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QUINT-PS-100-240AC/48DC/10

Power supply unit, primary switched-mode, single-phase, output: 48 V DC /10 A



INTERFACE

Data Sheet

102549_00_en

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Description

QUINT POWER 48 DC is a universal power supply unit of 240 W ... 960 W. In case of a regulated and adjustable output voltage of 30 V DC ... 56 V DC, output currents of 5 A, 10 A and 20 A are available.

The devices are built as primary switched-mode controllers and have a high degree of efficiency, due to which the heat loss is limited to a minimum.

The high operational safety is guaranteed reliably in unstable global networks as well. QUINT POWER also functions in applications where static voltage dips, transient failures of the supply voltage unit or phase failure are to be expected. Generously dimensioned capacitors guarantee a mains buffering of more than 20 ms under full load. All three-phase QUINT POWER provide full output power, even in the event of a long-term phase failure.

A reliable starting of complex loads is ensured by a power reserve of up to 50% – the POWER BOOST.

A preventive function monitoring diagnoses improper operating states and minimizes downtimes in your system. For remote monitoring of this state, an active transistor switching output and a floating relay contact are available.

- Universal power supply unit with an extensive product range, including special versions and accessories
- Can be used worldwide in all industrial sectors due to a wide-range input and an international approval package
- High operating safety due to long mains buffering under full load and high MTBF (> 500,000 h)
- Reliable starting of heavy loads with high inrush currents through the POWER BOOST power reserve
- High system availability of all three-phase devices, even if one phase fails permanently
- Active function monitoring through switching output and preventive function monitoring through floating relay contact for remote diagnosis
- Parallel connection possible for increased performance and redundancy
- Simplified commissioning with LED function monitoring



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!**



Make sure you always use the the latest documentation.
It can be downloaded at www.download.phoenixcontact.com.
A conversion table is available on the Internet at
www.download.phoenixcontact.com/general/7000_en_00.pdf.

QUINT-PS-100-240AC/48DC/10

Order data

| Description | Type | Order No. | Pcs./Pkt. |
|---|----------------------------|-----------|-----------|
| Power supply unit, primary switched-mode, single-phase, output: 48 V DC /10 A | QUINT-PS-100-240AC/48DC/10 | 2938248 | 1 |

| Accessories | Type | Order No. | Pcs./Pkt. |
|------------------------|------------|-----------|-----------|
| Universal wall adapter | UWA 182/52 | 2938235 | 1 |

Technical data

| Input data | |
|--|--|
| Input nominal voltage range | 100 V AC ... 240 V AC (wide range input) |
| AC input voltage range | 85 V AC ... 264 V AC |
| DC input voltage range | 90 V DC ... 350 V DC |
| AC frequency range | 45 Hz ... 65 Hz |
| DC frequency range | 0 Hz |
| Current consumption | 4.76 A (120 V AC) 2.3 A (230 V AC) |
| Inrush current limitation/ I^2t | < 15 A (3.2 A ² s) |
| Power failure bypass | > 30 ms |
| Typical response time | < 1 s |
| Protective circuitry | Transient surge protection Varistor |
| Input fuse, integrated | 12 A (slow-blow, internal) |
| Recommended backup fuse for mains protection | 10 A (characteristic B) 16 A (characteristic B) |
| Discharge current to PE | < 3.5 mA |

| Output data | |
|--|--|
| Nominal output voltage | 48 V DC $\pm 1\%$ |
| Setting range of the output voltage | 30 V DC ... 56 V DC |
| Output current | 10 A (nominal value, up to 60°C) |
| | 13 A (with POWER BOOST) |
| Derating | From +60°C 2.5% per Kelvin |
| Output current limit | 13 A (approx. I_{BOOST} , for short circuit) |
| Max. capacitive load | Unlimited |
| Control deviation | < 1 % (change in load, static 10% ... 90%) < 5 % (change in load, dynamic 10% ... 90%) < 0.1 % (change in input voltage $\pm 10\%$) |
| Power loss nominal load max. | 56 W |
| Maximum power dissipation idling | 5 W |
| Efficiency | > 90 % (for 230 V AC and nominal values) |
| Ascent time | < 2 ms (U_{OUT} (10% ... 90%)) |
| Residual ripple | < 100 mV _{PP} (with nominal values) |
| Peak switching voltages | < 100 mV _{PP} |
| Connection in parallel | Yes, for redundancy and increased capacity |
| Surge protection against internal surge voltages | Yes, limited to approx. 60 V DC |
| Resistance to reverse feed | 60 V DC |

