

# QUINT4-PS/24DC/24DC/10/PT - DC/DC converter



2910120

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Primary-switched DC/DC converter, QUINT POWER, DIN rail mounting, SFB Technology (Selective Fuse Breaking), input: 24 V DC, output: 24 V DC / 10 A

## Product description

QUINT DC/DC converter with maximum functionality

DC/DC converters alter the voltage level, regenerate the voltage at the end of long cables or enable the creation of independent supply systems by means of electrical isolation.

QUINT DC/DC converters magnetically and therefore quickly trip circuit breakers with six times the nominal current, for selective and therefore cost-effective system protection. The high level of system availability is additionally ensured, thanks to preventive function monitoring, as it reports critical operating states before errors occur.

## Your advantages

- Most powerful output side: easy system expansion, reliable heavy load startup and miniature circuit breaker tripping
- Most comprehensive signaling: preventive function monitoring reports critical operating states before errors occur
- Free selection between Push-in and screw connection
- Available pre-configured: from a batch quantity of just 1

## Technical data

### Input data

Nominal input voltage range	24 V DC
Input voltage range	24 V DC -25 % ... +40 %
Wide-range input	no
Electric strength, max.	35 V DC (60 s)
Inrush current	typ. 1.5 A
Inrush current integral ( $I^2t$ )	< 0.02 A <sup>2</sup> s
Inrush current limitation	1.5 A (after 1 ms)
Mains buffering time	typ. 11 ms (24 V DC)
Current consumption	13.8 A (24 V DC)
Typical response time	300 ms (from SLEEP MODE)
Switch-on time	< 1 s
Input fuse	30 A (slow-blow, internal)
Recommended breaker for input protection	16 A ... 20 A (Characteristic B, C, D, K or comparable)

### Signal Remote (configurable)

Connection labeling	3.3 +
Function	Output power ON/OFF (remote)
Default	Output power ON (>40 k $\Omega$ /24 V DC/open bridge between REM and SGnd)

### Output data

Efficiency	typ. 93.3 % (24 V DC)
Output characteristic	U/I Advanced
	Smart HICCUP
	FUSE MODE
Nominal output voltage	24 V DC
Setting range of the output voltage ( $U_{Set}$ )	24 V DC ... 29.5 V DC (> 24 V DC, constant capacity)
Nominal output current ( $I_N$ )	10 A
Static Boost ( $I_{Stat.Boost}$ )	12.5 A
Dynamic Boost ( $I_{Dyn.Boost}$ )	20 A (5 s)
Selective Fuse Breaking ( $I_{SFB}$ )	60 A (15 ms)
Magnetic circuit breaker tripping	A1...A6 / B2...B6 / C1...C3 / Z1...Z6
Short-circuit-proof	yes
No-load proof	yes
Output power ( $P_N$ )	240 W
Output power ( $P_{Stat. Boost}$ )	300 W
Output power ( $P_{Dyn. Boost}$ )	480 W (5 s)
Feedback voltage resistance	$\leq$ 35 V DC
Protection against overvoltage at the output (OVP)	$\leq$ 32 V DC
Residual ripple	< 50 mV <sub>PP</sub>
Control deviation	< 1 % (change in load, static 10 % ... 90 %)

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Control deviation	< 1 % (change in load, static 10 % ... 90 %)
Control deviation	< 1 % (change in load, static 10 % ... 90 %)
Rise time	< 100 ms ( $U_{OUT}$ (10 % ... 90 %))
Connection in series	yes
Maximum no-load power dissipation	< 5 W
Power loss nominal load max.	< 16 W
Power dissipation SLEEP MODE	< 2 W
Connection in parallel	yes, for redundancy and increased capacity

## Signal Out 1 (configurable)

Connection labeling	3.5 +
Digital	0 V DC
	24 V DC
	20 mA
Signal option	Output voltage
	Output current
	Output power
	Operating hours
	Early warning of high temperatures
	OVP voltage limitation active
Default	$U_{IN}$ input voltage OK

## Signal Out 2 (configurable)

Connection labeling	3.6 +
Digital	0 V DC
	24 V DC
	20 mA
Default	Output power
Signal option	Output voltage
	Output current
	Operating hours
	Early warning of high temperatures
	OVP voltage limitation active
Analog	4 mA ... 20 mA $\pm 5$ % (Load $\leq 400 \Omega$ )
Signal option	Output voltage
	Output current
	Output power

