

# QUINT4-PS/3AC/48DC/20 - Power supply unit



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QUINT POWER primary-switched power supply with free choice of output characteristic curve, SFB (Selective Fuse Breaking) Technology, and NFC interface, input: 3-phase, output: 48 V DC/20 A

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## Product description

The fourth generation of the high-performance QUINT POWER power supplies ensures superior system availability by means of new functions. Signaling thresholds and characteristic curves can be individually adjusted via the NFC interface. The unique SFB technology and preventive function monitoring of the QUINT POWER power supply increase the availability of your application.

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## Technical data

### Input data

Control input (configurable) Rem	Output power ON/OFF (SLEEP MODE)
Default	Output power ON (>40 k $\Omega$ /24 V DC/open bridge between Rem and SGnd)

### AC operation

Network type	Star network
Nominal input voltage range	3x 400 V AC ... 500 V AC
	2x 400 V AC ... 500 V AC
Input voltage range	3x 400 V AC ... 500 V AC -20 % ... +10 %
	2x 400 V AC ... 500 V AC -10 % ... +10 %
Typical national grid voltage	400 V AC
	480 V AC
Voltage type of supply voltage	AC/DC
Inrush current	typ. 1.5 A (at 25 °C)
Inrush current integral ( $I^2t$ )	< 0.06 A <sup>2</sup> s
Inrush current limitation	2 A (after 1 ms)
AC frequency range	50 Hz ... 60 Hz -10 % ... +10 %
Frequency range ( $f_N$ )	50 Hz ... 60 Hz -10 % ... +10 %
Mains buffering time	typ. 26 ms (3x 400 V AC)
	typ. 26 ms (3x 480 V AC)
Current consumption	3x 1.8 A (400 V AC)
	3x 1.5 A (480 V AC)
	2x 3 A (400 V AC)
	2x 2.5 A (480 V AC)
	3x 1.5 A (500 V AC)
	2x 2.4 A (500 V AC)
Nominal power consumption	1217 VA
Protective circuit	Transient surge protection; Varistor, gas-filled surge arrester
Power factor (cos phi)	0.95
Switch-on time	< 1 s
Typical response time	300 ms (from SLEEP MODE)
Recommended breaker for input protection	3x 4 A ... 20 A (Characteristic B, C, D, K or comparable)
Recommended fuse for input protection	$\geq$ 300 V AC
Discharge current to PE	< 3.5 mA
	1 mA (550 V AC, 60 Hz)

### DC operation

Nominal input voltage range	$\pm$ 260 V DC ... 300 V DC
Input voltage range	$\pm$ 260 V DC ... 300 V DC -13 % ... +30 %
Current consumption	2.2 A ( $\pm$ 260 V DC)
	1.9 A ( $\pm$ 300 V DC)

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Nominal power consumption	1217 VA
Recommended breaker for input protection	1x 6 A (10 x 38 mm, 30 kA L/R = 2 ms)
Recommended fuse for input protection	≥ 1000 V DC

## Output data

Efficiency	typ. 95.9 % (400 V AC)
	typ. 96.2 % (480 V AC)
Nominal output voltage	48 V DC
Setting range of the output voltage ( $U_{Set}$ )	48 V DC ... 56 V DC (constant capacity)
Nominal output current ( $I_N$ )	20 A
Static Boost ( $I_{Stat.Boost}$ )	22.5 A
Dynamic Boost ( $I_{Dyn.Boost}$ )	30 A (5 s)
Selective Fuse Breaking ( $I_{SFB}$ )	105 A (15 ms)
Magnetic circuit breaker tripping	A1...A20 / B2...B10 / C1...C6 / Z1...Z16
Derating	> 60 °C ... 70 °C (2.5%/K)
Feedback voltage resistance	≤ 60 V DC
Protection against overvoltage at the output (OVP)	≤ 60 V DC
Control deviation	< 0.5 % (Static load change 10 % ... 90 %)
	< 2 % (Dynamic load change 10 % ... 90 %, (10 Hz))
	< 0.25 % (change in input voltage ±10 %)
Residual ripple	< 50 mV <sub>PP</sub> (with nominal values)
Short-circuit-proof	yes
No-load proof	yes
Output power	960 W
	1080 W
	1440 W
Maximum no-load power dissipation	< 6 W (400 V AC)
	< 6 W (480 V AC)
Power loss nominal load max.	< 41 W (400 V AC)
	< 41 W (480 V AC)
Power dissipation SLEEP MODE	< 1 W (400 V AC)
	< 1 W (480 V AC)
Crest factor	typ. 1.67 (400 V AC)
	typ. 1.63 (480 V AC)
Rise time	< 1 s ( $U_{Out} = 10 % \dots 90 %$ )
Connection in parallel	yes, for redundancy and increased capacity
Connection in series	yes

