QUINT-PS/3AC/24DC/40

Power supply unit



Data sheet
103133_en_02

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1 Description

QUINT POWER power supply units – Superior system availability with SFB technology
Compact power supply units of the new QUINT POWER generation maximize the availability of your system. With the SFB technology (Selective Fuse Breaking Technology), six times the nominal current for 12 ms, even the standard power circuit-breakers can now also be triggered reliably and quickly. Faulty current paths are switched off selectively, the fault is located and important system parts continue to operate. Comprehensive diagnostics are provided through constant monitoring of output voltage and current. This preventive function monitoring visualizes critical operating modes and reports them to the control unit before an error can occur.

Features

Superior system availability

- Using SFB technology (6 times the nominal current for 12 ms), circuit breakers are tripped quickly and important system parts remain in operation
- Through the preventive monitoring of output voltage and current and the transmission of critical operating states to the controller
- Through reliable starting of difficult loads with POWER BOOST power reserve
- Long mains buffering > 25 ms
- High MTBF > 500,000 h (40°C)

Worldwide use

- Input voltage of 3 x 320 V AC ... 575 V AC or 2 x 360 ... 575 V AC
- Input voltage from 450 V DC ... 800 V DC

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.

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3 Ordering data

Description	Type	Order No.	Pcs./Pkt.
Primary-switched QUINT POWER power supply for DIN rail mounting with SFB (Selective Fuse Breaking) Technology, input: 3-phase, output: 24 V DC/40 A	QUINT-PS/3AC/24DC/40	2866802	1

Accessories	Type	Order No.	Pcs./Pkt.
Universal DIN rail adapter	UTA 107	2853983	5
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
DIN rail diode module 12-24 V DC/2x20 A or 1x40 A. Uniform redundancy up to the consumer.	QUINT-DIODE/12-24DC/ 2X20/1X40	2320157	1
Active QUINT redundancy module for DIN rail mounting with ACB (auto current balancing) technology and monitoring functions, input: 24 V DC, output: 24 V DC/2 x 20 A or 1 x 40 A, including mounted UTA 107/30 universal DIN rail adapter	QUINT-ORING/24DC/2X20/ 1X40	2320186	1
Thermomagnetic device circuit breaker, 1-pos., tripping characteristic SFB, 1 PDT contact, plug for base element.	CB TM1 1A SFB P	2800836	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 3A SFB P	2800838	1
Thermomagnetic device circuit breaker, 1-pos., tripping characteristic SFB, 1 PDT contact, plug for base element.	CB TM1 4A SFB P	2800839	1
Thermomagnetic device circuit breaker, 1-pos., tripping characteristic SFB, 1 PDT contact, plug for base element.	CB TM1 5A SFB P	2800840	1
Thermomagnetic device circuit breaker, 1-pos., tripping characteristic SFB, 1 PDT contact, plug for base element.	CB TM1 6A SFB P	2800841	1
Thermomagnetic device circuit breaker, 1-pos., tripping characteristic SFB, 1 PDT contact, plug for base element.	CB TM1 8A SFB P	2800842	1
Thermomagnetic device circuit breaker, 1-pos., tripping characteristic SFB, 1 PDT contact, plug for base element.	CB TM1 10A SFB P	2800843	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	3x 400 V AC ... 500 V AC
Input voltage range	2x 360 V AC ... 575 V AC 3x 320 V AC ... 575 V AC
Input voltage range	450 V DC ... 800 V DC
AC frequency range	45 Hz ... 65 Hz
Frequency range DC	0 Hz
Current consumption	3x 2.1 A (400 V AC) 3x 1.7 A (500 V AC) 1.7 A (600 V DC)
Inrush current limitation	< 15 A
I^2t	< 1 A^2s
Power failure bypass	> 25 ms (400 V AC) > 35 ms (500 V AC)
Typical response time	< 0.5 s
Protective circuit	Transient surge protection Varistor, gas-filled surge arrester
Choice of suitable circuit breakers	6 A ... 16 A (AC: Characteristics B, C, D, K)
Discharge current to PE	< 3.5 mA
Output data	
Nominal output voltage	24 V DC ±1 %
Setting range of the output voltage (U_{Set})	18 V DC ... 29.5 V DC (> 24 V DC, constant capacity restricted)
Output current	40 A (-25°C ... 60°C, U_{OUT} = 24 V DC) 45 A (with POWER BOOST, -25°C ... 40°C permanently, U_{OUT} = 24 V DC) 215 A (SFB technology, 12 ms)
Magnetic circuit breaker tripping	B2 / B4 / B6 / B10 / B16 / B25 / C2 / C4 / C6 / C13
Efficiency	> 94 % (at 400 V AC and nominal values)
Rise time	< 0.15 s (U_{OUT} (10 % ... 90 %))
Residual ripple	< 40 mV_{PP} (with nominal values)
Connection in parallel	Yes, for redundancy and increased capacity
Connection in series	yes
Circuit breaker against surge voltage at output by invasive foreign matter	< 35 V DC
Feedback resistance	max. 35 V DC
Short-circuit-proof	yes
Power consumption	
Maximum power dissipation in no-load condition	18 W
Power loss nominal load max.	63 W

