output power to be drawn for each ambient temperature for different mounting positions.

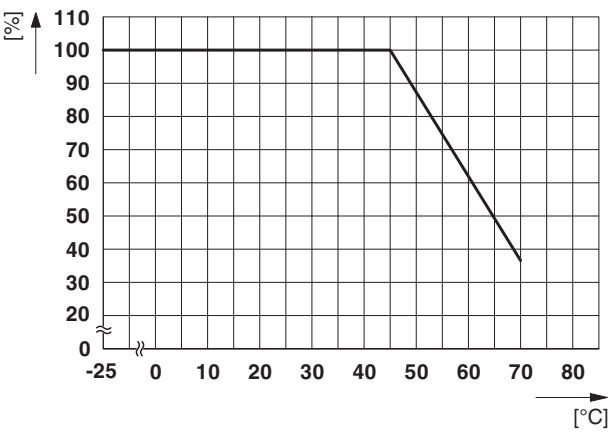
Normal mounting position



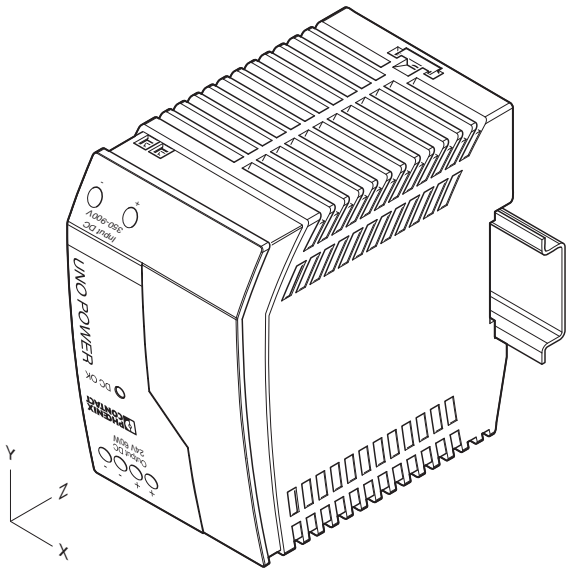


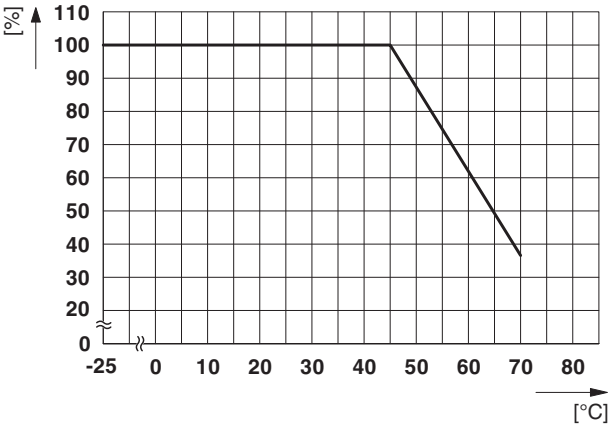
Rotated mounting position 90° X-axis



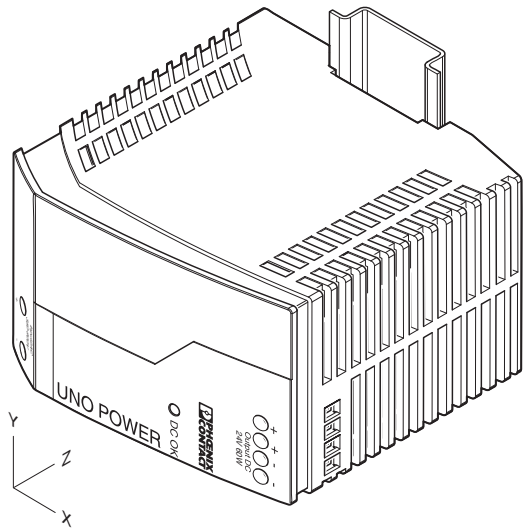


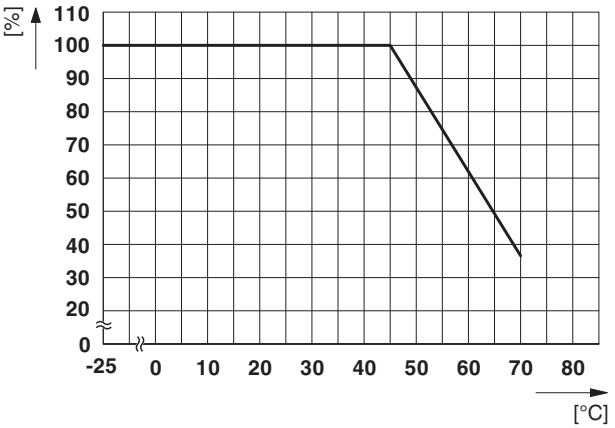
Rotated mounting position 180° X-axis



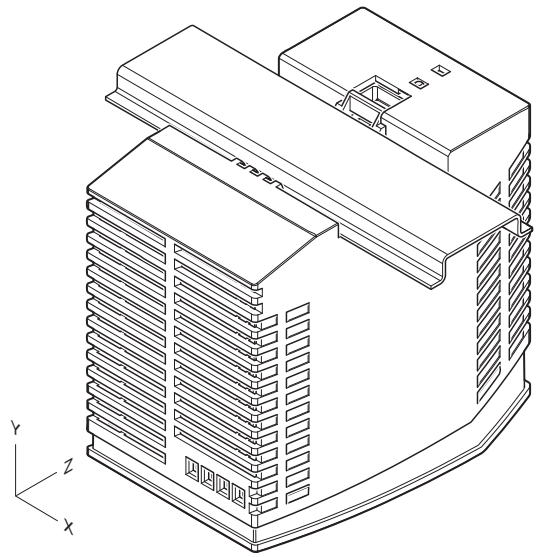


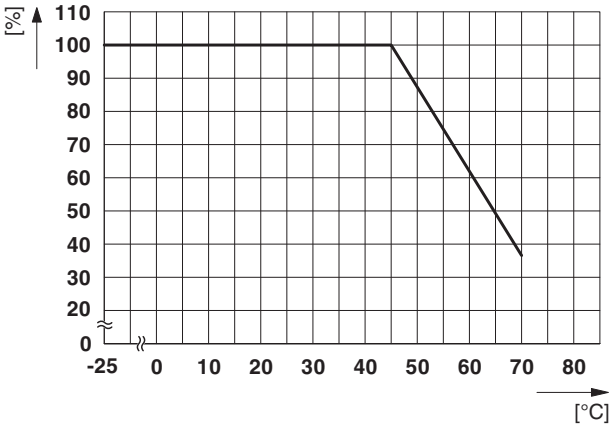
Rotated mounting position 270° X-axis



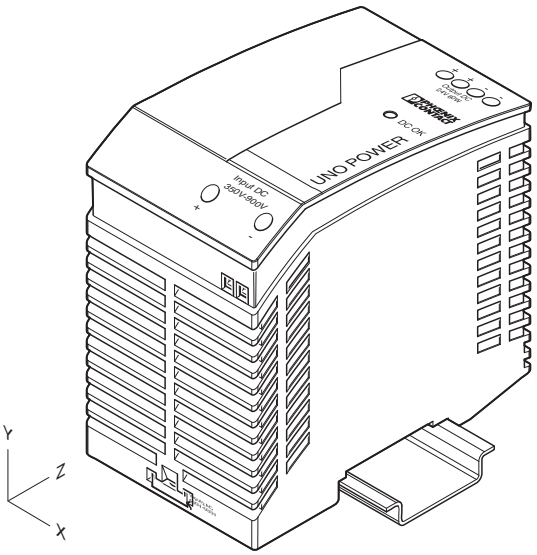


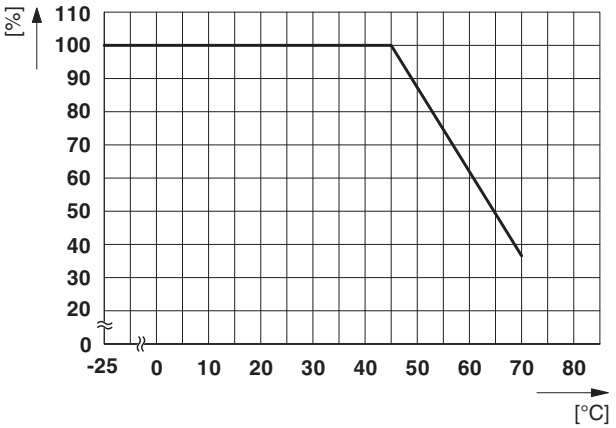
Rotated mounting position 90° Z-axis





Rotated mounting position 270° Z-axis





10 Operating the DC/DC converter

10.1 Function monitoring

DC OK LED

