STEP-DIODE/5-24DC/2X5/1X10

Redundancy module



Data sheet
104970_en_00

© PHOENIX CONTACT 2014-12-17

1 Description

Using the 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 performance or for redundancy to be isolated from one another.

The reliability of a power supply determines the availability of individual components in a system and whether complex systems can function safely.

Redundant circuits are intended to supply systems that set high demands on operational reliability. Long-term, permanent system availability is ensured by the redundant setup of the power supply.

The power supply of a system can be configured redundantly by switching at least two power supply units in parallel. Together, they then supply the connected devices.

The power supply units involved must be dimensioned to enable the total current requirements of all loads to be covered by one single power supply unit. In the event of an internal device fault or failure of the mains power supply on the primary side, the other device automatically takes over the entire power supply of the loads without interruption.

This means that operational reliability of the entire system can be effectively increased.

Features

- Decoupling power supply units switched in parallel
- Load currents up to 10 A are possible
- Easy mounting by snapping onto the DIN rail or screwing onto the mounting surface

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 ... 7
6 Structure ... 7
6.1 Device elements ... 7
6.2 Block diagram ... 7
7 Assembly ... 8
7.1 Unpacking ... 8
7.2 Mounting the redundancy module ... 8
7.3 Mounting on a DIN rail ... 10
7.4 Wall mounting ... 10
7.5 Normal mounting position ... 10
7.6 Behavior in the case of alternative mounting positions ... 11
8 Install the redundancy module ... 14
8.1 Safety regulations and installation notes ... 14
8.2 Device connections ... 14
8.3 Connecting cables ... 15
9 Redundancy module in operation ... 16
9.1 Temperature-dependent derating ... 16
10 Removal ... 16
10.1 Uninstall the redundancy module ... 16
10.2 Notes on disposal ... 16

3 Ordering data

Description	Type	Order No.	Pcs. / Pkt.
Redundancy module, 5-24 V DC, 2x 5 A, 1x 10 A	STEP-DIODE/5-24DC/2X5/1X10	2868606	1

4 Technical data

Input data/output data	
Nominal input/output voltage	5 V DC ... 24 V DC
DC input / output voltage range	4.5 V DC ... 30 V DC
Voltage drop, input/output	0.5 V
Nominal current	2x 5 A (-25°C ... 55°C) 1x 10 A (-25°C ... 55°C)
Transient surge protection	Transil diode
Protection against polarity reversal	Yes , < 60 V
Derating	55 °C ... 70 °C (2.5%/K)
Power loss nominal load max.	2.5 W (I_{OUT} = 5 A)
Efficiency	> 97 %

General data	
Insulation voltage input, output / housing	500 V
MTBF (IEC 61709, SN 29500)	> 25822000 h (40°C)
Mounting position	horizontal DIN rail NS 35, EN 60715
Housing material	Plastic
Dimensions W/H/D	18 mm / 90 mm / 61 mm
Weight	0.1 kg

Security	
Degree of protection	IP20
Protection class	III

Input connection data	
Connection method	Screw connection
Conductor cross section, solid	0.2 mm² ... 2.5 mm²
Conductor cross section, stranded	0.2 mm² ... 2.5 mm²
Conductor cross section AWG/kcmil	24 ... 12
Stripping length	6.5 mm
Screw thread	M3
Tightening torque	0.6 Nm ... 0.8 Nm

Output connection data	
Connection method	Screw connection
Conductor cross section, solid	0.2 mm² ... 2.5 mm²
Conductor cross section, stranded	0.2 mm² ... 2.5 mm²
Conductor cross section AWG/kcmil	24 ... 12
Stripping length	6.5 mm
Screw thread	M3
Tightening torque	0.6 Nm ... 0.8 Nm

Ambient conditions

Ambient temperature (operation)	-25 °C ... 70 °C (> 55° 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)

