Power Supply Unit, Primary Switched for Universal Use QUINT-PS-24DC/24DC/10

QUINT POWER provides:

- Preventive function monitoring through professional signaling
- Global use with an international approval package
- Safe supply of all 24 V loads in DC networks
- Flexible use due to a wide temperature range



1. Short Description

The QUINT-PS-24DC/24DC/10 DC/DC converter converts DC voltages of 18 - 32 V DC into an adjustable and regulated nominal output voltage of 22.5 - 28.5 V DC.

Preventive function monitoring diagnoses impermissible operating states and minimizes downtimes in your system. An active transistor output and a floating relay contact are provided for remote monitoring. The short-circuit current limit and surge protection offer additional safety.

An international approval package including UL 60950 for IT equipment and UL 508 for industrial control equipment enables the device to be used globally. Safe operation even in adverse conditions is emphasized by its approval by Germanischer Lloyd and the wide temperature range of -25°C to +70°C.

The QUINT POWER product range offers primary-switched power supply units for universal use up to 960 W for connection to single-phase (100 - 240 V AC) and 3-phase (3 x 400 - 500 V AC) AC networks. It is based on a uniform design and can be simply snapped onto EN DIN rails.

Depending on the type, regulated and adjustable output voltages of 12 V DC, 24 V DC or 48 V DC are available for output currents of 2.5 A, 5 A, 10 A, 20 A, 30 A, and 40 A. If required, the 24 V DC devices can be extended to include uninterruptible solutions. For short power interruptions, the QUINT BUFFER buffer module supplies power from maintenance-free electrolytic capacitors. In the case of longer failures, the QUINT DC-UPS uninterruptible power supply unit with long-life lead-acid batteries is used. The seamless range also includes products for the Ex area.

2. Area of Application

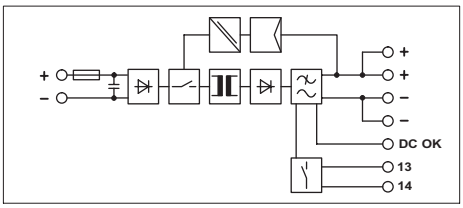
Sensitive loads in particular require a constant voltage for safe operation.

The QUINT-PS-24DC/24DC/10 ensures, for example, that output voltages from unregulated transformers or fluctuating supply networks with battery back-up are converted into a regulated DC voltage. The device also enables the electrical isolation of two DC networks.

Several devices can be connected in parallel to increase redundancy and power. A redundant structure can be created in various supply networks by combining the DC/DC converter with QUINT POWER power supplies of the same type.

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3. Technical Data





QUINT-PS-24DC/24DC/10

DC/DC converter

7 mm	Solid [mm²]	Stranded [mm²]	AWG	Torque [Nm]	[lb in.]
Input	0.2 - 2.5	0.2 - 2.5	25 - 14	0.5 - 0.6	4.4 - 5.3
Output	0.2 - 2.5	0.2 - 2.5	25 - 14	0.5 - 0.6	4.4 - 5.3
Signal	0.2 - 2.5	0.2 - 2.5	25 - 14	0.5 - 0.6	4.4 - 5.3

Description	Type	Order No.	Pcs. Pkt.
Power supply unit, primary switched for universal use	**QUINT-PS-24D/24DC/10**	**28 66 37 8**	1

Technical Data

Input Data ①	
Nominal input voltage	24 V DC
Input voltage range	18 - 32 V DC
Current consumption (for nominal values)	11.4 A (24 V DC), approximately
Inrush current limiting	20 A, approximately
Mains buffering for a nominal load (typical)	3 ms (24 V DC), approximately
Switch-on time after applying the mains voltage	< 1 s
Transient surge protection	Varistor
Input fuse, internal	T25AL32V
Output Data ②	
Nominal output voltage U_N/tolerance	24 V DC ±1%
Setting range for the output voltage	22.5 - 28.5 V DC
Output current (continuous) during convection cooling and nominal values Nominal output current I_N -25°C to +60°C	10 A (U_{out} = 24 V DC)
Derating	From +60°C, 2.5% per Kelvin
Short-circuit current limit	18 A, approximately
Startup of capacitive loads	Unlimited
System deviation on: Static load change 10 - 90%	< 1%, typical
Dynamic load change 10 - 90%	< 2%, typical
Input voltage change ±10%	< 0.1%, typical
Maximum power dissipation No load/nominal load	2 W/28 W, approximately
Efficiency	> 88% (for nominal values)
Response time U_{OUT} (10% - 90%)	< 2 ms
Residual ripple/switching peaks (20 MHz)	< 100 mV_{pp} (for nominal values)
Can be connected in parallel	To increase redundancy and power
Internal surge protection	Yes, limited to 35 V DC, approximately
Resistance to return supply	35 V DC
Signal Output Data	
DC OK (active) ③ (U_{out} > 21.5 x U_N ≙ high signal)	+24 V DC signal (with regard to the device weight), 40 mA, maximum
DC OK (electrically isolated) ④ (U_{out} > 21.5 x U_N ≙ contact closed)	30 V AC/DC, maximum; 1 A, maximum
LED ⑥ (U_{out} > 21.5 x U_N ≙ LED permanently on)	Green LED