## Signal

Signal ground SGnd	Reference potential for Out1, Out2, and Rem
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## Signal Out 1 (configurable)

Digital	0 V DC 24 V DC 20 mA
Default	24 V DC 20 mA 24 V DC for $U_{Out} > 0.9 \times U_{Set}$

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## Signal Out 2 (configurable)

Digital	0 V DC 24 V DC 20 mA
Analog	4 mA ... 20 mA $\pm 5\%$ (Load $\leq 400\ \Omega$ )
Default	24 V DC 20 mA 24 V DC for $P_{Out} < P_N$

## Signal relay 13/14 (configurable)

Default	closed ( $U_{out} > 0.9 U_{Set}$ )
Digital	24 V DC 1 A
	30 V AC 0.5 A

## Connection data

### Input

Connection method	Screw connection
Conductor cross section, rigid min.	0.2 mm <sup>2</sup>
Conductor cross section, rigid max.	6 mm <sup>2</sup>
Conductor cross section flexible min.	0.2 mm <sup>2</sup>
Conductor cross section flexible max.	4 mm <sup>2</sup>
Single conductor/flexible terminal point with ferrule with plastic sleeve, min.	0.25 mm <sup>2</sup>
Single conductor/flexible terminal point with ferrule with plastic sleeve, max.	4 mm <sup>2</sup>
Single conductor/flexible terminal point with ferrule without plastic sleeve, min.	0.25 mm <sup>2</sup>
Single conductor/flexible terminal point with ferrule without plastic sleeve, max.	4 mm <sup>2</sup>
Conductor cross section AWG min.	24
Conductor cross section AWG max.	10
Stripping length	8 mm
Tightening torque, min	0.5 Nm
Tightening torque max	0.6 Nm

### Output

Connection method	Screw connection
Conductor cross section, rigid min.	0.5 mm <sup>2</sup>
Conductor cross section, rigid max.	16 mm <sup>2</sup>
Conductor cross section flexible min.	0.5 mm <sup>2</sup>
Conductor cross section flexible max.	16 mm <sup>2</sup>
Single conductor/flexible terminal point with ferrule with plastic sleeve, min.	0.5 mm <sup>2</sup>
Single conductor/flexible terminal point with ferrule with plastic sleeve, max.	16 mm <sup>2</sup>
Single conductor/flexible terminal point with ferrule without plastic sleeve, min.	0.5 mm <sup>2</sup>
Single conductor/flexible terminal point with ferrule without plastic sleeve, max.	16 mm <sup>2</sup>
Conductor cross section AWG min.	20

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Conductor cross section AWG max.	6
Stripping length	10 mm
Tightening torque, min	1.2 Nm
Tightening torque max	1.5 Nm

## Signal

Connection method	Push-in connection
Conductor cross section, rigid min.	0.2 mm <sup>2</sup>
Conductor cross section, rigid max.	1 mm <sup>2</sup>
Conductor cross section flexible min.	0.2 mm <sup>2</sup>
Conductor cross section flexible max.	1.5 mm <sup>2</sup>
Single conductor/flexible terminal point with ferrule with plastic sleeve, min.	0.2 mm <sup>2</sup>
Single conductor/flexible terminal point with ferrule with plastic sleeve, max.	0.75 mm <sup>2</sup>
Single conductor/flexible terminal point with ferrule without plastic sleeve, min.	0.2 mm <sup>2</sup>
Single conductor/flexible terminal point with ferrule without plastic sleeve, max.	1.5 mm <sup>2</sup>
Conductor cross section AWG min.	24
Conductor cross section AWG max.	16
Stripping length	8 mm

