

TRIO3-PS/1AC/24DC/20 - Power supply unit



1159039

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Primary-switched power supply unit, TRIO POWER, Push-in connection, DIN rail mounting, input: 1-phase, output: 24 V DC / 20 A

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Technical Data

Input data

AC operation

Supply system configuration	Star network (TN, TT, IT (PE))
Nominal input voltage range	100 V AC ... 240 V AC
Input voltage range	100 V AC ... 240 V AC -15 % ... +10 % 115 V AC ... 240 V AC \pm 10 % (UL)
Derating	< 100 V AC (1 %/V) 2.5 %/K, > 60 °C
Typical national grid voltage	120 V AC 230 V AC
Voltage type of supply voltage	AC
Inrush current	< 21 A (25 °C)
Inrush current integral (I^2t)	< 1.091 A ² s
Frequency range (f_N)	50 Hz ... 60 Hz \pm 10 %
Mains buffering time	typ. 23 ms (120 V AC) typ. 24 ms (230 V AC)
Current consumption	5.3 A (100 V AC) 4.4 A (120 V AC) 2.3 A (230 V AC) 2.15 A (240 V AC)
Protective circuit	Transient protection; Varistor
Power factor (cos phi)	0.96 (230 V AC)
Device mains fuse	10 A internal (device protection)
Recommended breaker for input protection	6 A ... 16 A (Characteristic B, C, D, K or comparable)
Discharge current to PE	< 3.5 mA

DC operation

Input voltage range	100 V DC ... 240 V DC \pm 10 % 160 V DC ... 240 V DC \pm 10 % (UL)
Derating	< 140 V DC (1 %/V)
Current consumption	5.2 A (100 V DC) 2.1 A (240 V DC)

Output data

Efficiency	typ. 93.49 % (120 V AC) typ. 94.42 % (230 V AC)
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 restricted)
Nominal output current (I_N)	20 A
Dynamic Boost ($I_{Dyn.Boost}$)	max. 30 A (5 s)
Short-circuit-proof	yes

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Derating	60 °C ... 70 °C
Crest factor	typ. 1.77 (120 V AC)
	typ. 1.6 (230 V AC)
Output power (P_N)	480 W
Output power ($P_{Dyn. Boost}$)	max. 720 W (5 s)
Connection in parallel	yes, for increased efficiency and redundancy
Connection in series	yes, for increased output voltage (observe SELV limit)
Feedback voltage resistance	≤ 35 V DC
Protection against overvoltage at the output (OVP)	≤ 35 V DC
Residual ripple	typ. 50 mV _{pp} (with nominal values)
Control deviation	< 1 % (change in load, static 10 % ... 90 %)
	< 3 % (change in load, dynamic 10 % ... 90 %)
	< 0.1 % (change in input voltage ± 10 %)
Rise time	≤ 1 s ($U_{Out} = 10$ % ... 90 %)
Minimum no-load power dissipation	< 1.3 W (120 V AC)
Maximum no-load power dissipation	< 1.37 W (230 V AC)
Minimum nominal load power dissipation	< 33.37 W (120 V AC)
Power loss nominal load max.	< 26.72 W (230 V AC)
Integrated fuse protection	no

Signal relay 13/14

Position	3.x
Position marking	3.1 (13), 3.2 (14)
Switch contact (floating)	OptoMOS
Switching voltage	max. 30 V DC (SELV)
Current carrying capacity	max. 100 mA
State condition	$U_{Out} > 21$ V DC and $I_{Out} < 0.9 \times I_N$ (Contact closed)
	$U_{Out} < 21$ V DC or $I_{Out} > 0.9 \times I_N$ (averaging over 60 s) (Contact open)

Connection data

Input

Position	1.x
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Conductor connection

