Inline CANopen Bus Coupler
IL CAN BK-TC

Data Sheet 1605B

August 2004

1. Description

The Inline CANopen bus coupler allows for communications between the Phoenix Contact family of Inline I/O modules and a CANopen network. See Figure 1. The bus coupler is housed in a 91 mm (3.58 in.) wide package. Diagnostic indicators are provided for both the Inline local I/O and CANopen communications. The IL CAN BK-TC bus coupler is UL/cUL recognized and has received the CE mark of approval.

2. Inline Features

- Connects up to 63 I/O modules
- Advanced diagnostics
- Programmable fault response modes
- Stored I/O configuration
- Latching digital inputs
- Auto-configuration
- Up to 510 digital points, IN and OUT
- Up to 254 analog inputs, IN and OUT
- Up to 63 intelligent function modules
- Supports machine-mount Loop 2 I/O modules

WARNING

THIS EQUIPMENT IS SUITABLE FOR USE IN CLASS 1, DIVISION 2, GROUPS A, B, C, AND D OR NON-HAZARDOUS LOCATIONS ONLY.

WARNING – EXPLOSION HAZARD – SUBSTITUTION OF COMPONENTS MAY IMPAIR SUITABILITY FOR CLASS 1, DIVISION 2.

WARNING – EXPLOSION HAZARD – DO NOT DISCONNECT EQUIPMENT UNLESS POWER HAS BEEN SWITCHED OFF OR THE AREA IS KNOWN TO BE NON-HAZARDOUS.

3. CANopen Features

- Direct peer-to-peer communications
- Emergency message
- Error states and values
- Baud rate flexibility: 10K, 20K, 50K, 125K, 250K, 500K, 1Meg
- Trigger modes:
  - Event
  - Timer
  - Remote request
- Node guarding and heartbeat
- Analog interrupt triggers:
  - Set upper limit, lower limit
  - Unsigned Delta
- Supports 2 configuration devices simultaneously

1 Mounting Rail
2 Grounding Terminal (USLKG 5)
3* End Clamp (CLIPFIX 35)
4 Bus Coupler
5 End Plate
6* Power Connector
7* Labeling Field
8 Grounding Wire 0.2 to 1.5 mm² (24 to 16 AWG)
9 Twin COMBICON Connector
10 Electronic Data Sheet (EDS) Disk

* Included with IL CAN BK-TC-PAC

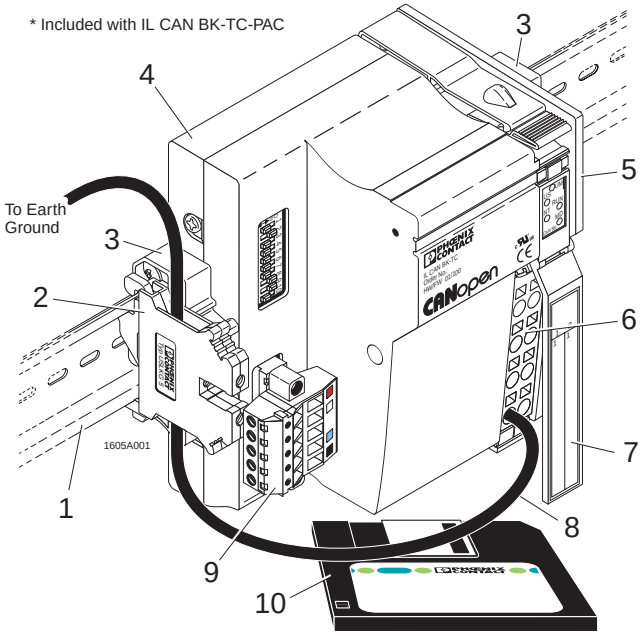

Figure 1. Inline CANopen Bus Coupler

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4. Wiring the Bus Coupler

a. Bus Coupler Connector Numbering

Figure 2 shows the standard numbering scheme for wiring the bus coupler. View A shows connector numbering for the 5-pin, with 2 rows of 5 contacts each, network connector. View B shows connector numbering for the 2-row power connector.