Approvals

UL approvals	UL/C-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		
Contact discharge	4 kV (Test intensity 2)	4 kV (Test intensity 2)
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)	2 kV (Test intensity 3 - asymmetrical)
Output	2 kV (Test intensity 3 - asymmetrical)	2 kV (Test intensity 3 - asymmetrical)
Comments	Criterion B	Criterion B
Surge current loads (surge) EN 61000-4-5		
Input	0.5 kV (Test intensity 1 - asymmetrical) 0.5 kV (Test intensity 1 - symmetrical)	2 kV (Test intensity 3 - asymmetrical) 1 kV (Test intensity 2 - symmetrical)
Output	0.5 kV (Test intensity 1 - asymmetrical) 0.5 kV (Test intensity 1 - symmetrical)	2 kV (Test intensity 3 - asymmetrical) 1 kV (Test intensity 2 - symmetrical)
Comments	Criterion B	Criterion B
Conducted interference EN 61000-4-6		
Input/Output/Signal	asymmetrical	asymmetrical
Frequency range	150 kHz ... 80 MHz	150 kHz ... 80 MHz
Voltage	10 V (Test intensity 3)	10 V (Test intensity 3)
Comments	Criterion A	Criterion A

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

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

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 redundancy module features IP20 protection and is intended for installation in housing. It is suitable for use in industrial applications.

The technical specifications must be taken into consideration and observed.

6 Structure

6.1 Device elements

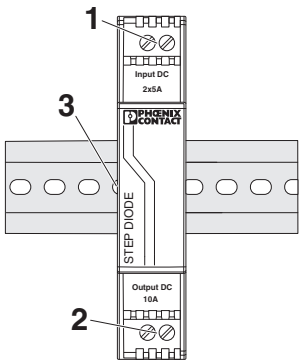


Figure 1 Device elements

1. DC input: Screw terminal blocks above
2. DC output: screw terminal blocks below
3. Universal snap-on foot: 35 mm DIN rail according to EN 60715

6.2 Block diagram

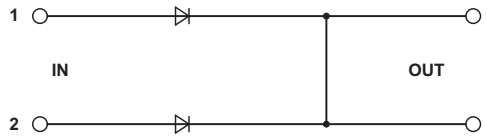


Figure 2 Block diagram

Element	Meaning
	Decoupling

7 Assembly

7.1 Unpacking

Before mounting the redundancy module, 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 redundancy module

The redundancy module is intended for installation in a distributor box or control cabinet.

The redundancy module is designed for convection cooling. A minimum distance from other devices must be maintained in order to ensure convection cooling.

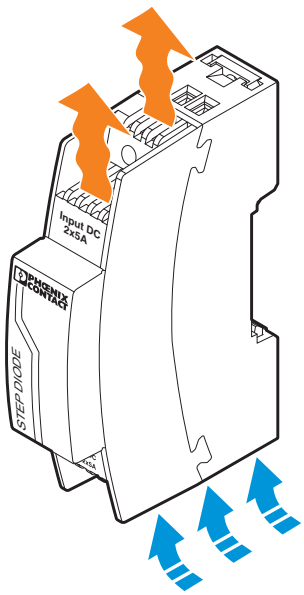
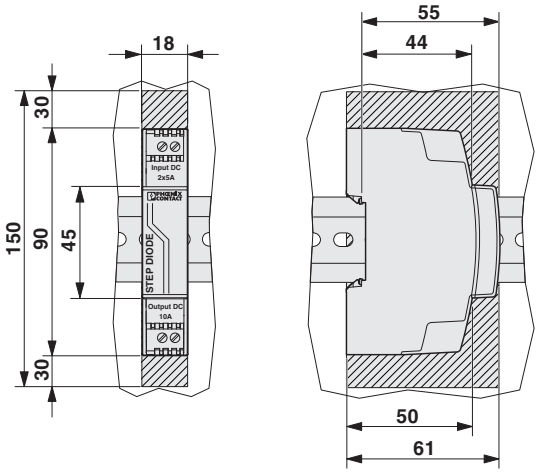


Figure 3 Convection

Prior to mounting the redundancy module:

