IL EC BK-PAC - TUNNEL

IL EC BK-PAC bus coupler: Access to PCP objects and startup parameterization

Application note
107884_en_00

1 About this document

This document describes how to access the PCP objects of Inline terminals from the IL EC BK-PAC bus coupler using tunnel objects. It also explains how to use the startup parameterization option.

Example

The following bus configuration is used here as an example:

IL EC BK-PAC	IB IL 24 DI 16-PAC	IB IL 24 DO 16-PAC	IB IL AI 2/SF-PAC	**IB IL SGI 2/P/ EF-PAC**

Write and read access is explained using the example of the IB IL SGI 2/P/EF-PAC Inline terminal.

The TwinCAT® software is used for explanatory purposes. However, the steps described here can also be applied to other tools.

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2 Tunnel objects of the IL EC BK-PAC bus coupler

For some Inline terminals it is possible to transmit the parameter data using the PCP channel of the Inline station.

In the following, the Inline terminals are referred to as modules, as they are listed as modules in EtherCAT®.

You can access the PCP objects of the modules of a station via EtherCAT®. To this end, the CoE objects $20nn_{hex}$ and $30nn_{hex}$ are used, with which a tunnel method can be implemented.

The CoE objects in the 2000_{hex} to $203F_{hex}$ area create PCP write access to acyclic EtherCAT® services. Once the local bus configuration has been successfully read in, for each detected local bus device, there is a CoE object, e.g., 2000_{hex} for module 1, 2001_{hex} for module 2, etc.

The CoE objects in the area 3000_{hex} to $303F_{hex}$ create PCP read access to acyclic EtherCAT® services. Once the local bus configuration has been successfully read in, for each detected local bus device, there is a CoE object, e.g., 3000_{hex} for module 1, 3001_{hex} for module 2, etc.

For I/O modules that are not PCP devices, these tunnel objects have no function. Access to these objects is answered with a negative confirmation. You will receive Error_Code 00_{hex} and Error_Class 02_{hex} as a response (feature not supported).

Module after the bus coupler	nn	Index of the PCP Read Tunnel object	Index of the PCP Write Tunnel object
1st module	00	3000	2000
2nd module	01	3001	2001
...	...	...	...
63rd module	62	3062	2062

For the structure of the tunnel objects, please refer to the data sheet for the bus coupler.

For the PCP objects of the individual Inline modules, please refer to the module-specific documentation.

3 Tunnel objects in the software

- Open the project in the TwinCAT® System Manager.
- Select the IL EC BK-PAC EtherCAT® bus coupler in the project tree.
- Open the “CoE-Online” tab.
- In order to be able to view all CoE objects, they must be imported first.
- Click on “Advanced ...”.
- In the window that opens, select “Online - via SDO Information”.
- Select “All Objects”.
- Confirm your selection with “OK”.

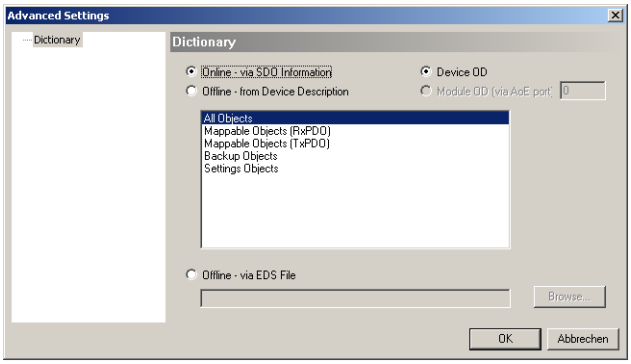

Figure 1 Reading all objects

A list including all CoE objects is now displayed under “CoE-Online”.

