QUINT4-S-ORING/12-24DC/1X40/VP

Redundancy module



Data sheet
108197_en_01

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1 Description

QUINT S-ORING is the active redundancy module from the QUINT POWER product range. The redundancy module can be used to 100% decouple power supplies.

Consistent redundancy

– Separate structure for redundant and monitored wiring of the power supply up to the load.

Preventive

– Comprehensive signaling by LED indicators and switch output.

Minimum power dissipation

– The use of MOSFETs enables a very small voltage drop and therefore low power dissipation.

Increased operational reliability

– OVP limits static surge voltages at the input to <30 V DC.

Technical data (short form)	
Input voltage range	8 V DC ... 27.5 V DC
Voltage drop, input/output	0.1 V DC
Output voltage	U_{In} - 0.1 V DC
Nominal output current (I_N) Static Boost ($I_{Stat.Boost}$) Dynamic Boost ($I_{Dyn.Boost}$) Selective Fuse Breaking (I_{SFB})	40 A 45 A 60 A (5 s) 215 A (15 ms)
Maximum power dissipation	6.5 W (I_{OUT} = 40 A)
Efficiency	typ. 99 % (12 V DC) typ. 99.2 % (24 V DC)
MTBF (IEC 61709, SN 29500)	> 7314000 h (40 °C)
Ambient temperature (operation)	-40 °C ... 70 °C > 60 °C Derating: 2.5 %/K
Dimensions W/H/D	32 mm / 130 mm / 125 mm
Weight	0.4 kg

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.

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3 Ordering data

Description	Type	Order No.	Pcs./Pkt.
Active QUINT single redundancy module for DIN rail mounting, protective coating, input: 12 - 24 V DC, output: 12 - 24 V DC/1 x 40 A, incl. mounted UTA 107/30 universal DIN rail adapter	QUINT4-S-ORING/12-24DC/1X40/VP	1043418	1

Accessories	Type	Order No.	Pcs./Pkt.
Universal wall adapter for securely mounting the power supply in the event of strong vibrations. The power supply is screwed directly onto the mounting surface. The universal wall adapter is attached at the top/bottom.	UWA 182/52	2938235	1
Universal DIN rail adapter	UTA 107/30	2320089	100
Assembly adapter for QUINT-PS... power supply on S7-300 rail	QUINT-PS-ADAPTERS7/1	2938196	1



The range of accessories is being continuously extended. The current range of accessories can be found in the download area for the product.

4 Technical data

Input data	
Unless otherwise stated, all data applies for 25°C ambient temperature, 24 V DC input voltage, and nominal output current (I_N).	
Nominal input voltage range	12 V DC ... 24 V DC
Input voltage range	8 V DC ... 27.5 V DC
Voltage drop, input/output typ.	0.1 V DC
Reverse polarity protection	< 60 V
Typical current consumption (for nominal values) Static Boost ($I_{Stat.Boost}$) Dynamic Boost ($I_{Dyn.Boost}$) Selective Fuse Breaking (I_{SFB})	40 A 45 A 60 A (5 s) 215 A (15 ms)
The SCCR value (short-circuit current rating) of the redundancy module corresponds to the SCCR value of the backup fuse (see input protection table).	

Input protection , DC (to be connected externally upstream if a current limiting source is not used)							
Input current I_{In} Input protection	**Circuit breaker**					**Neozed fuse or equivalent**	**Power switch**
Characteristics	**A**	**B**	**C**	**D**	**K**	**gG**	**≤ 13 x I_{In} (maximum magnetic tripping)**
20 A	-	✓	✓	-	-	✓	✓
25 A	-	✓	✓	-	-	✓	✓
32 A	✓	✓	✓	-	-	✓	✓
40 A	✓	✓	✓	-	-	-	✓

Electric strength of the insulation	
Type test (IEC/EN 60950-1)	0.5 kV AC
Production test	0.71 kV DC

Input connection data	
Connection method	Screw connection
Conductor cross section, solid	0.5 mm² ... 16 mm²
Conductor cross section, flexible	0.5 mm² ... 16 mm²
Conductor cross section flexible, with ferrule with plastic sleeve	0.5 mm² ... 16 mm²
Conductor cross section flexible, with ferrule without plastic sleeve	0.5 mm² ... 16 mm²
Conductor cross section AWG	20 ... 6
Stripping length	10 mm
Tightening torque	1.2 Nm ... 1.5 Nm

Output data	
Nominal output voltage (U_N)	U_{In} - 0.1 V DC
Nominal output current (I_N)	40 A
Static Boost ($I_{Stat.Boost}$)	45 A
Dynamic Boost ($I_{Dyn.Boost}$)	60 A (5 s)
Selective Fuse Breaking (I_{SFB})	215 A (15 ms)
Connection in series	No
Protection against surge voltage on the output	≤ 30 V DC

Output connection data	
Connection method	Screw connection
Conductor cross section, solid	0.5 mm² ... 16 mm²
Conductor cross section, flexible	0.5 mm² ... 16 mm²
Conductor cross section flexible, with ferrule with plastic sleeve	0.5 mm² ... 16 mm²
Conductor cross section flexible, with ferrule without plastic sleeve	0.5 mm² ... 16 mm²
Conductor cross section AWG	20 ... 6
Stripping length	10 mm
Tightening torque	1.2 Nm ... 1.5 Nm

LED signaling (Description)	Relay contact 13/14	Status
LED off, input voltage not present or short circuit at redundancy module output	open	U_{In} < 8 V DC
LED lights up green, input voltage present	closed	U_{In} > 8 V DC
LED flashing red, OVP active - input voltage exceeds the permissible voltage value	open	U_{In} > 30 V DC
LED lights up red, redundancy module needs to be factory tested	open	Redundancy modul faulty