## Signal relay 13/14 (configurable)

Connection labeling	3.1, 3.2
Switch contact (floating)	floating
Maximum contact load	24 V DC
	1 A
	30 V AC
	0.5 A

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Default	Output voltage
Signal option	Output current
	Output power
	Operating hours
	Early warning of high temperatures
	OVP voltage limitation active
	U <sub>IN</sub> input voltage OK

## Signal ground SGnd

Connection labeling	3.4 +
Function	Signal ground
Reference potential	to OUT1, OUT2, REM

## Connection data

### Input

Position	1.x
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### Conductor connection

Connection method	Push-in connection
rigid	0.2 mm <sup>2</sup> ... 6 mm <sup>2</sup>
flexible	0.2 mm <sup>2</sup> ... 6 mm <sup>2</sup>
flexible with ferrule without plastic sleeve	0.2 mm <sup>2</sup> ... 4 mm <sup>2</sup>
flexible with ferrule with plastic sleeve	0.2 mm <sup>2</sup> ... 4 mm <sup>2</sup>
rigid (AWG)	24 ... 10
Stripping length	10 mm

### Output

Position	2.x
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### Conductor connection

Connection method	Push-in connection
rigid	0.2 mm <sup>2</sup> ... 6 mm <sup>2</sup>
flexible	0.2 mm <sup>2</sup> ... 6 mm <sup>2</sup>
flexible with ferrule without plastic sleeve	0.2 mm <sup>2</sup> ... 4 mm <sup>2</sup>
flexible with ferrule with plastic sleeve	0.2 mm <sup>2</sup> ... 4 mm <sup>2</sup>
rigid (AWG)	24 ... 10
Stripping length	10 mm

### Signal

Position	3.x
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### Conductor connection

Connection method	Push-in connection
rigid	0.2 mm <sup>2</sup> ... 1 mm <sup>2</sup>
flexible	0.2 mm <sup>2</sup> ... 1.5 mm <sup>2</sup>
flexible with ferrule without plastic sleeve	0.2 mm <sup>2</sup> ... 1.5 mm <sup>2</sup>

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flexible with ferrule with plastic sleeve	0.2 mm <sup>2</sup> ... 0.75 mm <sup>2</sup>
rigid (AWG)	24 ... 16
Stripping length	8 mm

## Signaling

### LED signaling

Types of signaling	LED
	Floating signal contact
	Active signal output Out1 (digital, configurable)
	Active signal output Out2 (analog, configurable)
	Remote contact
	Signal ground SGnd
Signal threshold	> 100 % (LED lights up yellow, output power > 240 W)
	> 75 % (LED lights up green, output power > 180 W)
	> 50 % (LED lights up green, output power > 120 W)
	> 0.9 x U <sub>Set</sub> (LED lights up green)
	< 0.9 x U <sub>Set</sub> (LED flashes green)
	> 0.8 x U <sub>InNom</sub> (LED off)
	< 0.8 x U <sub>InNom</sub> (LED lights up yellow)

## Electrical properties

Number of phases	1.00
Insulation voltage input/output	4 kV DC (type test)
	2 kV DC (routine test)
Switching frequency	190.00 kHz ... 220.00 kHz (Auxiliary converter stage)
	67.00 kHz ... 135.00 kHz (Main converter stage)

## Product properties

Product type	DC/DC converters
Product family	QUINT POWER
MTBF (IEC 61709, SN 29500)	> 1380000 h (25 °C)
	> 800000 h (40 °C)
	> 340000 h (60 °C)

### Insulation characteristics

Protection class	Special with SELV input and output
Degree of pollution	2

### Life expectancy (electrolytic capacitors)

Current	5 A
Temperature	40 °C
Time	367721 h
Additional text	24 V DC

### Life expectancy (electrolytic capacitors)

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Current	10 A
Temperature	40 °C
Time	183860 h
Additional text	24 V DC

#### Life expectancy (electrolytic capacitors)

Current	10 A
Temperature	30 °C
Time	422400 h
Additional text	24 V DC

## Dimensions

#### Item dimensions

Width	50 mm
Height	130 mm
Depth	125 mm

#### Item dimensions with alternative mounting

Width	122 mm
Height	130 mm
Depth	53 mm

#### Installation dimensions

Installation distance right/left (active)	15 mm / 15 mm ( $\leq 70$ °C)
Installation distance right/left (passive)	0 mm / 0 mm ( $\leq 70$ °C)
Installation distance top/bottom (active)	50 mm / 50 mm ( $\leq 70$ °C)
Installation distance top/bottom (passive)	50 mm / 50 mm