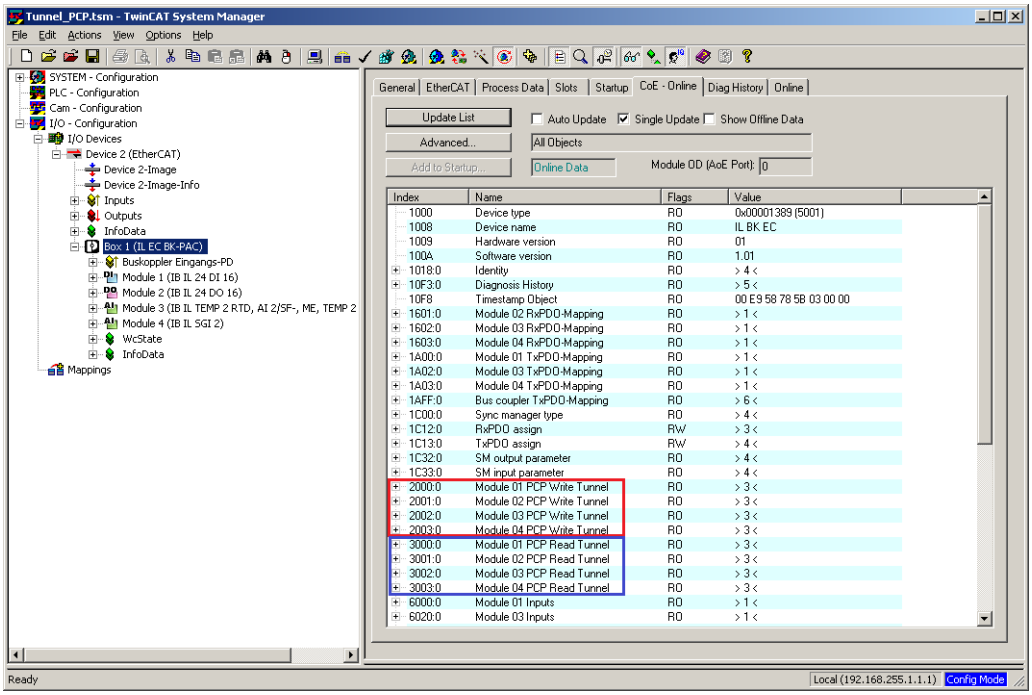

Figure 2 List including the CoE objects of the bus coupler

For the relevant fourth module, write access is carried out via index 2003 and read access via index 3003.

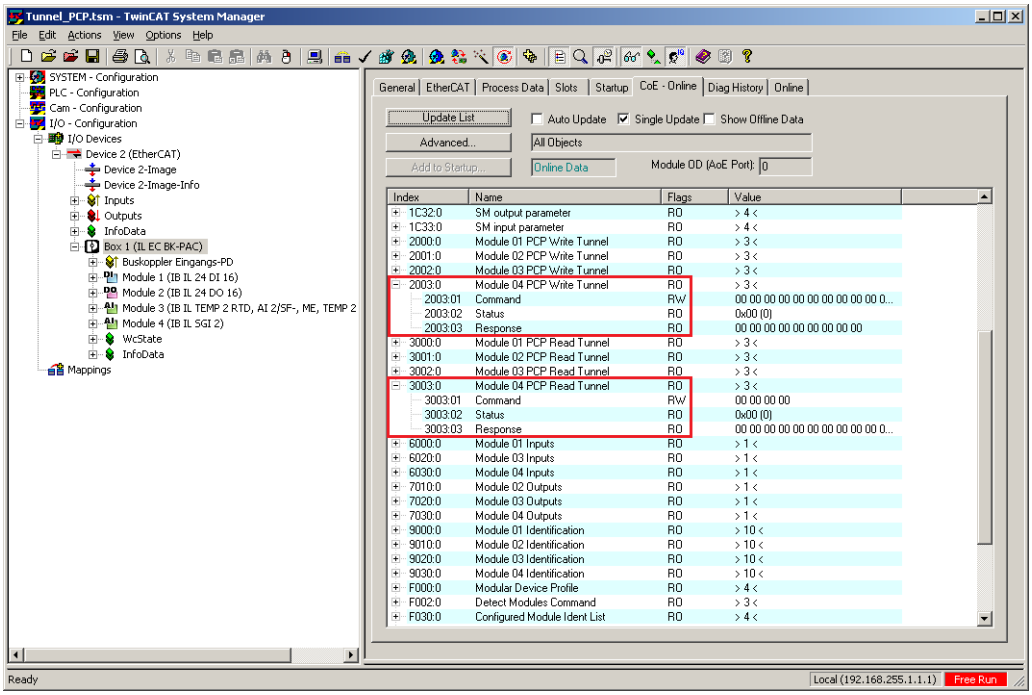

Figure 3 Tunnel objects of the IB IL SGI 2/P/EF-PAC module

4 Writing to PCP objects with PCP Write Tunnel

This CoE object allows writing to any PCP object where write access is permitted. In the following, write access is shown using a parameterization example.

