

# QUINT-PS/12DC/24DC/ 5

DC/DC converter with SFB technology, primary-switched, input: 12 V DC, output: 24 V DC, output current: 5 A



Data sheet  
105529\_en\_01

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## 1 Description

QUINT DC/DC converter – superior system availability from SFB technology

Compact DC/DC converters from the new QUINT POWER generation maximize your system availability. With SFB technology (Selective Fuse Breaking Technology), 6-fold nominal current for 12 ms, it is possible to trigger even standard circuit breakers reliably and quickly. Faulty current paths are switched off selectively, the fault is located, and important system parts remain in operation. Comprehensive diagnostics are provided through constant monitoring of the input voltage, output voltage and output current. Preventive function monitoring visualizes critical operating states and indicates them to the controller before errors can occur.

The application fields for DC/DC converters are numerous

- Changing the voltage level
- Refreshing the output voltage for constant voltage at the end of long cables
- Setup of independent supply systems by electrical isolation

### Features

- Wide-range voltage input
- Galvanic isolation
- Reverse polarity protection
- Preventive function monitoring
- Reliable starting of difficult loads with POWER BOOST static power reserve
- Fast tripping of standard circuit breakers with dynamic SFB technology power reserve
- High MTBF > 1,005,000 h (40°C)

### Flexible use

- Adjustable output voltage
- Can be used in Class I, Division 2, Groups A, B, C, D (Hazardous Location) ANSI-ISA 12.12



Make sure you always use the latest documentation.  
It can be downloaded from the product at [phoenixcontact.net/products](https://phoenixcontact.net/products).

<b>2</b>	<b>Table of contents</b>	
1	Description .....	1
2	Table of contents .....	2
3	Ordering data .....	3
4	Technical data .....	4
5	Safety regulations and installation notes.....	8
6	Basic circuit diagram .....	9
7	Structure.....	9
8	Installation .....	9
9	Dimensions and mounting positions .....	10
10	Mounting on DIN rails .....	11
	10.1 Normal mounting position .....	11
	10.2 Rotated mounting position (270° Y-axis).....	11
11	Input .....	11
	11.1 Protection of the primary side .....	11
12	Output.....	12
	12.1 Protection of the secondary side.....	12
13	Output characteristic curve .....	12
14	SFB technology .....	13
	14.1 Circuit breaker tripping characteristics .....	13
	14.2 Installation notes .....	13
	14.3 Deactivating SFB technology.....	13
15	Signaling.....	14
	15.1 Active switching output “DC OK” .....	14
	15.2 Active switching output “I < IN” .....	14
	15.3 Active switching output “UIN > 9.6 V” .....	14
16	Derating.....	15
	16.1 Temperature-dependent derating .....	15
	16.2 Voltage-dependent derating .....	15
	16.3 Position-dependent derating.....	16
17	Operating modes .....	19
	17.1 Series operation .....	19
	17.2 Parallel operation.....	19
	17.3 Redundant operation .....	19
	17.4 Increasing power .....	20

### 3 Ordering data

Description	Type	Order No.	Pcs./Pkt.
Primary-switched QUINT DC/DC converter for DIN rail mounting with SFB (Selective Fuse Breaking) Technology, input: 12 V DC, output: 24 V DC/5 A	QUINT-PS/12DC/24DC/ 5	2320131	1
<b>Accessories</b>			
Primary-switched QUINT POWER power supply for DIN rail mounting with SFB (Selective Fuse Breaking) Technology, input: 1-phase, output: 12 V DC/15 A	QUINT-PS/1AC/12DC/15	2866718	1
Primary-switched QUINT POWER power supply for DIN rail mounting with SFB (Selective Fuse Breaking) Technology, input: 1-phase, output: 12 V DC/20 A	QUINT-PS/1AC/12DC/20	2866721	1
Active QUINT redundancy module for DIN rail mounting with ACB technology (Active Current Balancing) and monitoring functions, input: 24 V DC, output: 24 V DC/2 x 10 A or 1 x 20 A, including mounted universal DIN rail adapter UTA 107/30	QUINT-ORING/24DC/2X10/1X20	2320173	1
Universal DIN rail adapter	UTA 107/30	2320089	100
Universal wall adapter	UWA 182/52	2938235	1
Thermomagnetic device circuit breaker, 1-pos., tripping characteristic SFB, 1 PDT contact, plug for base element.	CB TM1 1A SFB P	2800836	1
Assembly adapter for QUINT-PS... power supply on S7-300 rail	QUINT-PS-ADAPTERS7/1	2938196	1
Thermomagnetic device circuit breaker, 1-pos., tripping characteristic SFB, 1 PDT contact, plug for base element.	CB TM1 2A SFB P	2800837	1
Thermomagnetic device circuit breaker, 1-pos., tripping characteristic SFB, 1 PDT contact, plug for base element.	CB TM1 12A SFB P	2800844	1
Thermomagnetic device circuit breaker, 1-pos., tripping characteristic SFB, 1 PDT contact, plug for base element.	CB TM1 16A SFB P	2800845	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	12 V DC
Input voltage range	9 V DC ... 18 V DC
Current consumption	15 A (12 V, I <sub>BOOST</sub> )
Inrush current limitation	< 15 A (typical)
I <sup>2</sup> t	< 0.3 A <sup>2</sup> s
Power failure bypass	> 3 ms (12 V DC)
Protective circuit	Transient surge protection Varistor
Protection against polarity reversal	≤ 30 V DC
Input fuse, integrated	25 A (internal (device protection))
Output data	
Nominal output voltage	24 V DC ±1 %
Setting range of the output voltage	18 V DC ... 29.5 V DC (> 24 V DC, constant capacity restricted)
Output current	5 A (-25 °C ... 60 °C) 6.25 A (with POWER BOOST, -25°C ... 40°C permanently, U <sub>OUT</sub> = 24 V DC) 30 A (SFB technology, 12 ms)
Magnetic circuit breaker tripping	B2 / B4 / C2
Active current limitation	Approximately 6.9 A
Max. capacitive load	Unlimited
Control deviation	< 1 % (change in load, static 10 % ... 90 %) < 2 % (change in load, dynamic 10 % ... 90 %) < 0.1 % (change in input voltage ±10 %)
Efficiency	> 90 %
Rise time	< 2 ms (U <sub>OUT</sub> (10 % ... 90 %))
Residual ripple	< 75 mV <sub>PP</sub>
Peak switching voltages	< 10 mV <sub>PP</sub> (20 MHz)
Connection in parallel	Yes, for redundancy and increased capacity
Connection in series	Yes, 2 (Devices)
Protection against surge voltage on the output	< 35 V DC
Resistance to reverse feed	35 V DC
Power consumption	
Maximum power dissipation in no-load condition	2 W
Power loss nominal load max.	13.5 W
Status and diagnostic indicator DC OK active	
Active switching output	U <sub>OUT</sub> > 0.9 x U <sub>N</sub> : High signal
Voltage	18 V DC ... 24 V DC
Current	< 20 mA (short-circuit resistant)
Status display	"DC OK" LED green
Status and diagnostic indicator POWER BOOST, active	
Active switching output	I <sub>OUT</sub> < I <sub>N</sub> : High signal
Voltage	18 V DC ... 24 V DC
Current	< 20 mA (short-circuit resistant)
Status display	"BOOST" LED yellow/I <sub>OUT</sub> > I <sub>N</sub> : LED on