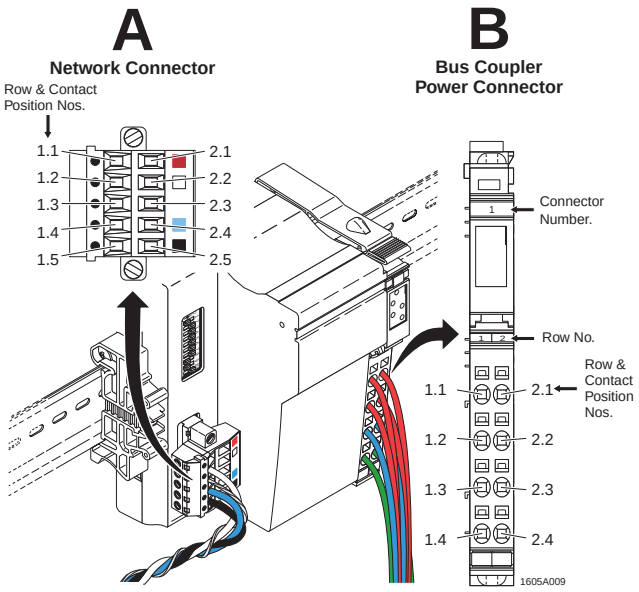

Figure 2. Bus Coupler Connector Numbering and Terminal Assignments

b. Bus Coupler Terminal Assignments

Table 1 lists terminal assignments for the bus coupler connectors. Figure 3 shows a wiring schematic for the power connector that includes internal connections. Note that the bus coupler provides I/O power to the main (U_M) and segment (U_S) circuits for the Inline station. Logic power (communications) and analog power are supplied by the bus coupler through the U_L connection.

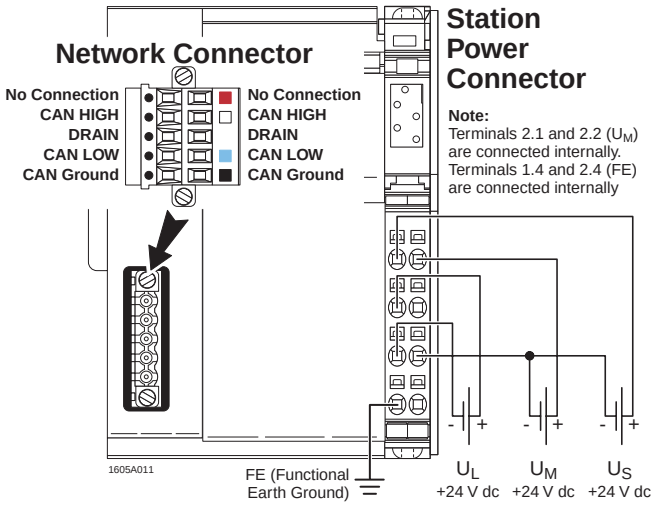

Figure 3. Bus Coupler Power Connections

c. Bus Coupler Power Supplies

CAUTION

Observe the current carrying capacity. The maximum total current that can flow through U_S, U_M and common ground potential jumpers is 8 amps.

Ground the bus coupler to earth ground using one of the FE terminals (1.4 or 2.4) on the power connector. See Figure 3. Then using a piece of 1.5 to 0.2 mm² (16 to 24 AWG) wire, connect the FE terminal to a grounding terminal block. Refer to Figure 1, Item 2.

d. 24 V Segment Supply (U_S) and 24 V Main Supply (U_M)

Both the segment supply and the main supply have the same reference potential. Therefore, an isolated voltage area on the I/O side cannot be created without adding a power terminal.

Both the main supply and the segment supply are protected against polarity reversal and surge voltage.

CAUTION

The main supply and the segment supply do not have short circuit protection. The user must provide short circuit protection. The rating of the fuse must be such that the maximum permissible load current is not exceeded.

Segment voltage can be supplied at the bus coupler or a power terminal. There are several ways of providing the segment voltage to the bus coupler.

1. You can provide the segment voltage separately by using terminal points 1.1 and 2.3 (GND) of the power connector. See Table 1.
2. You can jumper the connections 1.1 and 2.1 or 2.2 to ensure that the segment circuit is supplied from the main circuit.
3. With a switch between the terminal points 1.1 and 2.1 or 2.2 you can create a segment circuit (e.g., an emergency stop circuit).

e. 24 V Logic and Analog Supply (U_L)

U_L provides communications voltage and analog voltage to the connected Inline I/O modules. It is recommended that a separate supply is used.

The U_L supply has protection against polarity reversal and surge voltage. These elements will protect the power supply unit.