DC OK active	
Output description	U_{OUT} > 0.9 x U_N: High signal
Voltage/current	18 V DC ... 24 V DC / ≤ 20 mA (short-circuit resistant)
Status display	U_{OUT} > 0.9 x U_N: "DC OK" LED green / U_{OUT} < 0.9 x U_N: Flashing "DC OK" LED
DC OK floating	
Output description	Relay contact, U_{OUT} > 0.9 x U_N: Contact closed
Voltage/current	30 V AC/DC / 0.5 A , 24 V DC / 1 A
Status display	U_{OUT} > 0.9 x U_N: "DC OK" LED green / U_{OUT} < 0.9 x U_N: Flashing "DC OK" LED
POWER BOOST, active	
Output description	I_{OUT} < I_N: High signal
Voltage/current	18 V DC ... 24 V DC / ≤ 20 mA (short-circuit resistant)
Status display	I_{OUT} > I_N: LED "BOOST" yellow
General data	
Insulation voltage input/output	4 kV AC (type test) 2 kV AC (routine test)
Insulation voltage input / PE	3.5 kV AC (type test) 2 kV AC (routine test)
Insulation voltage output / PE	500 V DC (routine test)
Degree of protection	IP20
Protection class	I
MTBF (IEC 61709, SN 29500)	> 500000 h (40°C) / > 880000 h (25 °C)
Side element version	Aluminum
Hood version	Galvanized sheet steel, free from chrome (VI)
Dimensions W / H / D (state of delivery)	96 mm / 130 mm / 176 mm
Dimensions W / H / D (90° turned)	176 mm / 130 mm / 99 mm
Weight	2.5 kg
Ambient conditions	
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)
Maximum altitude	4000 m
Vibration (operation)	5 Hz - 100 Hz resonance search 2.3g, 90 min., resonance frequency 2.3g, 90 min. (according to DNV GL Class C)
Shock	18 ms, 30g, in each space direction (according to IEC 60068-2-27)
Degree of pollution in acc. with EN 60950-1	2
Climatic class	3K3 (in acc. with EN 60721)

Standards	
Electrical safety (of information technology equipment)	IEC 60950-1/VDE 0805 (SELV)
Electronic equipment for use in electrical power installations	EN 50178/VDE 0160 (PELV) / Overvoltage category III
SELV	IEC 60950-1 (SELV) and EN 60204-1 (PELV)
Safe isolation	DIN VDE 0100-410 DIN VDE 0106-101
Limitation of mains harmonic currents	EN 61000-3-2
Rail applications	EN 50121-4

Approvals	
UL	UL Listed UL 508 UL/C-UL Recognized UL 60950-1 (3-wire + PE, star net) UL ANSI/ISA-12.12.01 Class I, Division 2, Groups A, B, C, D (Hazardous Location)
CSA	CAN/CSA-C22.2 No. 60950-1-07 CSA-C22.2 No. 107.1-01
SIQ	CB Scheme
Shipbuilding	DNV GL (EMC A), ABS, LR, RINA, NK, BV

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 2)	8 kV (Test Level 4)
Housing air discharge	8 kV (Test Level 3)	15 kV (Test Level 4)
Comments	Criterion B	Criterion A
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 ... 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
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)
Signal	1 kV (Test Level 3 - asymmetrical)	2 kV (Test Level 4 - asymmetrical)
Comments	Criterion B	Criterion A
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) 6 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	1 kV (Test Level 2 - 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

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 Safety regulations and installation notes



EXPLOSION HAZARD!

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

DANGER

Components with dangerously high voltage and high stored energy are located in the device!
Never carry out work on live parts!
Depending on the ambient temperature and the load, the housing can become very hot!



CAUTION:

Before startup please ensure:

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

It must be possible to switch off power to device according to EN 60950.

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.



CAUTION: Risk of injury

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

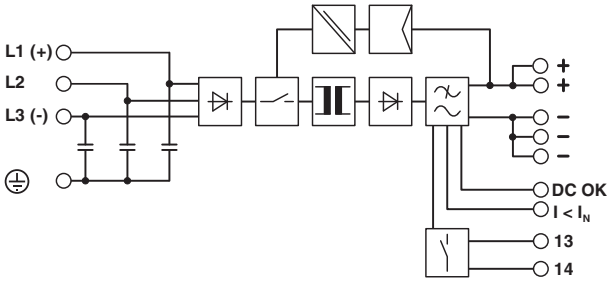


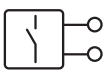
NOTE: Danger if used improperly

The power supply units are built-in devices. The device may only be installed and put into operation by qualified personnel. The corresponding national regulations must be observed.