Connection method	Push-in connection
rigid	0.2 mm ² ... 4 mm ²
	1.5 mm ² (recommended)
flexible	0.2 mm ² ... 2.5 mm ²
	1.5 mm ² (recommended)
flexible with ferrule without plastic sleeve	0.25 mm ² ... 2.5 mm ²
	1.5 mm ² (recommended)
flexible with ferrule with plastic sleeve	0.25 mm ² ... 1.5 mm ²
	1.5 mm ² (recommended)
rigid (AWG)	24 ... 12 (Cu)

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Stripping length	16 (recommended)
	10 mm (rigid/flexible)
	8 mm (Ferrule)

Output

Position	2.x
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Conductor connection

Connection method	Push-in connection
rigid	0.2 mm ² ... 10 mm ²
	4 mm ² (recommended)
flexible	0.2 mm ² ... 6 mm ²
	4 mm ² (recommended)
flexible with ferrule without plastic sleeve	0.25 mm ² ... 6 mm ² (Cu)
	4 mm ² (recommended)
flexible with ferrule with plastic sleeve	0.25 mm ² ... 6 mm ²
	4 mm ² (recommended)
rigid (AWG)	24 ... 8 (Cu)
	12 (recommended)
Stripping length	12 mm (rigid/flexible)
	12 mm (Ferrule)

Signal

Position	3.x
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Conductor connection

Connection method	Push-in connection
rigid	0.2 mm ² ... 1.5 mm ²
	0.5 mm ² (recommended)
flexible	0.2 mm ² ... 1.5 mm ²
	0.5 mm ² (recommended)
flexible with ferrule without plastic sleeve	0.25 mm ² ... 1.5 mm ² (Cu)
	0.5 mm ² (recommended)
flexible with ferrule with plastic sleeve	0.25 mm ² ... 0.75 mm ²
	0.5 mm ² (recommended)
rigid (AWG)	24 ... 16 (Cu)
	20 (recommended)
Stripping length	10 mm (rigid/flexible)
	8 mm (Ferrule)

Signaling

Types of signaling	LED DC OK – signal state operation ($U_N = 24 \text{ V DC}$, $I_{Out} = I_N$)
Function	Visual operating state display
Color	red, yellow, green (tricolor LED)
LED off	Supply voltage input AC not present (Off)
LED on (green), DC OK	$U_{Out} > 21 \text{ V DC}$ and $I_{Out} < 0.9 \times I_N$ (On (green), DC OK)

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LED on (yellow), I _{Out} > 90%	$U_{Out} > 21 \text{ V DC}$ and $I_{Out} > 0.9 \times I_N$ (On (yellow), I _{Out} > 90%)
LED on (red), I _{SHORT}	$U_{Out} < 21 \text{ V DC}$ and $I_{Out} > 0.9 \times I_N$ (On (red), I _{SHORT})
LED on (flashing red) OVP	$U_{OUT} > OVP$ (Over voltage protection) (On (flashing red))

Electrical properties

Number of phases	1.00
Insulation voltage input/output	3 kV AC (type test)
	3 kV AC (routine test)

Product properties

Product type	Power supply
Product family	TRIO POWER
MTBF (IEC 61709, SN 29500)	> 1400000 h (25 °C)
	> 770000 h (40 °C)
	> 310000 h (60 °C)
Environmental protection directive	RoHS Directive 2011/65/EU
	WEEE
	Reach

Insulation characteristics

Protection class	I
Degree of pollution	2

Dimensions

Dimensional drawing	
Width	55 mm
Height	135 mm
Depth	132 mm
Depth Device depth (DIN rail mounting)	125 mm

Installation dimensions

Installation distance right/left	0 mm / 0 mm
Installation distance top/bottom	50 mm / 50 mm

Mounting

Mounting type	DIN rail mounting
Assembly instructions	alignable: 0 mm horizontally, 30 mm vertically
Mounting position	horizontal DIN rail NS 35, EN 60715
With protective coating	No

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Material specifications

Flammability rating according to UL 94	V0 (Housing, terminal blocks)
Hood version	Polycarbonate
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, Derating: 10 %/1000 m)
Max. permissible relative humidity (operation)	≤ 95 % (at 25 °C, non-condensing)
Shock (operation)	18 ms, 30g, per spatial direction (IEC 60068-2-27)
Vibration (operation)	10 Hz ... 50 Hz, amplitude ±0.2 mm (IEC 60068-2-6) 50 Hz to 150 Hz, 2.3 g, 90 min.