General Data		
Insulation voltage:	Input/output	1.5 kV AC (type test)/1 kV AC (routine test) 500 V DC (routine test)
Approval package		
Electrical equipment of machines Safety transformers for switched-mode power supply units Electrical safety (of IT equipment) Industrial control equipment Electronic equipment for use in electrical power installations Safety extra-low voltage		EN 60 204 (Surge Voltage Category III) EN 61 558-2-17 EN 60950/VDE 0805 UL/C-UL Recognized UL 60 950 UL/C-UL Listed UL 508 EN 50 178 (VDE 0160) LISTED PELV (EN 60 204) SELV (EN 60 950) VDE 0100-410
Safe isolation Basic requirements for safe isolation in electrical equipment		DIN VDE 0106-101
Mounting position		On horizontal NS 35 DIN rail according to EN 60715
Degree of protection		IP20
Class of protection		III
MTBF		> 500,000 h according to IEC 1709 (SN 29 500)
Housing version		AluNox (AlMg1), closed
Dimensions (W x H x D) + DIN rail		Default upon delivery: (80 x 130 x 125) mm Rotated 90°: (122 x 130 x 83) mm
Weight		0.95 kg, approximately

Climatic Data		
Ambient temperature	Operation	-25°C to +70°C (> +60°C derating)
	Storage	-40°C to +85°C
Humidity		Up to 95% at +25°C, no condensation
Vibration	According to IEC 68-2-6	< 15 Hz, amplitude ±2.5 mm/15 Hz - 150 Hz, 2.3g, 90 minutes
Shock	According to IEC 68-2-27	30g in all space directions
Pollution degree		2 (according to EN 50 178)
Climatic category		3K3 (according to EN 60 721)

CE

Conformance With EMC Directive 89/336/EEC and Low Voltage Directive 73/23/EEC

EMC (Electromagnetic Compatibility) **Noise Immunity According to EN 61000-6-2:**			**Requirements** **EN 61 000-6-2**		**QUINT-PS-24DC/24DC/10**
Electrostatic discharge (ESD)	EN 61000-4-2[3]	Housing Contact discharge: Air discharge:			Level 3 8 kV 8 kV
Electromagnetic HF field	EN 61000-4-3[2]	Housing Frequency: Field strength:			Level 3 80 - 2000 MHz 10 V/m
Fast transients (burst)	EN 61000-4-4[3]	Input: Output: Signal:	2 kV 2 kV 1 kV	asymmetrical[5] asymmetrical[5] asymmetrical[5]	2 kV (Level 3) 2 kV (Level 3) 1 kV (Level 2)
Surge current loads (surge)	EN 61000-4-5[3]	Input: Output/signal:	2 kV 1 kV	asymmetrical[5] symmetrical[4]	2 kV (Level 3) 1 kV
Conducted interference	EN 61000-6-2	I/O/S: Frequency: U_0:	0.15 - 80 MHz 10 V	asymmetrical[5]	Level 3 0.15 - 80 MHz 10 V
Noise Emission According to EN 61000-6-3:					
Radio interference	EN 55011		Class A[6]		EN 55011 (EN 55022) Class B[7]
Radio interference	EN 55011		Class A[6]		EN 55011 (EN 55022) Class B[7]

EN 55011 corresponds to CISPR11/EN 55022 corresponds to CISPR22
EN 61000 corresponds to IEC 1000

[2] Criterion A: Normal operating characteristics within the specified limits.
[3] Criterion B: Temporary adverse effects on the operating characteristics which the device corrects automatically.