6 Structure

6.1 Block diagram



Element	Meaning
	Rectification
	Power factor correction filter
	Switch
	Electrically isolated signal transmission
	Regulation
	Transformer
	Output filter
	Floating switching output

6.2 Function elements

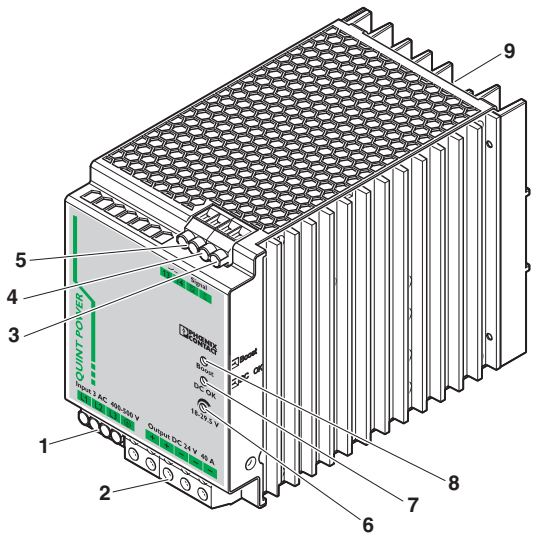


Figure 1 Position of the function elements

No.	Connection terminal blocks and function elements
1	AC input
2	DC output
3	Active signal output $I < I_N$ (POWER BOOST)
4	Active DC OK signal output
5	Floating DC OK switching output
6	Potentiometer for setting the output voltage
7	DC OK signal LED, green
8	Signal LED boost, yellow
9	Universal DIN rail adapter

6.3 Convection

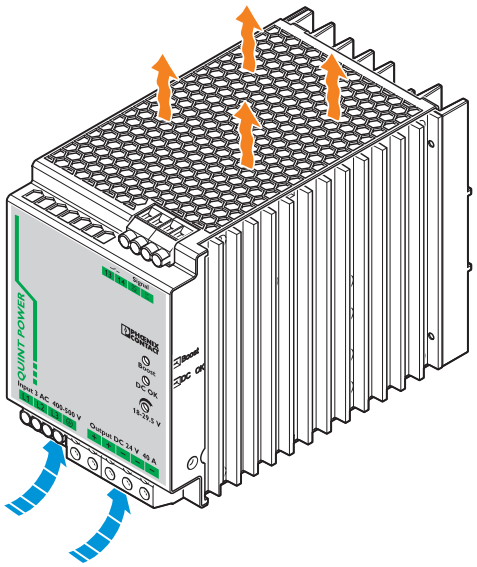


Figure 2 Convection

NOTE: enable convection

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

To enable sufficient convection, we recommend a minimum vertical clearance of 50 mm from other modules. In order to ensure proper functioning of the module, it is necessary to maintain a lateral distance of 5 mm and 15 mm for active components.

The device can be snapped onto all DIN rails in accordance with EN 60715 and should be mounted in the normal mounting position (connection terminal blocks on top and bottom).

6.4 Mounting position

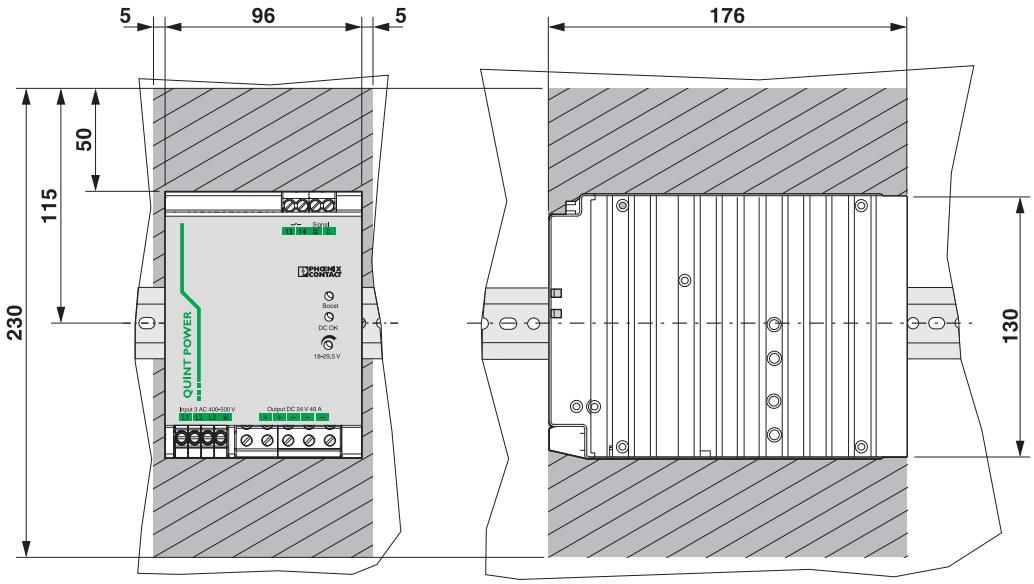


Figure 3 Locked areas

Possible mounting positions:

Normal mounting position, installation depth 176 mm (+ DIN rail) (delivery state)

Mounting position rotated by 90°, installation depth of 99 mm (+ DIN rail)

7 Mounting/removal

7.1 Normal mounting position

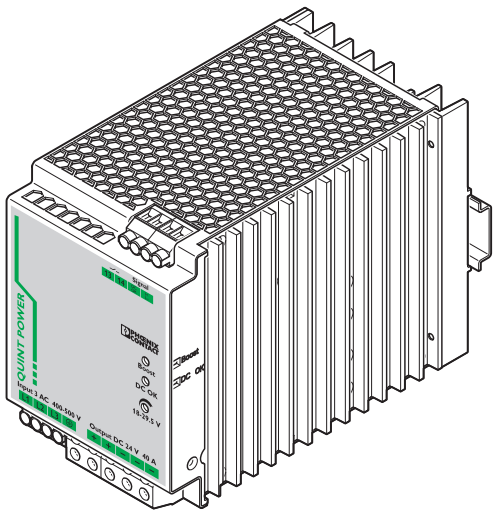


Figure 4 Normal mounting position

7.2 Mounting position rotated 90°

For a mounting position rotated at 90° to the DIN rail, mount the DIN rail adapter (UTA 107) as shown in the figure. No additional assembly material is required. Mounting screws: Torx® T10 (0.8 Nm ... 0.9 Nm tightening torque).

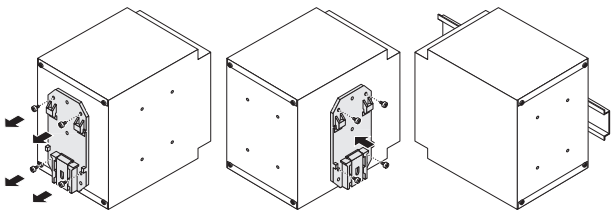


Figure 5 Mounting position rotated 90°

7.3 Mounting on a DIN rail

Position the module with the DIN rail guide on the upper edge of the DIN rail, and snap it in with a downward motion.

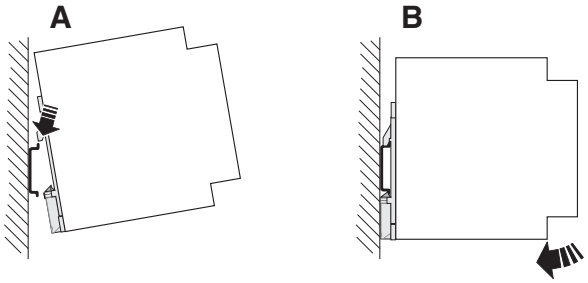


Figure 6 Assembly

7.4 Removal from the DIN rail

Pull the snap lever open with the aid of a screwdriver and slide the module out at the lower edge of the DIN rail.

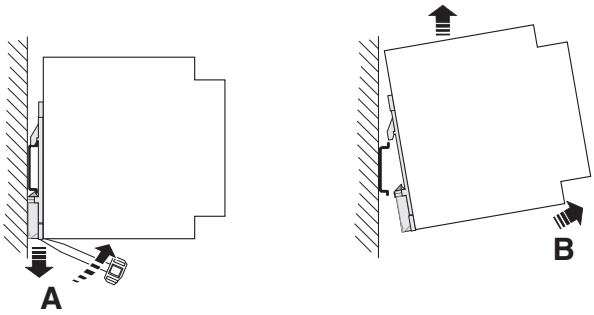


Figure 7 Removal

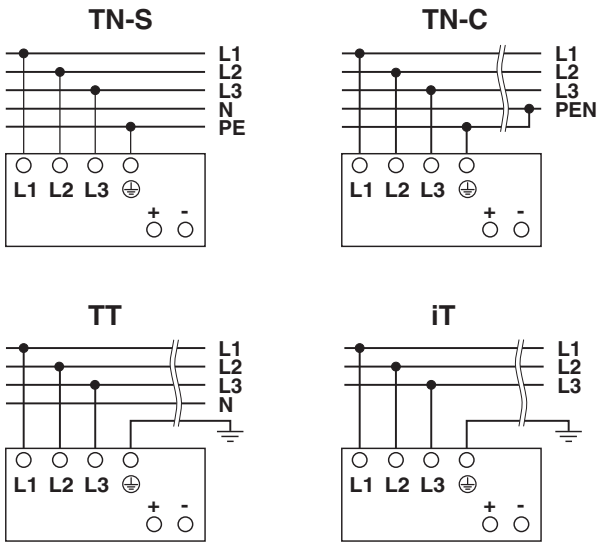
8 Device connection

8.1 Network types

The device can be connected to 2- or 3-phase AC networks with nominal voltages 2x/3x 400 V AC ... 500 V AC.
The 2x or 3x 400 V AC ... 500 V AC connection is made using the L1, L2, L3 and PE screw connections.
When connecting the three phases L1, L2 and L3, continuous operation at nominal capacity is ensured without limitations when one of the phases fails.