For floating switch contact 13/14, observe the maximum contact load: 30 V AC/DC, 100 mA

Signal connection data	
Connection method	Push-in connection
Conductor cross section, solid	0.2 mm² ... 1.5 mm²
Conductor cross section, flexible	0.2 mm² ... 1.5 mm²
Conductor cross section flexible, with ferrule with plastic sleeve	0.2 mm² ... 0.75 mm²
Conductor cross section flexible, with ferrule without plastic sleeve	0.2 mm² ... 1.5 mm²
Conductor cross section AWG	24 ... 16
Stripping length	8 mm

Reliability	24 V DC
MTBF (IEC 61709, SN 29500)	> 13486000 h (25 °C) > 7314000 h (40 °C) > 3379000 h (60 °C)

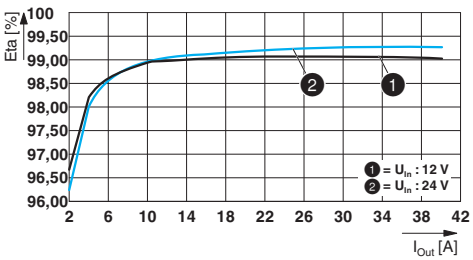
Life expectancy (electrolytic capacitors) Output current (I_{Out})	12 V DC	24 V DC
40 A	> 160000 h (40 °C)	> 149000 h (40 °C)

The expected service life is based on the capacitors used. If the capacitor specification is observed, the specified data will be ensured until the end of the stated service life. For runtimes beyond this time, error-free operation may be reduced. The specified service life of more than 15 years is simply a comparative value.

General data	
Degree of protection	IP20
Protection class	III
Inflammability class in acc. with UL 94 (housing / terminal blocks)	V0
Type of housing	Aluminum (AlMg3)
Hood version	Galvanized sheet steel, free from chrome (VI)
Dimensions W / H / D (state of delivery)	32 mm / 130 mm / 125 mm
Dimensions W / H / D (90° turned)	122 mm / 130 mm / 35 mm
Weight	0.4 kg

Power dissipation	12 V DC	24 V DC
Power loss nominal load max.	6.5 W	6 W

Efficiency	12 V DC	24 V DC
	typ. 99 %	typ. 99.2 %



Ambient conditions	
Ambient temperature (operation)	-40 °C ... 70 °C (> 60 °C Derating: 2.5 %/K)

The ambient temperature (operation) refers to UL 508 surrounding air temperature.

Ambient temperature (storage/transport)	-40 °C ... 85 °C
Max. permissible relative humidity (operation)	≤ 100 % (at 25 °C, non-condensing)
Installation height	≤ 5000 m (> 2000 m, observe derating)
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)

Standards	
Electrical safety (of information technology equipment)	EN 60950-1/VDE 0805 (SELV)
Electronic equipment for use in electrical power installations	EN 50178/VDE 0160 (PELV)
SELV	IEC 60950-1 (SELV) and EN 60204-1 (PELV)
Safe isolation	DIN VDE 0100-410
Protection against electric shock, basic requirements for safe isolation in electrical equipment	EN 50178

Approvals	
ATEX	Ⓔx II 3 G Ex nA nC IIC Gc SIQ 17 ATEX 020 U
IECEx	Ex nA nC IIC Gc IECEx SIQ 17.0006U
UL	UL/C-UL listed UL 508 UL/C-UL Recognized UL 60950-1 UL ANSI/ISA-12.12.01 Class I, Division 2, Groups A, B, C, D (Hazardous Location)

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

Electromagnetic compatibility		
Noise emission according to EN 61000-6-3 (residential and commercial) and EN 61000-6-4 (industrial)		
CE basic standard	**Minimum normative requirements**	**Higher requirements in practice (covered)**
Conducted noise emission EN 55016	EN 61000-6-4 (Class A)	EN 61000-6-3 (Class B)
Noise emission EN 55016	EN 61000-6-4 (Class A)	EN 61000-6-3 (Class B)

Noise emission for marine approval	**Minimum normative requirements of DNV GL**	**Higher requirements in practice of DNV GL (covered)**
DNV GL conducted noise emission	Class A Area power distribution	Class A Area power distribution
DNV GL noise radiation	Class A Area power distribution	Class B Bridge and deck area

Immunity according to EN 61000-6-1 (residential), EN 61000-6-2 (industrial), and EN 61000-6-5 (power station equipment zone)		
CE basic standard	**Minimum normative requirements of EN 61000-6-2 (CE) (immunity for industrial environments)**	**Higher requirements in practice (covered)**
Electrostatic discharge EN 61000-4-2		
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
Electromagnetic HF field EN 61000-4-3		
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 ... 6 GHz
Test field strength	3 V/m (Test Level 2)	10 V/m (Test Level 3)
Frequency range	2 GHz ... 2.7 GHz	1 GHz ... 6 GHz
Test field strength	1 V/m (Test Level 1)	10 V/m (Test Level 3)
Comments	Criterion B	Criterion A
Fast transients (burst) EN 61000-4-4		
Input	2 kV (Test Level 3 - asymmetrical)	2 kV (Test Level 4 - asymmetrical)
Output	2 kV (Test Level 3 - asymmetrical)	2 kV (Test Level 4 - asymmetrical)
Signal	2 kV (Test Level 3 - asymmetrical)	2 kV (Test Level 4 - asymmetrical)
Comments	Criterion B	Criterion A