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



– The device dimensions

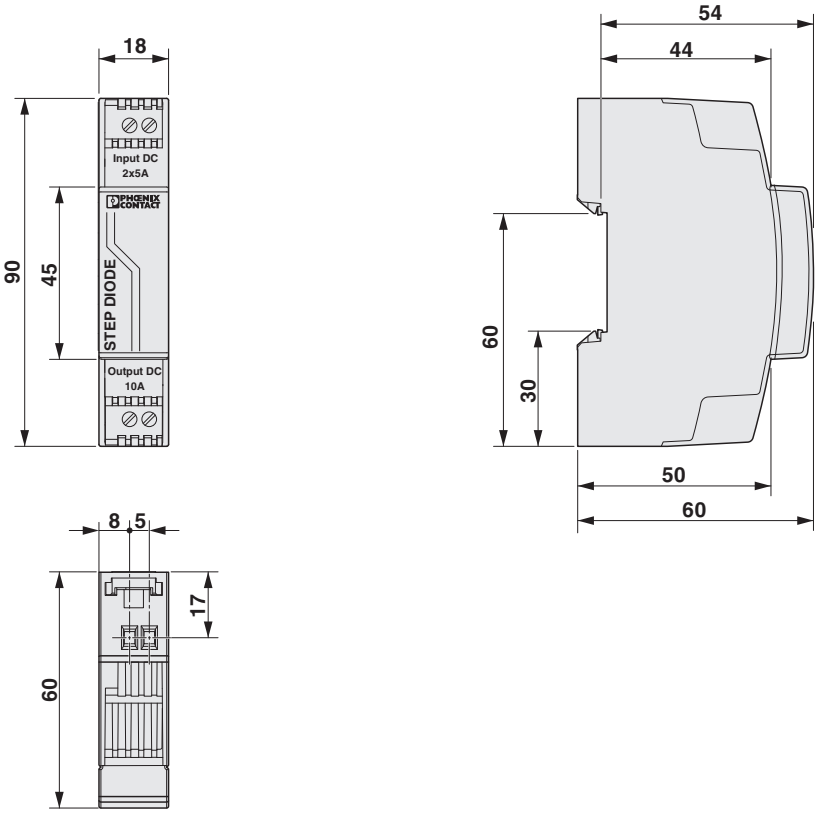


Figure 4 Device dimensions

7.3 Mounting on a DIN rail

The redundancy module can be installed on all 35 mm DIN rails according to EN 60175.

Snap the redundancy module directly onto the DIN rail.

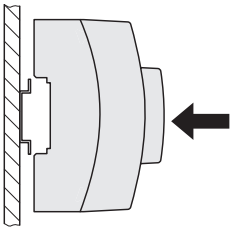


Figure 5 Mounting on a DIN rail

7.4 Wall mounting

If the redundancy module is to be fixed directly onto an even surface, press the orange base latch upward and down. Place a washer between the pulled out base latch and the even surface (maximum outside diameter of 8.5 m, maximum thickness of 1.3 mm, e.g.,spring washer for M4 according to DIN 127-B or toothed lock washer according to DIN 6797).

Then secure the device with two screws (maximum thread diameter of 4 mm, maximum head diameter of 8.5 mm).