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

The power supply is approved for connection to TN, TT, and IT power grids (star networks) with a maximum phase-to-phase voltage of 500 V AC.



NOTE:

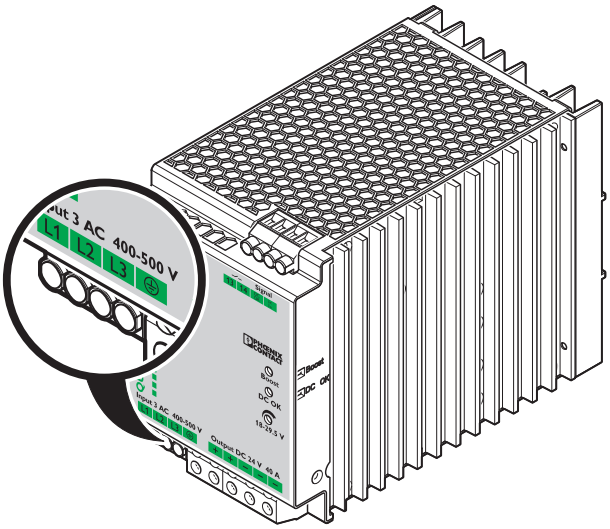
In DC applications, a suitable fuse must be wired upstream!
Connect not more than one power supply unit to a fuse or a power switch.

Suggestion: In AC connections, connect a maximum of one power supply unit to a fuse or a power switch.

In order to comply with UL approval, use copper cables with an operating temperature of > 75°C (ambient temperature < 55°C) and > 90°C (ambient temperature < 75°C).

8.2 AC input

The supply voltage is connected via "Input AC 100 - 240 V" connection terminal blocks.



8.2.1 Protection of the primary side

The device must be installed in acc. with the regulations as in EN 60950. It must be possible to disconnect the device using a suitable isolating facility outside the power supply. Primary circuit mains protection, for example, is suitable for this purpose.

8.2.2 Required backup fuse (device and line protection)

External thermo-magnetic fuses are necessary for device protection: 3 x 6 A, 10 A or 16 A power circuit breaker, characteristic B, C, D, K (or identical function).

Connect a suitable fuse upstream for DC applications!

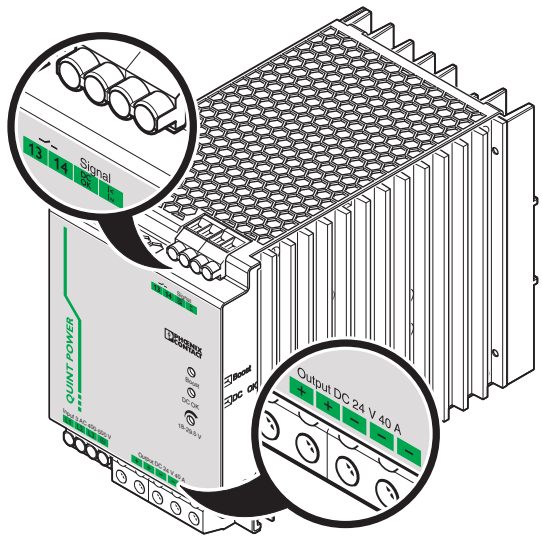
CAUTION:

If an internal fuse is triggered, there is a device malfunction. In this case, the device must be inspected in the factory.

When connected to IT systems the protective conductor current may rise to considerably above 3.5 mA (7 mA).

8.3 DC output

The output voltage is connected via the “Output DC” connection terminal blocks.

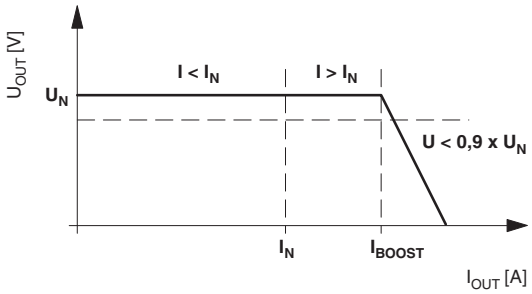


8.3.1 Protection of the secondary side

The device 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 or separately protected according to the maximum output current.

8.3.2 Output characteristic curve

The module functions according to the U/I characteristic curve with the static POWER BOOST power reserve. At a constant output voltage U_N, I_{BOOST} is available. This I_{BOOST} current supplies up to 1.5 times the I_N nominal output current. High inrush currents are therefore absorbed without voltage dips.



