

Features

- 1-channel signal conditioner
- 24 V DC supply
- Thermocouple, RTD, potentiometer or mV input
- Input for PTC thermistor
- Current and voltage output
- Line fault (LFD) and sensor burnout detection
- Accuracy 0.1 %
- Connection via screw terminals

Function

This signal conditioner provides the galvanic isolation between field circuits and control circuits.

The device has an input for signals of the following field devices:

- resistance thermometers
- thermocouples
- PTC thermistors
- potentiometers
- voltage sources
- field device with its own characteristic

The device provides the following standard signals at the output:

- 0/2 mA ... 10 mA signal
- 0/4 mA ... 20 mA signal
- 0/1 V ... 5 V signal
- 0/2 V ... 10 V signal

This device has an integrated cold junction compensation. You can also implement external cold junction compensation.

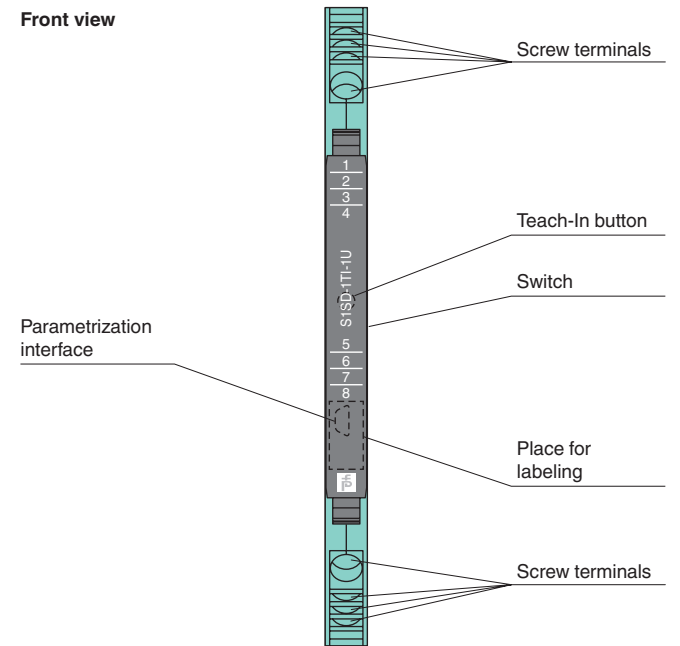
A fault is signalized by LEDs.

The device is easily configured by the use of DIP switches.

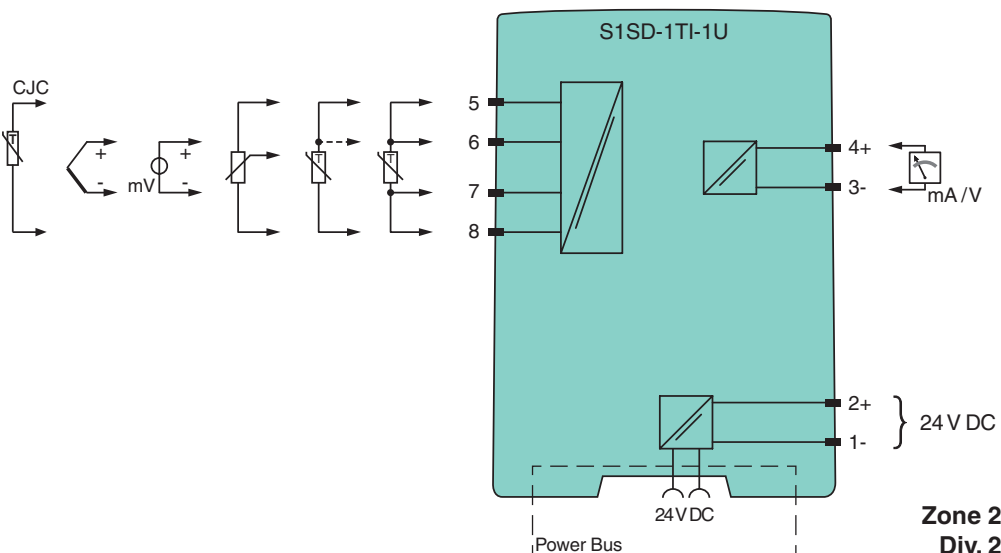
The Teach-In function can be used to teach in the potentiometer start value and end value.