QUINT-PS-100-240AC/48DC/10

Signal output DC OK active

| | |
|--------------------|--|
| Output description | $U_{OUT} > 0.9 \times U_N$: High signal |
| Continuous current | ≤ 40 mA |
| Output voltage | +24 V DC |
| Status display | "DC OK" LED green $U_{OUT} < 0.9 \times U_N$: LED flashing |

Signal output DC OK floating

| | |
|--------------------|--|
| Output description | Relay contact, $U_{OUT} > 0.9 \times U_N$: Contact closed |
| Continuous current | ≤ 0.5 A |
| Output voltage | ≤ 60 V AC/DC |
| Status display | "DC OK" LED green $U_{OUT} < 0.9 \times U_N$: LED flashing |

Standards

| | |
|--|---|
| Electrical Equipment for Machinery | EN 60204 |
| Safety transformers for power supply units | EN 61558-2-17 |
| Electrical safety (of information technology equipment) | EN 60950/VDE 0805 (SELV) UL/C-UL Recognized UL 60950 |
| | CB-Scheme |
| Industrial control equipment | UL/C-UL Listed UL 508 |
| Shipbuilding | German Lloyd, ABS |
| Electronic equipment for use in electrical power installations | EN 50178/VDE 0160 (PELV) |
| SELV | EN 60950 (SELV) EN 60204 (PELV) |
| Safe isolation | DIN VDE 0100-410 DIN VDE 0106-1010 |
| Protection against electric shock | DIN 57100-410 |
| Protection against electric shock, basic requirements for safe isolation in electrical equipment | DIN VDE 0106-101 |
| Limitation of mains harmonic currents | EN 61000-3-2 |
| Device safety | GS (tested safety) |

Approvals

Granted approvals



QUINT-PS-100-240AC/48DC/10

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) |
| Installation position | Horizontal DIN rail NS 35, EN 60715 |
| Degree of protection | IP20 |
| Class of protection | I, with PE connection |
| MTBF | > 500 000 h in acc. with IEC 61709 (SN 29500) |
| Housing version | AluNox (AlMg1) |
| Width | 157 mm |
| Height | 130 mm |
| Depth | 125 mm |
| Width with alternative assembly | 122 mm |
| Height with alternative assembly | 130 mm |
| Depth with alternative assembly | 160 mm |
| Weight | 2.5 kg |

Climatic data

| | |
|--|--|
| Ambient temperature (operation) | -25 °C ... 70 °C (> 60°C derating) |
| Ambient temperature (storage/transport) | -40 °C ... 85 °C |
| Max. permissible relative humidity (operation) | 95 % (at 25°C, no condensation) |
| Vibration (operation) | < 15 Hz, amplitude ±2.5 mm in acc. with IEC 60068-2-6 15 Hz ... 150 Hz, 2.3g, 90 min. |
| Shock | 30g in all directions in acc. with IEC 60068-2-27 |
| Pollution degree in acc. with EN 50178 | 2 |
| Climatic class | 3K3 (in acc. with EN 60721) |

Conformance with EMC directive 89/336/EEC

Immunity to interference in acc. with EN 61000-6-2

Discharge of static electricity in acc. with EN 61000-4-2

| | |
|-------------------|-------------|
| Housing | Level 4 |
| Contact discharge | 8 kV |
| Discharge in air | 15 kV |
| Comments | Criterion B |

Electromagnetic HF field in acc. with EN 61000-4-3

| | |
|-----------------|---------------------|
| Housing | Level 3 |
| Frequency range | 80 MHz ... 1000 MHz |
| Field intensity | 10 V/m |
| Comments | Criterion A |

Fast transients (burst) in acc. with EN 61000-4-4

| | |
|----------|--|
| Input | 4 kV (level 4 - asymmetrical: conductor to ground) |
| Output | 2 kV (level 3 - asymmetrical: conductor to ground) |
| Signal | 1 kV (level 1 - asymmetrical: conductor to ground) |
| Comments | Criterion B |