Immunity according to EN 61000-6-1 (residential), EN 61000-6-2 (industrial), and EN 61000-6-5 (power station equipment zone)		
CE basic standard	**Minimum normative requirements of EN 61000-6-2 (CE) (immunity for industrial environments)**	**Higher requirements in practice (covered)**
Surge voltage load (surge) EN 61000-4-5		
Input	1 kV (Test Level 3 - symmetrical) 2 kV (Test Level 3 - asymmetrical)	1 kV (Test Level 4 - symmetrical) 2 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)
Signal	0.5 kV (Test Level 1 - asymmetrical)	1 kV (Test Level 2 - asymmetrical)
Comments	Criterion B	Criterion A
Conducted interference EN 61000-4-6		
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
Power frequency magnetic field EN 61000-4-8		
	50 Hz , 60 Hz (30 A/m)	16.67 Hz , 50 Hz , 60 Hz (30 A/m 60 s)
	not required	
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.

5 Safety and installation notes

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

Check the device for damage before startup.



CAUTION: Before startup, observe the following

Preferably mount the redundancy module in the normal mounting position.

Make sure that the redundancy module wiring on the primary side and the secondary side is adequately dimensioned and protected.

The redundancy module is a built-in device. The IP20 degree of protection of the redundancy module is intended for use in a clean and dry environment. The redundancy module is mounted in a control cabinet.

For the connection parameters for wiring the redundancy module, such as the required stripping length with and without ferrule, refer to the technical data section.

To avoid accidental contact with live parts, always cover the termination area (e.g., installation in the control cabinet).



The redundancy module does not require maintenance. Repairs may only be carried out by the manufacturer. Opening the housing invalidates the warranty.



CAUTION: Hot surface

The housing can become hot, depending on the ambient temperature and redundancy module load.



The redundancy module may only be used for its intended use.

6 High-voltage test (HIPOT)

This protection class III redundancy module is subject to the Low Voltage Directive and is factory tested. During the HIPOT test (high-voltage test), the insulation between the input and output circuit and the housing is tested for the prescribed electric strength values, for example. The test voltage in the high-voltage range is applied at the input, output, and signal terminal blocks of the redundancy module. The operating voltage used in normal operation is considerably lower than the test voltage used.

High-voltage tests up to 0.71 kV DC can be performed as described.

The test voltage should rise and fall in ramp form. The relevant rise and fall time of the ramp should be at least two seconds.

6.1 High-voltage dielectric test (dielectric strength test)

In order to ensure permanent safe isolation from the housing, high-voltage testing is performed as part of the safety approval process (type test) and manufacturing (routine test).

6.2 High-voltage dielectric test during the manufacturing process

During the manufacturing process for the redundancy module, a high-voltage test is performed as part of the dielectric test in accordance with the specifications of IEC/UL/EN 60950-1. The high-voltage test is performed with a test voltage of at least 0.71 kV DC or higher. Routine manufacturing tests are inspected regularly by a certification authority.

6.3 High-voltage dielectric test performed by the customer

Apart from routine and type tests to guarantee electrical safety, the end user does not have to perform another high-voltage test on the redundancy module as an individual component. As per EN 60204-1 (Safety of machinery - Electrical equipment of machines), the redundancy module can be disconnected during the high-voltage test and only installed once the high-voltage test has been completed.

6.3.1 Performing high-voltage testing

If high-voltage testing of the control cabinet or the redundancy module as an individual component is planned during final inspection and testing, the following features must be observed.

- The redundancy module wiring must be implemented as shown in the wiring diagram.
- The maximum permissible test voltages must not be exceeded.

Avoid unnecessary loading or damage to the redundancy module due to excessive test voltages.

For the relevant applicable test voltages, refer to the corresponding table (see technical data: electric strength of the insulation section).

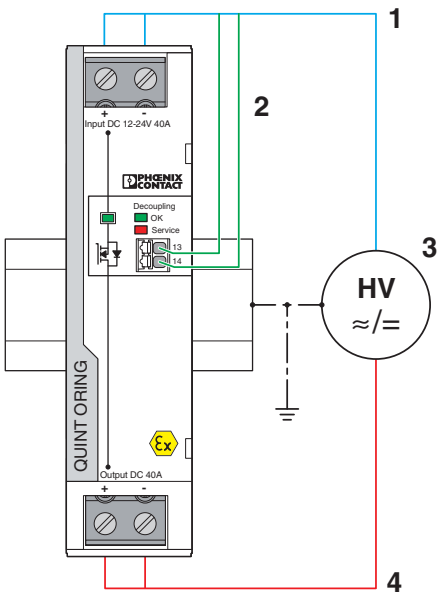


Figure 1 Potential-related wiring for the high-voltage test

Key

No.	Designation	Color coding	Potential levels
1	DC input circuit	Blue	Potential 1
2	Signal contacts	Green (optional)	Potential 2
3	High-voltage tester	--	--
4	DC output circuit	Red	Potential 3

7 Structure of the redundancy module

The convection-cooled active redundancy module can be snapped onto all DIN rails according to EN 60715.