**Status and diagnostic indicator U<sub>IN</sub> OK, active**

Active switching output	U <sub>IN</sub> > 9.6 V: high signal
Voltage	18 V DC ... 24 V DC
Current	< 20 mA (short-circuit resistant)
Status display	LED "U <sub>IN</sub> < 9.6 V" yellow/U <sub>IN</sub> < 9.6 V DC: LED on

**General data**

Insulation voltage input/output	1.5 kV (type test) 1 kV (routine test)
MTBF (IEC 61709, SN 29500)	> 1005000 h (40°C)
Normal mounting position	horizontal DIN rail NS 35, EN 60715
Dimensions W/H/D (normal mounting position/delivered condition)	32 mm / 130 mm / 125 mm
Dimensions W / H / D (X-axis rotated 270°)	122 mm / 130 mm / 35 mm
Weight	0.7 kg

**Housing**

Degree of protection	IP20
Type of housing	Aluminum (AlMg3)
Hood version	Galvanized sheet steel, free from chrome (VI)

**Input connection data**

Connection method	Pluggable screw connection
Conductor cross section, solid	0.2 mm <sup>2</sup> ... 2.5 mm <sup>2</sup>
Conductor cross section, flexible	0.2 mm <sup>2</sup> ... 2.5 mm <sup>2</sup>
Conductor cross section AWG/kcmil	18 ... 12
Stripping length	8 mm
Screw thread	M3
Tightening torque	0.5 Nm ... 0.6 Nm

**Connection data, output/signals**

Connection method	Pluggable screw connection
Conductor cross section, solid	0.2 mm <sup>2</sup> ... 2.5 mm <sup>2</sup>
Conductor cross section, flexible	0.2 mm <sup>2</sup> ... 2.5 mm <sup>2</sup>
Conductor cross section AWG/kcmil	18 ... 12
Stripping length	7 mm
Screw thread	M3
Tightening torque	0.5 Nm ... 0.6 Nm

**Ambient conditions**


Protection class	III
Ambient temperature (operation)	-25 °C ... 70 °C (> 60 °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 in acc. with EN 50178	2
Climatic class	3K3 (in acc. with EN 60721)

**Standards**

Electrical Equipment for Machinery	EN 60204-1
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) EN 60204-1 (PELV)
Safe isolation / protection against electric shock	DIN VDE 0100-410

**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)
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 Current approvals/permissions for the product can be found in the download area under [phoenixcontact.net/products](http://phoenixcontact.net/products).

**Conformance with EMC Directive 2004/108/EC**

**Noise immunity according to EN 61000-6-2**

	EN 61000-6-2 requirement	Tested
<b>Electrostatic discharge EN 61000-4-2</b>		
Housing contact discharge	4 kV (Test Level 2)	8 kV (Test Level 4)
Housing air discharge	8 kV (Test Level 3)	15 kV (Test Level 4)
Comments	Criterion B	Criterion B
<b>Electromagnetic HF field EN 61000-4-3</b>		
Frequency range	80 MHz ... 1 GHz	80 MHz ... 1 GHz
Test field strength	10 V/m (Test Level 3)	20 V/m (Test Level 3)
Frequency range	1.4 GHz ... 2 GHz	1 GHz ... 2 GHz
Test field strength	3 V/m (Test Level 2)	10 V/m (Test Level 3)
Frequency range	2 GHz ... 2.7 GHz	2 GHz ... 3 GHz
Test field strength	1 V/m (Test Level 1)	10 V/m (Test Level 3)
Comments	Criterion A	Criterion A
<b>Fast transients (burst) EN 61000-4-4</b>		
Input	2 kV (Test Level 3 - asymmetrical)	2 kV (Test Level 3 - asymmetrical)
Output	2 kV (Test Level 3 - asymmetrical)	2 kV (Test Level 3 - asymmetrical)
Signal	1 kV (Test Level 3 - asymmetrical)	1 kV (Test Level 4 - asymmetrical)
Comments	Criterion B	Criterion B
<b>Surge current loads (surge) EN 61000-4-5</b>		
Input	0.5 kV (Installation class 1 - symmetrical) 0.5 kV (Test Level 1 - asymmetrical)	1 kV (Test Level 2 - symmetrical) 2 kV (Test Level 3 - 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)
Signal	1 kV (Test Level 2 - asymmetrical)	1 kV (Test Level 2 - asymmetrical)
Comments	Criterion B	Criterion B
<b>Conducted interference EN 61000-4-6</b>		
Input/Output/Signal	asymmetrical	asymmetrical
Frequency range	0.15 MHz ... 80 MHz	0.15 MHz ... 80 MHz
Voltage	10 V (Test Level 3)	10 V (Test Level 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



All technical specifications are nominal and refer to a room temperature of 25 °C and 70% relative humidity at 2000 m above sea level.