[4] Symmetrical: Cable to cable
[5] Asymmetrical: Cable to ground

[6] Class A: Industrial applications
[7] Class B: Industrial and domestic applications

4. Device View, Connections, and Control Elements

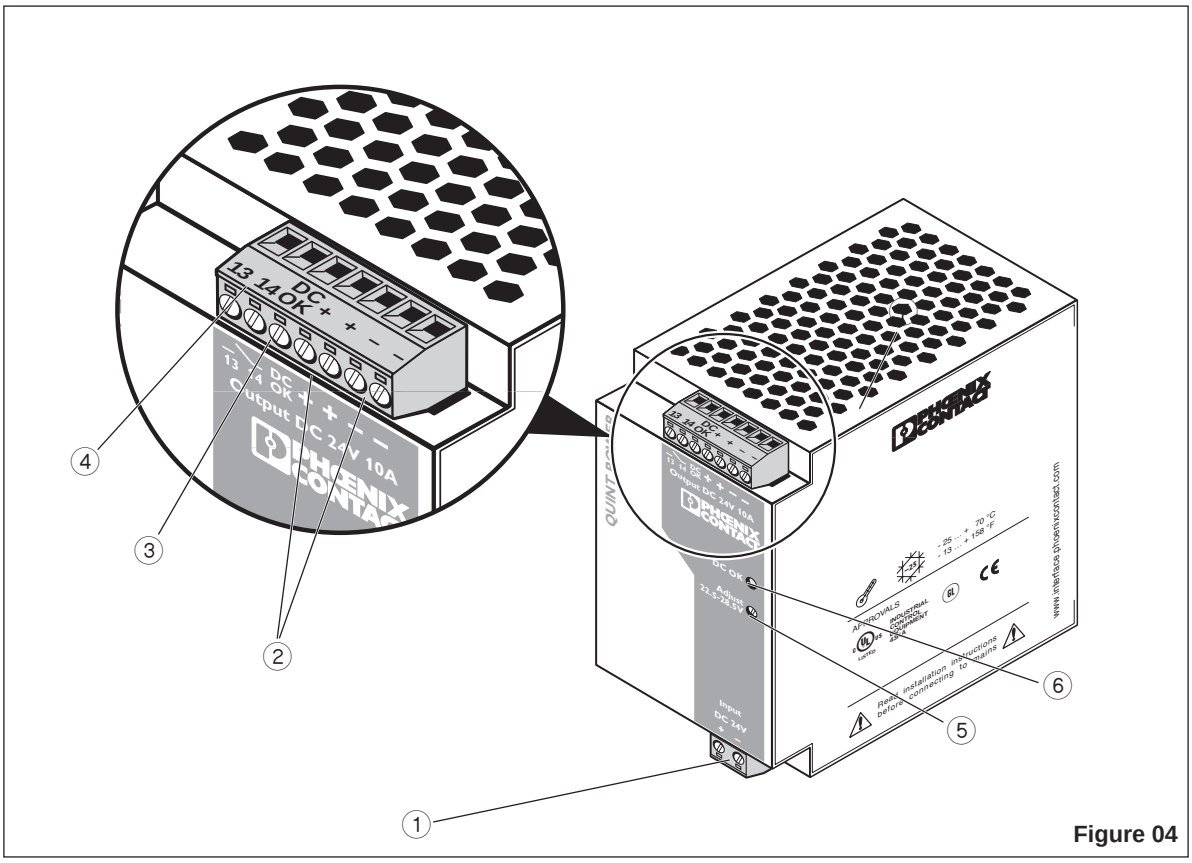


Figure 04

① **AC input:**
18 - 32 V AC input voltage
(0.2 mm^2 to 2.5 mm^2 solid)
(0.2 mm^2 to 2.5 mm^2 stranded)
(25 - 14 AWG)
Internal fuse T 25 A

② **DC output:**
24 V DC output voltage (default),
can be set from 22.5 - 28.5 V DC using
a potentiometer ⑤ (0.2 mm^2 to 2.5 mm^2 solid)
(0.2 mm^2 to 2.5 mm^2 stranded) (25 - 14 AWG)
The device is idling-proof and short-circuit-proof.

③ **DC OK output active**

④ **DC OK output electrically isolated**

⑤ **Potentiometer (covered) 22.5 - 28.5 V DC**

⑥ **DC OK LED**

⑦ **Universal DIN rail adapter UTA 107**

5. Safety Notes and Warning Instructions

To ensure that the device can be operated safely and all functions can be used, please read these instructions carefully.