Parameterization example

Please refer to the module-specific data sheet for parameterization options.

- The IB IL SGI 2/P/EF-PAC module needs to be parameterized. It is the fourth module after the bus coupler (nn = 03).
- The parameterization is performed via object 0080_{hex} (ConfigTable).
- According to the data sheet, this object has the following structure:

Object	ConfigTable		
Access	Read, write		
Data type	Array of Records Record = 4 x Unsigned 16		2 x 8 bytes
Index	0080_{hex}		
Subindex	00_{hex}	Read/write all elements	
	01_{hex}	Parameterization of channel 1	Unsigned 16
		Nominal load (MAX) of channel 1	Unsigned 16
		Adjustment value 1 of channel 1	Unsigned 16
		Adjustment value 2 of channel 1	Unsigned 16
	02_{hex}	Parameterization of channel 2	Unsigned 16
		Nominal load (MAX) of channel 2	Unsigned 16
		Adjustment value 1 of channel 2	Unsigned 16
		Adjustment value 2 of channel 2	Unsigned 16
Length (bytes)	10_{hex}	Subindex 00_{hex}	
	08_{hex}	Subindex 01_{hex} to 02_{hex}	
Data	Parameter table: terminal parameterization		

- Channel 1 should be parameterized using the following values:
  - Parameterization of channel 1:

Parameter		Value (bin)	Meaning
M	Mean value	10	4-sample mean value
C	Conversion time of the analog-digital converter	0	100 ms
N	Nominal characteristic value	0101	±5 mV/V

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Meaning	0	0	0	0	0	0	**M**		0	0	0	**C**	**N**			
bin	0	0	0	0	0	0	**1**	**0**	0	0	0	**0**	**0**	**1**	**0**	**1**
hex	0				2				0				5			

  - Nominal load (MAX) of channel 1 = 50 kg
  - Adjustment value 1 of channel 1 = 12500
  - Adjustment value 2 of channel 1 = 0 (should not be used)
- The parameterization of channel 1 is performed via the PCP object 0080_{hex} (ConfigTable), subindex 1.

Procedure

- In index 2003, double-click subindex 1, Command.

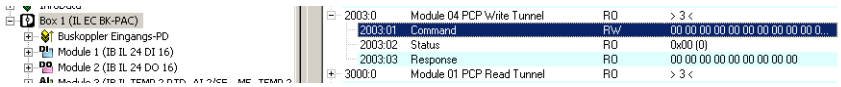

Figure 4 Command of PCP Write Tunnel for the IB IL SGI 2/P/EF-PAC module

The “Set Value Dialog” box opens.

- Specify the octet string for the parameterization.

“Command” has a maximum length of 250 bytes. However, only the user data needs to be entered.
According to the data sheet for the bus coupler, the “Command” structure corresponds to that shown in the table below.
According to the data sheet for the module to be parameterized, the following values are used for module parameterization.

Data for the PCP write request			
Byte 0	Invoke ID	00	Invoke ID for parallel services (Default value: 00_{hex})
Bytes 1, 2	PCP object index	0080	ConfigTable PCP object
Byte 3	PCP object subindex	01	Subindex 1 = channel 1
Byte 4	Length of the data to be written	08	8 bytes of user data
User data:			
Bytes 5, 6	Parameterization of channel 1	0205	See above
Bytes 7, 8	Nominal load (MAX) of channel 1	$50_{dec} = 0032_{hex}$	Nominal load 50 kg in display format 12.345
Bytes 9, 10	Adjustment value 1 of channel 1	$12500_{dec} = 30D4_{hex}$	
Bytes 11, 12	Adjustment value 2 of channel 1	00 00	

This results in the following octet string for the parameterization:
00 00 80 01 08 02 05 00 32 30 D4 00 00

- In the “Binary” line, enter the octet string for the parameterization.

A binary code is not required, even if the parameterization is entered under “Binary”.