QUINT-PS-100-240AC/48DC/10

Conformance with EMC directive 89/336/EEC

Immunity to interference in acc. with EN 61000-6-2

Surge voltage capacities (surge) in acc. with EN 61000-4-5

| | |
|----------|---|
| Input | 4 kV (inst. class 4 - asymmetrical: conductor to ground) |
| | 2 kV (inst. class 4 -symmetrical: conductor to conductor) |
| Output | 0.5 kV (level 1 - asymmetrical: conductor to ground) |
| | 0.5 kV (level 1 - symmetrical: conductor to conductor) |
| Signal | 1 kV (level 2 - asymmetrical: conductor to ground) |
| Comments | Criterion B |

Conducted disturbance in acc. with EN 61000-4-6

| | |
|---------------------|------------------------|
| Input/Output/Signal | Level 3 - asymmetrical |
| Frequency range | 0.15 MHz ... 80 MHz |
| Voltage | 10 V |
| Comments | Criterion A |

Voltage dips in acc. with EN 61000-4-11

| | |
|----------|---------------------------|
| Input | (mains buffering > 20 ms) |
| Comments | Criterion B |

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

Note:

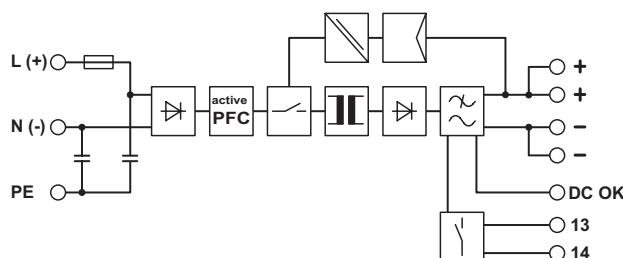
Criterion A: Normal operating behavior within the defined limits.

Criterion B: Temporary impairment to operational behavior that is corrected by the device itself

EN 55011 corresponds to CISPR11 / EN 55022 corresponds to CISPR22

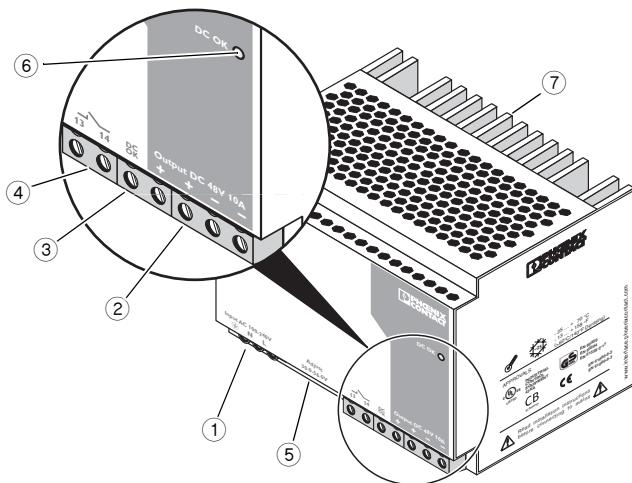
EN 61000 corresponds to IEC 1000

Block diagram



QUINT-PS-100-240AC/48DC/10

Structure



- 1 AC input
- 2 DC output
- 3 DC OK output active
- 4 DC OK output, floating
- 5 Potentiometer (covered) 30 V DC ... 56 V DC
- 6 DC OK control lamp
- 7 DIN rail adapter

| | [mm ²] solid | [mm ²] stranded | AWG | [Nm] Torque |
|--------|-----------------------------|--------------------------------|---------|----------------|
| Input | 0.2 - 6 | 0.2 - 4 | 24 - 10 | 0.5 - 0.6 |
| Output | 0.5 - 16 | 0.5 - 10 | 20 - 6 | 1.2 - 1.5 |
| Signal | 0.5 - 16 | 0.5 - 10 | 20 - 6 | 1.2 - 1.5 |

Input data

| | |
|--|--|
| Input nominal voltage range | 100 V AC ... 240 V AC (wide range input) |
| AC input voltage range | 85 V AC ... 264 V AC |
| DC input voltage range | 90 V DC ... 350 V DC |
| AC frequency range | 45 Hz ... 65 Hz |
| DC frequency range | 0 Hz |
| Input fuse, integrated | 12 A (slow-blow, internal) |
| Recommended backup fuse for mains protection | 10 A (characteristic B) 16 A (characteristic B) |
| Type of connection | Screw connection |
| Stripping length | 7 mm |

Output data

| | |
|-------------------------------------|---|
| Nominal output voltage | 48 V DC ±1% |
| Setting range of the output voltage | 30 V DC ... 56 V DC |
| Output current | 10 A (nominal value, up to 60°C) 13 A (with POWER BOOST) |
| Type of connection | Screw connection |
| Stripping length | 7 mm |

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Safety and warning notes



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 (e.g. VDE, DIN) must be observed.