Standards and regulations

Overvoltage category

EN 61010-1	III (≤ 2000 m)
	II (≤ 5000 m)

Overvoltage category

EN 61010-2-201	III (≤ 2000 m)
	II (≤ 5000 m)

Safety of power supply units up to 1100 V (insulation distances)

Standards/specifications	DIN EN 61558-2-16
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Electrical safety

Standards/specifications	IEC 61010-2-201 (SELV)
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Electronic equipment for use in power installations

Standards/specifications	EN 50178/VDE 0160 (PELV)
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Safety for measurement, control, and laboratory equipment

Standards/specifications	IEC 61010-1
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Protective extra-low voltage

Standards/specifications	IEC 61010-1 (SELV)
	IEC 61010-2-201 (PELV)

Safe isolation

Standards/specifications	IEC 61558-2-16
	IEC 61010-2-201

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Limitation of harmonic line currents

Standards/specifications	EN 61000-3-2
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Approvals

UL

Identification	UL/C-UL Listed UL 61010-1
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UL

Identification	UL/C-UL Listed UL 61010-2-201
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ANSI/UL 121201

Identification	PROCESS CONTROL EQUIPEMENT FOR HAZARDOUS LOCATIONS
	(EN) <input type="checkbox"/> This equipment is suitable for use in Class I, Division 2, Groups A, B, C and D, Hazardous Locations, or non-hazardous locations only. (FR) <input type="checkbox"/> Cet appareil convient uniquement pour une utilisation en atmosphères explosibles de classe I, division 2, groupes A, B, C et D ou en atmosphères non explosibles.
	(EN) <input type="checkbox"/> WARNING: Explosion Hazard - Do not connect or disconnect equipment unless power has been switched off or the area is known to be non-hazardous. (FR) <input type="checkbox"/> AVERTISSEMENT : risque d'explosion - ne pas connecter ou déconnecter les équipements sauf si l'alimentation a été coupée ou si la zone est réputée non dangereuse.
	(EN) <input type="checkbox"/> If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired. (FR) <input type="checkbox"/> Si l'équipement est utilisé d'une manière non spécifiée par le fabricant, la protection fournie par cet équipement peut être altérée.
	(EN) <input type="checkbox"/> This equipment must be installed in a suitable, tool secured/key locked enclosure. (FR) <input type="checkbox"/> Cet équipement doit être installé dans un boîtier approprié, verrouillé par une clé ou dont l'ouverture nécessite l'utilisation d'un outil.

EMC data

Low Voltage Directive	Conformance with Low Voltage Directive 2014/35/EC
Interference emission	Interference emission in accordance with EN 61000-6-3 (residential and commercial) and EN 61000-6-4 (industrial)
Noise immunity	Immunity in accordance with EN 61000-6-1 (residential), EN 61000-6-2 (industrial)
Electromagnetic compatibility	Conformance with EMC Directive 2014/30/EU
Conducted noise emission	EN 55016
	EN 61000-6-3 (Class B)
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