QUINT POWER is a built-in device. **Installation and startup** must only be carried out by qualified personnel. The relevant country-specific regulations (e.g. VDE, DIN) must also be observed.

Before startup it is particularly important to ensure that:

- All supply lines have sufficient fuse protection and are the correct size.
- All output cables are the correct size for the maximum device output current or have separate fuse protection.
- Sufficient convection is ensured.

6. Installation

6.1. Mounting

The power supply unit can be snapped onto all DIN rails according to EN 60715 and should be mounted horizontally (input terminal blocks facing downwards).

Installation Dimensions

To ensure sufficient convection, we recommend the following minimum spacing be used between modules:

5.0 cm for vertical installation
0.0 cm for horizontal installation

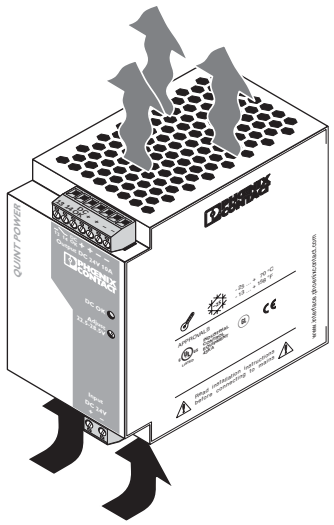


Figure 05

Narrow mounting position:
Installation depth: 125 mm (+ DIN rail)

Flat mounting position:
Installation depth: 83 mm (+ DIN rail)

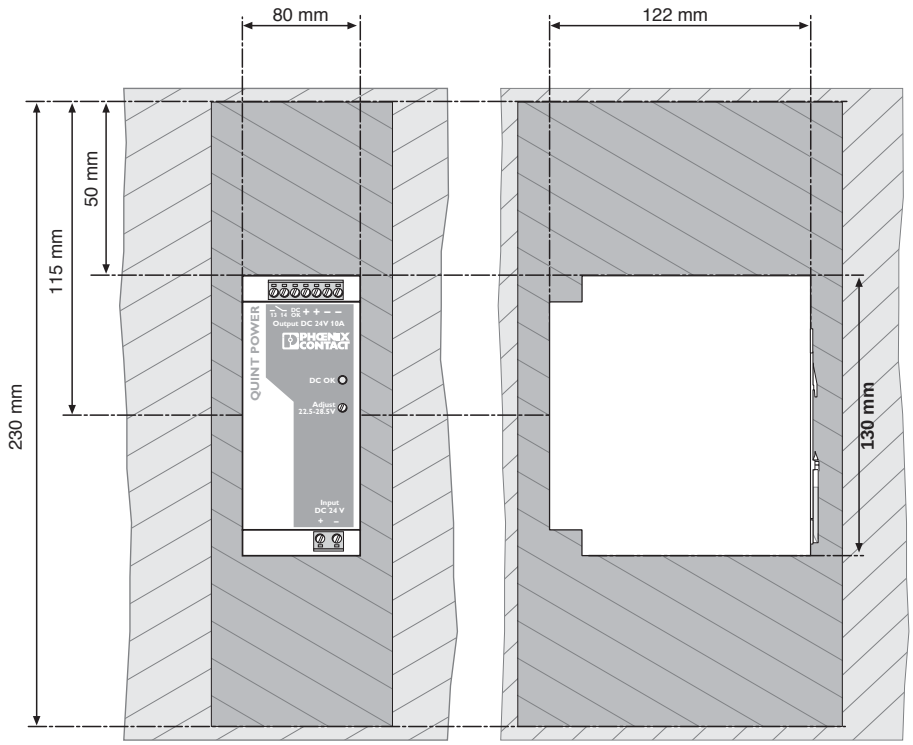


Figure 06

6.2. Narrow Mounting Position

The device is supplied ready for installation in a narrow mounting position.

Mounting:

Place the module with the DIN rail guideway on the **top edge** of the DIN rail and then snap it **downwards**.

Removal:

Release the snap-on catch using a screwdriver and then detach the module from the **bottom edge** of the DIN rail.

6.3. Flat Mounting Position

A flat mounting position can be achieved by mounting the module onto the DIN rail at a 90° angle. To do this, mount the DIN rail adapter (UTA 107) ⑦ as shown in Figure 08. No additional assembly material is required. Mounting screws: Torx T10 (torque 0.8 - 0.9 Nm).

