

# QUINT4-PS/24DC/24DC/20/SC/+ - DC/DC converter



1046881

<https://www.phoenixcontact.com/us/products/1046881>

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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 / 20 A

## Product description

Featuring high functionality and leading technologies, QUINT DC/DC converters >100 W deliver safety and reliability. SFB Technology, static boost, dynamic boost, and preventive function monitoring ensure maximum system availability. You can also adjust signaling thresholds and characteristic curves individually.

## 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
- Integrated decoupling MOSFET for 1+1 and n+1 redundancy

## Commercial data

Item number	1046881
Packing unit	1 pc
Minimum order quantity	1 pc
Sales key	CM01
Product key	CMDI43
GTIN	4055626645629
Weight per piece (including packing)	1,672 g
Weight per piece (excluding packing)	1,200 g
Customs tariff number	85044095
Country of origin	TH

## Technical data

### Input data

Nominal input voltage range	24 V DC -25 % ... +40 %
Input voltage range	24 V DC -25 % ... +40 %
Wide-range input	no
Electric strength, max.	35 V DC (60 s)
Inrush current	typ. 2.7 A
Inrush current integral ( $I^2t$ )	< 0.2 A <sup>2</sup> s
Inrush current limitation	2.7 A (after 1 ms)
Mains buffering time	typ. 16 ms (24 V DC)
Current consumption	27 A (24 V DC)
Typical response time	300 ms (from SLEEP MODE)
Switch-on time	< 1 s
Recommended breaker for input protection	50 A (Characteristic B, C or comparable)

### Output data

Efficiency	typ. 94.7 % (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 ... 28 V DC (> 24 V DC, constant capacity)
Nominal output current ( $I_N$ )	20 A
Static Boost ( $I_{Stat.Boost}$ )	25 A
Dynamic Boost ( $I_{Dyn.Boost}$ )	30 A (5 s)
Selective Fuse Breaking ( $I_{SFB}$ )	120 A (15 ms)
Magnetic circuit breaker tripping	A1...A16 / B2...B13 / C1...C6 / Z1...Z16
Short-circuit-proof	yes
No-load proof	yes
Output power ( $P_N$ )	480 W
Output power ( $P_{Stat. Boost}$ )	600 W
Output power ( $P_{Dyn. Boost}$ )	720 W (5 s)
Feedback voltage resistance	≤ 35 V DC
Protection against overvoltage at the output (OVP)	≤ 30 V DC
Residual ripple	< 50 mV <sub>PP</sub>
Control deviation static	< 3 % (change in load, static 10 % ... 90 %)
Control deviation dynamic	< 3 % (change in load, static 10 % ... 90 %)
Control deviation Input voltage change	< 3 % (change in load, static 10 % ... 90 %)
Rise time	< 100 ms ( $U_{OUT}$ (10 % ... 90 %))
Connection in series	yes
Maximum no-load power dissipation	< 4 W
Power loss nominal load max.	< 26.6 W

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Power dissipation SLEEP MODE	< 2 W
Connection in parallel	yes, for redundancy and increased capacity
Fuse protection (secondary side)	electronic
	thermal-magnetic
	thermal

## Connection data

### Input

Position	1.x
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### Conductor connection

Connection method	Screw connection
rigid	0.75 mm <sup>2</sup> ... 16 mm <sup>2</sup>
flexible	0.75 mm <sup>2</sup> ... 16 mm <sup>2</sup>
flexible with ferrule without plastic sleeve	0.75 mm <sup>2</sup> ... 16 mm <sup>2</sup>
flexible with ferrule with plastic sleeve	0.75 mm <sup>2</sup> ... 16 mm <sup>2</sup>
rigid (AWG)	20 ... 6
Stripping length	18 mm
Tightening torque	1.4 Nm ... 1.7 Nm
Drive form screw head	Slotted L
Screwdriver blade	0.6 x 3.5 mm

### Output

Position	2.x
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### Conductor connection

Connection method	Screw 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
Tightening torque	0.6 Nm ... 0.8 Nm
Drive form screw head	Slotted L
Screwdriver blade	0.6 x 3.5 mm

### Signal

Position	3.x
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### Conductor connection