The device can be powered via terminals or Power Bus.

Assembly



Connection



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| | |
|----------------------------------|--|
| General specifications | |
| Signal type | Analog input |
| Supply | |
| Connection | Power Bus or terminals 1-, 2+ |
| Rated voltage U_r | 16.8 ... 31.2 V DC |
| Power dissipation | 0.7 W |
| Power consumption | 0.8 W |
| Interface | |
| Programming interface | programming socket |
| Input | |
| Connection side | field side |
| Connection | terminals 5, 6, 7, 8 |
| PTC | |
| Measuring current | approx. 200 μ A |
| Types of measuring | 2-, 3-, 4-wire connection |
| Lead resistance | $\leq 100 \Omega$ per line |
| Measurement loop monitoring | sensor breakage, lead breakage, short circuit |
| RTD | |
| Measuring current | approx. 200 μ A |
| Types of measuring | 2-, 3-, 4-wire connection |
| Lead resistance | $\leq 100 \Omega$ per line |
| Measurement loop monitoring | sensor breakage, lead breakage, short circuit |
| Thermocouples | |
| | type B, E, J, K, N, S, T (IEC 584-1:1995) type L, U (DIN 43710:1985) type C, D (ASTM E988) |
| Cold junction compensation | external (Pt100) and internal, manually |
| Lead resistance | $\leq 10 \text{ k}\Omega$ |
| Measurement loop monitoring | sensor breakage, lead breakage |
| Resistor | |
| Measurement range | 0 ... 5 $\text{k}\Omega$ |
| Potentiometer | |
| Types of measuring | 3-wire connection |
| Voltage | |
| | -100 ... 100 mV -1000 ... 1000 mV |
| Input resistance | $\geq 1 \text{ M}\Omega$ |
| Output | |
| Connection side | control side |
| Connection | terminals 3-, 4+ |
| Analog voltage output | 0/1 ... 5 V, 0/2 ... 10 V, load $\geq 2 \text{ k}\Omega$ |
| Analog current output | 0/2 ... 10 mA, 0/4 ... 20 mA, load $\leq 600 \Omega$ |
| Ripple | $\leq 10 \text{ mV}_{\text{eff}}$ |
| Fault signal | downscale or upscale |
| Transfer characteristics | |
| Accuracy | $\leq 0.1 \%$ of full-scale value |
| Measuring time | $\leq 300 \text{ ms}$ |
| Deviation | |
| RTD | $< 0.1 \text{ K}/0.05 \%$ of the measured value |
| Thermocouples | $< 0.3 \text{ K}/0.1 \%$ of the measured value |
| Voltage | $< 0.1 \%$ of the measured value |
| Potentiometer | $< 0.02 \%$ of the measured value |
| Influence of ambient temperature | $< 100 \text{ ppm/K}$ of full-scale value |
| Galvanic isolation | |
| Output/power supply | safe electrical isolation by reinforced insulation according to IEC/EN 61010-1, rated insulation voltage 300 V_{eff} test voltage 3 kV, 50 Hz, 1 min |
| Input/Other circuits | safe electrical isolation by reinforced insulation according to IEC/EN 61010-1, rated insulation voltage 300 V_{eff} test voltage 3 kV, 50 Hz, 1 min |
| Indicators/settings | |
| Control elements | DIP-switch keys |
| Configuration | via DIP switches via keys via software |
| Labeling | space for labeling at the front |
| Directive conformity | |
| Electromagnetic compatibility | |

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
Refer to "General Notes Relating to Pepperl+Fuchs Product Information".