## 5 Safety regulations and installation notes



Before startup please ensure:

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



### NOTE: Danger if used improperly

- The device is a built-in device.
- The IP20 degree of protection (IEC 60529/EN 60529) of the device is intended for use in a clean and dry environment. Do not subject the device to any load that exceeds the described limits.
- Do not subject the device to mechanical and/or thermal loads that exceed the specified limits.
- Installation and startup may only be carried out by qualified personnel. The relevant country-specific regulations must be observed.
- It is not permissible to open or modify the device. Do not repair the device yourself but replace it with an equivalent device. Repairs may only be carried out by the manufacturer. The manufacturer is not liable for damage resulting from violation.



### CAUTION:

Before startup please ensure:

- Connection must be performed by specialist personnel and protection against electric shock ensured.
- It must be possible to switch off the device outside the power supply according to the regulations in EN 60950-1 (e.g., by line protection on the primary side).
- 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 is guaranteed!



### EXPLOSION HAZARD!

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

### DANGER

Never carry out work on live parts!  
The housing can become very hot, depending on the ambient temperature and load!



6 Basic circuit diagram

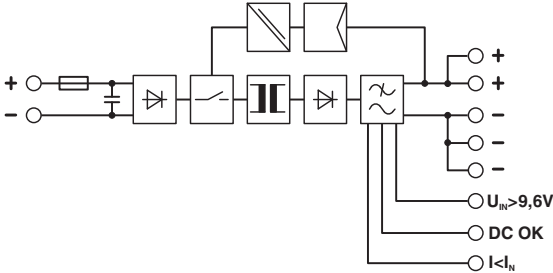


Figure 1 Block diagram

7 Structure

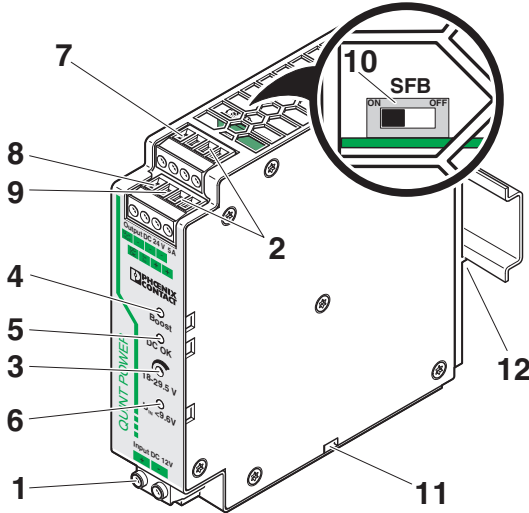


Figure 2 Function elements

- 1 DC input
- 2 DC output
- 3 Potentiometer 18 ... 29.5 V DC
- 4 LED "BOOST", yellow
- 5 "DC OK" LED, green
- 6 "U<sub>IN</sub> < 9.6 V" LED, yellow
- 7 U<sub>IN</sub> > 9.6 V, active switching output
- 8 DC OK, active switching output
- 9 I < I<sub>N</sub>, active switching output
- 10 SFB switch (left: SFB activated, right: SFB deactivated)
- 11 Strain relief for connecting cables
- 12 DIN rail adapter

8 Installation

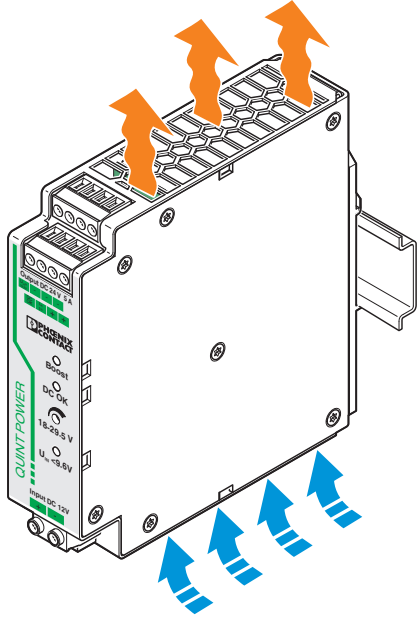


Figure 3 Convection



– To enable sufficient convection, we recommend a minimum vertical spacing of 50 mm from other devices. Lateral spacing of 5 mm, or 15 mm for active components, must be observed in order to ensure correct device function of the DC/DC converter.

– The housing can become very hot depending on the ambient temperature and load of the DC/DC converter.



The DC/DC converter can be snapped onto all DIN rails according to EN 60715 and should be mounted in the normal mounting position (connection terminal blocks on top and bottom).

### 9 Dimensions and mounting positions

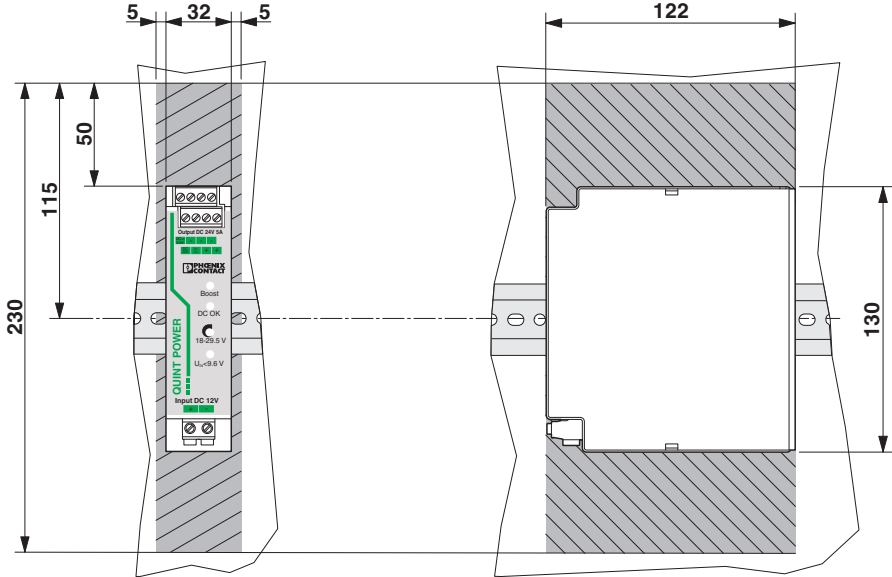


Figure 4 Dimensions

**Possible mounting positions:**

Normal mounting position, installation depth 125 mm (+ DIN rail) (delivery state)