## Mounting

Mounting type	DIN rail mounting
Assembly instructions	alignable: $P_N \geq 50\%$ , 5 mm horizontally, 15 mm next to active components, 50 mm vertically alignable: $P_N < 50\%$ , 0 mm horizontally, 40 mm vertically top, 20 mm vertically bottom
With protective coating	No

## Material specifications

Flammability rating according to UL 94 (housing / terminal blocks)	V0
Housing material	Metal
Hood version	Stainless steel X6Cr17
Side element version	Aluminum

## Environmental and real-life conditions

#### Ambient conditions

Degree of protection	IP20
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Ambient temperature (operation)	-25 °C ... 70 °C (> 60 °C Derating: 2,5 %/K)
Ambient temperature (storage/transport)	-40 °C ... 85 °C
Ambient temperature (start-up type tested)	-40 °C
Maximum altitude	≤ 5000 m (> 2000 m, observe derating)
Climatic class	3K22 (in accordance with EN 60721-3-3)
Max. permissible relative humidity (operation)	≤ 95 % (at 25 °C, non-condensing)
Shock	18 ms, 30g, in each space direction (according to IEC 60068-2-27)
Vibration (operation)	5 Hz ... 100 Hz resonance search 2.3g, 90 min., resonance frequency 2.3g, 90 min. (according to DNV GL Class C)

## Standards and regulations

### Overvoltage category

EN 61010-1	II (≤ 5000 m)
EN 62477-1	III (≤ 5000 m)

### Safety for measurement, control, and laboratory equipment

Standard designation	Electrical safety (of control and regulation devices)
Standards/specifications	IEC 61010-1

### Protective extra-low voltage

Standard designation	Protective extra-low voltage
Standards/specifications	EN 61010-1 (SELV) IEC 61010-2-201 (PELV)

### Mains voltage dips

Standard designation	Mains variation/undervoltage
Standards/specifications	EN 61000-4-29

### Railway applications

Standard designation	Railway applications
Standards/specifications	EN 50121-3-2 IEC 62236-3-2

## Approvals

### UL

Identification	UL Listed UL 61010-1
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### UL

Identification	UL Listed UL 61010-2-201
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### UL

Identification	UL 121201 & CSA C22.2 No. 213-17 Class I, Division 2, Groups A, B, C, D T4 (Hazardous Location)
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### CSA

Identification	CAN/CSA-C22.2 No. 61010-1-12
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## CSA

Identification	CAN/CSA C22.2 No. 61010-2-201:18
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## SIQ

Identification	Type tested (type approved)
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## SIQ

Identification	CB scheme (IEC 61010-1, IEC 61010-2-201)
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## Shipbuilding

Identification	DNV
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## Shipbuilding

Identification	ABS
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## Shipbuilding

Identification	BV
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## Shipbuilding

Identification	NK
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## Shipbuilding

Identification	LR
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## EMC data

Low Voltage Directive	Conformance with Low Voltage Directive 2014/35/EC
EMC requirements for noise emission	EN 61000-6-3
	EN 61000-6-4
EMC requirements for noise immunity	EN 61000-6-1
	EN 61000-6-2
Electromagnetic compatibility	Conformance with EMC Directive 2014/30/EU
EMC requirements, power plant	IEC 61850-3
	EN 61000-6-5
Conducted noise emission	EN 55016
	EN 61000-6-3 (Class B)
Noise emission	Additional basic standard EN 61000-6-5 (immunity in power station), IEC/EN 61850-3 (energy supply)
Noise emission	EN 55016
	EN 61000-6-3 (Class B)
DNV GL conducted interference	Class B
Additional text	Bridge and deck area
DNV GL noise radiation	Class B
Additional text	Bridge and deck area

## Electrostatic discharge

Standards/regulations	EN 61000-4-2
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## Electrostatic discharge

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Contact discharge	8 kV (Test Level 4)
Discharge in air	15 kV (Test Level 4)
Comments	Criterion A

## Electromagnetic HF field

Standards/regulations	EN 61000-4-3
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## Electromagnetic HF field

Frequency range	80 MHz ... 1 GHz
Test field strength	20 V/m (Test Level 3)
Frequency range	1 GHz ... 6 GHz
Test field strength	10 V/m (Test Level 3)
Comments	Criterion A