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| | |
|--|--|
| Directive 2014/30/EU | EN 61326-1:2013 (industrial locations) |
| Conformity | |
| Degree of protection | IEC 60529:2001 |
| Protection against electrical shock | EN 61010-1:2010 |
| Ambient conditions | |
| Ambient temperature | -25 ... 70 °C (-13 ... 158 °F) |
| Storage temperature | -40 ... 85 °C (-40 ... 185 °F) |
| Damaging gas | designed for operation in environmental conditions acc. to ISA-S71.04-1985, severity level G3 |
| Mechanical specifications | |
| Degree of protection | IP20 |
| Connection | screw terminals |
| Core cross-section | 0.5 ... 2.5 mm ² (20 ... 14 AWG) |
| Mass | approx. 70 g |
| Dimensions | 6.2 x 97 x 107 mm (0.24 x 3.82 x 4.21 inch) , housing type S1 |
| Mounting | on 35 mm DIN mounting rail acc. to EN 60715:2001 |
| Data for application in connection with hazardous areas | |
| Certificate | DEMKO 16 ATEX 1750X |
| Marking |  II 3G Ex nA IIC T4 Gc |
| Directive conformity | |
| Directive 2014/34/EU | EN 60079-0:2012+A11:2013 , EN 60079-15:2010 |
| International approvals | |
| UL approval | E106378 |
| IECEX approval | IECEX UL 16.0116X |
| Approved for | Ex nA IIC T4 Gc |
| General information | |
| Supplementary information | Observe the certificates, declarations of conformity, instruction manuals, and manuals where applicable. For information see www.pepperl-fuchs.com . |
| Accessories | |
| Optional accessories | power feed module S1SD-2PF adapter with USB interface S-ADP-USB Power Bus POWERBUS-SETL5.*** Power Bus POWERBUS-SETH5.*** cover for DIN mounting rail POWERBUS-COV.250 end cap POWERBUS-CAP |

Configuration

Configuration using DIP switches

Use the DIP switches to configure the device. Via the DIP switches you can select only a limited number of sensors. A wider range of sensors you can select via software configuration. The following options are available:

| Input | S1 | | | | |
|----------|----|----|----|----|----|
| | 1 | 2 | 3 | 4 | 5 |
| PT100 | | | | | |
| PT1000 | ON | | | | |
| Ni100 | | ON | | | |
| Resistor | ON | | ON | | |
| 4-wire | | | | | |
| 3-wire | | | | ON | |
| 2-wire | | | | | ON |

| | | | | | |
|---------------|----|--|----|----|----|
| Potentiometer | ON | | ON | ON | ON |
|---------------|----|--|----|----|----|

| | | | | | |
|--------------|----|----|----|----|----|
| Typ J | ON | ON | | | |
| Typ K | | | ON | | |
| CJC internal | | | | | |
| CJC external | | | | ON | |
| CJC OFF | | | | | ON |

| | | | | | |
|----------|--|----|----|--|----|
| +100 mV | | ON | ON | | |
| +1000 mV | | ON | ON | | ON |

| | | | | | |
|----------------|----|----|----|--|--|
| PC-Programming | ON | ON | ON | | |
|----------------|----|----|----|--|--|