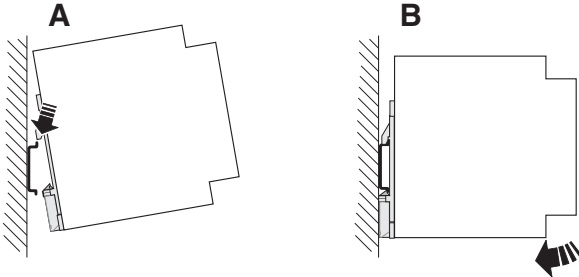
Rotated mounting position, 270° Y-axis, installation depth: 35 mm (+ DIN rail)

## 10 Mounting on DIN rails

### 10.1 Normal mounting position

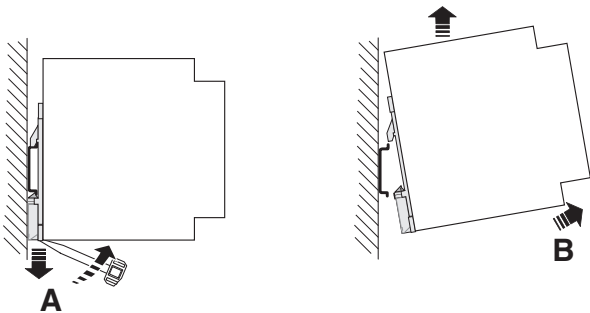
Assembly:

Position the DC/DC converter with the DIN rail guide on the top edge of the DIN rail and snap it in by pushing downward.



Removing:

Pull back the snap-on catch using a screwdriver and detach the DC/DC converter from the bottom edge of the DIN rail.



### 10.2 Rotated mounting position (270° Y-axis)

A rotated mounting position can be achieved for the DC/DC converter by mounting the device on the DIN rail at a 270° angle. Mount the DIN rail adapter (UTA 107/30) as shown in the figure. No additional mounting material is required. Mounting screws: Torx® T10 (0.8 Nm ... 0.9 Nm tightening torque).

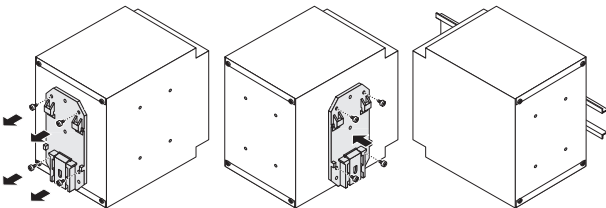


Figure 5 Rotated mounting position (270° Y-axis)



Other mounting positions are also possible. Always observe position-dependent derating.

## 11 Input

Connection to the input voltage is established via the screw connectors on the DC input screw connection.

The DC/DC converter converts a DC voltage of 9 ... 18 V into an adjustable, regulated, and electrically isolated output voltage.

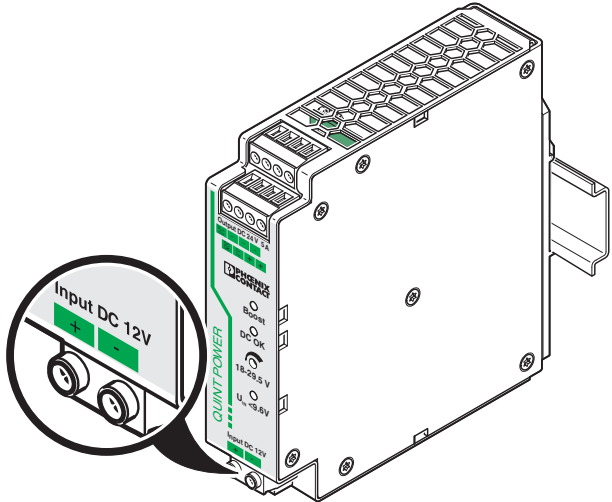


Figure 6 Input

### 11.1 Protection of the primary side

Installation of the DC/DC converter must correspond to EN 60950 regulations.

An internal fuse is provided for device protection. Additional device protection is not required.

The connecting cables on the primary side should have large cross sections to keep the voltage drops in the cables as low as possible.



**NOTE: Device may be damaged**

If an internal fuse trips, this is due to a device fault. In this case, the DC/DC converter must be inspected in the factory.

## 12 Output

Connection of the output voltage is established via the screw connectors on the DC output screw connection. The output voltage can be set on the potentiometer.

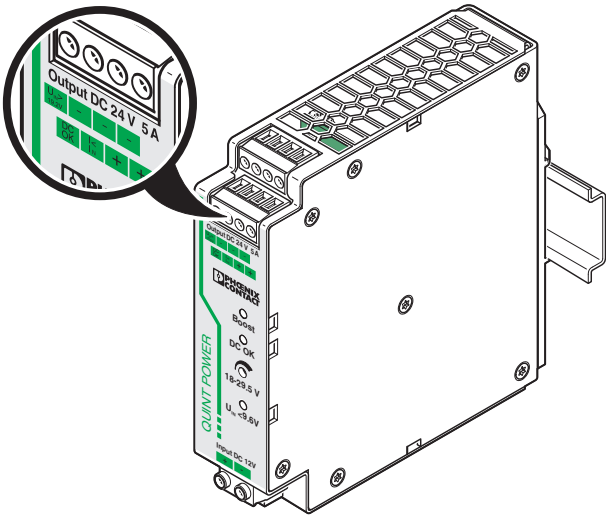


Figure 7 Output

### 12.1 Protection of the secondary side

The DC/DC converter is electronically short-circuit-proof and idling-proof. In the event of an error, the output voltage is limited. It must be ensured that all output cables are dimensioned accordingly for the maximum output current or have separate protection.

The connecting cables on the secondary side should have large cross sections to keep the voltage drops in the cables as low as possible.