## Signaling

### Signal output

P <sub>Out</sub>	> 100 % (LED lights up yellow, output power > 960 W)
	> 75 % (LED lights up green, output power > 720 W)
	> 50 % (LED lights up green, output power > 480 W)
U <sub>Out</sub>	> 0.9 × U <sub>Set</sub> (LED lights up green)
	< 0.9 × U <sub>Set</sub> (LED flashes green)

## Electrical properties

Number of phases	3.00
Insulation voltage input/output	4 kV AC (type test)
	2.4 kV AC (routine test)
Insulation voltage output / PE	0.5 kV DC (type test)
	0.5 kV DC (routine test)
Insulation voltage input / PE	3.5 kV AC (type test)
	2.4 kV AC (routine test)
Switching frequency	32 kHz ... 100 kHz (Auxiliary converter stage)
	55 kHz ... 300 kHz (Main converter stage)
	25 kHz ... 500 kHz (PFC stage)

## Product properties

Product type	Power supply
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Product family	QUINT POWER
MTBF (IEC 61709, SN 29500)	> 851000 h (25 °C)
	> 519000 h (40 °C)
	> 237000 h (60 °C)
Environmental protection directive	RoHS Directive 2011/65/EU
	WEEE
	Reach

## Insulation characteristics

Protection class	I
Degree of pollution	2

## Life expectancy (electrolytic capacitors)

Current	10 A
Temperature	40 °C
Time	378000 h
Additional text	400 V AC

## Life expectancy (electrolytic capacitors)

Current	10 A
Temperature	40 °C
Time	370000 h
Additional text	480 V AC

## Life expectancy (electrolytic capacitors)

Current	20 A
Temperature	25 °C
Time	635000 h
Additional text	400 V AC

## Life expectancy (electrolytic capacitors)

Current	20 A
Temperature	25 °C
Time	618000 h
Additional text	480 V AC

## Life expectancy (electrolytic capacitors)

Current	20 A
Temperature	40 °C
Time	224000 h
Additional text	400 V AC

## Life expectancy (electrolytic capacitors)

Current	20 A
Temperature	40 °C
Time	218000 h
Additional text	480 V AC

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## Dimensions

Width	120 mm
Height	130 mm
Depth	125 mm

### Installation dimensions

Installation distance right/left	5 mm / 5 mm
Installation distance top/bottom	50 mm / 50 mm

## Mounting

Mounting type	DIN rail mounting
Mounting position	horizontal DIN rail NS 35, EN 60715
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
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	3K3 (in acc. with EN 60721)
Max. permissible relative humidity (operation)	≤ 95 % (at 25 °C, non-condensing)
Shock	11 ms, 15 g, in each space direction (according to IEC 60068-2-27)
Vibration (operation)	5 Hz ... 100 Hz resonance search 0.7g, 90 min., resonance frequency 0.7g, 90 min. (in accordance with DNV GL Class A) 5 Hz ... 100 Hz resonance search 2.3g, 90 min., resonance frequency 2.3g, 90 min. (according to DNV GL Class C) mounted with UWA 130 - 2901664

## Standards and regulations

Rail applications	EN 50121-3-2
	EN 50121-5
	IEC 62236-3-2
	IEC 62236-5
Standard – Limitation of mains harmonic currents	EN 61000-3-2
Standard - Electrical safety	IEC 61010-2-201 (SELV)