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| Start value | | | | S1 | | | | |
|-------------|--------|----------|---------|----|----|----|----|----|
| Temp | Res | Poti | mV | 6 | 7 | 8 | 9 | 10 |
| -200 °C | 0 Ω | 0 % | -100 mV | ON | | | | |
| -175 °C | 50 Ω | 1 % | -90 mV | | ON | | | |
| -150 °C | 100 Ω | 2 % | -80 mV | ON | ON | | | |
| -125 °C | 150 Ω | 3 % | -70 mV | | | ON | | |
| -100 °C | 200 Ω | 4 % | -60 mV | ON | | ON | | |
| -75 °C | 250 Ω | 5 % | -50 mV | | ON | ON | | |
| -50 °C | 300 Ω | 6 % | -45 mV | ON | ON | ON | | |
| -25 °C | 350 Ω | 7 % | -40 mV | | | | ON | |
| 0 °C | 400 Ω | 8 % | -35 mV | | | | | |
| 25 °C | 450 Ω | 9 % | -30 mV | ON | | | ON | |
| 50 °C | 500 Ω | 10 % | -25 mV | | ON | | ON | |
| 75 °C | 550 Ω | 11 % | -20 mV | ON | ON | | ON | |
| 100 °C | 600 Ω | 12 % | -15 mV | | | ON | ON | |
| 125 °C | 650 Ω | 13 % | -10 mV | ON | | ON | ON | |
| 150 °C | 700 Ω | 14 % | -5 mV | | ON | ON | ON | |
| 175 °C | 750 Ω | 15 % | 0 mV | ON | ON | ON | ON | |
| 200 °C | 800 Ω | 20 % | 5 mV | | | | | ON |
| 225 °C | 850 Ω | 25 % | 10 mV | ON | | | | ON |
| 250 °C | 900 Ω | 30 % | 15 mV | | ON | | | ON |
| 275 °C | 950 Ω | 35 % | 20 mV | ON | ON | | | ON |
| 300 °C | 1000 Ω | 40 % | 25 mV | | | ON | | ON |
| 350 °C | 1500 Ω | 45 % | 30 mV | ON | | ON | | ON |
| 400 °C | 2000 Ω | 50 % | 35 mV | | ON | ON | | ON |
| 450 °C | 2500 Ω | 55 % | 40 mV | ON | ON | ON | | ON |
| 500 °C | 3000 Ω | 60 % | 45 mV | | | | ON | ON |
| 550 °C | 3500 Ω | 65 % | 50 mV | ON | | | ON | ON |
| 600 °C | 4000 Ω | 70 % | 60 mV | | ON | | ON | ON |
| 650 °C | 4500 Ω | 75 % | 70 mV | ON | ON | | ON | ON |
| 700 °C | - | 80 % | 80 mV | | | ON | ON | ON |
| 800 °C | - | 85 % | 90 mV | ON | | ON | ON | ON |
| 900 °C | - | 90 % | - | | ON | ON | ON | ON |
| 1000 °C | - | Teach-in | - | ON | ON | ON | ON | ON |