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Additional text	Bridge and deck area
Harmonic currents	
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
Electrostatic discharge	
Contact discharge	6 kV (Test Level 3)
Discharge in air	8 kV (Test Level 3)
Comments	Criterion B
Electromagnetic HF field	
Standards/regulations	EN 61000-4-3
Electromagnetic HF field	
Frequency range	80 MHz ... 1 GHz
Test field strength	10 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	asymmetrical 2 kV (Test Level 3)
Output	asymmetrical 2 kV (Test Level 4)
Signal	asymmetrical 1 kV (Test Level 3)
Comments	Criterion A
Surge voltage load (surge)	
Standards/regulations	EN 61000-4-5
Input	symmetrical 4 kV (Test Level 4)
	asymmetrical 2 kV (Test Level 4)
Output	symmetrical 1 kV (Test Level 3)
	asymmetrical 2 kV (Test Level 3)
Signal	asymmetrical 1 kV (Test Level 2)
Comments	Criterion A

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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)

Voltage dips

Standards/regulations	EN 61000-4-11
Voltage	230 V AC
Frequency	50 Hz
Voltage dip	70 %
Number of periods	25 periods
Additional text	Class 3
Comments	Criterion A
Voltage dip	40 %
Number of periods	10 periods
Additional text	Class 3
Comments	Criterion B
Voltage dip	0 %
Number of periods	1 period
Additional text	Class 3
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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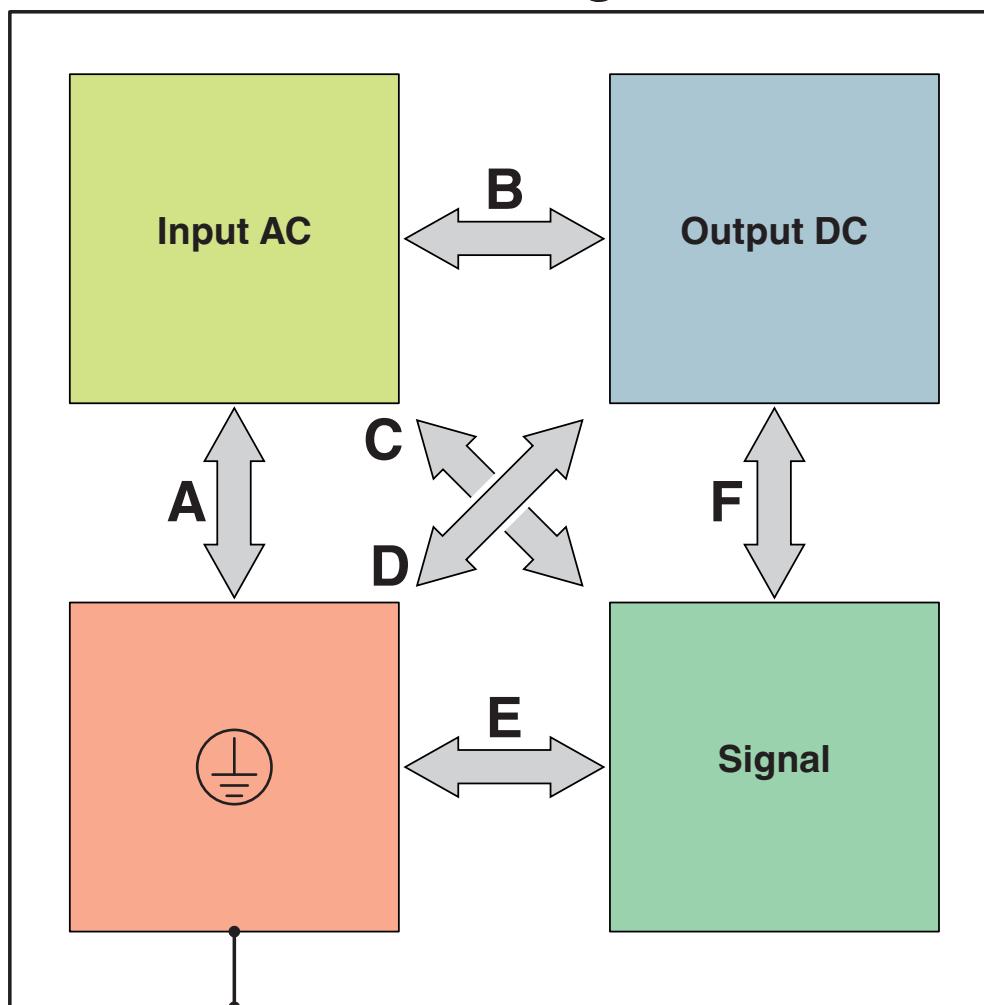