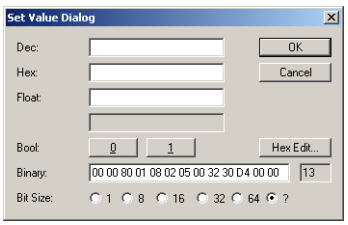

Figure 5 Parameterization value

- Confirm your entry with “OK”.

Result

Subindex 02 (Status) and subindex 03 (Response) contain the result.

– Positive write access

If the status is 01_{hex}, the write access has been completed successfully. The response is in this case irrelevant.

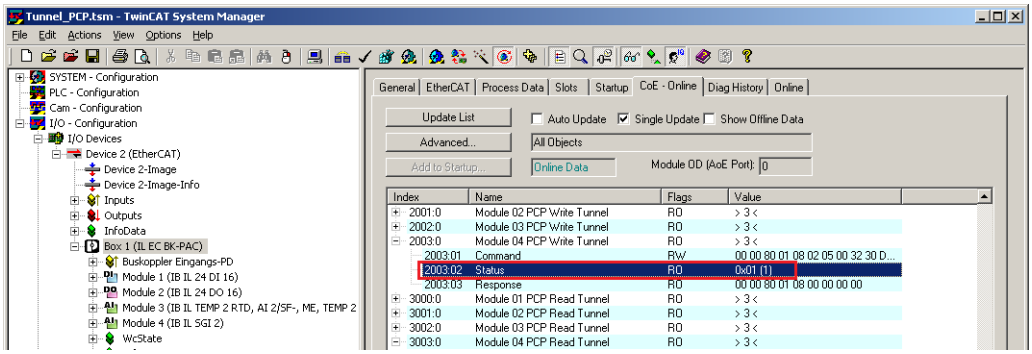

Figure 6 Write access successful

– Negative write access

An error has occurred if the status is 03_{hex}. The response contains the mirrored command and the diagnostic code. Apart from including the diagnostic code in the response, the error will also be indicated in the message window.

The diagnostic code included in the response is reported by the module or the Inline system.

Diagnostics in the message window is reported by the EtherCAT® system, including the diagnostic code and plain text.

The two messages do not have to be identical.

For the meaning of the diagnostic codes included in the response, please refer to the module-specific data sheet or the PCP-specific user manuals (IBS SYS PCP G4 UM E and IBS PCP COMPACT UM E).

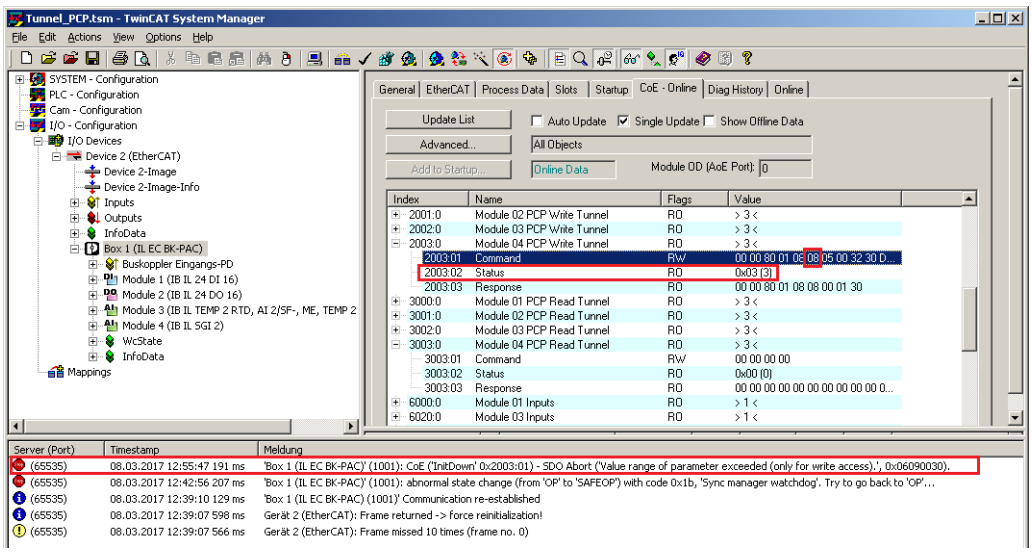

Figure 7 Write access not successful

Diagnostic messages

– Message in the response

00	00 80	01	08	08	00	01	30
Slot	PCP object index ParaTable	Subin-dex	Length	Error class	Error code	Additional code	

In the example, the following error has occurred:
A reserved bit or reserved code was used during parameterization.
Additional code: 01 = channel 1, 30 = value is out of range

– Message in the message window

SDO abort (value range of parameter exceeded (only for write access), 0x06090030.