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| End value | | | | S2 | | | | | |
|-----------|--------|------|--------|----|----|----|----|----|----|
| Temp | Res | Poti | mV | 1 | 2 | 3 | 4 | 5 | 6 |
| -150 °C | 100 Ω | 10 % | - | ON | | | | | |
| -125 °C | 150 Ω | 15 % | - | | ON | | | | |
| -100 °C | 200 Ω | 20 % | - | ON | ON | | | | |
| -75 °C | 250 Ω | 25 % | - | | | ON | | | |
| -50 °C | 300 Ω | 30 % | - | ON | | ON | | | |
| -25 °C | 350 Ω | 35 % | - | | ON | ON | | | |
| 0 °C | 400 Ω | 40 % | - | ON | ON | ON | | | |
| 25 °C | 450 Ω | 45 % | - | | | | ON | | |
| 50 °C | 500 Ω | 46 % | - | ON | | | ON | | |
| 75 °C | 550 Ω | 47 % | - | | ON | | ON | | |
| 100 °C | 600 Ω | 48 % | 100 mV | | | | | | |
| 125 °C | 650 Ω | 49 % | 95 mV | ON | ON | | ON | | |
| 150 °C | 700 Ω | 50 % | 90 mV | | | ON | ON | | |
| 175 °C | 750 Ω | 51 % | 85 mV | ON | | ON | ON | | |
| 200 °C | 800 Ω | 52 % | 80 mV | | ON | ON | ON | | |
| 225 °C | 850 Ω | 53 % | 75 mV | ON | ON | ON | ON | | |
| 250 °C | 900 Ω | 54 % | 70 mV | | | | | ON | |
| 275 °C | 950 Ω | 55 % | 65 mV | ON | | | | ON | |
| 300 °C | 1000 Ω | 56 % | 60 mV | | ON | | | ON | |
| 325 °C | 1050 Ω | 57 % | 55 mV | ON | ON | | | ON | |
| 350 °C | 1100 Ω | 58 % | 50 mV | | | ON | | ON | |
| 350 °C | 1150 Ω | 59 % | 45 mV | ON | | ON | | ON | |
| 400 °C | 1200 Ω | 60 % | 40 mV | | ON | ON | | ON | |
| 425 °C | 1250 Ω | 61 % | 35 mV | ON | ON | ON | | ON | |
| 450 °C | 1300 Ω | 62 % | 30 mV | | | | ON | ON | |
| 475 °C | 1400 Ω | 63 % | 25 mV | ON | | | ON | ON | |
| 500 °C | 1500 Ω | 64 % | 20 mV | | ON | | ON | ON | |
| 525 °C | 1600 Ω | 65 % | 15 mV | ON | ON | | ON | ON | |
| 550 °C | 1700 Ω | 66 % | 10 mV | | | ON | ON | ON | |
| 575 °C | 1800 Ω | 67 % | 5 mV | ON | | ON | ON | ON | |
| 600 °C | 1900 Ω | 68 % | 0 mV | | ON | ON | ON | ON | |
| 625 °C | 2000 Ω | 69 % | -5 mV | ON | ON | ON | ON | ON | |
| 650 °C | 2100 Ω | 70 % | -10 mV | | | | | | ON |
| 675 °C | 2200 Ω | 71 % | -15 mV | ON | | | | | ON |
| 700 °C | 2300 Ω | 72 % | -20 mV | | ON | | | | ON |
| 725 °C | 2400 Ω | 73 % | -25 mV | ON | ON | | | | ON |
| 750 °C | 2500 Ω | 74 % | -30 mV | | | ON | | | ON |
| 775 °C | 2600 Ω | 75 % | -35 mV | ON | | ON | | | ON |
| 800 °C | 2700 Ω | 76 % | -40 mV | | ON | ON | | | ON |
| 825 °C | 2800 Ω | 77 % | -45 mV | ON | ON | ON | | | ON |
| 850 °C | 2900 Ω | 78 % | -50 mV | | | | ON | | ON |
| 875 °C | 3000 Ω | 79 % | -55 mV | ON | | | ON | | ON |
| 900 °C | 3100 Ω | 80 % | -60 mV | | ON | | ON | | ON |
| 925 °C | 3200 Ω | 81 % | -65 mV | ON | ON | | ON | | ON |
| 950 °C | 3300 Ω | 82 % | -70 mV | | | ON | ON | | ON |
| 975 °C | 3400 Ω | 83 % | -75 mV | ON | | ON | ON | | ON |
| 1000 °C | 3500 Ω | 84 % | -80 mV | | ON | ON | ON | | ON |
| 1025 °C | 3600 Ω | 85 % | -85 mV | ON | ON | ON | ON | | ON |
| 1050 °C | 3700 Ω | 86 % | -90 mV | | | | | ON | ON |
| 1075 °C | 3800 Ω | 87 % | - | ON | | | | ON | ON |
| 1100 °C | 3900 Ω | 88 % | - | | ON | | | ON | ON |
| 1125 °C | 4000 Ω | 89 % | - | ON | ON | | | ON | ON |
| 1150 °C | 4100 Ω | 90 % | - | | | ON | | ON | ON |
| 1175 °C | 4200 Ω | 91 % | - | ON | | ON | | ON | ON |
| 1200 °C | 4300 Ω | 92 % | - | | ON | ON | | ON | ON |
| 1225 °C | 4400 Ω | 93 % | - | ON | ON | ON | | ON | ON |
| 1250 °C | 4500 Ω | 94 % | - | | | | ON | ON | ON |
| 1275 °C | 4600 Ω | 95 % | - | ON | | | ON | ON | ON |
| 1300 °C | 4700 Ω | 96 % | - | | ON | | ON | ON | ON |
| 1325 °C | 4800 Ω | 97 % | - | ON | ON | | ON | ON | ON |
| 1350 °C | 4900 Ω | 98 % | - | | | ON | ON | ON | ON |
| 1375 °C | 5000 Ω | 99 % | - | ON | | ON | ON | ON | ON |

Refer to "General Notes Relating to Pepperl+Fuchs Product Information".