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Drawings

Schematic diagram

Housing

Test sections, insulation voltage

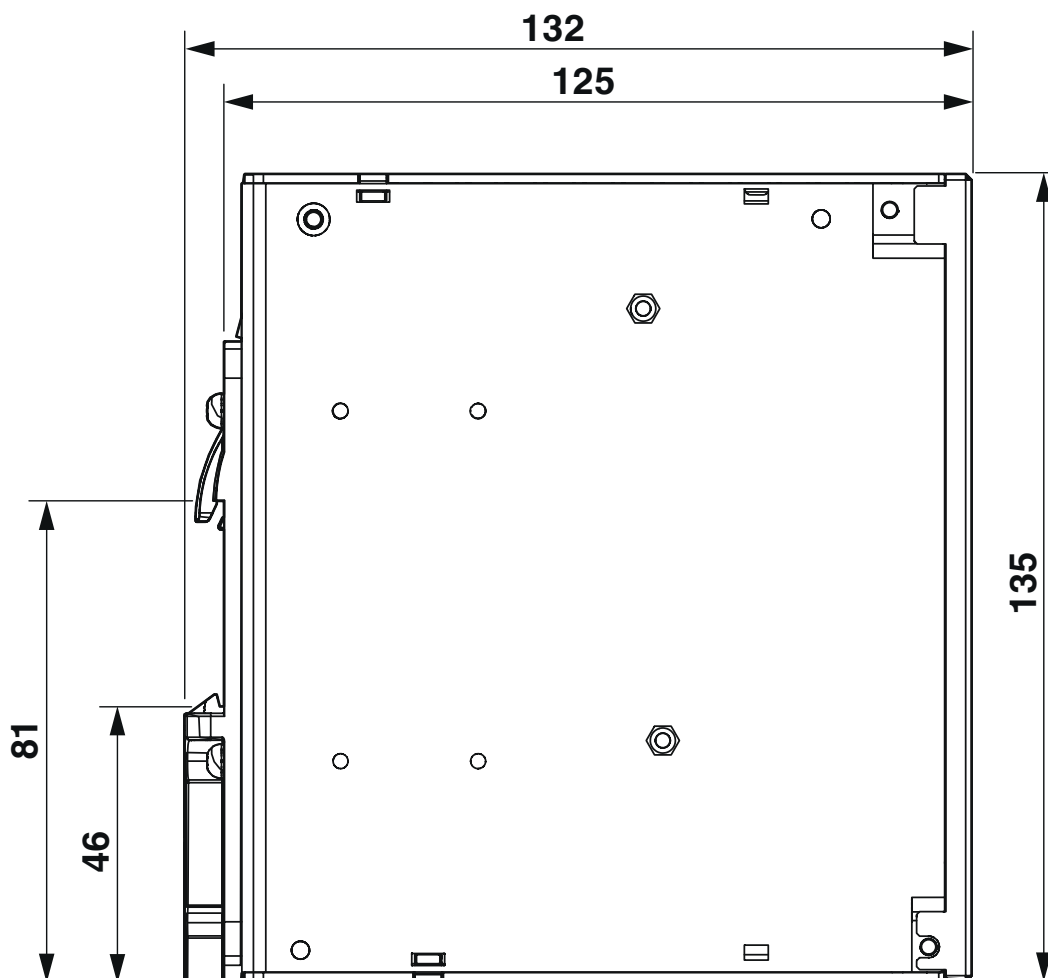
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Dimensional drawing



Device dimensions (dimensions in mm)