U_N = 24 V

I_N = 40 A

I_{BOOST} = 45 A

SFB technology = 215 A (12 ms)

P_N = 960 W

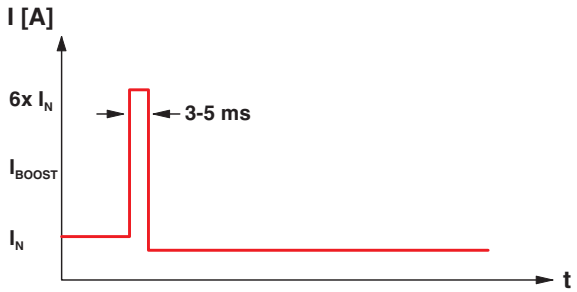
P_{BOOST} = 1080 W

9 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.

9.1 Circuit breaker tripping characteristics

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



Tripping time of the circuit breaker = 3 - 5 ms, typically

9.2 Installation notes

To use the SFB technology of the QUINT power supply, 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 devices, cable cross section, and the circuit breaker.

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

– Ensure the lowest possible cable impedance at the input of the power supply by using short cable lengths and large cable cross sections.

Note the maximum distance between the power supply and load.

(see also SFB configuration)

9.3 SFB configuration

9.3.1 Standard circuit breakers

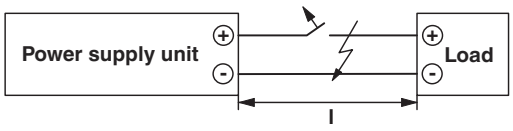


Figure 8 Cable lengths

Maximum distance between the power supply and load (l_1)

Cross section [^{2}mm]	0.75	1.0	1.5	2.5	4.0	6.0	10.0
Distance l with C2 circuit breaker [m]	14	19	29	49	79	< 100	< 150
Distance l with C4 circuit breaker [m]	8	11	17	29	47	70	< 100
Distance l with C6 circuit breaker [m]	6	8	12	20	32	48	81
Distance l with C10 circuit breaker [m]		3	5	9	14	21	36
Distance l with C13 circuit breaker [m]			3	5	8	13	22
Distance l with B6 circuit breaker [m]	12	17	25	42	68	< 100	< 150
Distance l with B10 circuit breaker [m]		10	16	27	43	65	< 100
Distance l with B16 circuit breaker [m]			8	14	23	35	58
Distance l with B20 circuit breaker [m]				9	15	23	38
Distance l with B25 circuit breaker [m]				6	10	15	25

The following parameters are the basis for calculation:

- Circuit breaker from Siemens, B and C characteristics (e. g., B6: 5SY6106-6)
- B characteristic: electromagnetic tripping of the circuit breaker at the latest at (5-fold rated current) x (correction factor 1.2 at 0 Hz) = 6-fold rated current
- C characteristic: electromagnetic tripping of the circuit breaker at the latest at (10-fold rated current) x (correction factor 1.2 at 0 Hz) = 12-fold rated current
- Ambient temperature: +20 °C
- The internal resistances of the circuit breakers are considered.
- In addition to short circuit current, the relevant power supply unit supplies half of the nominal current for paths connected in parallel.

9.3.2 CB TM1 SFB device circuit breaker

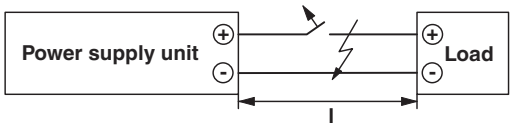


Figure 9 Cable lengths

Maximum distance between the power supply and load (l)

Cross section [^{2}mm]	0.75	1.0	1.5	2.5	4.0
Spacing with CB TM1 1A SFB P [m]	27	36	54	91	146
Spacing with CB TM1 2A SFB P [m]	18	25	37	63	101
Spacing with CB TM1 3A SFB P [m]	13	18	27	46	74
Spacing with CB TM1 4A SFB P [m]	10	14	21	35	57
Spacing with CB TM1 5A SFB P [m]	8	11	17	29	47
Spacing with CB TM1 6A SFB P [m]	7	9	14	24	39
Spacing with CB TM1 8A SFB P [m]	5	7	11	19	31
Spacing with CB TM1 10A SFB P [m]	4	5	8	14	22
Spacing with CB TM1 12A SFB P [m]		3	5	9	15
Spacing with CB TM1 16A SFB P [m]			3	5	9

The following parameters are the basis for calculation:

- CB TM1 xA SFB P device circuit breaker
- Electromagnetic triggering of the circuit breaker at the latest at (10 times the rated current)
- Ambient temperature: +20 °C
- The internal resistance of the device circuit breakers is taken into account
- In addition to short circuit current, the relevant power supply unit supplies half of the nominal current for paths connected in parallel.

10 Signaling

The following are available for function monitoring:

- The active signal output DC OK
- The floating DC OK output
- The active POWER BOOST signal output

In addition, the “DC OK” and “BOOST” LEDs can be used to evaluate the function of the power supply directly at the installation location (see output characteristic curve).