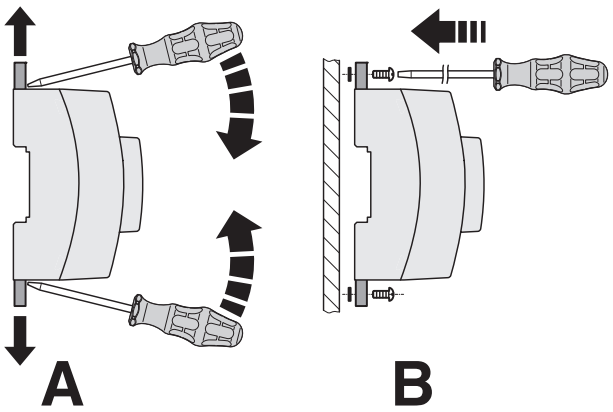


Figure 6 Wall mounting

7.5 Normal mounting position

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

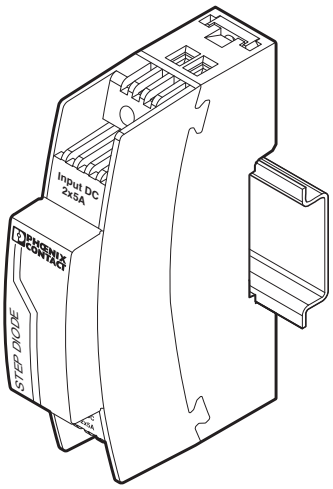


Figure 7 Normal mounting position

7.6 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 maximal output power to be drawn for each ambient temperature for different mounting positions.