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Standard – Safety extra-low voltage	IEC 61010-1 (SELV)
	IEC 61010-2-201 (PELV)
Standard - Safe isolation	IEC 61558-2-16
	IEC 61010-2-201
Standard - safety for equipment for measurement, control, and laboratory use	IEC 61010-1
Standard - Safety of transformers	EN 61558-2-16
Battery charging	DIN 41773-1
Approval - requirement of the semiconductor industry with regard to mains voltage dips	SEMI F47-0706, EN 61000-4-11

## Overvoltage category

EN 61010-1	II ( $\leq 5000$ m)
EN 62477-1	III ( $\leq 2000$ m)
EN 61558-2-16	II ( $\leq 4000$ m)

## Approvals

CSA	CAN/CSA-C22.2 No. 61010-1-12
	CAN/CSA-C22.2 No. 61010-2-201
SIQ	CB-Scheme (IEC 61010-1, IEC 61010-2-201)
UL approvals	UL Listed UL 61010-1
	UL Listed UL 61010-2-201
	UL 121201 & CSA C22.2 No. 213-17 Class I, Division 2, Groups A, B, C, D T4 (Hazardous Location)

## 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 A
Additional text	Area power distribution
DNV GL noise radiation	Class B
Additional text	Bridge and deck area

## Harmonic currents

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Standards/regulations	EN 61000-3-2
	EN 61000-3-2 (Class A)
Frequency range	0 kHz ... 2 kHz

## Flicker

Standards/regulations	EN 61000-3-3
	EN 61000-3-3
Frequency range	0 kHz ... 2 kHz

## 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)
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	4 kV (Test Level 4 - asymmetrical)
Output	4 kV (Test Level 4 - asymmetrical)
Signal	4 kV (Test Level 4 - asymmetrical)
Comments	Criterion A

## Surge voltage load (surge)

Standards/regulations	EN 61000-4-5
Input	2 kV (Test Level 3 - symmetrical)
	6 kV (Test Level 4 - asymmetrical)
Output	1 kV (Test Level 3 - symmetrical)
	2 kV (Test Level 3 - asymmetrical)
Signal	4 kV (Test Level 2 - 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
Comments	Criterion A
Frequency	50 Hz
	60 Hz
Frequency range	50 Hz ... 60 Hz
Test field strength	1 kA/m
Additional text	3 s
Frequency	0 Hz
Test field strength	300 A/m
Additional text	DC, 60 s

## Voltage dips

Standards/regulations	EN 61000-4-11
Voltage	400 V AC
Frequency	50 Hz
Voltage dip	70 %
Number of periods	0.5 / 1 / 25 periods
Additional text	Test Level 2
Comments	Criterion A: 0.5 / 1 period Criterion B: 25 periods
Voltage dip	40 %
Number of periods	5 / 10 / 50 periods
Additional text	Test Level 2
Comments	Criterion B
Voltage dip	0 %
Number of periods	0,5 / 1 / 5 / 50 / 250 periods
Additional text	Test Level 2
Comments	Criterion A: 0.5 / 1 period Criterion B: 5 / 50 / 250 periods

## Pulse-shape magnetic field

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

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Comments	Criterion A
Attenuated sinusoidal oscillations (ring wave)	
Standards/regulations	EN 61000-4-12
Input	2 kV (Test Level 4 - symmetrical)
	4 kV (Test Level 4 - asymmetrical)
Comments	Criterion A

## Asymmetrical conducted disturbance variables

Standards/regulations	EN 61000-4-16
Test level 1	15 Hz 150 Hz (Test Level 4)
Voltage	30 V 3 V
Test level 2	150 Hz 1.5 kHz (Test Level 4)
Voltage	3 V
Test level 3	1.5 kHz 15 kHz (Test Level 4)
Voltage	3 V 30 V
Test level 4	15 kHz 150 kHz (Test Level 4)
Voltage	30 V
Test level 5	16.7 Hz 50 Hz 60 Hz 150 Hz 180 Hz (Test Level 4)
Voltage	30 V (10 s)
Test level 6	16.7 Hz 50 Hz 60 Hz (Test Level 4)
Voltage	300 V (1 s)
Comments	Criterion A