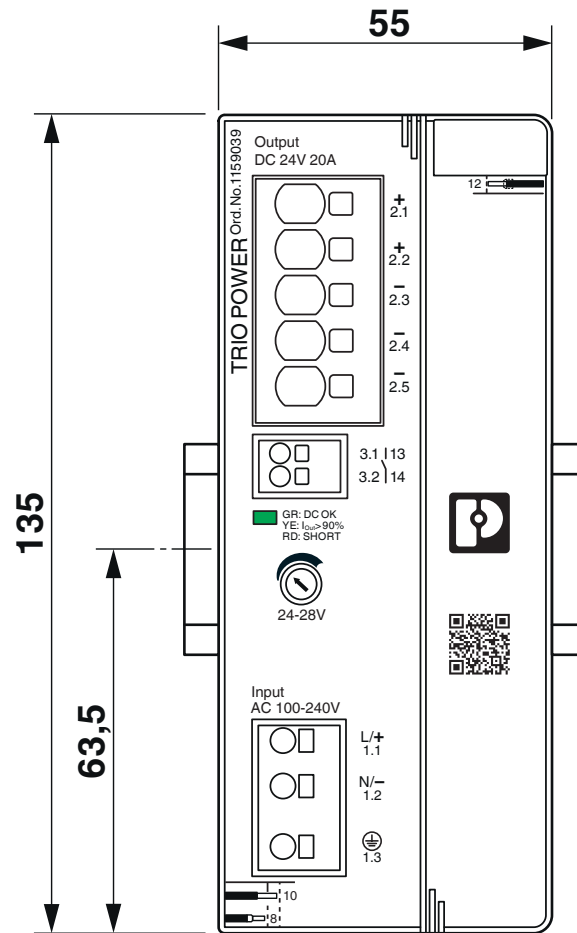
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Dimensional drawing



Device dimensions (dimensions in mm)

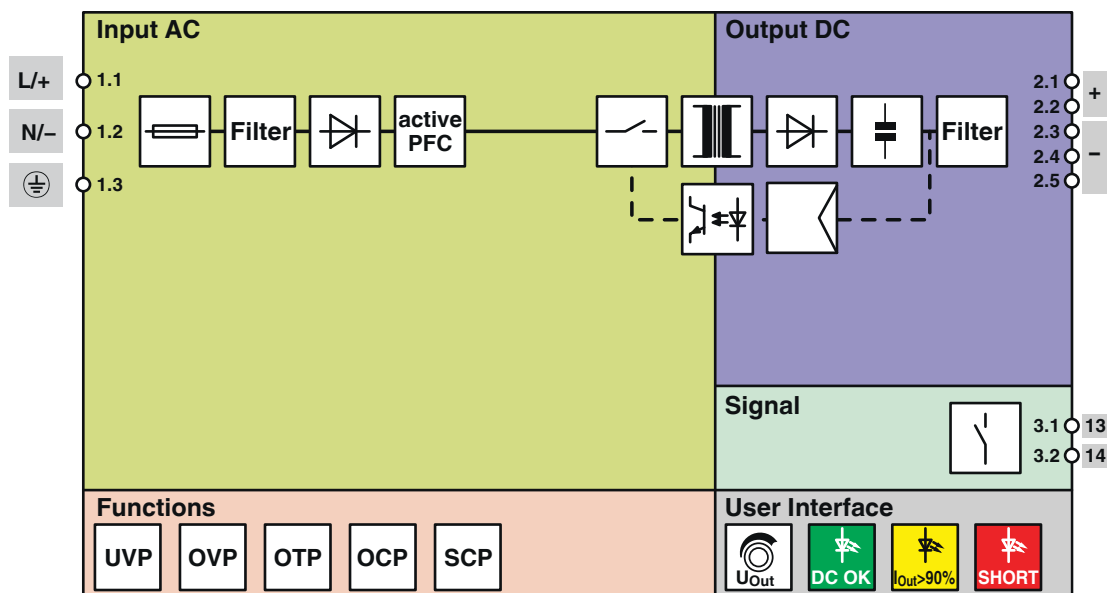
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Block diagram