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| End value | | | | S2 | | | | | |
|-----------|-----|----------|----|----|----|----|----|----|----|
| Temp | Res | Poti | mV | 1 | 2 | 3 | 4 | 5 | 6 |
| 1400 °C | - | 100% | - | | ON | ON | ON | ON | ON |
| 1425 °C | - | Teach-in | - | ON | ON | ON | ON | ON | ON |

| Output | S2 | | | |
|----------------|----|----|---|----|
| | 7 | 8 | 9 | 10 |
| 0 V ... 5 V | ON | ON | | |
| 0 V ... 10 V | | ON | | |
| 4 mA ... 20 mA | ON | | | |
| 0 mA ... 20 mA | | | | |

| Characteristic | | | | |
|----------------|--|--|----|--|
| rising | | | | |
| falling | | | ON | |

| Diagnostics | | | | |
|-------------|--|--|--|----|
| downscale | | | | ON |
| upscale | | | | |

Factory settings: all switches in position OFF

Configuration using software

Use software to configure the device. Configuration must be permitted by setting the DIP switches. See table.

The device is equipped with a programming socket on the front. A corresponding adapter is available as an accessory. This adapter can be used to configure the device. The software is available to download from www.pepperl-fuchs.com.

The following options are available:

- You can choose from a wider range of sensor types.
- You can adjust the start value and end value in smaller increments.

Fault signals on the output

| Characteristic | Diagnostics | Output range ¹ | Underrange | Overrange | Fault signal |
|----------------------|-------------------------|---------------------------|------------|-----------|--------------|
| rising S2.9 = OFF | upscale S2.10 = OFF | 0 ... 20 mA | 0 mA | 20.5 mA | 22 mA |
| | | 4 ... 20 mA | 3.8 mA | 20.5 mA | 22 mA |
| | | 0 ... 5 V | 0 V | 5.125 V | 5.5 V |
| | | 0 ... 10 V | 0 V | 10.25 V | 11 V |
| falling S2.9 = ON | downscale S2.10 = ON | 0 ... 20 mA | 0 mA | 20 mA | 0 mA |
| | | 4 ... 20 mA | 4 mA | 20 mA | 4 mA |
| | | 0 ... 5 V | 0 V | 5 V | 0 V |
| | | 0 ... 10 V | 0 V | 10 V | 0 V |
| falling S2.9 = ON | upscale S2.10 = OFF | 20 ... 0 mA | 20.5 mA | 0 mA | 22 mA |
| | | 20 ... 4 mA | 20.5 mA | 3.8 mA | 22 mA |
| | | 5 ... 0 V | 5.125 V | 0 V | 5.5 V |
| | | 10 ... 0 V | 10.25 V | 0 V | 11 V |
| falling S2.9 = ON | downscale S2.10 = ON | 20 ... 0 mA | 20 mA | 0 mA | 0 mA |
| | | 20 ... 4 mA | 20 mA | 4 mA | 4 mA |
| | | 5 ... 0 V | 5 V | 0 V | 0 V |
| | | 10 ... 0 V | 10 V | 0 V | 0 V |

¹ Other output ranges react analogous to the table.

LED indicators

| LED | Status | Description |
|-----------|------------------|-------------------------------|
| green LED | Off | No power supply |
| | On | Normal functionn |
| red LED | Flashing rapidly | Device is in teach-in mode |
| | Flashing slowly | Line fault or faulty teach-in |
| | On | Device fault |

Teach-in function

The teach-in function can be used to teach in the potentiometer start value and end value.

There are two ways of teaching in the potentiometer using the teach-in function:

- Automatic teach-in of the device in drag mode
- Manual teach-in of the start value and end value

The taught-in values remain stored under the teach-in setting. The start value is 0 % and the end value is 100 % by default.

Starting the teach-in function

Use the teach-in button located behind the cover on the front of the device to teach in the device.

1. Configure the device using the DIP switches on the side of the device.
2. Press and hold the teach-in button for longer than 3 seconds.

The red LED will flash rapidly.

3. Automatic teach-in: Move to the start value and end value. Both values are automatically recorded in the device.

or

Manual teach-in: Move to the first end stop and press and hold the teach-in button for around 0.5 seconds. Move to the second end stop and press and hold the teach-in button for around 0.5 seconds.

Ending the teach-in function, saving the start value and end value

Press and hold the teach-in button for longer than 3 seconds.

The red LED no longer flashes. The values are saved.

Ending the teach-in function without saving the start value and end value

Press and hold the teach-in button for longer than 6 seconds.

or

Switch off the device.