5 Reading PCP objects with PCP Read Tunnel

The CoE object allows reading of any PCP object where read access is permitted.

Example

– The order number should be read from the IB IL SGI 2/P/EF-PAC. It is the fourth module after the bus coupler (nn = 03).
– The order number is read using object $000A_{hex}$ (OrderNumber).

Procedure

In order to read PCP objects, proceed in the same way as described for writing.

- In index 3003, double-click subindex 1, Command.

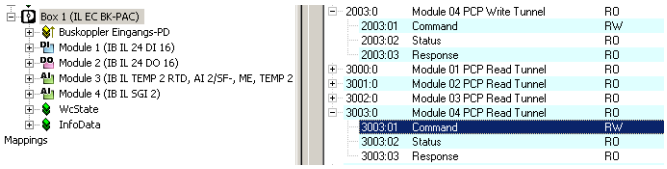

Figure 8 Command of PCP Read Tunnel for the IB IL SGI 2/P/EF-PAC module

The “Set Value Dialog” box opens.

- Enter the octet string in the “Binary” line.

Data for the PCP read request			
Byte 0	Subslot	00	No subslot
Bytes 1, 2	PCP object index	000A	OrderNumber PCP object
Byte 3	PCP object subindex	00	No subindex

This results in the value 00 00 0C 00.

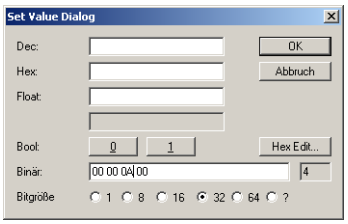

Figure 9 Parameter for reading

Result

Subindex 02 (Status) and subindex 03 (Response) contain the result.

– Positive read access

If the status is 01_{hex}, the read access has been completed successfully. The response includes the mirrored request and the read data.

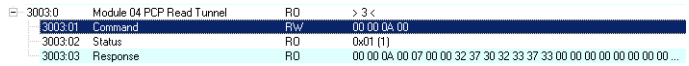

Figure 10 Read access successful; OrderNumber: 2702373

00	00 0A	00	07	00 00	32 37 30 32 33 37 33 00 00 ....
Slot	PCP object index OrderNumber	Subin- dex	Length 7 bytes	-	2702373

– Negative read access

An error has occurred if the status is 03_{hex}. The response contains the mirrored command and the error code. Apart from including the error code in the response, the error will also be indicated in the message window. See also “– Negative write access” on page 7).

6 Startup parameterization

You can store a startup parameterization for the connected Inline modules. After replacing a module, the new module will start up with this parameterization.

Startup parameterization example

– The startup parameterization needs to be stored for the IB IL SGI 2/P/EF-PAC module. It is the fourth module after the bus coupler (nn = 03).
– Channel 1 should be parameterized with the same values as specified in Section “Writing to PCP objects with PCP Write Tunnel” on page 5.
– The parameterization of channel 1 is performed via the PCP object 0080_{hex} (ParaTable), subindex 1.

Procedure

• In order to store the startup parameterization, switch to the “Startup” tab.
Standard parameterizations may already be available as shown in Figure 11.
• Click the “New...” button.