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!



Before startup please ensure:

The mains connection has been carried out by a competent person and protection against electric shock is guaranteed!

The device can be disconnected outside the power supply unit in accordance with the regulations as in EN 60950 (e.g. through primary side line protection)!

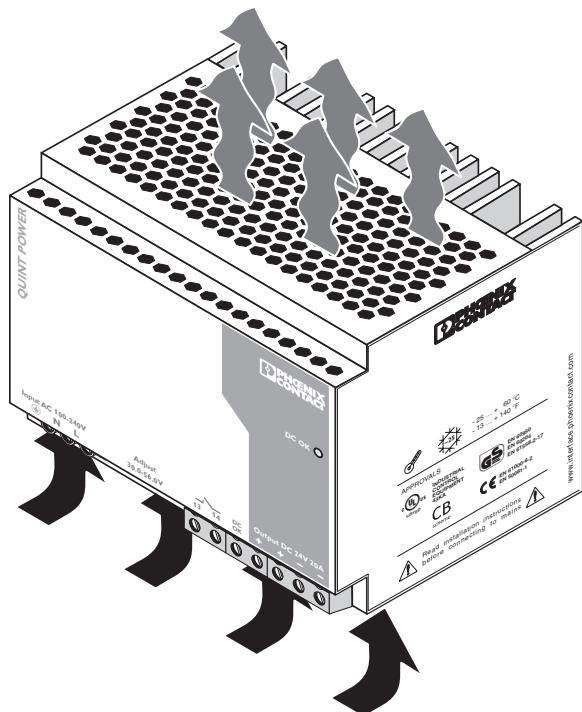
The ground conductor is connected!

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!

Installation



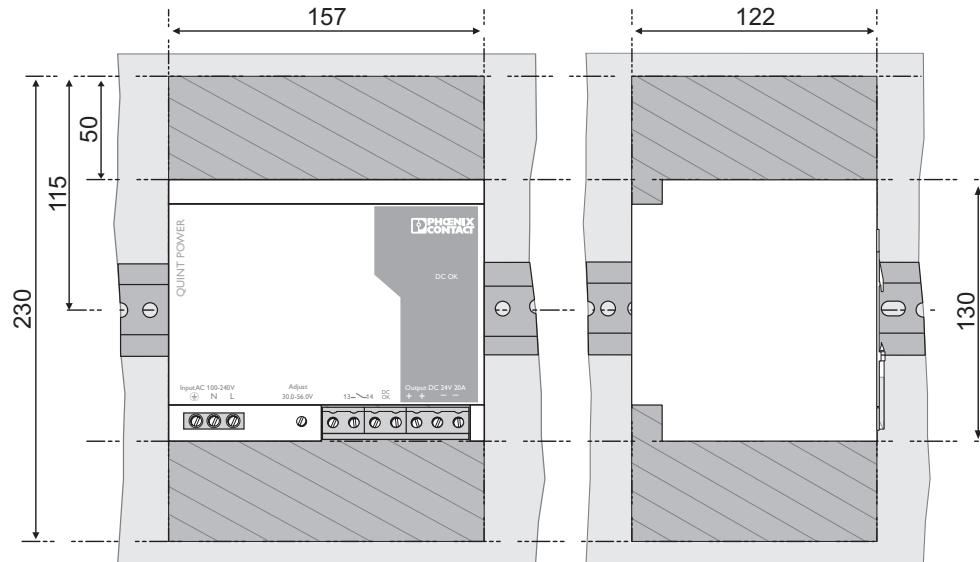
In order to guarantee sufficient convection, we recommend observing the following minimum distance to other modules: 5 cm in a vertical direction and 0 cm in a horizontal direction.



The power supply unit can be snapped onto all DIN rails in acc. with EN 60715. They must be horizontal (connecting terminal blocks below).