## 13 Output characteristic curve

The DC/DC converter works with the POWER BOOST power reserve as shown in the U/I characteristic curve in the figure. At ambient temperatures < 40°C, I<sub>BOOST</sub> is permanently available. It is also available at higher temperatures for a few minutes.

In the event of a secondary-side short circuit or overload, the output current is limited to I<sub>BOOST</sub>. In this case, the DC/DC converter does not switch off but supplies output current continuously. The secondary voltage is then reduced until the short circuit is eliminated. The U/I characteristic curve with the POWER BOOST power reserve ensures that high inrush currents of capacitive loads in the primary circuit can be supplied reliably.

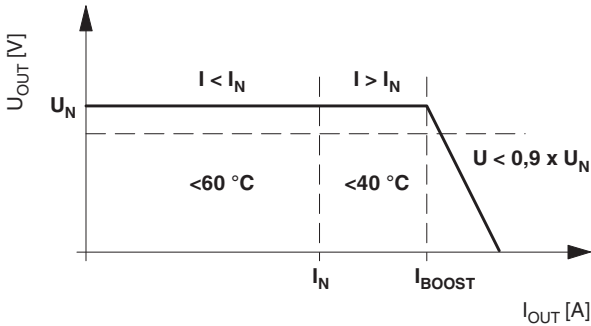


Figure 8 Output characteristic curve

- U<sub>N</sub> = 24 V
- I<sub>N</sub> = 5 A
- I<sub>BOOST</sub> = 6.25 A
- SFB Technology = 30 A (for 12 ms)
- P<sub>N</sub> = 120 W
- P<sub>BOOST</sub> = 150 W

## 14 SFB technology

SFB (Selective Fuse Breaking) technology reliably switches off faulty current paths in the event of a short circuit. In this case, it supplies up to six times the nominal current for 12 ms. SFB technology therefore reliably triggers standard circuit breakers. Faults are located reliably and important system parts remain in operation.

### 14.1 Circuit breaker tripping characteristics

Typically, a circuit breaker trips within 3 ... 5 ms. Fast enough to avoid voltage drops of parallel connected loads.

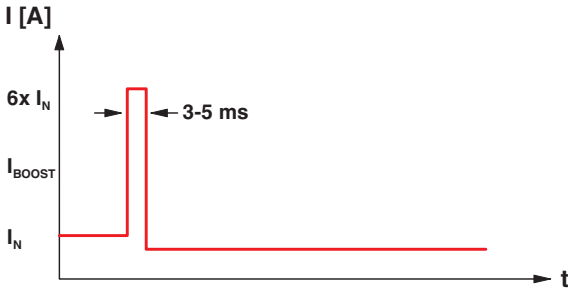


Figure 9 Quick tripping of circuit breakers with SFB technology

### 14.2 Installation notes

To use the SFB technology of the QUINT DC/DC converter, you must observe the following requirements:

- When designing the secondary side, consider the configuration matrix that describes the maximum cable lengths depending on the performance class of the DC/DC converters, the conductor cross section, and the circuit breaker.

**i** The current configuration matrix can be found in the product download area.

- Make sure that the source to be supplied is able to deliver a corresponding current pulse to supply the DC/DC converter. For example, this can be achieved by upstream connection of a QUINT SFB power supply (see accessories) or suitable battery capacity.
- Ensure the lowest possible cable impedance at the input of the DC/DC converter by using short cable lengths and large cable cross sections.

**i** Observe the maximum distance between the source to be supplied and the DC/DC converter.  
(see also SFB configuration)

**i** If conditions cannot be observed, SFB technology can be deactivated.

### 14.3 Deactivating SFB technology

The DC/DC converter is equipped with an additional SFB switch which can be used to deactivate SFB technology. The SFB switch is located on the top side of the housing and is accessible for suitable tools, such as a small screwdriver through the vents.

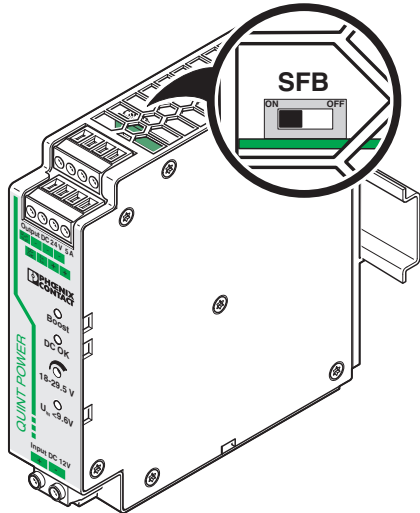


Figure 10 Position of the SFB switch

Switch position	SFB technology status
left	ON (default setting)
right	OFF

**i** Activating/deactivating SFB technology must only be performed when the DC/DC converter is switched off.

## 15 Signaling

The active DC OK signal output, the active POWER BOOST signal output, and the active  $U_{IN}$  OK signal output are available for function monitoring. In addition, the DC OK LED, BOOST LED, and  $U_{IN} < 9.6$  V LED enable function evaluation of the power supply directly at the installation location.

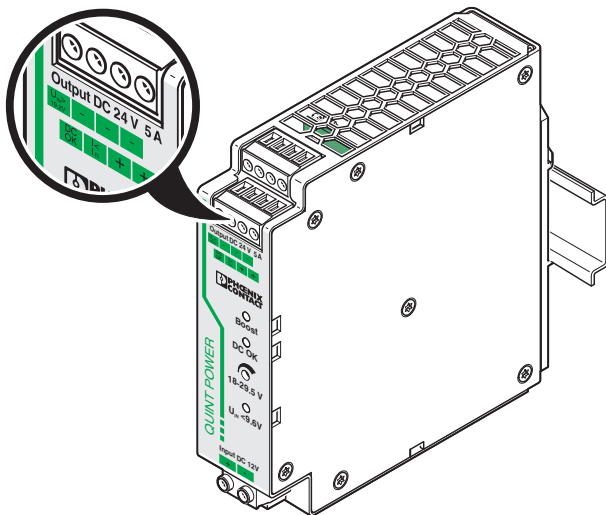


Figure 11 Signal outputs

Due to permanent monitoring of input voltage, output voltage and output current, critical operating states are reported before errors occur.