Connection method	Push-in connection
rigid	0.2 mm <sup>2</sup> ... 1.5 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>
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 threshold	Signal ground SGnd
	> 100 % (LED lights up yellow, output power > 480 W)
	> 75 % (LED lights up green, output power > 360 W)
	> 50 % (LED lights up green, output power > 240 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)	

### Signal input Remote (configurable)

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

### Signal output Out 1 (configurable)

Connection labeling	3.5 +
Digital	0 V DC
	24 V DC
	20 mA
Default	U <sub>IN</sub> input voltage OK
Signal option	Output voltage
	Output current
	Output power
	Operating hours
	Early warning of high temperatures
	OVP voltage limitation active

### Signal output Out 2 (configurable)

Connection labeling	3.6 +
Digital	0 V DC
	24 V DC
	20 mA
Default	Output power
	Output voltage

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Signal option	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 output Relay 13/14 (configurable)

Connection labeling	3.1, 3.2
Switch contact (floating)	floating
Digital	24 V DC
	1 A
	30 V AC
	0.5 A
Default	Output voltage
Signal option	Output current
	Output power
	Operating hours
	Early warning of high temperatures
	OVP voltage limitation active
	$U_{IN}$ input voltage OK

## Signal ground SGnd

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

## 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)	> 986000 h (25 °C)
	> 563000 h (40 °C)
	> 232000 h (60 °C)

## Insulation characteristics

Protection class	Special with SELV input and output
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Overvoltage category (EN 61010-1)	II ( $\leq 5000$ m)
Overvoltage category (EN 62477-1)	III ( $\leq 5000$ m)
Degree of pollution	2

## Life expectancy (electrolytic capacitors)

Current	10 A
Temperature	40 °C
Time	413707 h
Additional text	24 V DC

## Life expectancy (electrolytic capacitors)

Current	20 A
Temperature	40 °C
Time	139340 h
Additional text	24 V DC

## Life expectancy (electrolytic capacitors)

Current	20 A
Temperature	30 °C
Time	278680 h
Additional text	24 V DC

## Dimensions

### Item dimensions

Width	70 mm
Height	130 mm
Depth	125 mm

### Item dimensions with alternative mounting

Width	122 mm
Height	130 mm
Depth	73 mm

### Installation dimensions

Installation distance right/left (active)	15 mm / 15 mm
Installation distance right/left (passive)	5 mm / 5 mm
Installation distance top/bottom (active)	50 mm / 50 mm
Installation distance top/bottom (passive)	50 mm / 50 mm

## Mounting

Mounting type	DIN rail mounting
Assembly note	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	yes

## 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
Ambient temperature (operation)	-40 °C ... 70 °C (> 60 °C Derating: 2,5 %/K)
Ambient temperature (storage/transport)	-40 °C ... 85 °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
Temp code	T4 (-40 ... +70 °C; > 60 °C, Derating: 2,5 %/K)

## Standards and regulations

### Fire protection in rail vehicles

Standard designation	Fire protection in rail vehicles
Standards/specifications	EN 45545-2 (HL3)

### Railway applications

Standard designation	Railway applications
Standards/specifications	EN 50121-3-2
	EN 50121-4
	IEC 62236-3-2
	IEC 62236-4
	EN 50155

### 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)

### Explosive atmospheres

Standard designation	Explosive atmospheres
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Standards/specifications	IEC 60079-0
	IEC 60079-7
	IEC 60079-11
	IEC 60079-15

## Mains voltage dips

Standard designation	Mains variation/undervoltage
Standards/specifications	EN 61000-4-29
Standard designation	EMC requirement for power stations and switching devices
Standards/specifications	IEC 61850-3
	EN 61000-6-5

## 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 ANSI/ISA-12.12.01 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-IEC 61010-2-201:14
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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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### ATEX

Identification	SIQ 21 ATEX 287 X
	⊕ II 3 G Ex ec ic nC IIC T4 Gc

### IECEX

Identification	IECEX SIQ 20.0002X
	Ex ec ic nC IIC T4 Gc

### Functional safety in accordance with IEC 61508

Identification	SIL 2
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### UKEX

Identification	EXV21UKEX1073X
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## Shipbuilding

Identification	DNV
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## Shipbuilding

Identification	ABS
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## Shipbuilding

Identification	LR
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## Shipbuilding