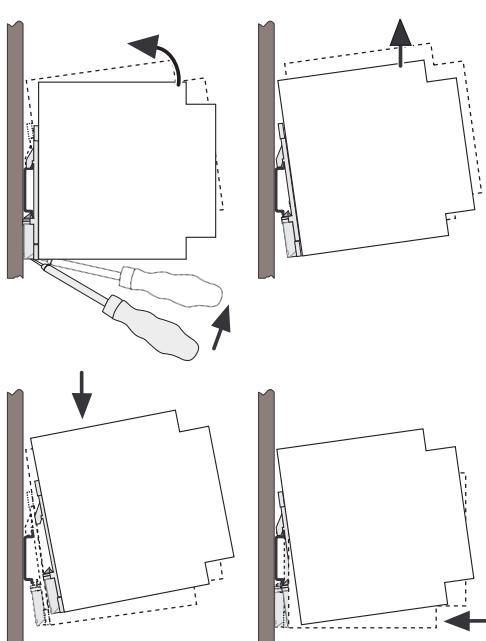
QUINT-PS-100-240AC/48DC/10

Installation position



Slim-style installation: Installation depth 125 mm (+ DIN rail)

Low-profile installation: Installation depth 160 mm (+ DIN rail)
(condition at the time of delivery)



Low-profile installation:

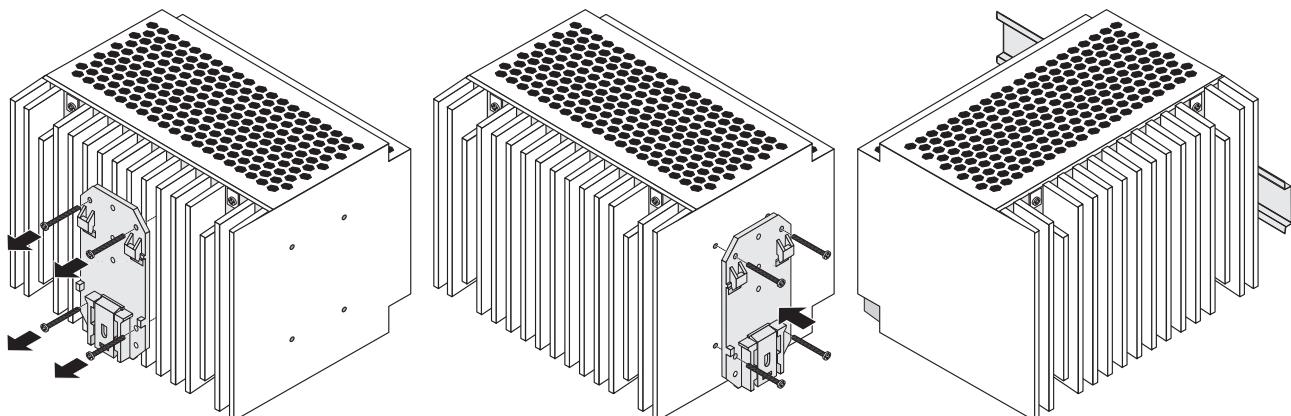
Assembly

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

Dismantling

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

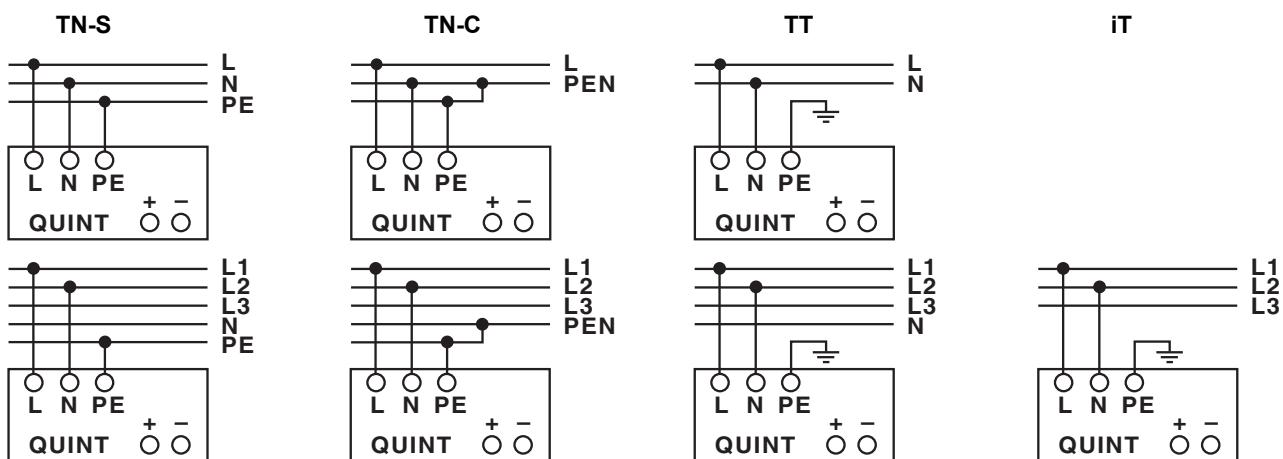
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Slim-style installation:

Slim-style installation can be achieved by mounting the device at right-angles to the DIN rail. Mount the DIN rail adapter (UTA 107) as described in the figure. No additional mounting material is required. Fixing screws: Torx T10 (torque 0.8 - 0.9 Nm).