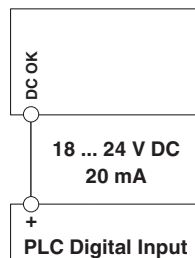
	$I < I_N$	$I > I_N$	$U < 0.9 \times U_N$
DC OK LED, green	lit	lit	Flashing
Boost LED, yellow	OFF	lit	lit
"DC OK" active switching output	high	high	low
" $I < I_N$ " active switching output	high	low	low
Meaning	Normal operation	POWER BOOST, active	Overload

	$U_{IN} > 9.6$ V DC	$U_{IN} < 9.6$ V DC
" $U_{IN} < 9.6$ V" LED, yellow	OFF	lit
Active switching output " $U_{IN} > 9.6$ V"	high	low
Meaning	$U_{IN}$ OK	$U_{IN}$ low

### 15.1 Active switching output "DC OK"

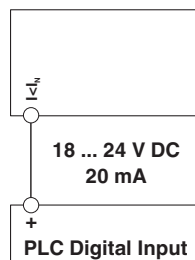
During normal operation of the DC/DC converter, the DC OK output signal ( $U_{OUT} > 0.9 \times U_N$ ) is between connection terminal blocks "DC OK" and "-" and can carry a maximum of 20 mA. The DC OK signal output indicates an output voltage underrange of more than 10 % by switching from "active high" to "low".

The DC OK signal is decoupled from the power output. This makes it impossible for devices connected in parallel to act as an external power supply.



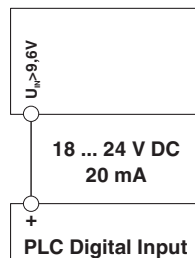
### 15.2 Active switching output " $I < I_N$ "

During normal operation of the DC/DC converter, the boost output signal ( $I < I_N$ ) is between connection terminal blocks " $I < I_N$ " and "-" and can carry a maximum of 20 mA. The boost signal output indicates that the nominal current has been exceeded and that boost mode has been entered by switching from "active high" to "low".



### 15.3 Active switching output " $U_{IN} > 9.6$ V"

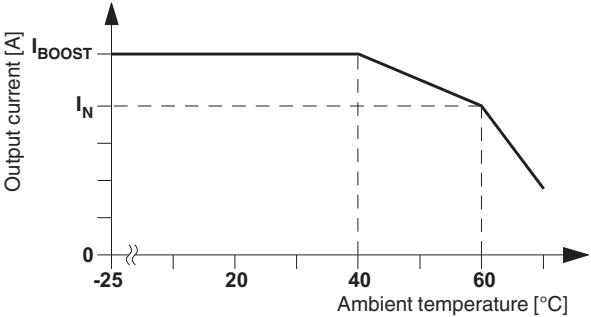
During normal operation of the DC/DC converter, the  $U_{IN} > 9.6$  V output signal is between connection terminal blocks " $U_{IN} > 9.6$  V" and "-" and can carry a maximum of 20 mA. The  $U_{IN} > 9.6$  V signal output indicates a low input voltage by switching from "active high" to "low".



## 16 Derating

### 16.1 Temperature-dependent derating

With an ambient temperature of up to +40°C, the device supplies the continuous output current of  $I_{BOOST}$ . The device can supply a nominal output current of  $I_N$  with ambient temperatures of up to +60°C. In the case of ambient temperatures above +60°C, the output current must be reduced by 2.5% per Kelvin increase in temperature. The device does not switch off at ambient temperatures of +70°C or thermal overload. The output capacity is reduced as far as necessary to provide device protection. After it has cooled down, the output capacity is increased again.



### 16.2 Voltage-dependent derating



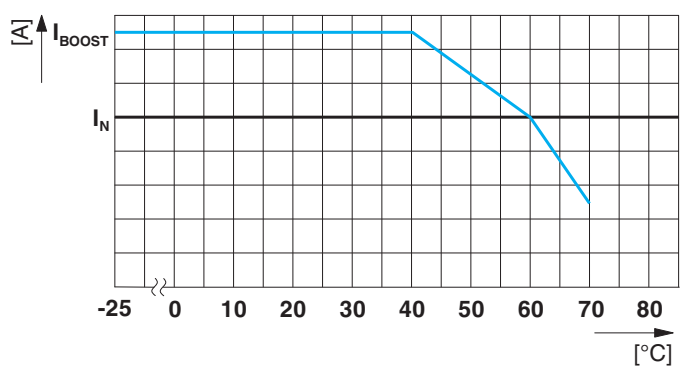
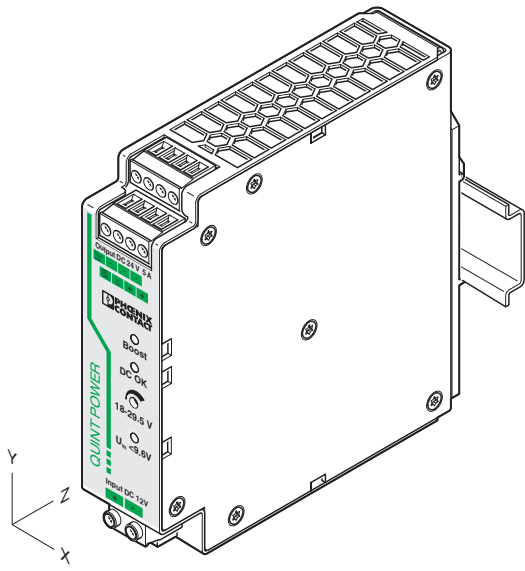
There is no voltage-dependent derating.