## Attenuated oscillating wave

Standards/regulations	EN 61000-4-18
Input, output (test level 1)	100 kHz 1 MHz (Test Level 3 - symmetrical)
Voltage	1 kV
Input, output (test level 2)	10 MHz (Test Level 3 - asymmetrical)
Voltage	1 kV
Input, output (test level 3)	100 kHz 1 MHz (Test Level 3 - asymmetrical)
Voltage	2.5 kV
Signals (test level 1)	100 kHz 1 MHz (Test Level 3 - symmetrical)
Voltage	1 kV
Signals (test level 2)	100 kHz 1 MHz (Test Level 3 - asymmetrical)
Voltage	2.5 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

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## 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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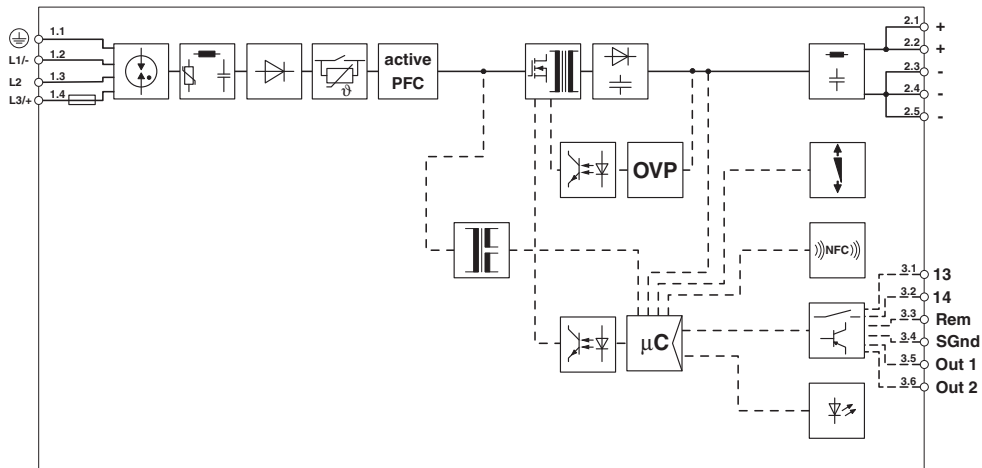


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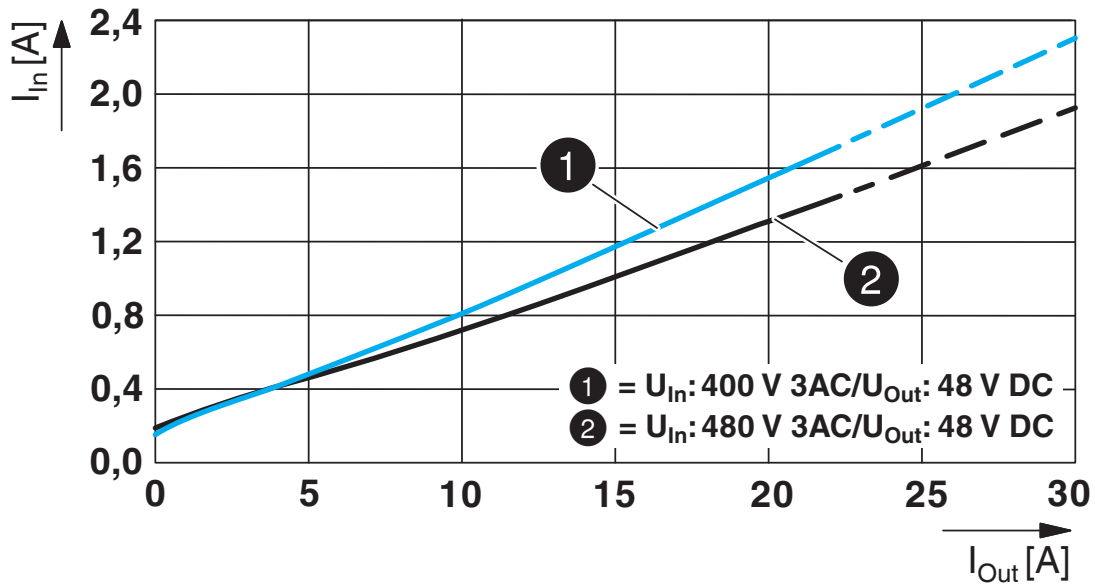
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## Drawings