The DC OK LED is available for visual function monitoring of the DC/DC converter.

	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 DC/DC converter, connect a DC/DC converter of the same type parallel to the existing device, remove the short circuit, apply mains voltage, enable the fuse again or replace the DC/DC converter.

10.2 Parallel operation of DC/DC converters

DC/DC converters 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 DC/DC converter 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 reliability. If a fault occurs in the primary circuit of the first DC/DC converter, the second device automatically takes over the complete power supply without interruption, and vice versa.

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

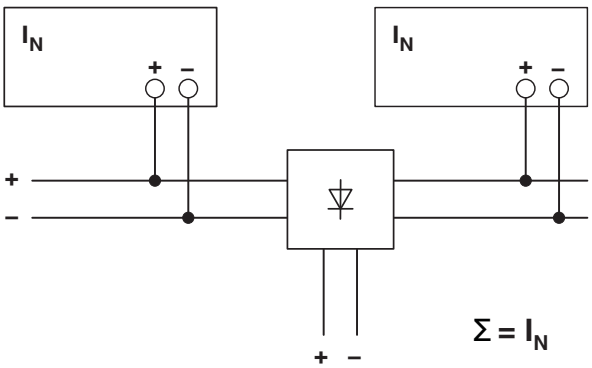


Figure 13 Redundant circuit with redundancy module

Increased performance

DC/DC converters 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 DC/DC converter 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 DC/DC converters of the same type that are connected in parallel on the output side for increased power to be decoupled from one another.

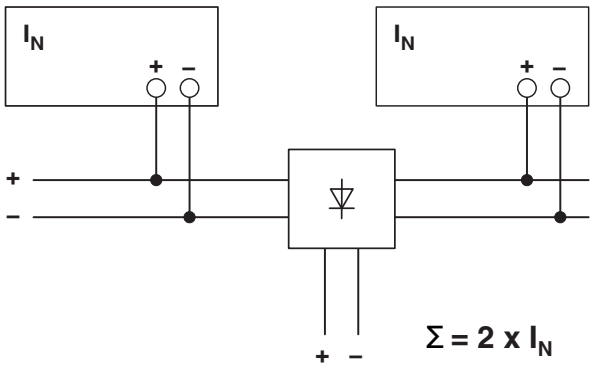


Figure 14 Parallel connection to increase power with a redundancy module

11 Removal

11.1 Removing the DC/DC converter

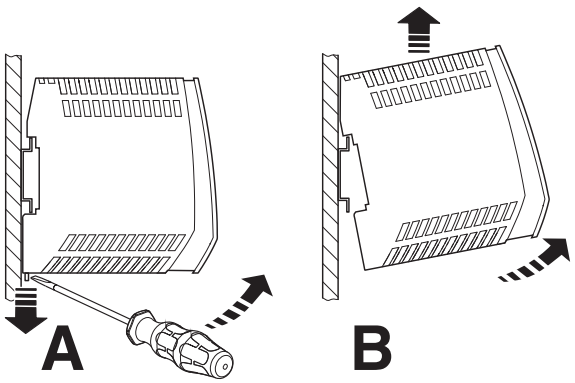


Figure 15 Removal

11.2 Notes on disposal

Do not dispose of the DC/DC converter with household waste. It should be disposed of in accordance with the currently applicable national regulations.