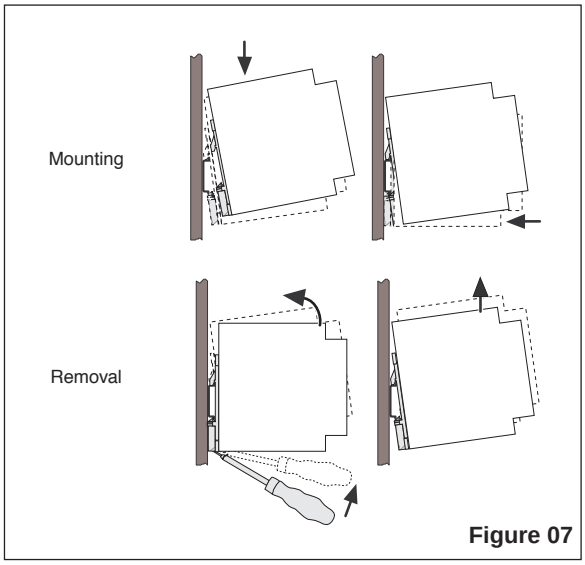


Figure 07

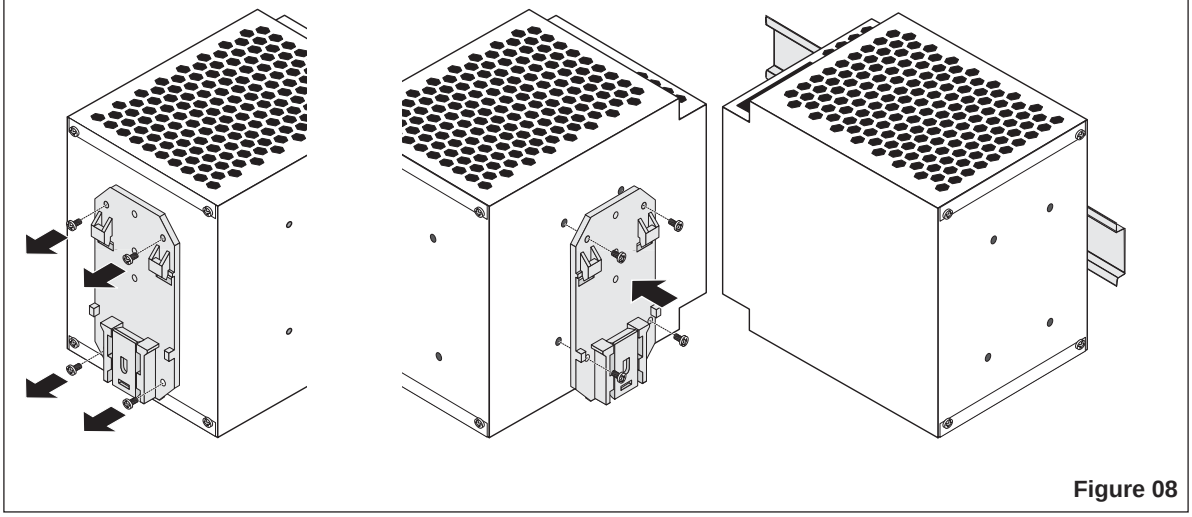


Figure 08

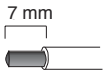
6.4. Connection:

The device is equipped with COMBICON connectors. This reliable user-friendly connection method enables quick device connection and visible isolation of the electrical connection, if required.
Only operate connectors when the power is switched off.

The following cable cross sections can be connected:

	Solid [mm²]	Stranded [mm²]	AWG	Torque [Nm]	[lb in.]
① Input:	0.2 - 2.5	0.2 - 2.5	25 - 14	0.5 - 0.6	4.4 - 5.3
② Output:	0.2 - 2.5	0.2 - 2.5	25 - 14	0.5 - 0.6	4.4 - 5.3
③ Signal:	0.2 - 2.5	0.2 - 2.5	25 - 14	0.5 - 0.6	4.4 - 5.3

For reliable and safe-to-touch connections: Strip 7 mm from the connector ends.