7.1 Function elements

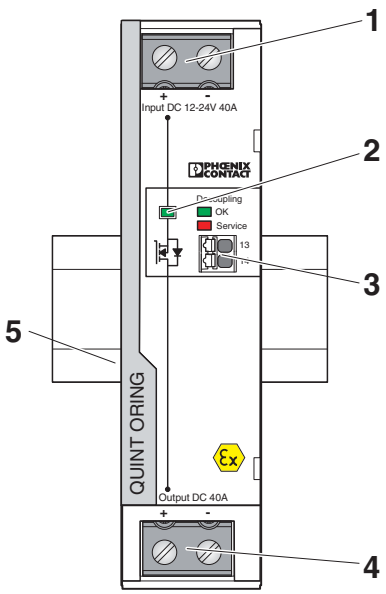


Figure 2 Operating and indication elements

Key

No.	Designation
1	DC input voltage connection terminal blocks
2	DC input voltage LED status indicators, Decoupling OK/Service
3	13/14 floating switch contact (N/O contact)
4	DC output voltage connection terminal blocks
5	Universal DIN rail adapter (rear of housing)

7.2 Device dimensions

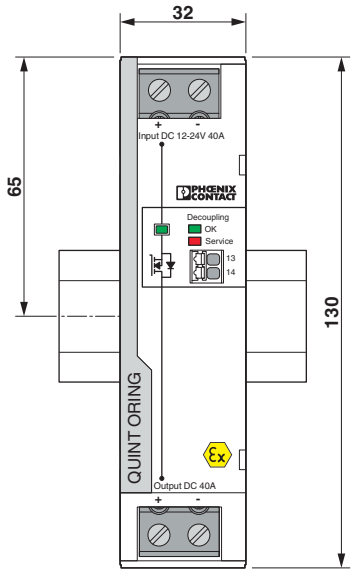


Figure 3 Device dimensions (dimensions in mm)

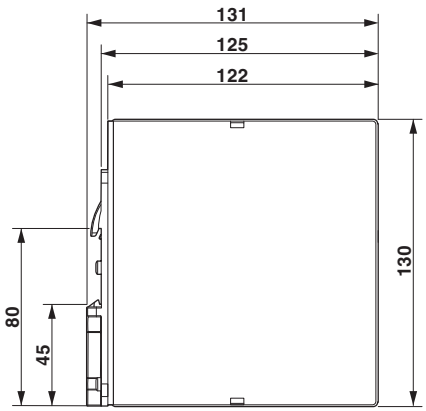


Figure 4 Device dimensions (dimensions in mm)

7.3 Keep-out areas

The required keep-out areas for mounting vary depending on the application and ambient conditions.

Output power of the power supply	Ambient temperature	Spacing [mm]		
		a	b	c
0 ... 50 %	-25 ... 70 °C	0	40	20
≥50 % ... 125 %	-25 ... ≤40 °C	5	50	
≥50 % ... 100 %	>40 ... 70 °C	15		

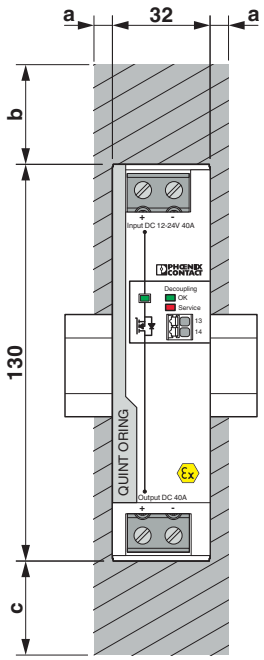


Figure 5 Device dimensions and minimum keep-out areas (in mm)

7.4 Block diagram

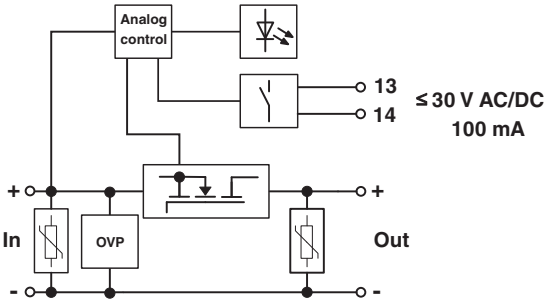


Figure 6 Block diagram

Key

Symbol	Designation
	Surge protection (varistor)
OVP	Additional regulatory protection against surge voltage
	Power semiconductor
Analog Control	Analog control equipment
	Signal/indicator LEDs (U_{In} > 8 V DC, Decoupling OK/Service)
	Floating switching output

8 Mounting/removing the redundancy module

8.1 Mounting the redundancy module

Proceed as follows to mount the redundancy module:

1. In the normal mounting position the redundancy module is mounted on the DIN rail from above. Make sure that the universal DIN rail adapter is in the correct position behind the DIN rail (A).
2. Then press the redundancy module down until the universal DIN rail adapter audibly snaps into place (B).
3. Make sure that the redundancy module is securely mounted on the DIN rail.

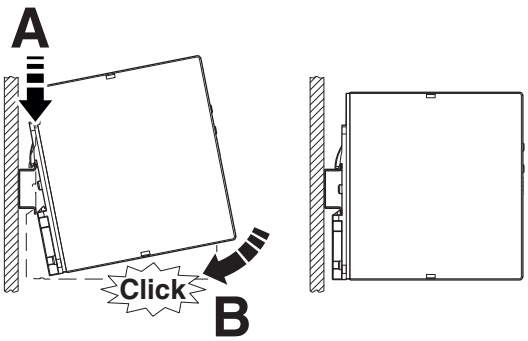


Figure 7 Snapping the redundancy module onto the DIN rail

8.2 Uninstall the redundancy module

Proceed as follows to remove the redundancy module:

1. Take a suitable screwdriver and insert this into the lock hole on the universal DIN rail adapter (A).
2. Release the lock by lifting the screwdriver (B).
3. Carefully swivel the redundancy module forward (C) so that the lock slides back into the starting position.
4. Then lift the redundancy module from the DIN rail.