Connection, network forms 100...240 V AC networks



The 100...240 V AC connection is established using the L, N and PE screw connections.

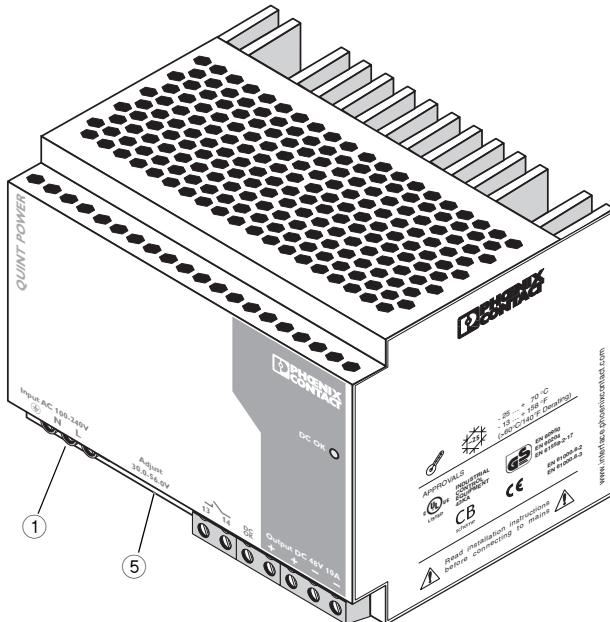
The device can be connected to 1-phase AC networks or to two of the phase conductors of three-phase systems (TN, TT or iT networks in acc. with VDE 0100-300/IEC 60364-3) with nominal voltages of 100 V AC ...240 V AC.



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

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Input



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. The primary side line protection, for example, is suitable. For device protection, there is an internal fuse. Additional device protection is not necessary.

Recommended backup fuse for mains protection

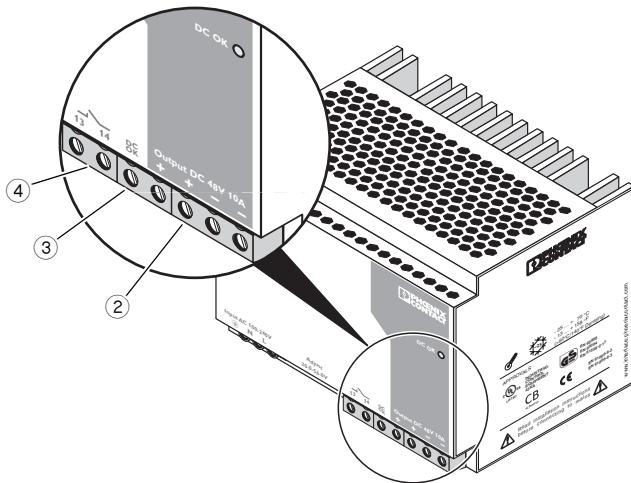
Power circuit breaker 10 A or 16 A, characteristic B (or identical function). In DC applications, a suitable fuse must be wired in upstream.



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

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Output



Make sure that all output lines are dimensioned according to the maximum output current or are separately protected. The cables on the secondary side must have sufficiently large cross sections in order to keep the voltage drops on the lines as low as possible.

The connection is established using screw connections on the screw connection of the DC output:
 48 V DC: "+" and "-"; DC OK switching output active: "DC OK" and "-"; DC OK output floating: "13" and "14".
 The set output voltage is 48 V DC at the time of delivery. The output voltage can be set on the potentiometer.