Table 1. Network and Power Connector Wiring

Bus Coupler Terminal Assignments			
Network Connector		**Power Connector**	
1.1 & 2.1	No Connection	1.1	+24 V dc (Segment circuit U_S), [red]
1.2 & 2.2	CAN H (white)	1.2	+24 V dc (Logic and analog circuit U_L), [red]
1.3 & 2.3	CAN Shield (bare)	1.3	U_L GND (Logic and analog ground), [blue]
1.4 & 2.4	CAN L (blue)	1.4	FE (Functional Earth ground), [green]
1.5 & 2.5	CAN Ground (black)	2.1 & 2.2	+24 V dc (Main circuit U_M), [red]
		2.3	GND (U_S and U_M), [blue]
		2.4	FE (Functional Earth ground), [green]

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CAUTION

The U_L supply does not have short-circuit protection.

The user must provide short circuit protection. The rating of the fuse must be such that the maximum permissible load current is not exceeded.

5. Networking Information

CANopen utilizes a linear bus topology. See Figure 4. Terminating resistors are required at each end of the trunk cable. Stubs are permitted but should be as short as possible (0.3 meters at 1 M baud).

The total length of trunk and stub cable depends upon the data rate and the type of cable. Use Table 2 and Table 3 as guidelines to determine the type of trunk cable, length, termination and number of nodes. Refer to the CANopen specification, DR303-1, to determine exact trunk and stub cabling limits.

a. Trunk Cable

The trunk cable is used to connect nodes to each other if no stubs exist on the network. If stubs are present, T-connectors will be linked using the trunk cable. See Figure 4. The maximum number of nodes on a CANopen network is limited to 127. The maximum length of a trunk cable ranges from 40 m to 1 km, depending on baud rate. The total distance of the cable can be increased through the use of repeaters.

b. Stub Cable

The stub cable is used to connect nodes to the trunk cable. This connection is made by using a T-connector. However, care must be taken to keep the stub lines within the recommended lengths, especially at the higher baud rates. At 1 M bit, the maximum length of a stub line is 0.3 m.

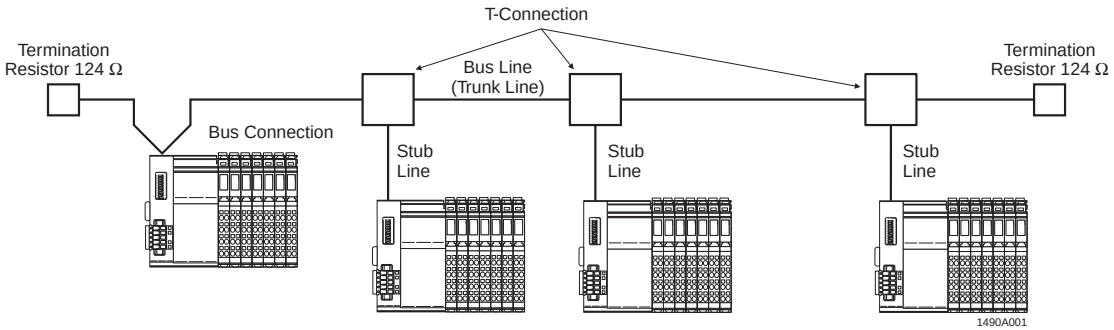

Figure 4. Example CANopen Toplogy

Table 2. Cable Length/Type vs Baud Rate

Bus Length (Meters)	Milliohms Per Meter	Cable Cross Section (mm^2)	Termination Resistance (Ω)	Baud Rate (k bits)
0 to 40	70	0.25 to 0.34	124	1000 at 40 m
40 to 300	<60	0.34 to 0.60	150 to 300	>500 at 100 m
300 to 600	<40	0.50 to 0.60	150 to 300	>100 at 500 m
600 to 1000	<26	0.75 to 0.80	150 to 300	>50 at 1 km

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Note: Recommended bus cable AC parameters: 120 W impedance with 5 ns/meter line delay

Table 3. Cable Length/Type vs Number of Nodes

	Maximum Length in Meters (0.2 Safety Margin)			Maximum Length in Meters (0.1 Safety Margin)		
Cable Cross Section (mm^2)	32 Nodes	64 Nodes	100 Nodes	32 Nodes	64 Nodes	100 Nodes
0.25	200	170	150	230	200	170
0.50	360	310	270	420	360	320
0.75	550	470	410	640	550	480