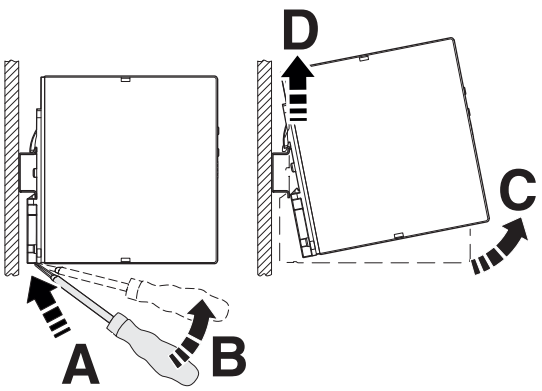


Figure 8 Removing the redundancy module from the DIN rail

8.3 Retrofitting the universal DIN rail adapter

For installation in horizontal terminal boxes it is possible to mount the redundancy module at a 90° angle to the DIN rail.

No additional mounting material is required.

Use the Torx screws provided to attach the universal DIN rail adapter to the side of the redundancy module.

8.3.1 Disassembling the universal DIN rail adapter

Proceed as follows to disassemble the universal DIN rail adapter that comes pre-mounted:

1. Remove the screws for the universal DIN rail adapter using a suitable screwdriver (Torx 10).
2. Remove the universal DIN rail adapter from the rear of the redundancy module.

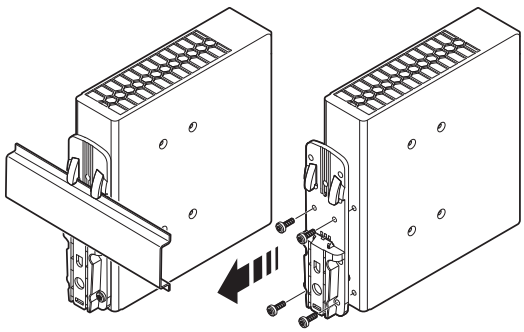


Figure 9 Disassembling the universal DIN rail adapter

8.3.2 Mounting the universal DIN rail adapter

To mount the universal DIN rail adapter on the left side of the device, proceed as follows:

1. Position the universal DIN rail adapter on the left side of the housing so that the mounting holes are congruent with the hole pattern for the mounting holes.
2. Insert the Torx screws that were removed earlier into the appropriate hole pattern on the universal DIN rail adapter so that the necessary drill holes of the redundancy module can be accessed.
3. Screw the universal DIN rail adapter onto the redundancy module.

The maximum tightening torque of the Torx screw (Torx® T10) is 0.7 Nm.

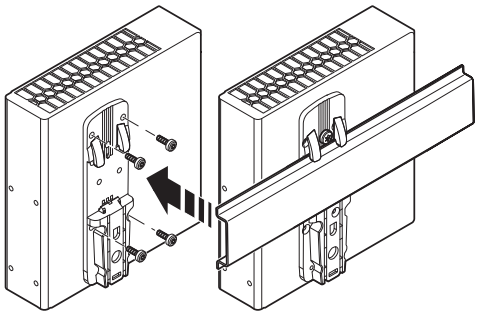


Figure 10 Mounting the universal DIN rail adapter

8.4 Retrofitting the universal wall adapter

The UWA 182/52 universal wall adapter (Order No. 2938235) or UWA 130 universal wall adapter (Order No. 2901664) is used to attach the redundancy module directly to the mounting surface.

The use of universal wall adapters is recommended under extreme ambient conditions, e.g., strong vibrations. Thanks to the tight screw connection between the redundancy module and the universal wall adapter or the actual mounting surface, an extremely high level of mechanical stability is ensured.

The redundancy module is attached to the UWA 182 or UWA 130 universal wall adapter by means of the Torx screws of the universal DIN rail adapter.

8.4.1 Mounting the UWA 182/52 universal wall adapter

Proceed as follows to disassemble the universal DIN rail adapter that comes pre-mounted:

1. Remove the screws for the universal DIN rail adapter using a suitable screwdriver (Torx 10).
2. Remove the universal DIN rail adapter from the rear of the redundancy module.
3. Position the universal wall adapter in such a way that the keyholes or oval tapers face up. The mounting surface for the redundancy module is the raised section of the universal wall adapter.
4. Place the redundancy module on the universal wall adapter in the normal mounting position (input voltage connection terminal blocks above).
5. Insert the Torx screws into the appropriate hole pattern on the universal wall adapter so that the necessary mounting holes of the redundancy module can be accessed.
6. Screw the universal wall adapter onto the redundancy module.

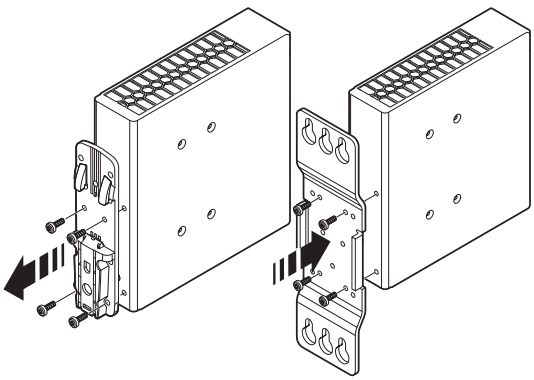


Figure 11 Mounting the UWA 182/52 universal wall adapter

The maximum tightening torque of the Torx screw (Torx® T10) is 0.7 Nm.

Make sure you use suitable mounting material when attaching to the mounting surface.

8.5 Secure the connection wiring to the redundancy module

Two receptacles for the bundled attachment of the connection wiring are integrated in the left and right housing panel. Use cable binders to secure the connection wiring (optional PKB 140X3,6 - Order No. 1005460).