Identification	NK
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## Shipbuilding

Identification	BV
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## EMC data

Electromagnetic compatibility	Conformance with EMC Directive 2014/30/EU
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

## Conducted noise emission

Standards/regulations	EN 55016
	EN 61000-6-3 (Class B)

## Noise emission

Standards/regulations	Additional basic standard EN 61000-6-5 (immunity in switching devices), IEC/EN 61850-3 (power supply)
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## Noise emission

Standards/regulations	EN 55016
	EN 61000-6-3 (Class B)

## DNV GL conducted noise emissions

DNV	Class B
Additional text	Bridge and deck area

## DNV GL noise radiation

DNV	Class B
Additional text	Bridge and deck area

## Electrostatic discharge

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

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

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Comments	Criterion A
Electromagnetic HF field	
Standards/regulations	EN 61000-4-3
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
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
Surge voltage load (surge)	
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
Conducted interference	
Input/output/signal	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	10 % ( $U_N$ )
Frequency	50 Hz
	100 Hz
	150 Hz
Comments	Criterion A
Alternating component	10 % ( $U_N$ )
Frequency	300 Hz
Comments	Criterion A

## Attenuated oscillating wave

Standards/regulations	EN 61000-4-18
Input, output (test level 1)	1 MHz (Test Level 2 - symmetrical)
Voltage	0.5 kV
Input, output (test level 2)	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)	1 MHz (Test Level 2 - symmetrical)
Voltage	0.5 kV
Signals (test level 2)	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.