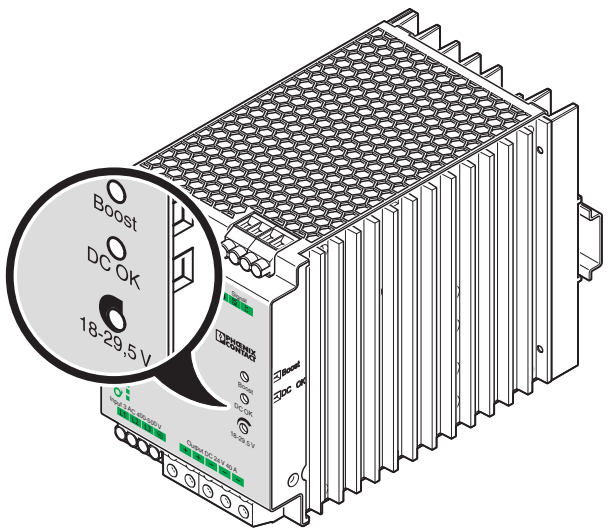


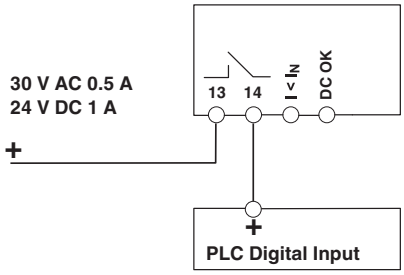
Figure 10 Signal outputs

If the output voltage falls below 90% of the output voltage set on the potentiometer as a result of overloading, the signal state “DC OK” switches from “Active High” to “Low”. The limit value of 90% always refers to the set output voltage range of 18 V DC to 29.5 V DC.

	Normal operation $I < I_N$	POWER BOOST $I > I_N$	Overload mode $U_{OUT} < 0.9 \times U_N$
“DC OK” LED, green	lit	lit	flashing
“BOOST” LED, yellow	OFF	lit	lit
“DC OK” signal	ON	ON	OFF
“DC OK” relay	closed	closed	opened
Signal “$I < I_N$”	ON	OFF	OFF
Meaning	Normal operation of the power supply unit (U_{OUT} > 21.5 V)	POWER BOOST mode, e.g., for starting loads	Overload mode, e. g., load short circuit or overload

10.1 Floating switch contact

The floating switch contact opens to indicate that the set output voltage has been undershot by more than 10 % ($U_{OUT} < 0.9 \times U_N$). Signals and ohmic loads can be switched. For heavily inductive loads such as a relay, a suitable protective circuit (e.g., freewheeling diode) is necessary.



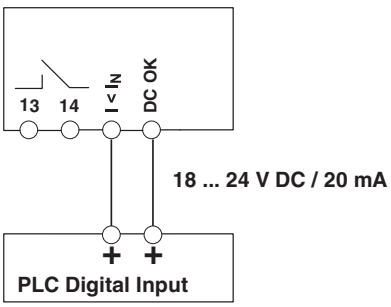
10.2 Active signal outputs

For the transmission of signals to a higher-level controller, the active “DC OK” and “Boost” signal outputs can be used.

The 18 ... 24 V DC signal is applied between the “DC OK” and “-” (active DC OK signal output) or between “$I < I_N$” and “-” (active POWER BOOST signal output) and can withstand a maximum of 20 mA.

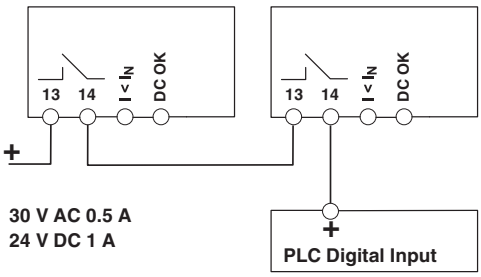
By switching from “active high” to “low”, the DC OK signal output indicates that the set output voltage has been undershot by more than 10 % ($U_{OUT} < 0.9 \times U_N$). The DC OK signal is decoupled from the power output. This makes it impossible for devices connected in parallel to act as an external power supply.

The BOOST signal output “$I < I_N$” indicates that the nominal current has been exceeded. The power supply then switches to POWER BOOST mode. Thanks to this preventive function monitoring, critical operating states can be recognized at an early stage, prior to a voltage dip occurring.



