

TRIO-DIODE/48DC/2X10/1X20

Redundancy module

Data sheet
106042_en_01

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1 Description

TRIO DIODE is the DIN-rail mountable redundancy module from the TRIO POWER product range.

With the aid of the redundancy module, it is possible for two power supply units of the same type connected in parallel on the output side to increase performance or for redundancy to be decoupled 100 % from one another.

Redundant systems are used in plants that make particularly high demands on operational reliability. The power supplies involved must be dimensioned to enable the total current requirements of all loads to be covered by one single power supply. The redundant structure of the power supply therefore ensures long-term, permanent system availability.

In the event of an internal device fault or failure of the mains power supply on the primary side, the other device automatically takes over the entire supply of the loads without interruption. The floating signal contact and LED immediately indicate the loss of redundancy.

Features

- Decoupling power supply units switched in parallel
- Reliable signaling of redundancy
- Load currents up to 30 A supported
- High level of safety with regard to supply due to MTBF > 10 million h
- Reverse polarity protection



Make sure you always use the latest documentation.
It can be downloaded from the product at phoenixcontact.net/products.

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3 Ordering data

Description	Type	Order No.	Pcs./Pkt.
Redundancy module with function monitoring, 48 V DC, 2x 10 A, 1x 20 A	TRIO-DIODE/48DC/2X10/ 1X20	2866527	1

4 Technical data

Input data/output data	
Nominal input/output voltage	48 V DC
DC input / output voltage range	30 V DC ... 56 V DC
Voltage drop, input/output	approx. 0.65 V
Nominal current	2x 10 A (-25 °C ... 55 °C) 1x 20 A (-25 °C ... 55 °C)
Maximum current	2x 15 A (-25°C ... 40°C) 1x 30 A (-25°C ... 40°C)
Transient surge protection	Varistor
Reverse polarity protection	Yes , < 60 V
Derating	55 °C ... 70 °C (2.5%/K)
Power loss nominal load max.	14 W ($I_{OUT} = 20$ A)
Efficiency	> 97 %
Connection in series	No
Power consumption	
Maximum power dissipation in no-load condition	7 W ($I_{OUT} = 10$ A)
Power loss nominal load max.	14 W ($I_{OUT} = 20$ A)
Floating redundancy OK	
Output description	Contact closed when U_{IN1} & $U_{IN2} > 28$ V
Voltage	30 V AC/DC
Current	≤ 100 mA (short-circuit resistant)
Status display	LED redundancy OK / U_{IN1} & $U_{IN2} > 28$ V: LED lights up green
General data	
Insulation voltage input, output / housing	500 V
MTBF (IEC 61709, SN 29500)	> 10000000 h (40 °C)
Mounting position	horizontal DIN rail NS 35, EN 60715
Housing material	Steel sheet, zinc-plated
Dimensions W/H/D	32 mm / 130 mm / 115 mm
Weight	0.37 kg
Security	
Degree of protection	IP20
Protection class	III
SELV	IEC 60950-1 (SELV) and EN 60204-1 (PELV)

TRIO-DIODE/48DC/2X10/1X20**Input connection data**

Connection method	Screw connection
Conductor cross section, solid	0.2 mm ² ... 2.5 mm ²
Conductor cross section, flexible	0.2 mm ² ... 2.5 mm ²
Conductor cross section AWG/kcmil	24 ... 14
Stripping length	9 mm
Screw thread	M2,5
Tightening torque	0.4 Nm ... 0.5 Nm

Output connection data

Connection method	Screw connection
Conductor cross section, solid	0.5 mm ² ... 6 mm ²
Conductor cross section, flexible	0.5 mm ² ... 4 mm ²
Conductor cross section AWG/kcmil	20 ... 10
Stripping length	14 mm
Screw thread	M3
Tightening torque	0.5 Nm ... 0.6 Nm

Ambient conditions

Ambient temperature (operation)	-25 °C ... 70 °C (> 55° C derating : 2.5%/K)
Ambient temperature (storage/transport)	-40 °C ... 85 °C
Max. permissible relative humidity (operation)	≤ 95 % (at 25 °C, non-condensing)
Vibration (operation)	< 15 Hz, amplitude ±2.5 mm 15 Hz ... 150 Hz, 2.3g t _v = 90 min.
Shock	15g in all directions in acc. with IEC 60068-2-27
Degree of pollution in acc. with EN 50178	2
Climatic class	3K3 (in acc. with EN 60721)

Approvals

UL approvals	UL/C-UL listed UL 508 UL/C-UL Recognized UL 60950
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Current approvals/permissions for the product can be found in the download area under phoenixcontact.net/products.