Normal mounting position

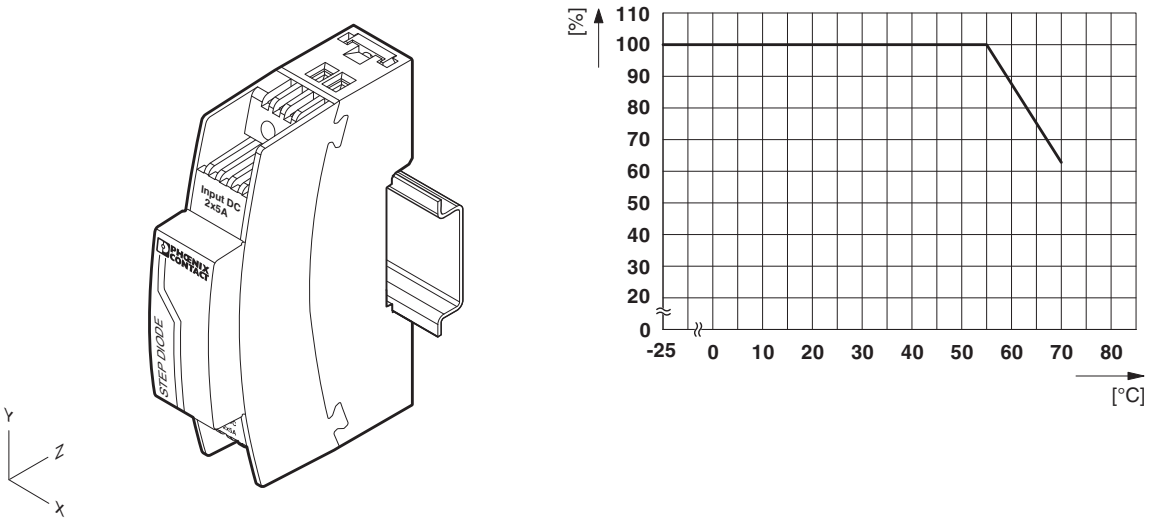


Figure 8 Normal mounting position

Rotated mounting position 90° X-axis

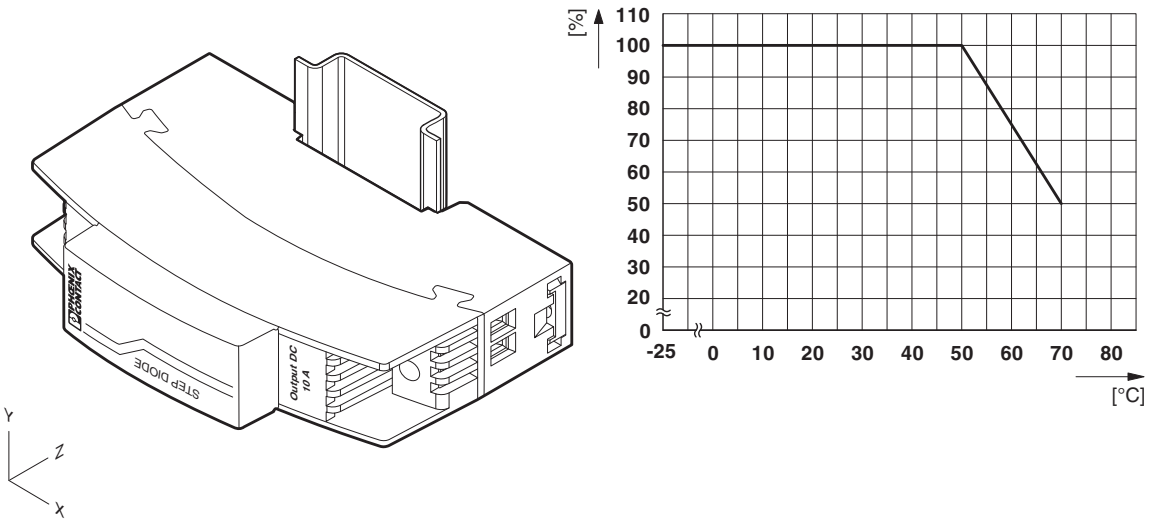


Figure 9 Rotated mounting position 90° X-axis

Rotated mounting position 180° X-axis

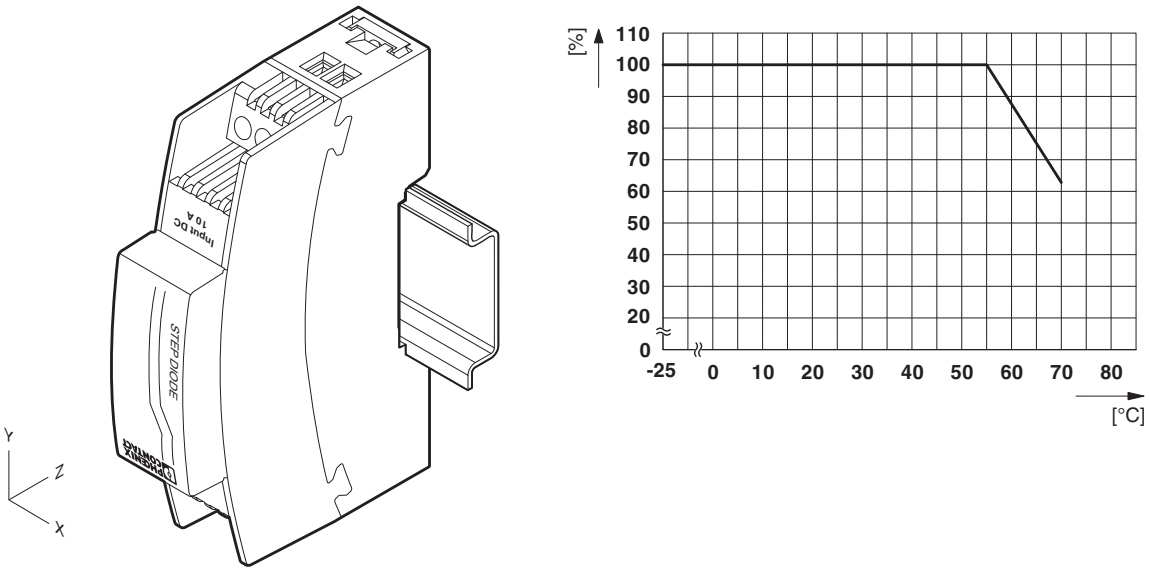


Figure 10 Rotated mounting position 180° X-axis

Rotated mounting position 270° X-axis

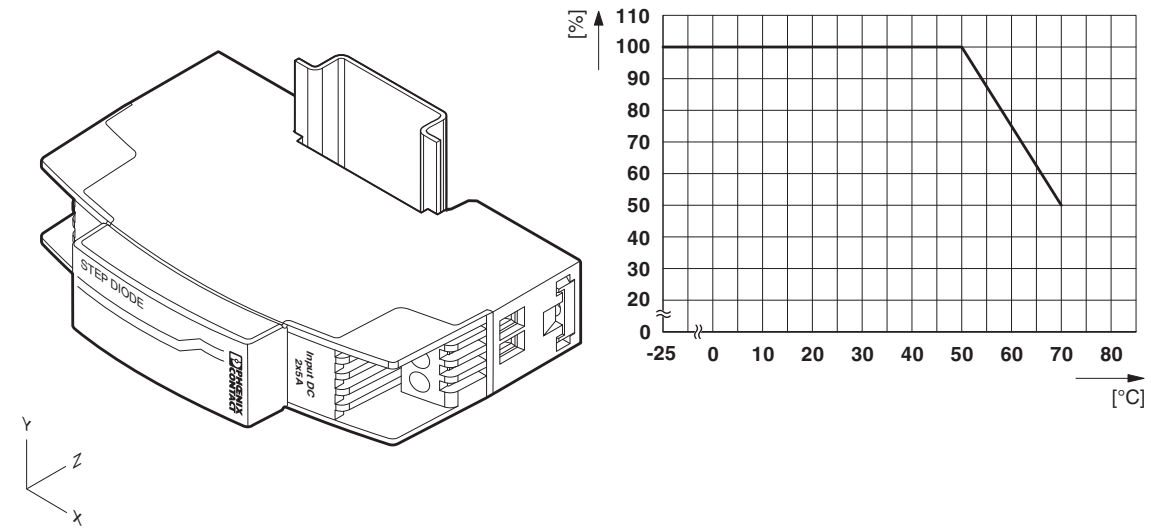


Figure 11 Rotated mounting position 270° X-axis

Rotated mounting position 90° Z-axis

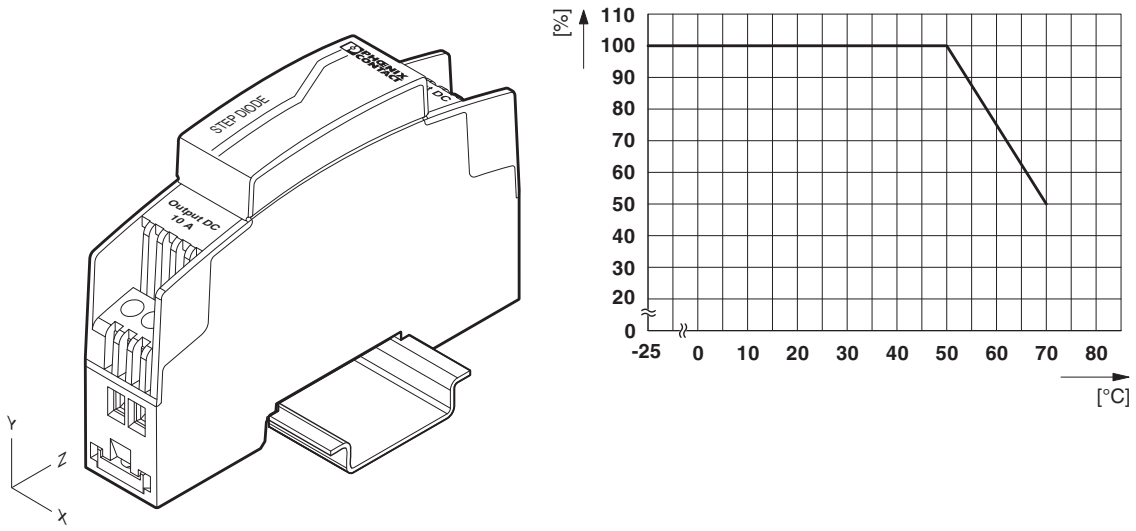


Figure 12 Rotated mounting position 90° Z-axis

Rotated mounting position 270° Z-axis