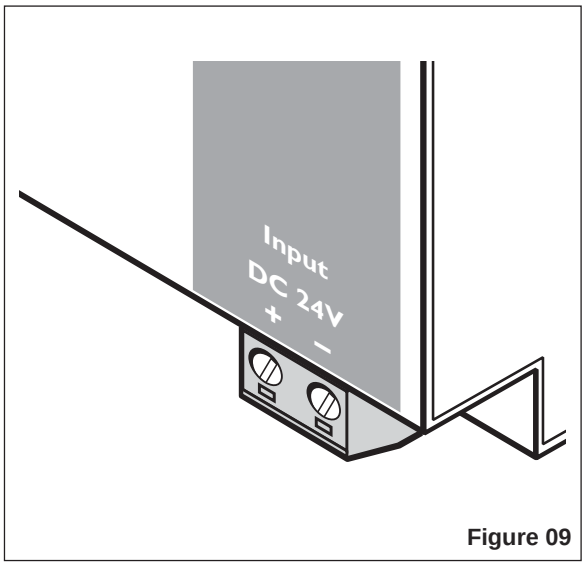


Figure 09

6.5. Input (①, Figure 09)

The 24 V DC connection is made using the "+" and "-" screw connections.

Protecting the Primary Side

The device must be installed according to the specifications of EN 60 950.

Device protection is not required, as an internal fuse is present.

**If the internal fuse is blown, this is most probably due to a device fault.
In this case, the device should be checked in the factory.**

6.6. Output (Figure 10)

The 24 V DC connection is made using the "+" and "-" screw connections on the screw connection ②. The output voltage set upon delivery is 24 V DC.

The output voltage can be adjusted from 22.5 to 28.5 V DC on the potentiometer ⑤.

Protecting the Secondary Side:

The device is electronically short-circuit-proof and idling-proof. In the event of an error, the output voltage is limited to a maximum of 35 V DC.

It should be ensured that all output cables are the correct size for the maximum output current or have separate fuse protection.

The cable cross sections in the secondary circuit should be large enough to keep the voltage drops on the cables as low as possible.

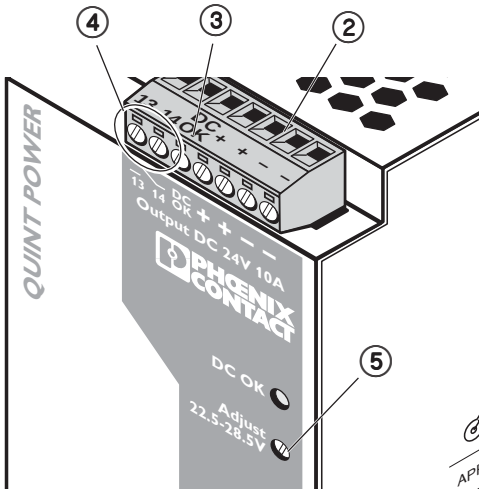


Figure 10

Signaling

Both DC OK outputs are used for preventive function monitoring of the power supply. A floating signal contact ④ and an active DC OK signal ③ are available. In addition, the DC OK LED ⑥ can be used to evaluate the function of the power supply directly at the installation location.

Floating Contact (Figure 11)

When opened, the floating signal contact indicates that the output voltage has fallen more than 10% below the set value. Signals and ohmic loads up to a maximum of 30 V and currents up to a maximum of 1 A can be switched.

With heavy inductive loads, e.g., a relay, a suitable protective circuit (e.g., free-wheeling diode) is required.

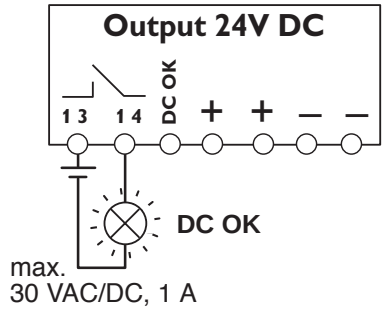


Figure 11

Active Signal Output (Figure 12)

The 24 V DC signal is between the "DC OK" and "-" connection terminal blocks and can be loaded with 40 mA maximum. This signal output indicates that the output voltage has fallen more than 10% below the set value when "active high" changes to "low".

The DC OK signal is isolated from the power output. This ensures that a separate supply does not enter from devices connected in parallel.

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

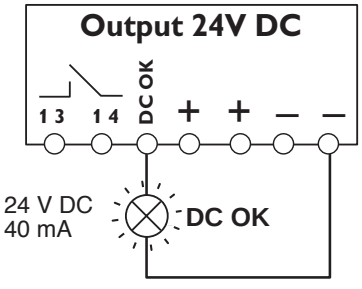


Figure 12

Signal Loop (Figure 13)

The two signal outputs mentioned above can be combined easily.