Block diagram



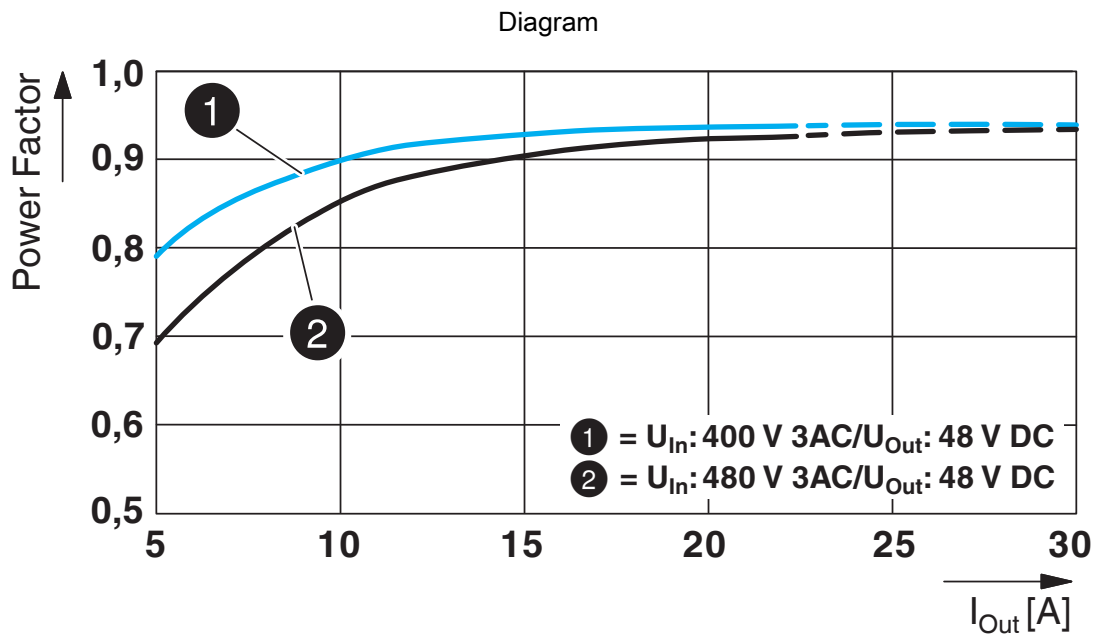
Diagram



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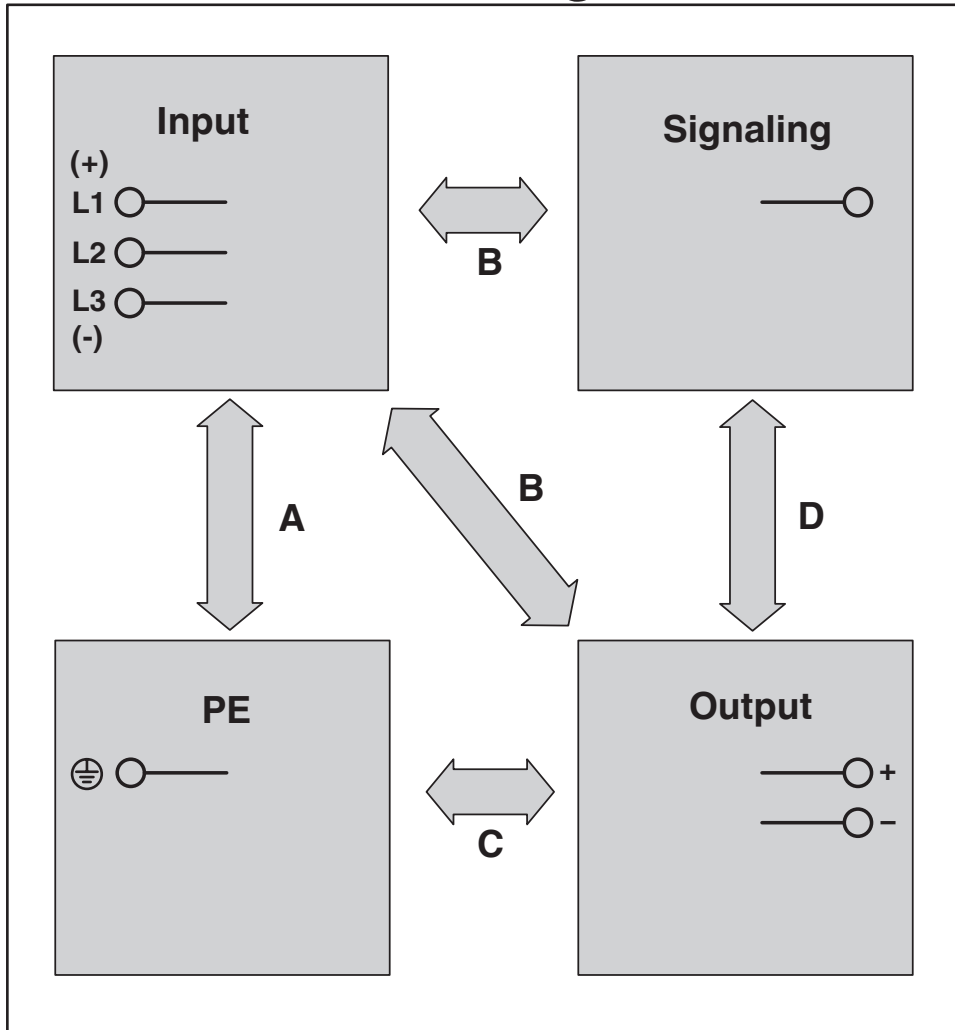