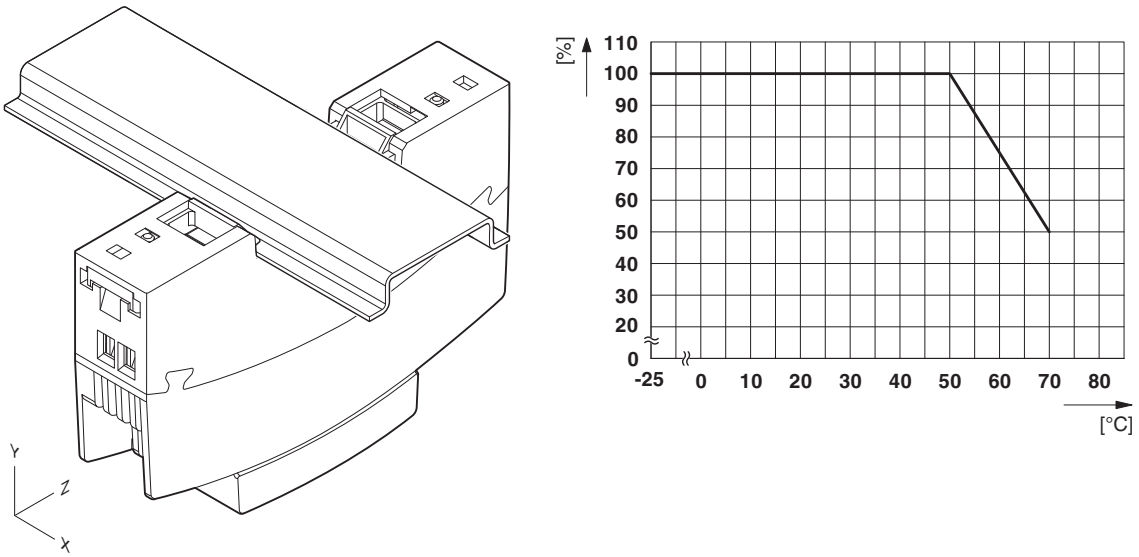


Figure 13 Rotated mounting position 270° Z-axis

8 Install the redundancy module

8.1 Safety regulations and installation notes

EXPLOSION HAZARD!

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

DANGER

Never carry out work when the power is turned on.

CAUTION:

Before startup please ensure:

The connection must be carried out by a competent person and protection against electric shock guaranteed.

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.

Observe mechanical and thermal limits.

The redundancy module is maintenance-free. Repairs may only be carried out by the manufacturer.