10.3 Signal loop

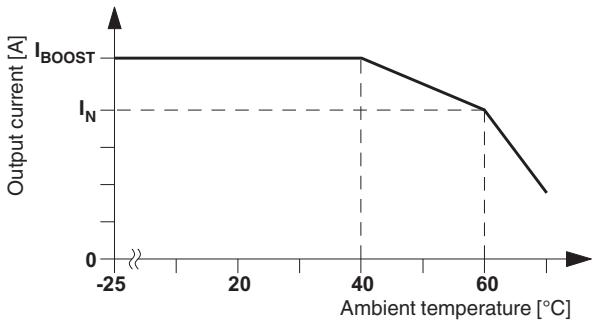
Monitoring of two devices: use the active DC OK signal output of device 1 and loop the floating alarm output of device 2. In the event of a malfunction, you will receive a group error message. Any number of devices can be looped. This signal combination saves wiring costs and logic inputs.



11 Derating

11.1 Temperature-dependent derating

At an ambient temperature of -25 °C to +40 °C, the device continuously supplies the I_{BOOST} output current. The device can supply the I_N nominal output current up to an ambient temperature of +60°C. At ambient temperatures above +60 °C, the output power must be decreased by 2.5 % per Kelvin increase in temperature. At ambient temperatures above +70 °C or in the event of a thermal overload, the device does not switch off. The output power is decreased to such an extent that device protection is provided. Once the device has cooled down, the output power is increased again.



12 Operating modes

12.1 Series operation

Two power supplies can be switched in series, to double the output voltage. For connection in series, only power supplies of the same performance class should be used. An output voltage of 48 V DC can be provided, if two 24 V power supplies are connected in series.

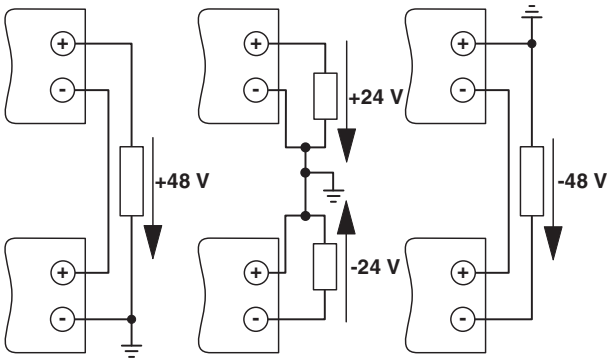


Figure 11 Series operation

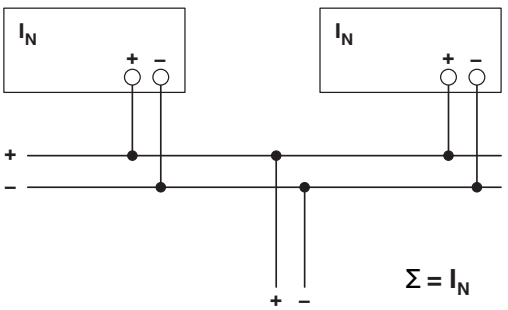
12.2 Parallel operation

Devices of the same type can be connected in parallel to increase both redundancy and power. No further adjustments are necessary for the default setting.

If the output voltage of a power supply unit is adjusted, all power supplies connected in parallel must be set to the same output voltage in order to ensure an even distribution of current.

In order to ensure symmetrical current distribution, we recommend that all cable connections from the power supply unit to the busbar are the same length and have the same cross section.

Depending on the system, a protective circuit should be installed at each individual device output (e.g., decoupling diode, DC fuse or circuit breaker) for parallel connection of more than two power supplies. This prevents high return currents in the event of a secondary device fault.

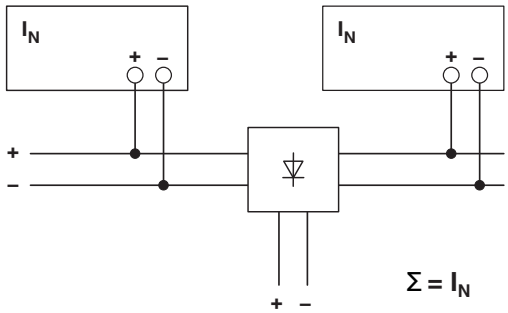


12.3 Redundant operation

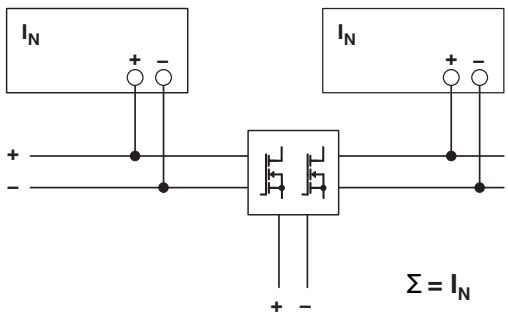
Redundant circuits are suitable for supplying systems which place particularly high demands on operational safety. If a 1+1 redundancy is implemented, this means that for a load of 20 A, two modules each with 20 A must be connected in parallel on the output side. In the event of an internal device fault or failure of the mains power supply on the primary side, the second module automatically takes over the entire supply of the loads.

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



12.4 Increasing power

The output current can be increased to n x I_N in the case of n parallel connected devices. 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 load should be distributed between individual devices that are independent from one another.