Protection of the secondary side

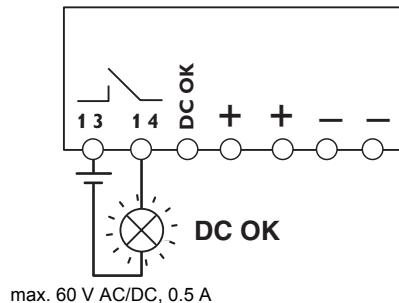
The device is electronically protected against short circuit and idling. In the event of a malfunction, the output voltage is limited to 60 V DC. Make sure that all output lines are dimensioned according to the maximum output current or are separately protected! The cables on the secondary side should have large cross sections in order to keep the voltage drops on the lines to a minimum.

Signaling

An active signal output and a floating signal contact are provided to monitor the function. The DC OK LED also enables the evaluation of function of power supply directly on the operation site.

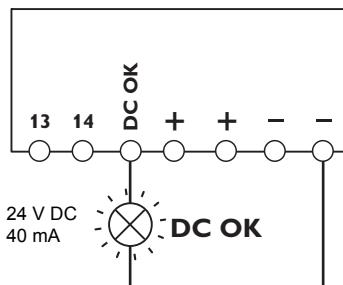
| DC OK LED | ON | Flashing | OFF |
|-------------------------------|---|--|---|
| Active DC OK switching output | U = +24 V (in reference to "-") | U = 0 V (in reference to "-") | U = 0 V (with reference to "-") |
| Floating DC OK output | Closed | Open | Open |
| Voltage at the output | Output voltage > 90% of the set voltage | Output voltage < 90% of the set voltage | No voltage at the output |
| Meaning | Output voltage and output current OK | QUINT POWER is in operation, but there is a fault in the consumer, the current consumption is greater than I_{BOOST} or the output is short circuited. | QUINT POWER is out of operation because there is no mains voltage, the fuse on the primary side has tripped, or the device is faulty. |

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Floating contact

The floating signal contact opens and indicates that the set output voltage has undershot by more than 10%. Signals and ohmic loads of up to a maximum of 60 V and currents of up to a maximum of 0.5 A can be connected. A suitable protective circuit (e.g. free-wheeling diode) is necessary for heavily inductive loads such as a relay.

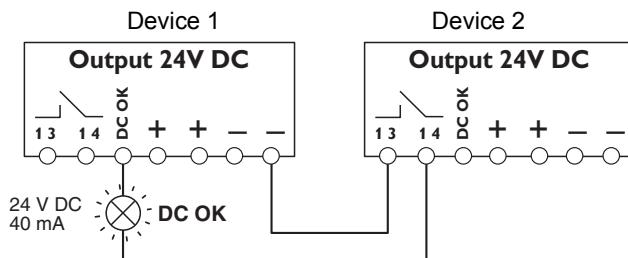


Active signal output

The 24 V DC signal is applied between the "DC OK" and "—" connecting terminal blocks and can carry up to 40 mA. This signal output signalizes when the output voltage is more than 10% below the output voltage by switching from "active high" to "low".

The DC OK signal is decoupled from the power output. It is thus not possible for parallel switched devices to provide external supply.

The 24 V DC signal can be directly connected to a logic input for evaluation.

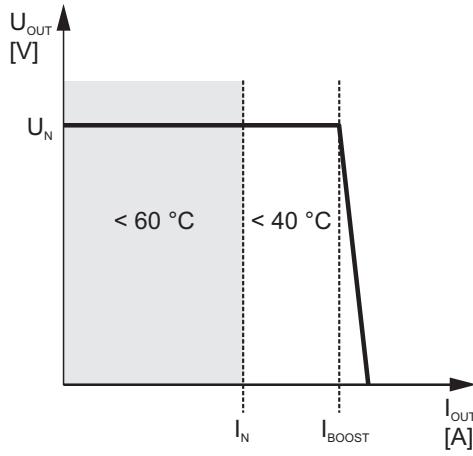


Signal loop

Monitoring two devices: Use the active signal output of device 1 and loop in the floating signal output of device 2. In the event of malfunctioning, a common alarm is output. Any number of devices can be looped in. This signal combination saves wiring costs and logic inputs.

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Function



Output characteristic curve

At ambient temperatures $T_{\text{amb}} < +40^{\circ}\text{C}$, the device can continuously provide current I_{BOOST} at nominal voltage. In the event of a higher load, the operating point follows the U/I characteristic curve depicted in the figure. In the event of a short circuit or overload, the output current is limited to I_{BOOST} . Thereby, the device does not switch off, but rather supplies a continuous output current. The secondary voltage is reduced until the short circuit on the secondary side has been remedied.