Conformance with EMC Directive 2014/30/EU			
Noise immunity according to EN 61000-6-2			
		EN 61000-6-2 requirement	tested
Electrostatic discharge EN 61000-4-2			
	Contact discharge	4 kV (Test Level 2)	6 kV (Test Level 3)
	Air discharge	8 kV (Test Level 3)	8 kV (Test Level 3)
	Comments	Criterion B	Criterion B
Electromagnetic HF field EN 61000-4-3			
	Frequency range	80 MHz ... 1 GHz	80 MHz ... 1 GHz
	Test field strength	10 V/m (Test Level 3)	10 V/m (Test Level 3)
	Frequency range	1.4 GHz ... 2 GHz	1 GHz ... 2 GHz
	Test field strength	3 V/m (Test Level 2)	10 V/m (Test Level 3)
	Frequency range	2 GHz ... 2.7 GHz	2 GHz ... 3 GHz
	Test field strength	1 V/m (Test Level 1)	10 V/m (Test Level 3)
	Comments	Criterion A	Criterion A
Fast transients (burst) EN 61000-4-4			
	Input	2 kV (Test Level 3 - asymmetrical)	2 kV (Test Level 3 - asymmetrical)
	Output	2 kV (Test Level 3 - asymmetrical)	2 kV (Test Level 3 - asymmetrical)
	Comments	Criterion B	Criterion B
Surge current loads (surge) EN 61000-4-5			
	Input	0.5 kV (Test Level 1 - symmetrical) 0.5 kV (Test Level 1 - asymmetrical)	2 kV (Test Level 3 - asymmetrical) 1 kV (Test Level 2 - symmetrical)
	Output	0.5 kV (Test Level 1 - symmetrical) 0.5 kV (Test Level 1 - asymmetrical)	2 kV (Test Level 3 - asymmetrical) 1 kV (Test Level 2 - symmetrical)
	Comments	Criterion B	Criterion B
Conducted interference EN 61000-4-6			
	Input/Output/Signal	asymmetrical	asymmetrical
	Frequency range	0.15 MHz ... 80 MHz	0.15 MHz ... 80 MHz
	Voltage	10 V (Test Level 3)	10 V (Test Level 3)
	Comments	Criterion A	Criterion A
Emitted interference in acc. with EN 61000-6-3			
Radio interference voltage in acc. with EN 55011		EN 55011 (EN 55022) Class B, area of application: Industry and residential	
Emitted radio interference in acc. with EN 55011		EN 55011 (EN 55022) Class B, area of application: Industry and residential	

Key

Criterion A

Normal operating behavior within the specified limits.

Criterion B

Temporary impairment to operational behavior that is corrected by the device itself.



All technical specifications are nominal values and refer to a room temperature of 25 °C and 70 % relative humidity at 100 m above sea level.

5 Intended use

This redundancy module features IP20 protection and is intended for installation in housing. It is suitable for use in industrial applications.

The technical specifications must be taken into consideration and observed.