Proceed as follows to secure the connection wiring:

– Wire redundancy module with sufficient connection reserve (input terminal blocks, output terminal blocks, signal terminal blocks)
– Thread the cable binders into the necessary receptacles for the cable binders.
– Bundle and set up the connection wiring so that the cooling grilles on the top and bottom of the housing are covered as little as possible.

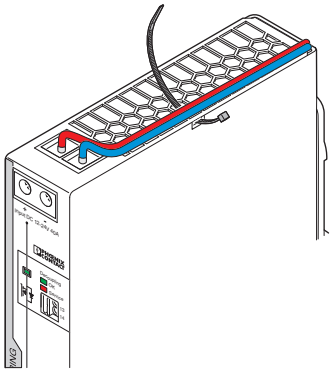


Figure 12 Lay and align connection wiring

– Secure the connection wiring with the cable binders. Make sure that the connection wiring is attached safely and securely without damaging the connection wiring.

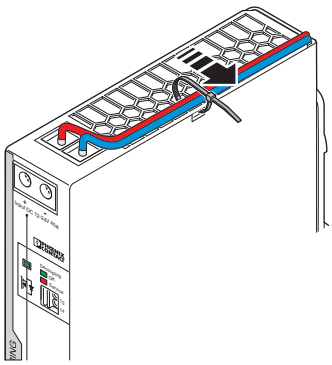


Figure 13 Secure connection wiring with cable binder

– Shorten the excess length of the cable binder ends.
– Then check again that the connection wiring is properly secured.

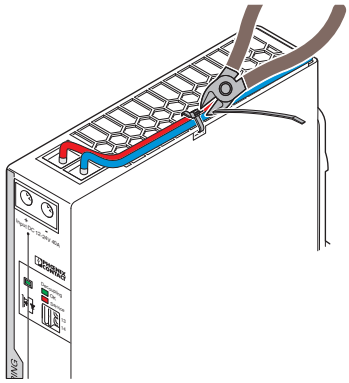


Figure 14 Shorten protruding ends of the cable binder

NOTE: Mechanical damage to the connection wiring caused by friction

In extreme ambient conditions, e.g., strong vibrations, protect the connection wiring against mechanical damage using additional insulation material. The additional insulation material for protecting the connection wiring is limited to the area where the cable binders are attached.

9 Device connection terminal blocks

The DC input terminal blocks and DC output terminal blocks on the front of the redundancy module feature screw connection technology. The signal level is wired by means of tool-free Push-in connection technology.

For the necessary connection parameters for the connection terminal blocks, refer to the technical data section.

9.1 Input

The redundancy module is operated with the DC output voltage of the upstream power supply. On the primary side, the redundancy module is connected via connection terminal blocks INPUT DC +/-.

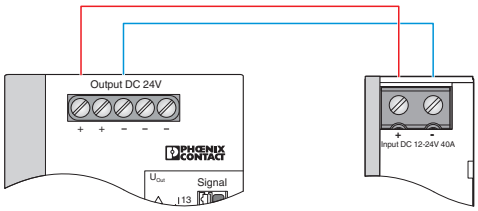


Figure 15 Schematic diagram, wiring of the input terminal blocks

Protection of the primary side

NOTE: Potential damage to the redundancy module caused by overload

If a non-current-limiting source is used to supply the load, appropriate protection must be implemented.

9.2 Output

The load to be supplied is operated with the DC output voltage of the redundancy module. On the secondary side, the redundancy module is connected via connection terminal blocks OUTPUT DC +/-.

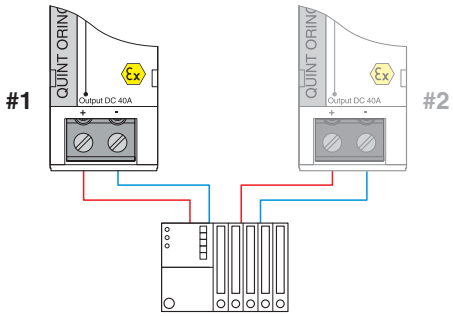


Figure 16 Schematic diagram, wiring of the output terminal blocks

10 Signaling

A floating signal contact is available for preventive function monitoring of the redundancy module.

The current device status of the redundancy module is signaled using an LED status indicator. The function of each LED status indicator is assigned to a fixed event and cannot be modified.

10.1 Location and function of the signaling elements

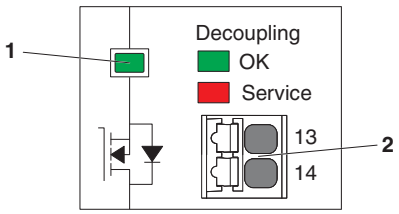


Figure 17 Position of signaling elements

Key

No.	Signaling elements
1	LED status and diagnostic indicators
2	13/14 floating switch contact (N/O contact)

10.2 Signaling table

The device status is indicated by an LED in different colors and flashing patterns.

The table below lists the possible signaling variants.

LED	Relay contact 13/14	Description
	Open	Input voltage not present or short circuit at redundancy module output
	Closed	Input voltage present
	Open	Redundancy module needs to be factory tested
	Open	OVP active, input voltage exceeds the permissible voltage value

Key

Symbol	Description
	LED OFF
	LED lights up green
	LED lights up red
	LED flashing red

10.3 Floating switch contact

The operating status of the redundancy module is forwarded to the higher-level controller using a floating switch contact (see signaling table section).