NOTE: Danger if used improperly

The redundancy module is a device installing into an enclosed space. Installation and start-up may only be carried out by qualified personnel. The relevant country-specific regulations must be observed.

8.2 Device connections

Screw connection for input DC

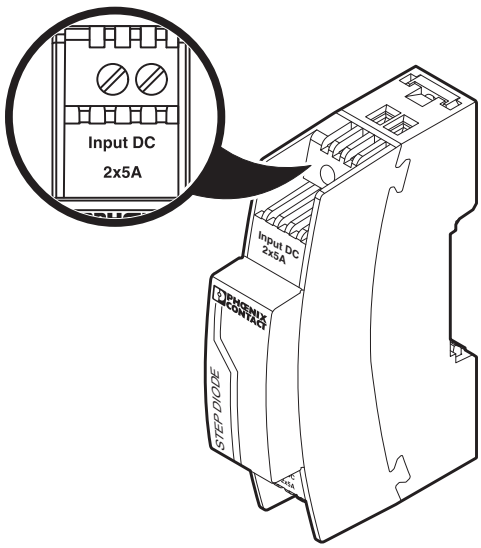


Figure 14 Screw connection for input DC

Screw connection for output DC

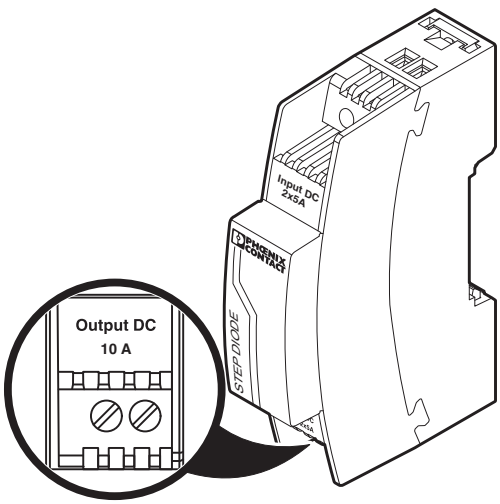


Figure 15 Screw connection for output DC

8.3 Connecting cables

Use two cables of the same length and the same cross section to connect the redundancy module to the power supply.