Block diagram

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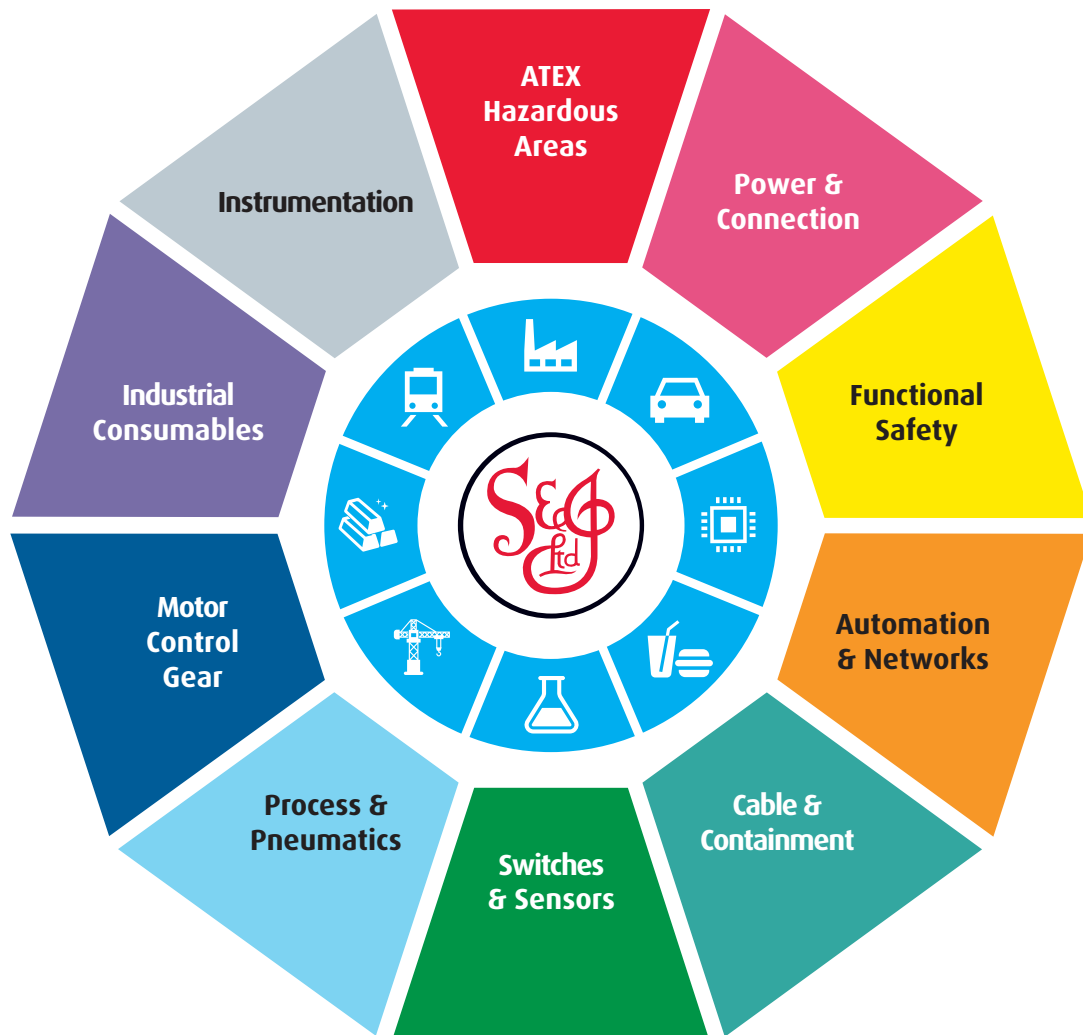
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