The U/I characteristic curve ensures that the heavily capacitive loads and the consumers with DC/DC converters in the input circuit can be fed without problems using QUINT POWER.

Downstream fuses are triggered reliably. Selectivity in the design of your system is guaranteed at all times.

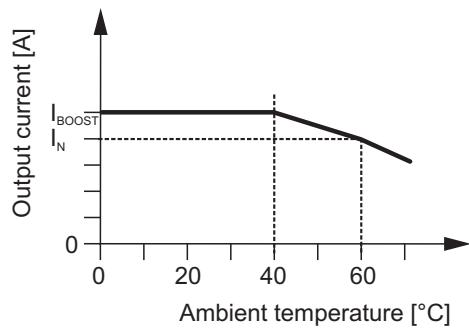
$U_N = 48 \text{ V}$

$I_N = 10 \text{ A}$

$I_{\text{BOOST}} = 13 \text{ A}$

$P_N = 480 \text{ W}$

$P_{\text{BOOST}} = 625 \text{ W}$

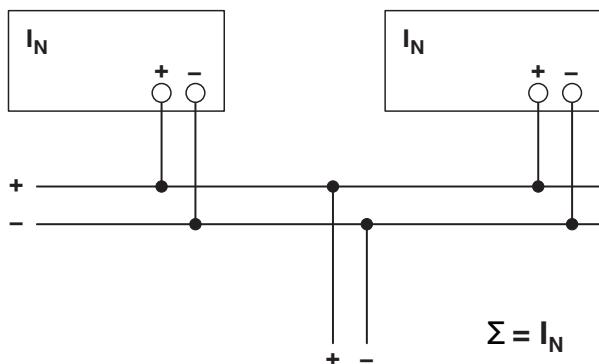


Thermal behavior

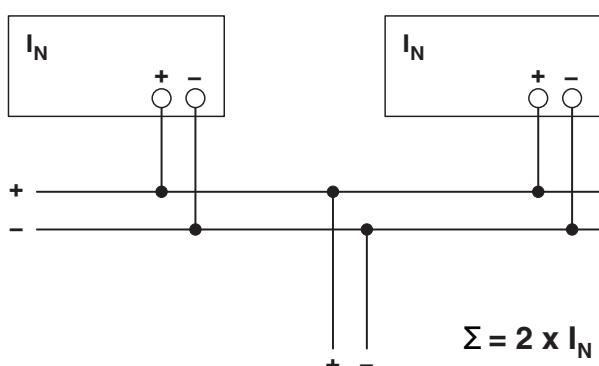
With an ambient temperature of up to $+40^{\circ}\text{C}$, the device supplies the continuous output current of I_{BOOST} . The device can supply a nominal output current of I_N with ambient temperatures of up to $+60^{\circ}\text{C}$. In the case of ambient temperatures above $+60^{\circ}\text{C}$, the output current must be reduced by 2.5% per Kelvin increase in temperature. The device does not switch off at ambient temperatures of $+70^{\circ}\text{C}$ 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.

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Parallel operation

Devices of the same type can be connected in parallel to enable both redundancy and an increase in efficiency. No other alignment is necessary when in the state of delivery. If the output voltage is adjusted, a uniform distribution of power is guaranteed by setting all parallel operated power supply units to exactly the same output voltage. To ensure symmetrical distribution of power, we recommend designing all cable connections from the power supply unit to a busbar of the same length and with the same conductor cross section. The system makes it advisable to install a protective circuit at the output of each device when more than two power supply units are connected in parallel (e.g. decoupling diode or DC fuse). This prevents high reverse feed currents in the event of a secondary device fault.


Redundant operation

Redundant circuits are suitable for the supply of systems which make especially high requirements on the operational safety. If a fault occurs in the primary circuit of the first power supply unit, the second device automatically takes over the entire power supply, without interruption, and vice versa. For this reason, the power supply units to be connected in parallel are dimensioned in such a way that the total current requirement of all consumers can be completely covered by one power supply unit. 100% redundancy makes external decoupling diodes necessary (QUINT-DIODE/40, Order No. 2938963)!


Increased performance

For n parallel connected devices, the output current can be increased to $n \times I_N$. Parallel connection to increase efficiency is used for the expansion of existing systems. It is advisable to use parallel connection if the power supply unit does not cover the current requirement of the most powerful consumer. Otherwise the consumers should be spread among individual devices independent of one another. A maximum of five devices can be connected in parallel!