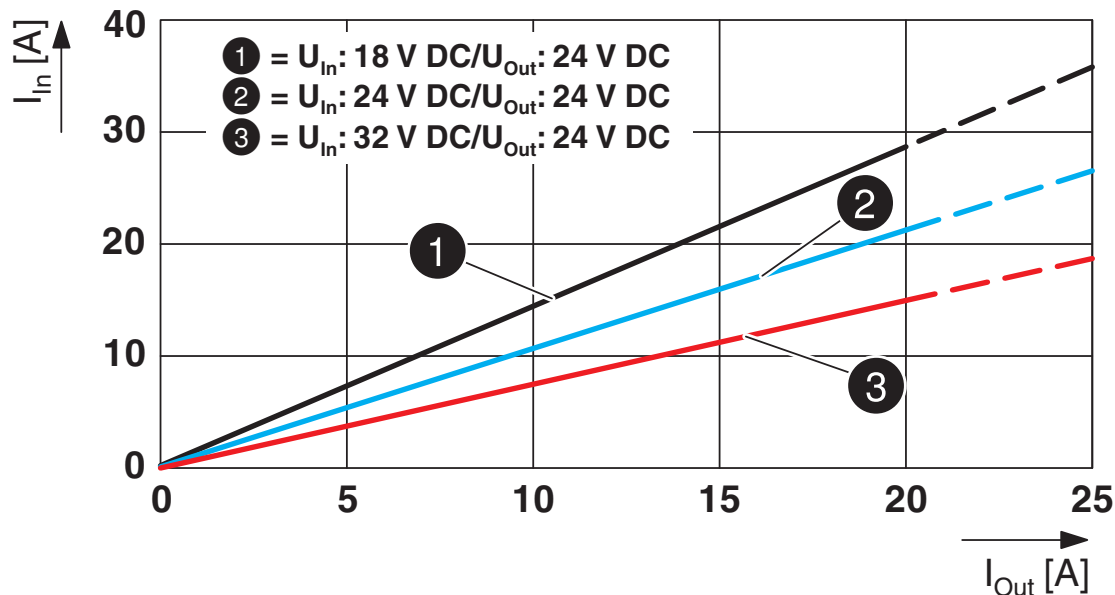
Drawings

Schematic diagram

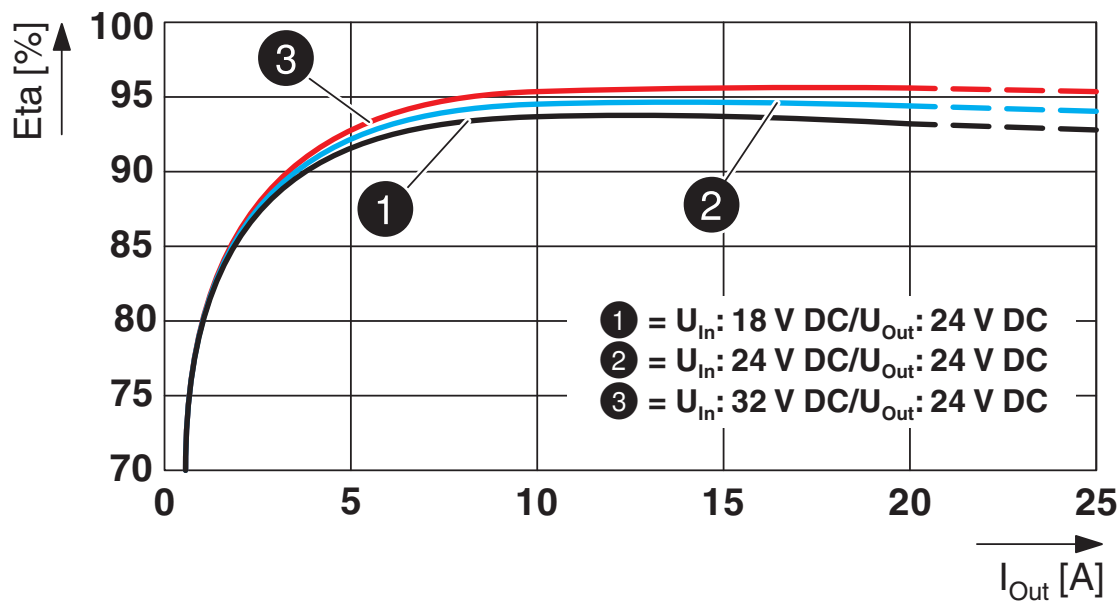
# Housing



Diagram



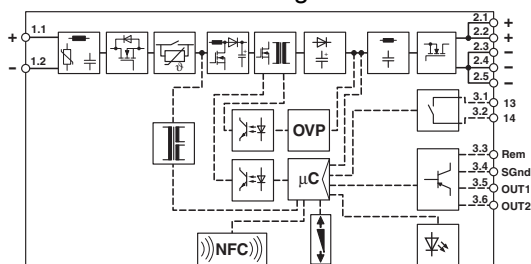
Diagram



Diagram



Block diagram



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## Approvals

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**BV**

Approval ID: 57060/B0 BV



**IECEE CB Scheme**

Approval ID: SI-7748



**LR**

Approval ID: LR22472797TA



**NK**

Approval ID: TA21182M

**ABS**

Approval ID: 26-0442641-PDA



**cULus Listed**

Approval ID: FILE E 123528



**Type approved**

Approval ID: SI-SIQ BG 005/076

**DNV**

Approval ID: TAA00001YD



**cCSAus**

Approval ID: 80031630

**TUEV RH FS**

Approval ID: 968/FSP 2174.01/25



**ATEX**

Approval ID: SIQ 21 ATEX 287 X

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**IECEx**

Approval ID: SIQ 20.0002X



**ATEX**

Approval ID: BVS 20 ATEX E 028 X



**cULus Listed**

Approval ID: FILE E 199827



**NEPSI-EX**

Approval ID: GYJ21.1001X



**CCC**

Approval ID: 2021322303003661



**UKCA-EX**

Approval ID: EXV21UKEX1073X\_00

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## Classifications

### ECLASS

ECLASS-13.0	27040701
ECLASS-15.0	27040701

### ETIM

ETIM 10.0	EC002540
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### UNSPSC

UNSPSC 21.0	39121000
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## Environmental product compliance

### EU RoHS

Fulfills EU RoHS substance requirements	Yes
Exemption	6(c), 7(a), 7(c)-I

### China RoHS

Environment friendly use period (EFUP)	EFUP-25
	An article-related China RoHS declaration table can be found in the download area for the respective article under "Manufacturer declaration". For all articles with EFUP-E, no China RoHS declaration table issued and required.

### EU REACH SVHC

REACH candidate substance (CAS No.)	Lead(CAS: 7439-92-1)
SCIP	c8b257b0-a2b8-4c39-86e9-16806ba5a6f1

### EF3.1 Climate Change

CO2e kg	32.502 kg CO2e
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