6 Structure

6.1 Device elements

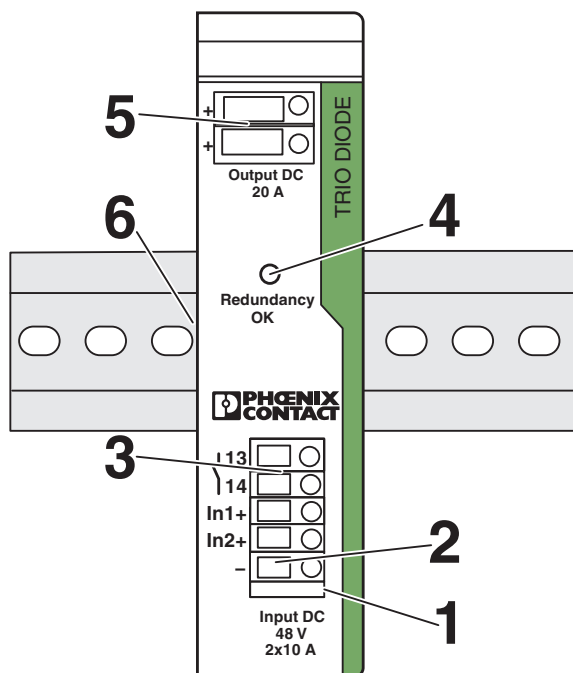


Figure 1 Device elements

1. DC input In1/In2
2. Signal GND
3. Floating relay contact
4. Green LED: Redundancy OK
5. DC output
6. Universal snap-on foot: 35 mm DIN rail according to EN 60715

6.2 Block diagram

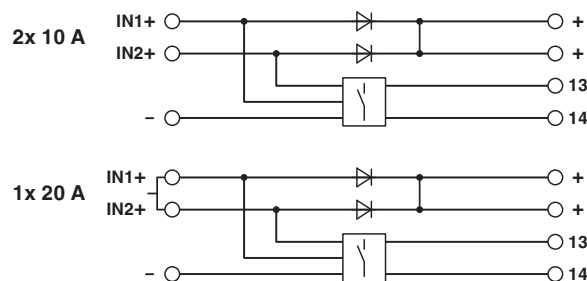


Figure 2 Block diagram

Element	Meaning
	Decoupling
	Switch

7 Assembly

7.1 Unpacking

Before mounting the redundancy module, it must be checked for damage:

- Take the device out of its packaging.
- Check the device for any damage sustained during transport.
- Retain the package slip for future use.
- Dispose of packaging in an environmentally-friendly way.

7.2 Mounting the redundancy module



The redundancy module is intended for installation in a distributor box or control cabinet.



The redundancy module is designed for convection cooling. A minimum distance from other devices must be maintained in order to ensure convection cooling.

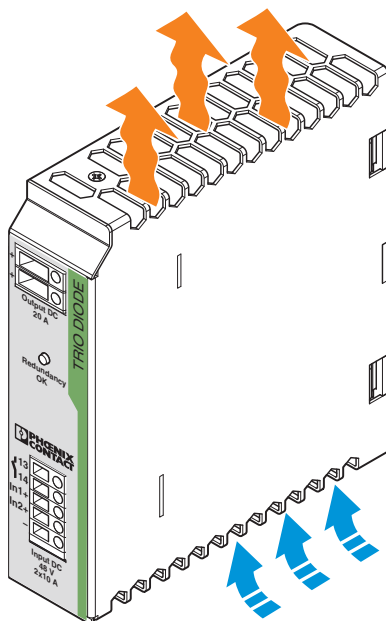


Figure 3 Convection

Prior to mounting the redundancy module:

- The minimum distance from other devices that must be observed in order to ensure convection cooling is:
50 mm vertically, 0 mm horizontally