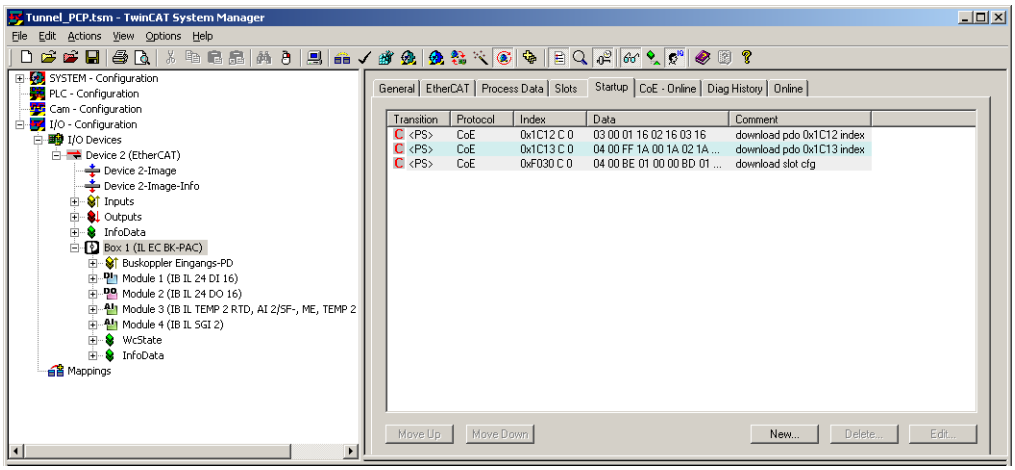

Figure 11 Startup window for storing the startup parameterization

• In the window that opens, specify under “Transition” the state where parameterization should be applied.

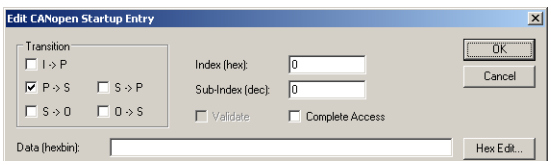

Figure 12 Transition specification in order to apply the parameterization

- Select the index 2002, Command, in the bottom window.
- Specify the parameterization in the “Data (hexbin)” field.
  The octet string for the parameterization is the same as before: 00 00 80 01 08 02 05 00 32 30 D4 00 00
- Confirm your entry with “OK”.

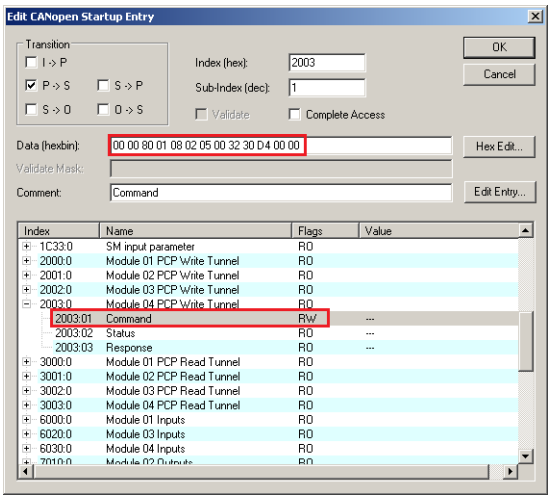

Figure 13 Specifying the startup parameterization

The startup parameterization has been stored. The startup parameterization will be applied every time the module is started up.

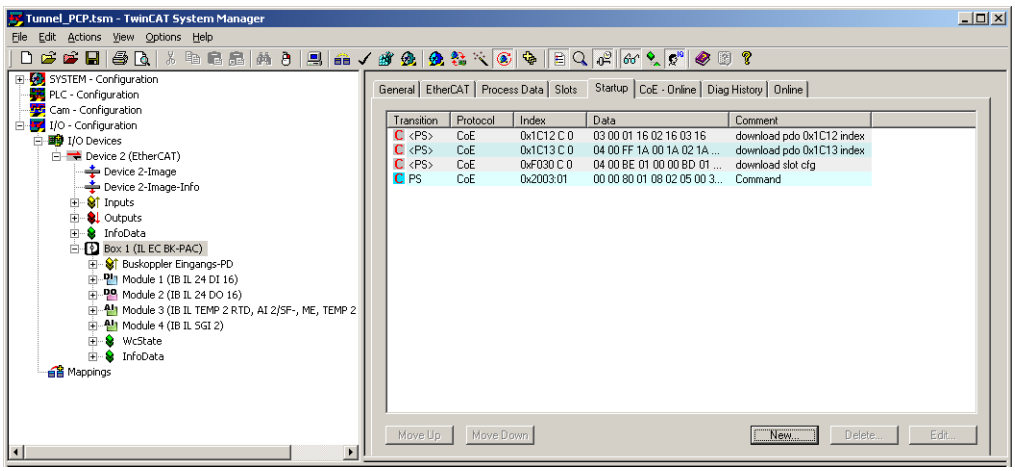

Figure 14 Startup parameters

All changes made after the module startup will only be stored on the module. When you replace the module, the changes will not be applied.