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Schematic diagram

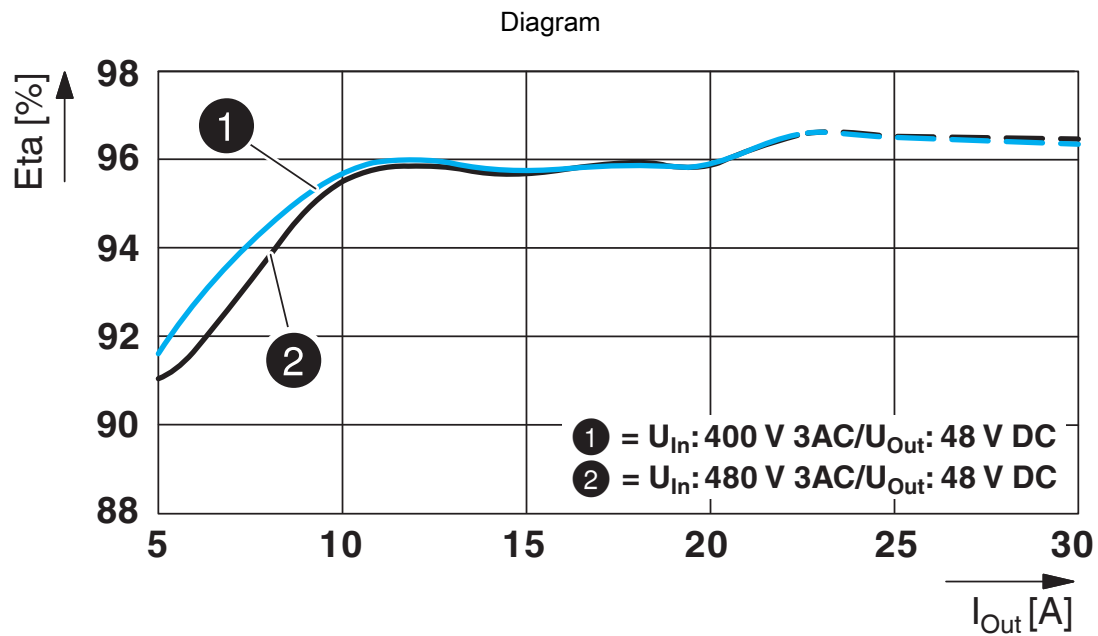
## Housing