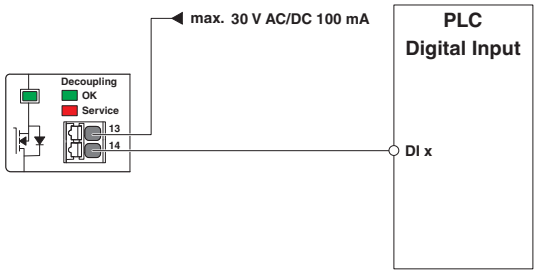


Figure 18 Schematic diagram, wiring of the floating switch contact

11 Redundancy operation

Redundant circuits are suitable for supplying systems and system parts which place particularly high demands on operational reliability.

If energy is to be supplied to the load with 1+1 redundancy, two power supplies of the same type and performance class must be used. In the event of an error, it must be ensured that one of the power supplies is able to provide the total required power for the load. This means that in redundancy mode, two 20 A power supplies supply a load with a nominal current of 20 A, for example. During normal operation of the power supplies, each power supply therefore supplies 10 A.

Always use cables with the same cross sections and lengths when wiring the power supplies on the DC output side.

11.1 Optimum structure for a redundant system

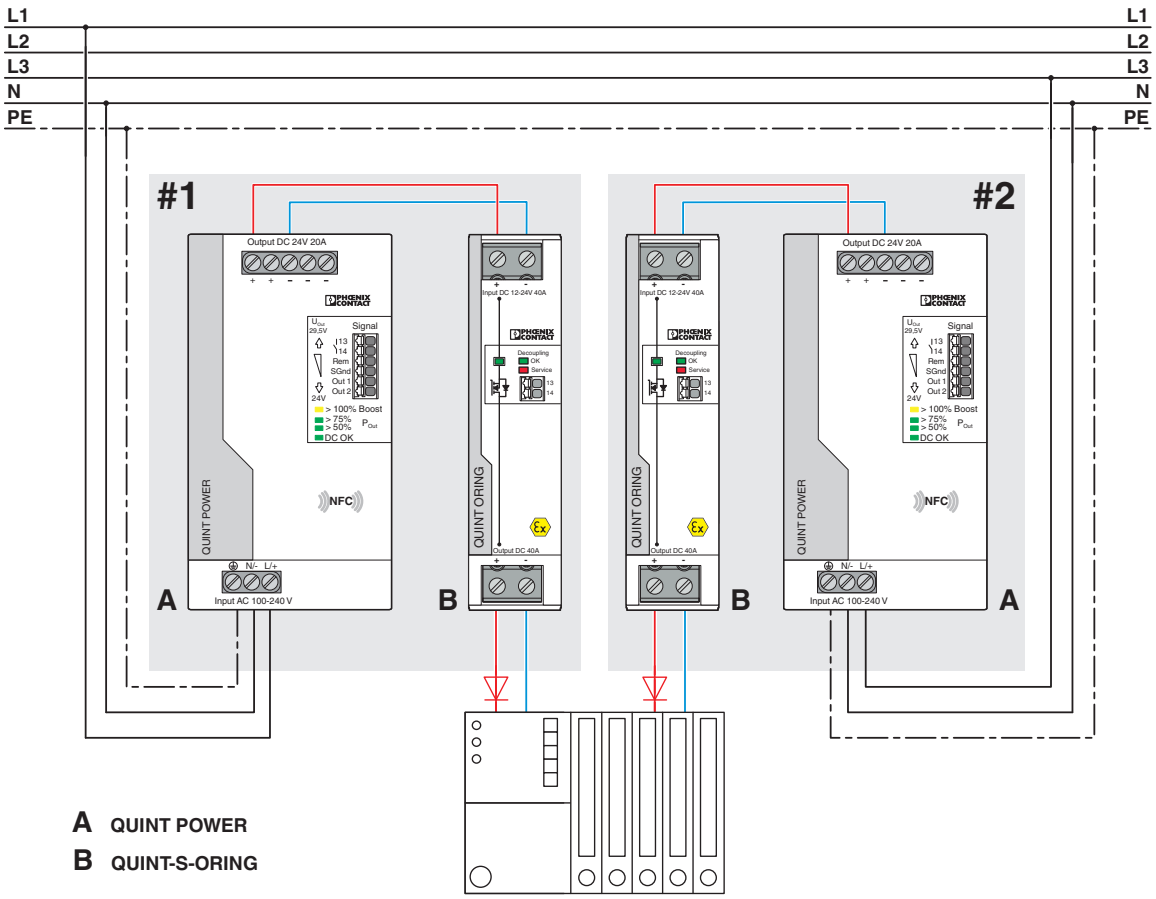


Figure 19 Structure of a redundant system

The following conditions must be met for 1+1 and n+1 redundancy operation of the power supplies in conjunction with a QUINT4-S-ORING module.

- Power supplies are connected to different phases
- Symmetrical cable routing up to the load
- Power supplies are set to the same output voltage
- Power supplies are switched to parallel operation
- Current threshold for monitoring is set to the load current

11.2 Error in a redundant system

The redundant system structure, comprising QUINT POWER power supplies and QUINT S-ORING modules, enables the complete, functional monitoring of your application.