- Repeat these steps if you want to store the startup parameterization for other modules.

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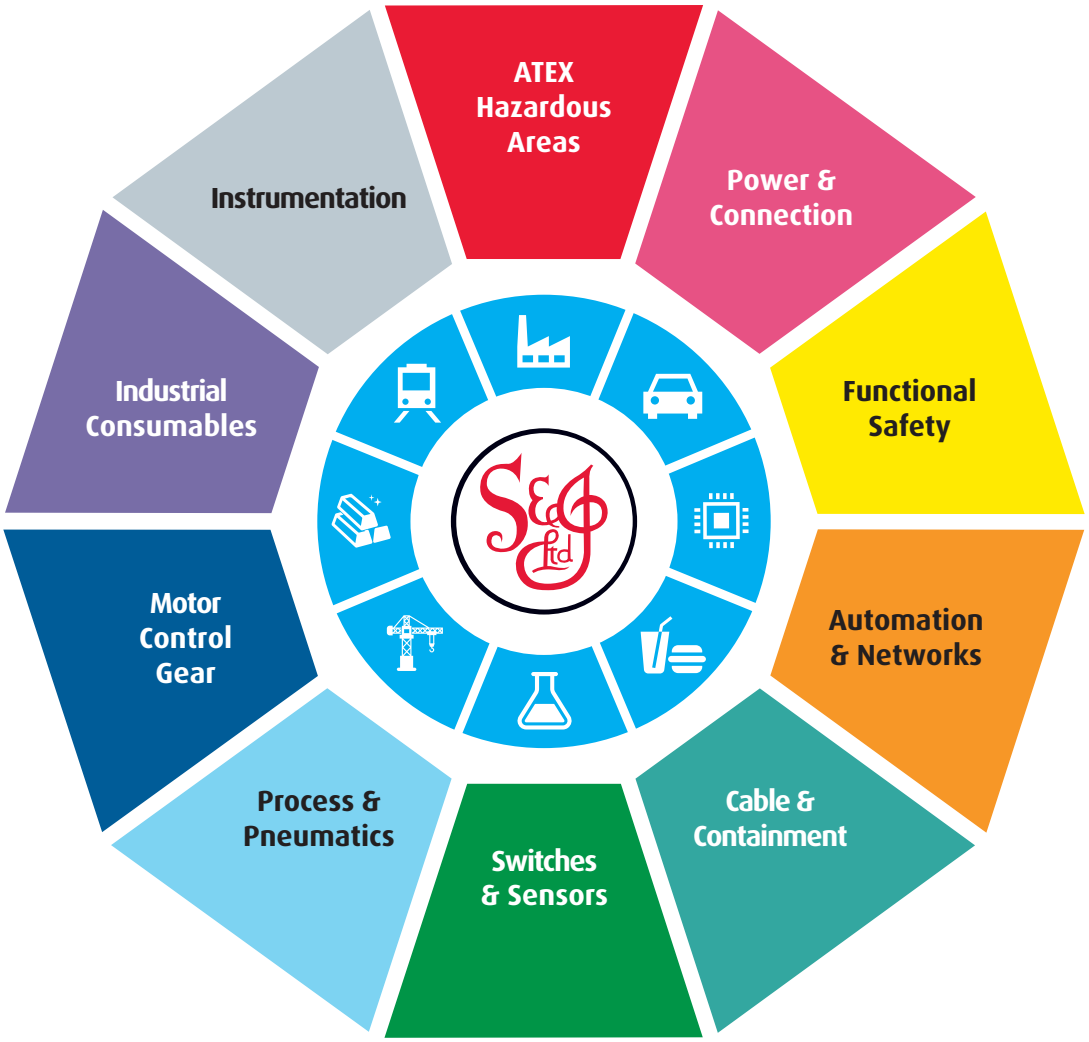

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