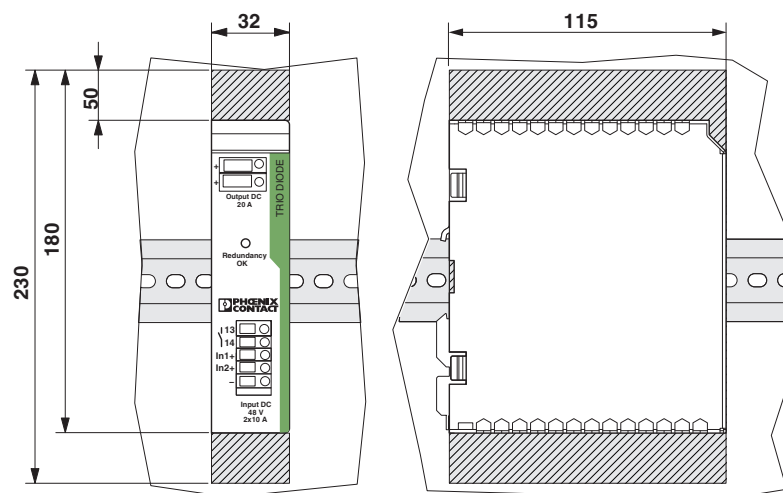


Figure 4 Device dimensions and keepout areas

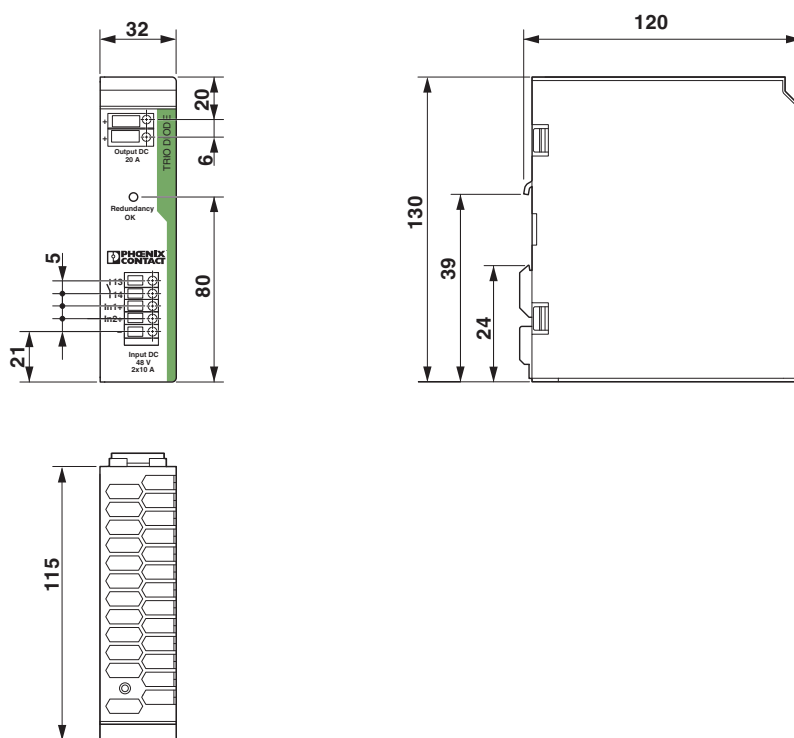


Figure 5 Device dimensions

7.3 Mounting on a DIN rail

The redundancy module can be installed on all 35 mm DIN rails according to EN 60715.

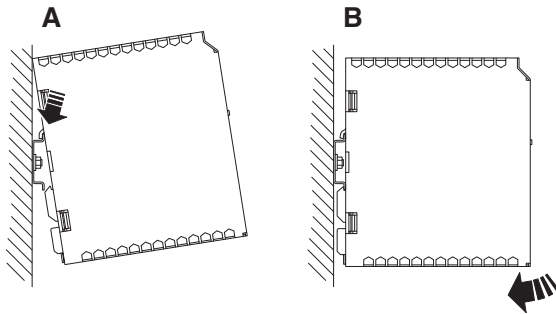


Figure 6 Mounting on a DIN rail

7.4 Normal mounting position

When installed, the input terminal blocks must be at the bottom and the output terminal blocks at the top.

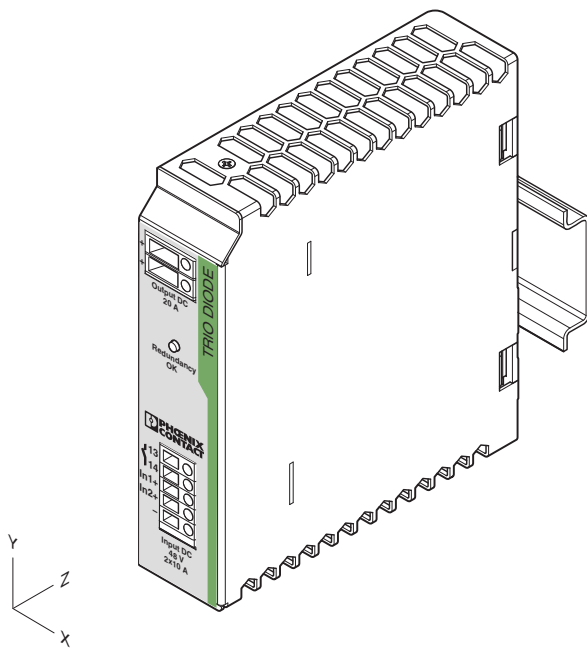


Figure 7 Normal mounting position

7.5 Alternative mounting positions

Alternative mounting positions are possible.