The red LED no longer flashes. The values are not saved.

Teach-in fault

If the span between the start value and the end value is too small, the red LED will flash slowly again after saving the values.

Possible reasons for this include:

- The slider has not moved in drag mode.
- The second end stop is too close to the first end stop.

In the event of an error, the teach-in function must be performed again in its entirety.

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ELECTRICAL ENGINEERING & FLUID CONTROL DISTRIBUTORS

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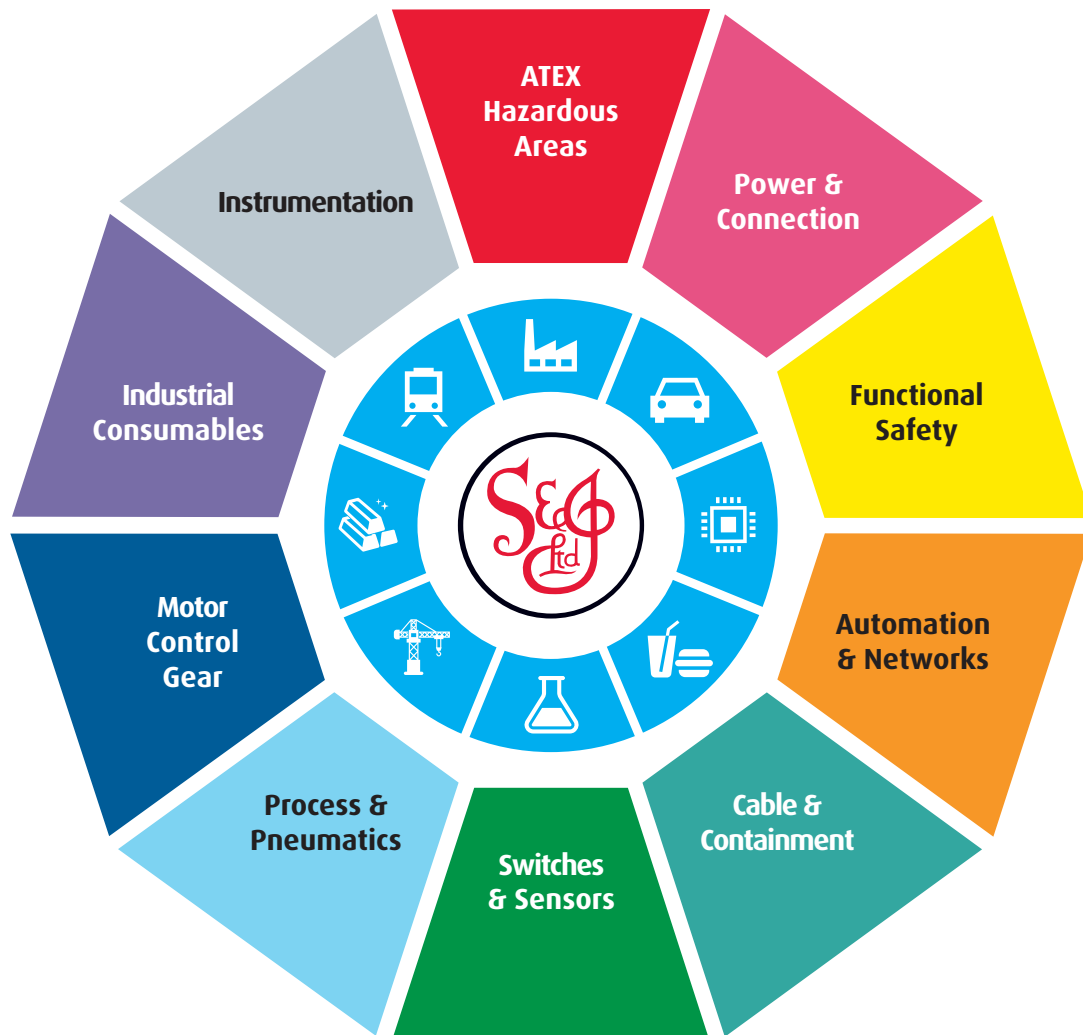
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