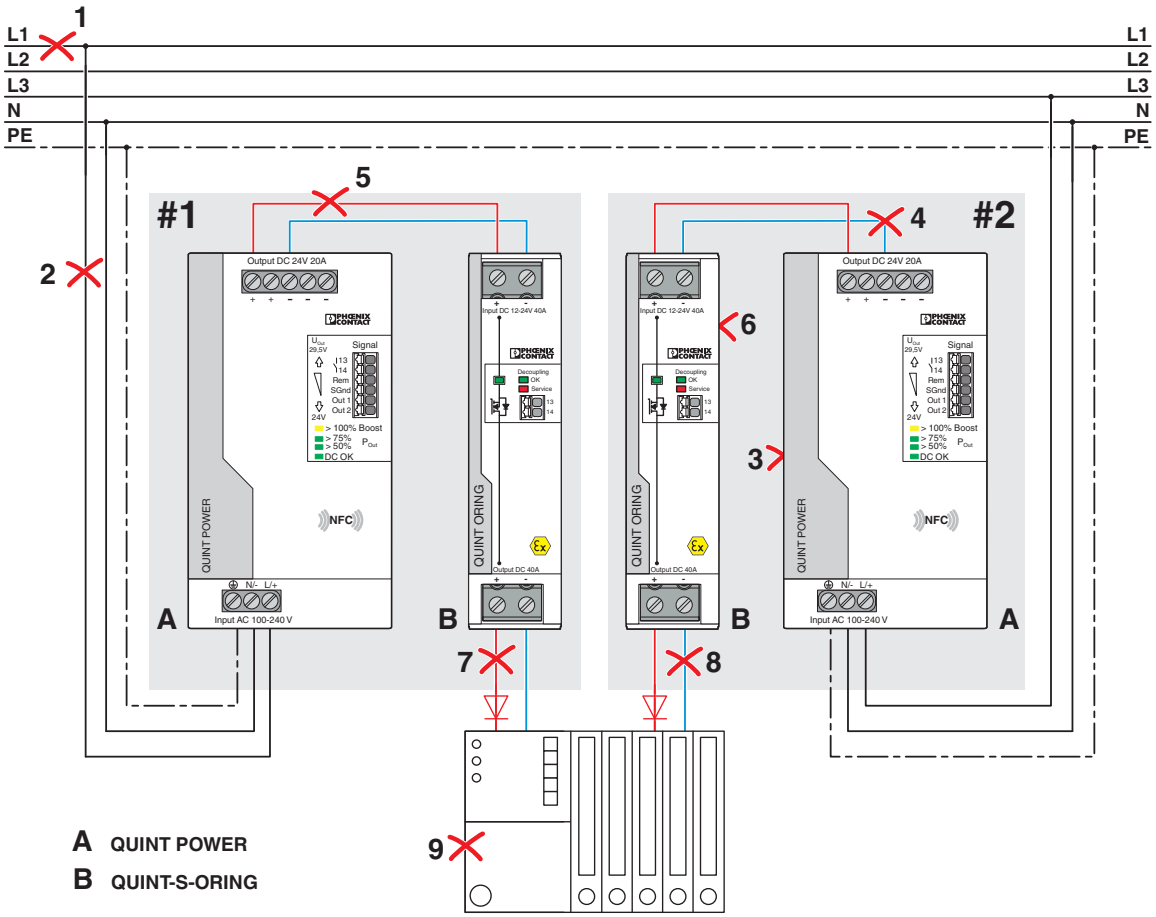


Figure 20 Schematic diagram of the monitored error scenarios

No.	Error description
1	Error in the active power grid phase
2	Supply line of the power supply interrupted or short circuited
3	Error in the active power supply
4	Short circuit in the wiring between a power supply and the connected redundancy module
5	Interruption in the wiring between a power supply and the connected redundancy module
6	Redundancy module error
7	Interruption in the wiring between a redundancy module and the load
8	Short circuit in the wiring between a redundancy module and the load
9	Load current is too high for a power supply

12 Derating

The redundancy module runs in nominal operation without any limitations. For operation outside the nominal range, the following points should be observed depending on the type of use.

12.1 Ambient temperature

When operating the redundancy module at an ambient temperature of > 60°C, a power derating of 2.5%/K should be observed. Up to an ambient temperature of 40°C, the power of the static boost can be taken from the redundancy module for a sustained period. In the 40°C to 60°C temperature range, the redundancy module can output more than the nominal power for a sustained period.

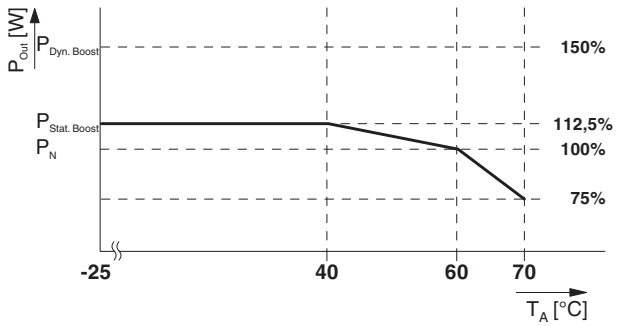


Figure 21 Output power depending on the ambient temperature

The redundancy module can be operated at an installation height of up to 5000 m without any limitations. Different data applies for installation locations above 2000 m due to the differing air pressure and the reduced convection cooling associated with this (see technical data section). The data provided is based on the results of pressure chamber testing performed by an accredited test laboratory.

12.2 Installation height

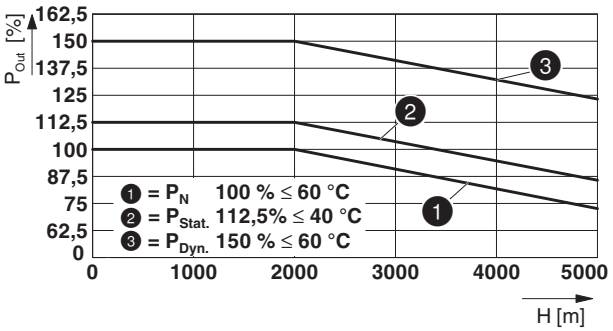


Figure 22 Output power depending on the installation height

12.3 Position-dependent derating

Position-dependent derating does not have to be taken into consideration.