### 16.3 Position-dependent derating

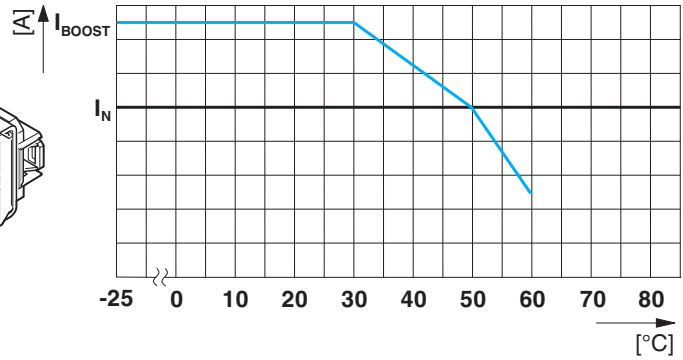
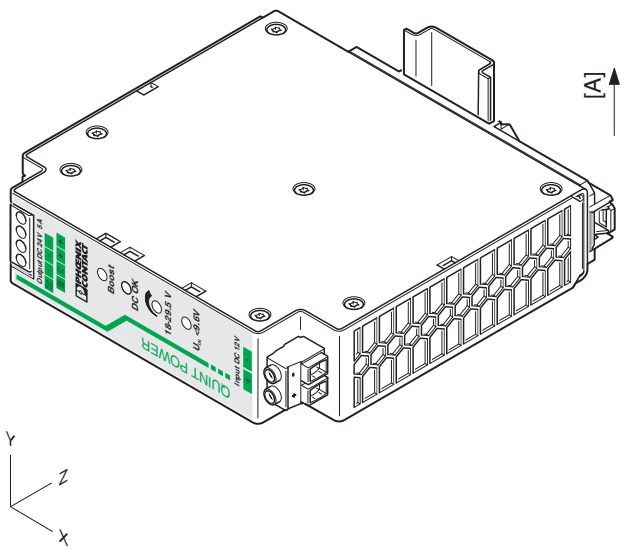
The DC/DC converters can be snapped onto all DIN rails according to EN 50022-35. They should be mounted horizontally (input terminal blocks on bottom). When installing in a different mounting position, derating should be observed.

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

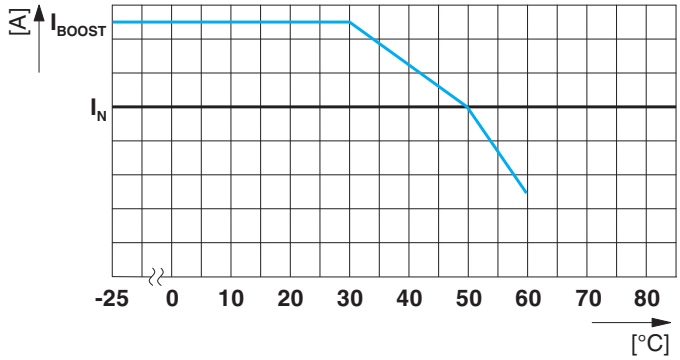
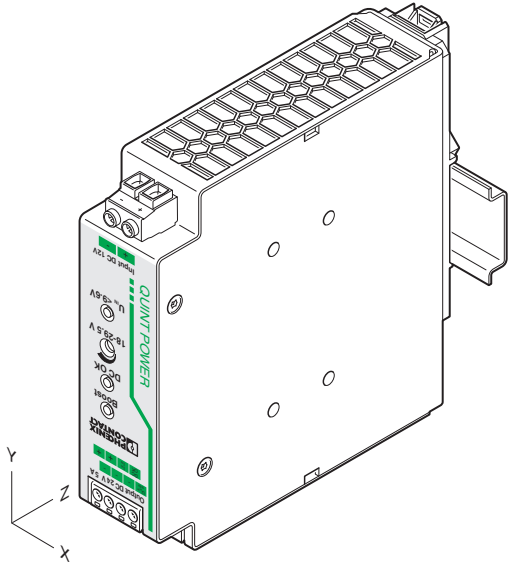


#### Rotated mounting position 90° X-axis

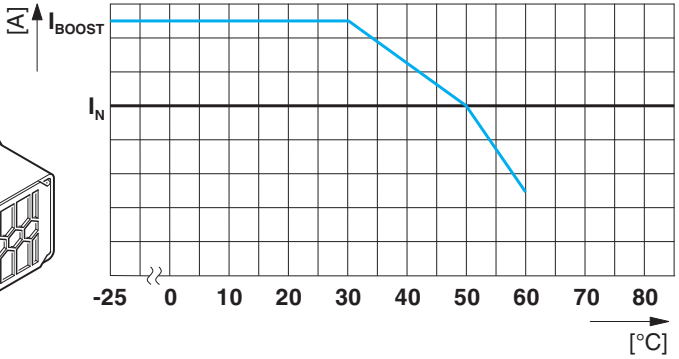
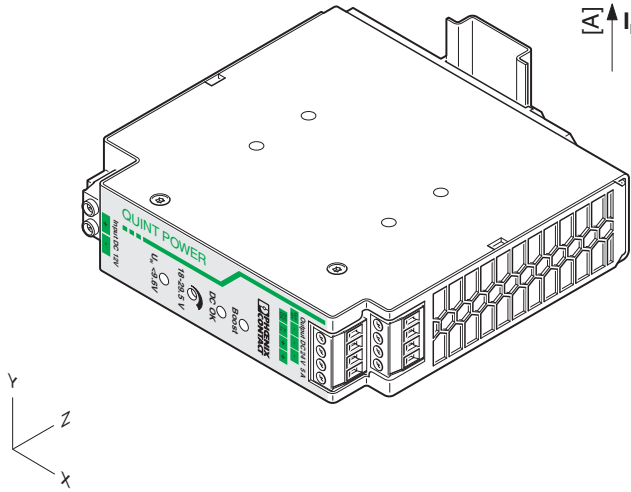