There is no position-dependent derating.

8 Install the redundancy module

8.1 Safety regulations and installation notes



WARNING: risk of electric shock!

Only professionals may install, start up, and operate the device. Observe the national safety and accident prevention regulations.

Prior to installation, disconnect the input voltage and make sure that it cannot be switched on again unintentionally.

Mains connection must be performed by specialist personnel and protection against electric shock ensured.

Make sure that the device can be switched off outside the power supply according to the regulations in EN 60950 (e.g., by line protection on the primary side).

Cover termination area after installation in order to avoid accidental contact with live parts (e.g., by installing in a control cabinet).

Protect the device against ingress by foreign bodies, e.g., paper clips or metal parts.



WARNING: risk of electric shock!

Make sure that all supply lines are sufficiently dimensioned and have sufficient fuse protection.

Make sure that all output cables are dimensioned accordingly for the maximum device output current or have separate fuse protection.

Do not exceed the maximum input/output current of 30 A. Use current-limited source, (e.g., TRIO POWER) or suitable fuse.

8.2 Device connections

Screw connection for input DC

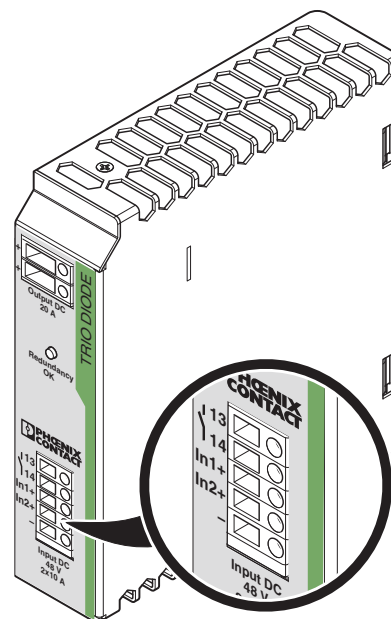


Figure 8 Screw connection for input DC

Screw connection for output DC

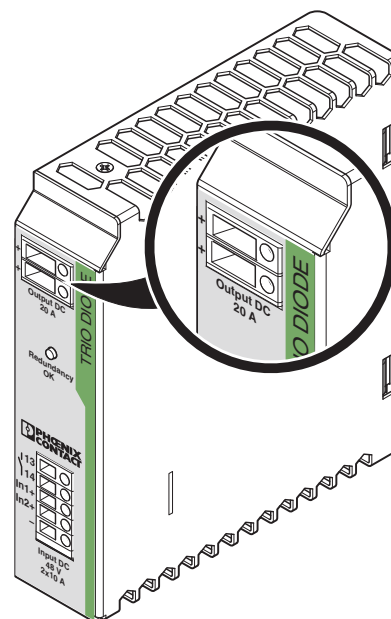


Figure 9 Screw connection for output DC

8.3 Connecting cables



Use two cables of the same length and the same cross section to connect the redundancy module to the power supply.



Use copper cables with an operating temperature $> 75^{\circ}\text{C}$ (ambient temperature $< 55^{\circ}\text{C}$) and $> 90^{\circ}\text{C}$ (ambient temperature $< 75^{\circ}\text{C}$).



Use ferrules for flexible cables.

Input

To decouple two parallel connected power supplies 1 and 2 with nominal currents of up to 10 A, one redundancy module is needed.

1. Connect one input of the redundancy module to one power supply in each case.
2. Connect the “-” terminal when signaling is necessary.