## Fast transients (burst)

Standards/regulations	EN 61000-4-4
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## Fast transients (burst)

Input	2 kV (Test Level 3 - asymmetrical)
Output	2 kV (Test Level 3 - asymmetrical)
Signal	2 kV (Test Level 4 - asymmetrical)
Comments	Criterion A

## Surge voltage load (surge)

Standards/regulations	EN 61000-4-5
Input	1 kV (Test Level 3 - symmetrical)
	2 kV (Test Level 3 - asymmetrical)
Output	1 kV (Test Level 3 - symmetrical)
	2 kV (Test Level 3 - asymmetrical)
Signal	2 kV (Test Level 3 - asymmetrical)
Comments	Criterion A

## Conducted interference

Standards/regulations	EN 61000-4-6
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## Conducted interference

I/O/S	asymmetrical
Frequency range	0.15 MHz ... 80 MHz
Comments	Criterion A
Voltage	10 V (Test Level 3)

## Power frequency magnetic field

Standards/regulations	EN 61000-4-8
Frequency	16.7 Hz
	50 Hz
	60 Hz
Test field strength	100 A/m
Additional text	60 s

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Comments	Criterion A
Frequency	50 Hz
	60 Hz
Frequency range	50 Hz ... 60 Hz
Test field strength	1 kA/m
Additional text	3 s
Comments	Criterion A
Frequency	0 Hz
Test field strength	300 A/m
Additional text	DC, 60 s
Comments	Criterion A

## Voltage dips

Standards/regulations	EN 61000-4-29
Voltage	24 V DC
Voltage dip	70 %
Time	100 ms
Additional text	Test Level 2
Comments	Criterion A
Voltage dip	40 %
Time	100 ms
Additional text	Test Level 2
Comments	Criterion B
Voltage dip	0 %
Time	50 ms
Additional text	Test Level 2
Comments	Criterion B

## Pulse-shape magnetic field

Standards/regulations	EN 61000-4-9
Test field strength	1000 A/m
Comments	Criterion A

## Asymmetrical conducted disturbance variables

Standards/regulations	EN 61000-4-16
Test level 1	15 Hz 150 Hz (Test Level 3)
Voltage	10 V 1 V
Test level 2	150 Hz 1.5 kHz (Test Level 3)
Voltage	1 V
Test level 3	1.5 kHz 15 kHz (Test Level 3)
Voltage	1 V 10 V
Test level 4	15 kHz 150 kHz (Test Level 3)
Voltage	10 V
Test level 5	16.7 Hz 50 Hz 60 Hz 150 Hz 180 Hz (Test Level 3)
Voltage	10 V (Permanent)

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Test level 6	0 Hz 16.7 Hz 50 Hz 60 Hz (Test Level 3)
Voltage	100 V (1 s)
Comments	Criterion A

#### Alternating component of direct voltage

Standards/regulations	EN 61000-4-17
Alternating component	15 % ( $U_N$ )
Frequency	50 Hz
	100 Hz
	150 Hz
Comments	Criterion A
Alternating component	14 % ( $U_N$ )
Frequency	300 Hz
Comments	Criterion A

#### Attenuated oscillating wave

Standards/regulations	EN 61000-4-18
Input, output (test level 1)	100 kHz 1 MHz (Test Level 2 - symmetrical)
Voltage	0.5 kV
Input, output (test level 2)	100 kHz 1 MHz (Test Level 2 - asymmetrical)
Voltage	1 kV
Input, output (test level 3)	10 MHz (Test Level 2 - asymmetrical)
Voltage	0.5 kV
Signals (test level 1)	100 kHz 1 MHz (Test Level 2 - symmetrical)
Voltage	0.5 kV
Signals (test level 2)	100 kHz 1 MHz (Test Level 2 - asymmetrical)
Voltage	1 kV
Comments	Criterion A

#### Attenuated oscillating magnetic field

Standards/regulations	EN 61000-4-10
Test field strength	100 A/m
Test level 1	100 kHz
Test field strength	100 A/m
Test level 2	1 MHz
Comments	Criterion A

#### Criteria

Criterion A	Normal operating behavior within the specified limits.
Criterion B	Temporary impairment to operational behavior that is corrected by the device itself.
Criterion C	Temporary adverse effects on the operating behavior, which the device corrects automatically or which can be restored by actuating the operating elements.

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