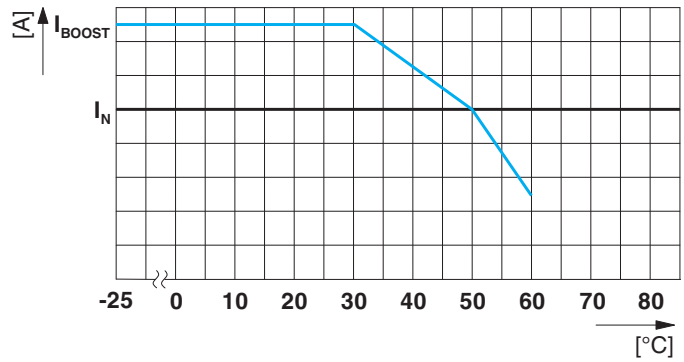
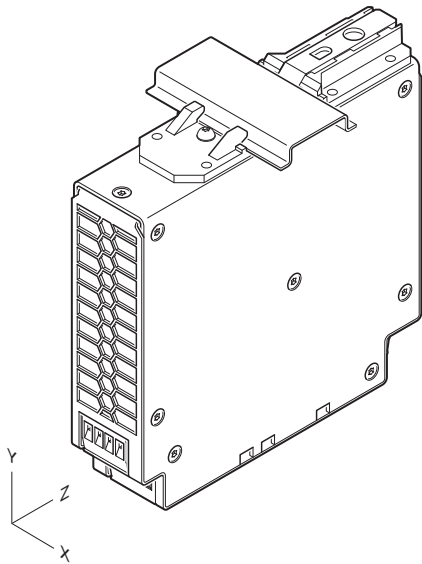
Rotated mounting position 180° X-axis



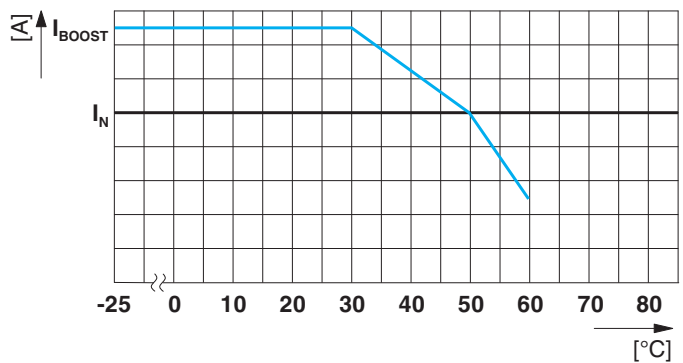
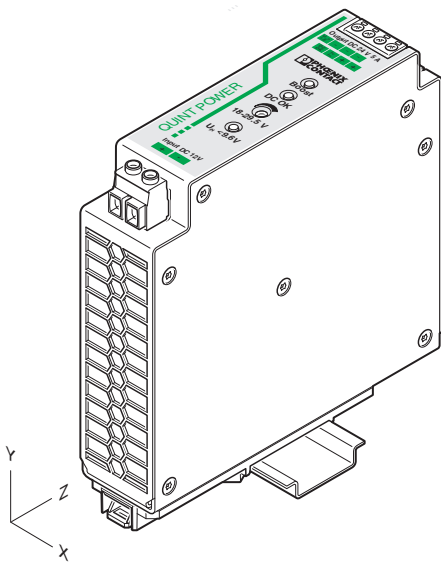
Rotated mounting position 270° X-axis



Rotated mounting position 90° Z-axis



Rotated mounting position 270° Z-axis



## 17 Operating modes

### 17.1 Series operation

Two DC/DC converters can be connected in series to double the voltage. Only devices of the same performance class should be connected in series. Series connection should always be used if the output voltage of the module is not sufficient. For example, DC/DC converters with 24 V DC nominal output voltage each supply 48 V DC in series. Depending on the specification of the PE connection, output voltages of +48 V or -48 V as well as  $\pm 24$  V DC can also be made available.

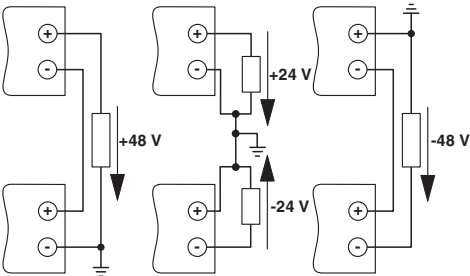
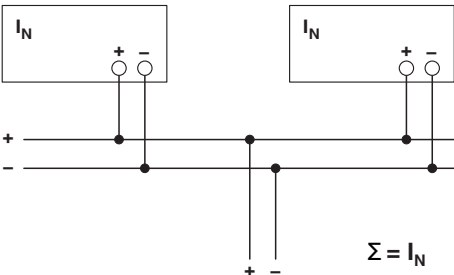


Figure 12 Series operation

### 17.2 Parallel operation

DC/DC converters of the same type can be connected in parallel to increase both redundancy and power. No further adjustments to the default setting are necessary. To ensure symmetrical load distribution, it is recommended that all cable connections from the DC/DC converters to the busbar are the same length and have the same conductor cross section. Depending on the system, a protective circuit should be installed at each individual device output (e.g. decoupling diode or DC fuse) for parallel connection of more than two DC/DC converters. This prevents high return currents in the event of a secondary device fault.

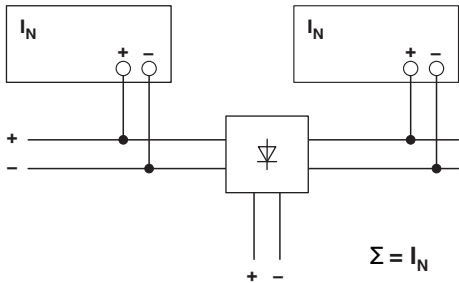


### 17.3 Redundant operation

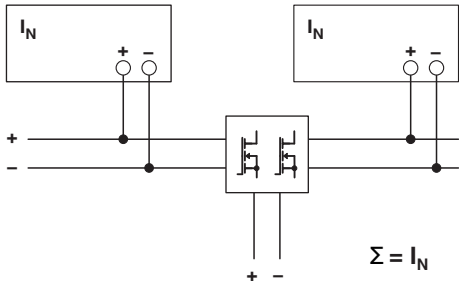
Redundant circuits are suitable for supplying systems, which place particularly high demands on operational safety. If a fault occurs in the primary circuit of the first power supply unit, the second device automatically takes over the complete power supply without interruption, and vice versa. For this purpose, the power supply units to be connected in parallel must be large enough to ensure 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!

Optimization of redundancy can be achieved by decoupling and monitoring. Phoenix Contact offers a comprehensive product range for this purpose (e. g., QUINT-DIODE or QUINT-ORING).

#### Example: diode module



#### Example: QUINT ORING



## 17.4 Increasing power

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 loads should be divided on individual devices independent from each other.