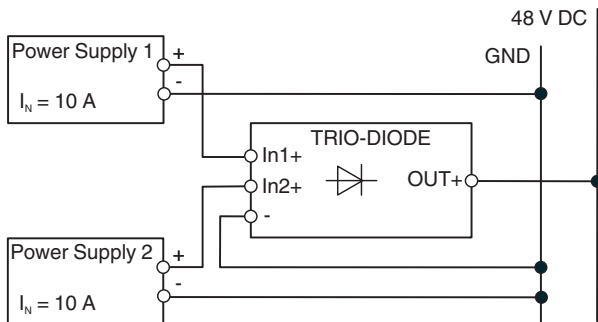


Figure 10 Decouple power supplies with nominal currents ≤ 10 A

One redundancy module per power supply is required to decouple power supplies with nominal currents greater than 10 A to 20 A.

1. For this purpose, connect the two inputs of one redundancy module to one power supply in each case.

This is necessary because the maximum current carrying capacity of 15 A per input must not be exceeded.

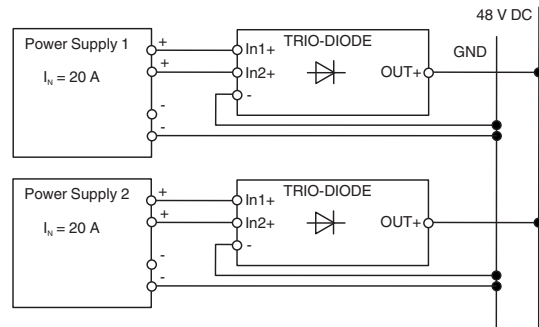


Figure 11 Decouple power supplies with nominal currents from 10 A to 20 A

Output

1. Wire the load with the internally connected plus terminals to the output of the redundancy module.



Close all unused clamping spaces.

9 Redundancy module in operation



WARNING: Risk of burns

Depending on the ambient temperature and the load, the housing can become very hot.



The redundancy module is maintenance-free. Repairs may only be carried out by the manufacturer.

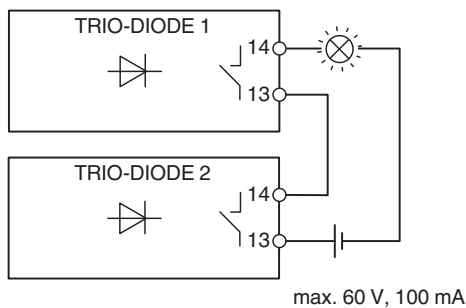
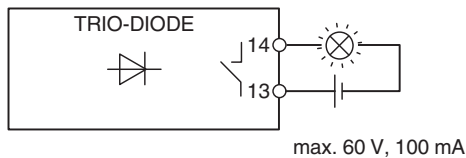
The warranty no longer applies if the housing is opened.

9.1 Signaling

A floating relay contact and "Redundancy OK" LED are available for monitoring redundancy. In normal operation where input voltage > 28 V DC at input terminals "IN1+" and "IN2+", the relay contact (13/14) is closed and the "Redundancy OK" LED lights up.

If the input voltage falls to below the value of 28 V DC at one of the input terminals, the floating relay contact opens and the "Redundancy OK" LED goes out.

Floating, current-limited "Redundancy OK" signal contacts are to be connected in series for monitoring redundancy. If monitoring the redundancy is not necessary, the "GND signal" does not need to be connected.



9.2 Temperature response

The device can be operated at an ambient temperature of -25 °C to +70 °C. For ambient temperatures above +55 °C, the output current must be reduced by 2.5% per Kelvin increase in temperature.

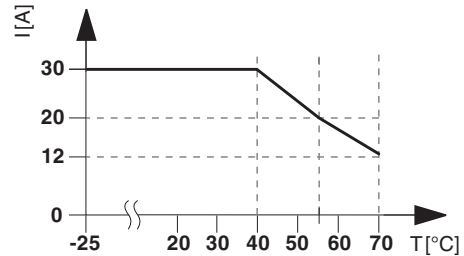


Figure 12 Temperature-dependent derating

10 Removal

10.1 Uninstall the redundancy module

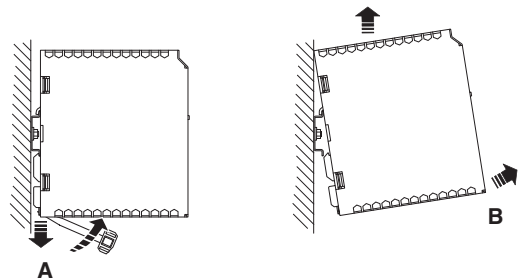


Figure 13 Removal

10.2 Notes on disposal



Do not dispose of the redundancy module with household waste. It should be disposed of in accordance with the currently applicable national regulations.