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

Use ferrules for flexible cables.

Input

To decouple two parallel connected power supplies 1 and 2 with nominal currents of up to 5 A, one redundancy module is needed.

1. Connect one input of the redundancy module to one power supply in each case.

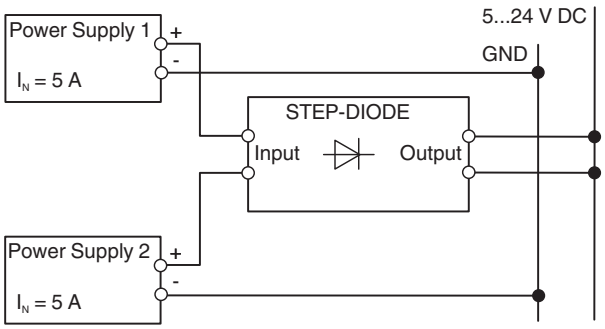


Figure 16 Decouple power supplies with nominal currents ≤ 5 A

One redundancy module per power supply is required to decouple power supplies with nominal currents from 5 A to 10 A.

1. For this purpose, connect the two inputs of one redundancy module to one power supply in each case.

This is necessary because the maximum current carrying capacity of 5 A per input must not be exceeded.

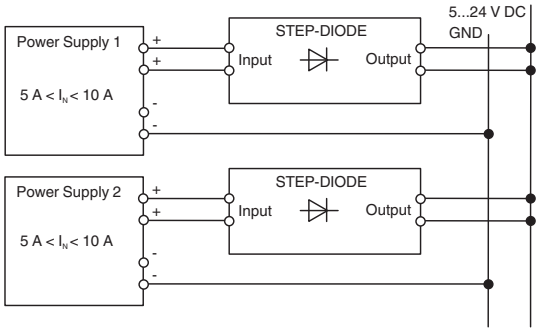


Figure 17 Decouple power supplies with nominal currents from 5 A to 10 A

Output

1. Wire the load with the plus terminals to the output of the redundancy module.

Close all unused clamping spaces.

9 Redundancy module in operation

WARNING: Risk of burns

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

The redundancy module is maintenance-free. Repairs may only be carried out by the manufacturer.

The warranty no longer applies if the housing is opened.

9.1 Temperature-dependent derating

In the horizontal mounting position, the redundancy module can carry permanent load currents up to a maximum of 2 x 5 A or 1 x 10 A at ambient temperatures of up to 55°C. Depending on the ambient temperature, the permissible current carrying capacity is reduced in the case of a conductor cross section of 2.5 mm^2.
A maximum of 2 x 3.5 A or 1 x 7 A can be permanently carried at an ambient temperature of 70°C.

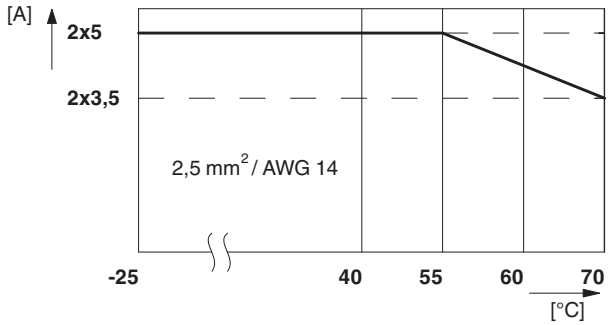


Figure 18 Temperature-dependent derating

10 Removal

10.1 Uninstall the redundancy module

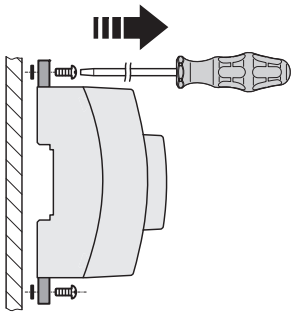


Figure 19 Removal

10.2 Notes on disposal

Do not dispose of the redundancy module with household waste. It should be disposed of in accordance with the currently applicable national regulations.