Example: Monitoring two devices

Use the active alarm output of device 1 and loop in the electrically isolated alarm output of device 2. In the event of an error, a group error message is generated. Any number of devices can be looped.

This signal combination saves on wiring costs and logic inputs.

DC OK LED

The green DC OK LED enables local function evaluation in the control cabinet.

LED ON	Normal operation of the power supply
LED OFF	1) The output voltage has fallen by more than 10%. There is a secondary load short circuit or overload. 2) No mains voltage is present or there is a device fault.

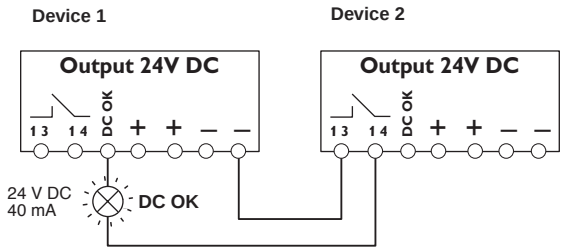


Figure 13

7. Function

7.1. Output Characteristic Curve

At ambient operating temperatures T_{amb} < +60°C, the device can continuously supply 10 A at a 24 V DC output voltage (P_{out} = 240 W).

With heavy loads, the working point demonstrates the U/I characteristic curve shown in Figure 13. The output current is limited to 18 A, approximately.

The secondary voltage is reduced until the short circuit on the secondary side is removed.

The U/I characteristic curve ensures that both heavy capacitive loads and devices with DC/DC converters can be supplied by QUINT POWER in the input circuit without any problems.

Connected fuses are reliably tripped. The selectivity in your system configuration is ensured at all times.

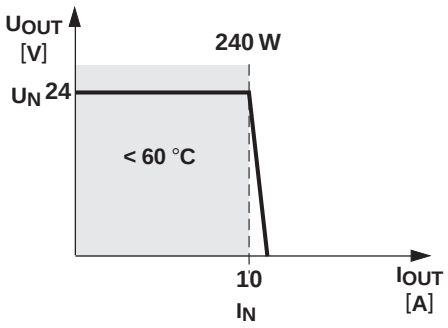


Figure 14

7.2. Temperature Response

At an ambient operating temperature of up to +60°C, the device continuously supplies an output current of 10 A.

The output power must be decreased by 2.5% per Kelvin temperature increase for ambient operating temperatures over +60°C.

At ambient operating 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.

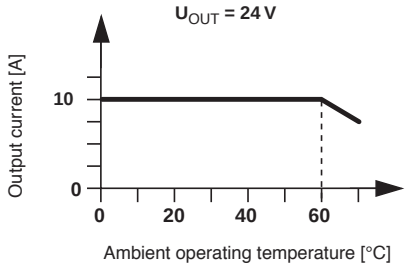


Figure 15

7.3. Parallel Operation

Devices of the same type can be connected in parallel to increase both redundancy and power. The default setting does not have to be adjusted.

If the output voltage is adjusted, an even current distribution can be ensured by precisely setting all power supply units that are operated in parallel to the same output voltage.

To ensure symmetrical current distribution we recommend that all cable connections from the power supply unit to the DIN rail are the same length and have the same cross section.

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

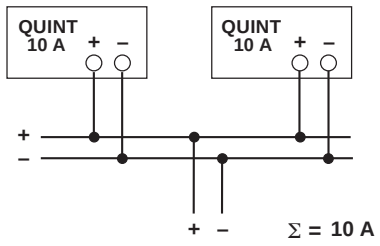


Figure 16

7.4. Redundancy Operation (Figure 16)

Redundant connections are designed for supplying systems, which place particularly high requirements 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 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, e.g., QUINT diode/40 (Order No. 2938 96 3).

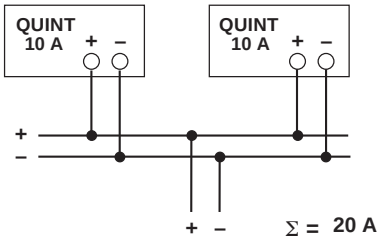


Figure 17

7.5. Power Increase (Figure 17)

The output current can be increased to **n x I_N** where **n** is the number of devices connected in parallel.

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 over independent individual devices.

A maximum of five devices can be connected in parallel.

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