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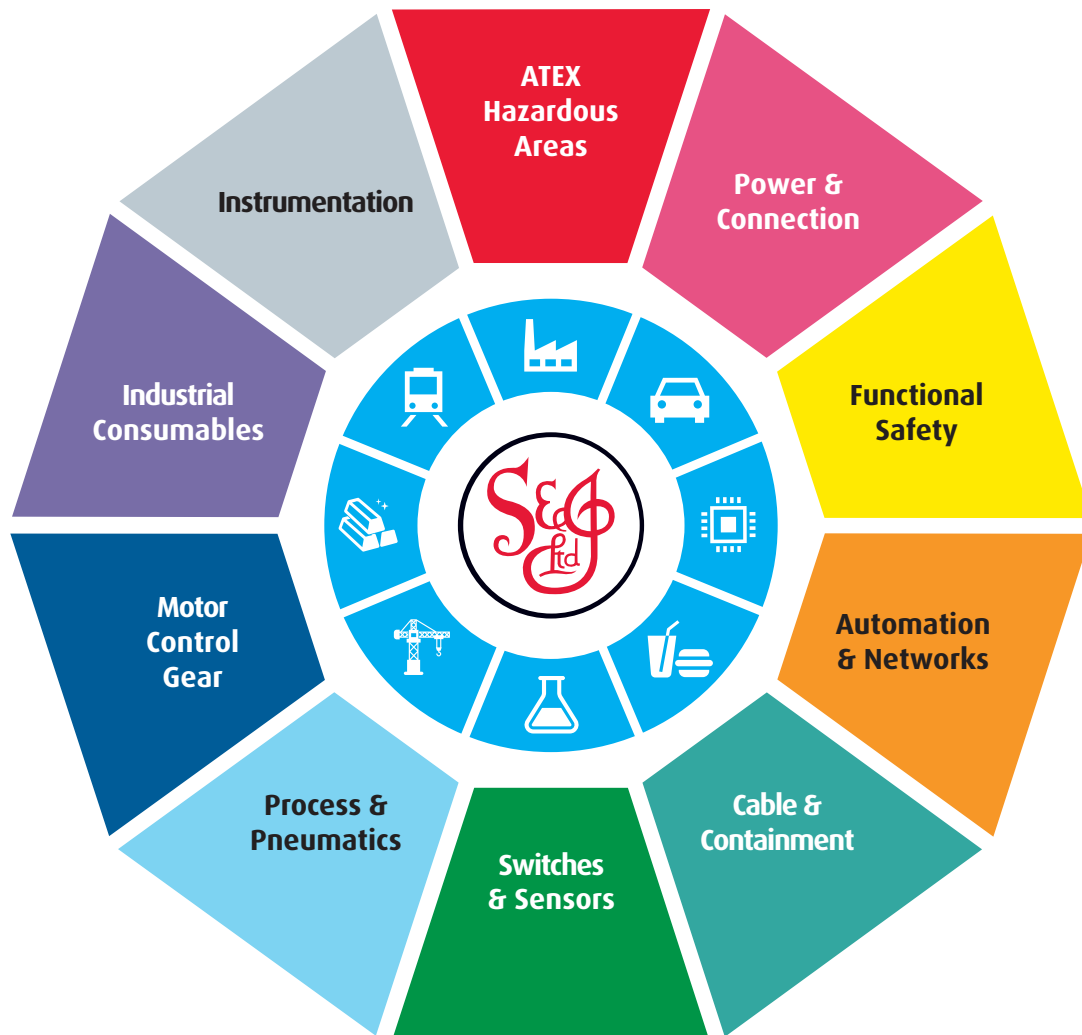
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