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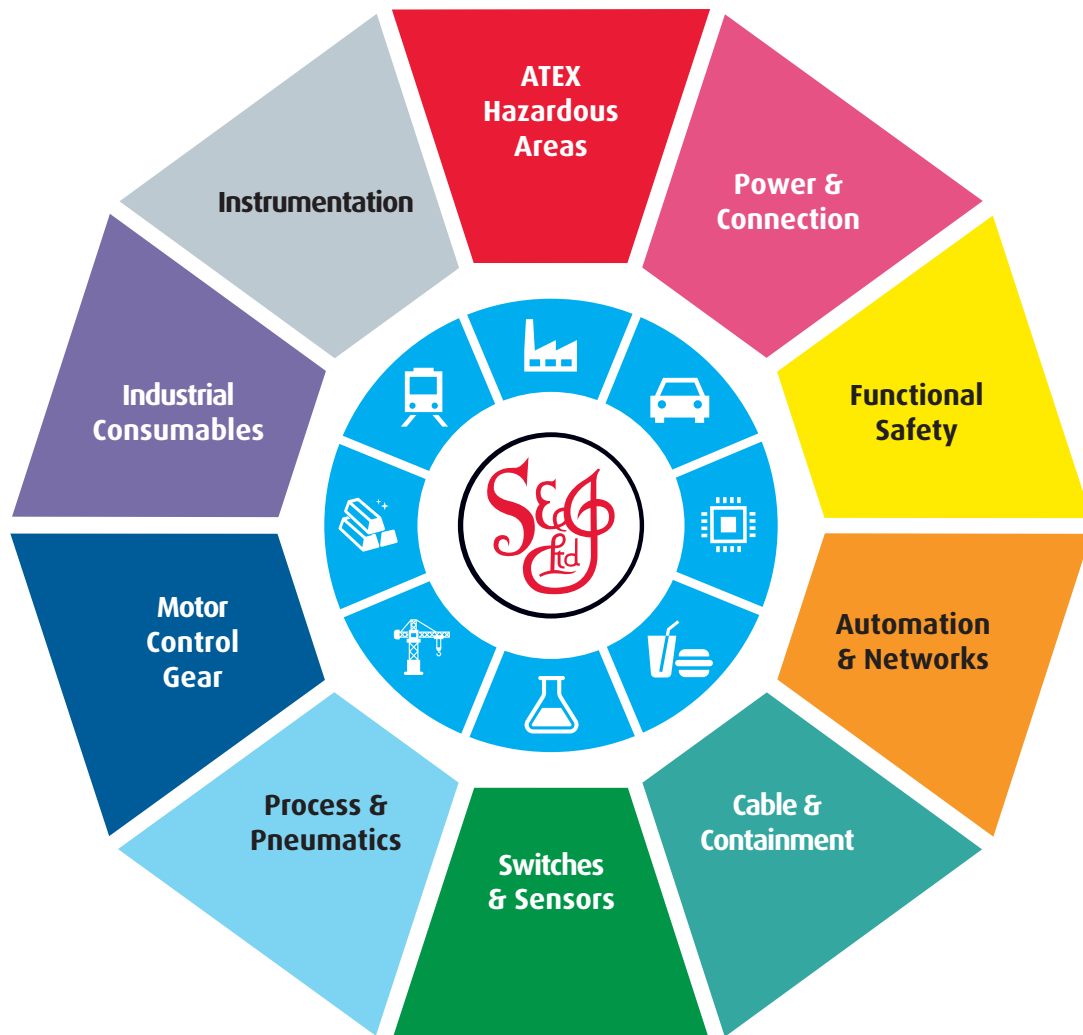
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