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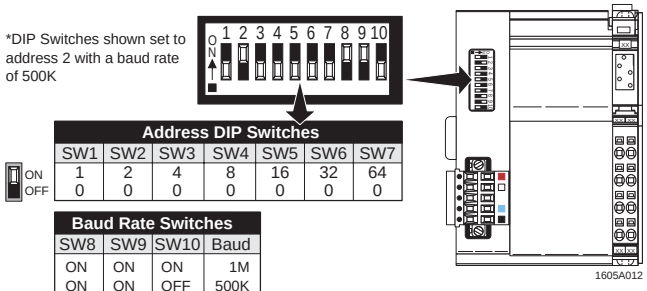
c. Termination Resistors

CANopen requires a terminating resistor to be installed at each end of the trunk line. The typical resistor used to terminate a CANopen trunk line is 124 ohms and has a power dissipation rating of 0.25 W. Refer to the CANopen specification DR303-1 to determine exact values and for additional information about termination resistors.

6. DIP Switch Settings for Address and Baud Rate

Each bus coupler has 10 DIP switches. These switches are located on the left side of the CANopen bus coupler, see Figure 5. DIP switches 1 through 7 are used to set the node address and DIP switches 8-10 are used to set the baud rate.



Address DIP Switches

SW1	SW2	SW3	SW4	SW5	SW6	SW7
1	2	4	8	16	32	64
0	0	0	0	0	0	0

Baud Rate Switches

SW8	SW9	SW10	Baud
ON	ON	ON	1M
ON	ON	OFF	500K
ON	OFF	ON	250K
ON	OFF	OFF	125K
OFF	ON	ON	50K
OFF	ON	OFF	20K
OFF	OFF	ON	10K

Figure 5. DIP Switch Meanings

a. Setting the Node Address

The node address is set using DIP switches 1 through 7. DIP switch 1 is the least significant digit of the node address and DIP switch 7 is the most. Valid node address settings range from 1 to 127. Note that UL power will need to be cycled in order to implement any changes to the node address. Node address 0 is reserved, and is used to auto-configure the I/O attached to the module. The unit will not go online at address 0.

b. Setting the Baud Rate Using DIP Switches 8, 9, & 10

The baud rate is set using DIP switches 8 -10 set the baud rate. DIP switch settings for various baud rates are shown in Figure 5. Note that UL power will need to be cycled in order to implement any changes to the baud rate.

7. Configuring the Bus Coupler Using the DIP Switches

Auto-configuration using the DIP switches allows for "in-the-field" configuration of the bus coupler without any software. It will configure using the following default settings:

1. Receive Process Data Object (RPDO) 1 will contain the digital outputs from 1 to 64. If there are less digital outputs attached the RPDO will contain the outputs from 1 to the number of digital outputs attached.
2. Transmit Process Data Object (TPDO) 1 will contain the digital inputs from 1 to 64. If there are less digital inputs attached the TPDO will contain the inputs from 1 to the number of digital inputs attached.
3. RPDO 2 will contain the analog outputs from 1 to 4 if they are present.
4. TPDO 2 will contain the analog inputs from 1 to 4 if they are present.
5. RPDO 3 will contain analog outputs 5 to 8 if they are present.
6. TPDO 3 will contain the analog inputs from 5 to 8 if they are present.
7. RPDO 4 will contain analog outputs 9 to 12 if they are present.
8. TPDO 4 will contain the analog inputs from 9 to 12 if they are present.

Note

All other I/O will not be mapped during the configuration procedure. This includes all special function modules. All unmapped I/O must be manually mapped to PDOs 5 through PDO 32.

Inline special function modules include the following module types.

- IB IL SSI — Absolute Encoder
- IB IL INC — Incremental Encoder
- IB IL CNT — High-speed Counter
- ASI MA IB IL — Inline to AS-i controller
- IB IL RS 232* — RS232 Module
- IB IL RS 485/422* — RS485/422 Module

  * Module is not supported in bus coupler firmware Version 1.00.

a. Configuration Procedure

To use the auto-configuration option, proceed as described in the following steps:

1. Set the node address DIP switches 1 through 7 to all 0's.
2. Power up the bus coupler (U_L, U_S, and U_M power) with the required I/O connected. When the RUN LED becomes solid green on the coupler, the station will now have stored the I/O configuration in the flash memory.

Note

The unit will not go online with the node address set to 0.

3. Power down the bus coupler.
4. Set the node address and baud rate switches to the desired settings.
5. Power up the bus coupler.

8. Diagnostics

a. LED Diagnostic Indicators

Figure 6 shows the definition for each LED on the bus coupler.

b. Emergency Message and Diagnostic Object Indexes

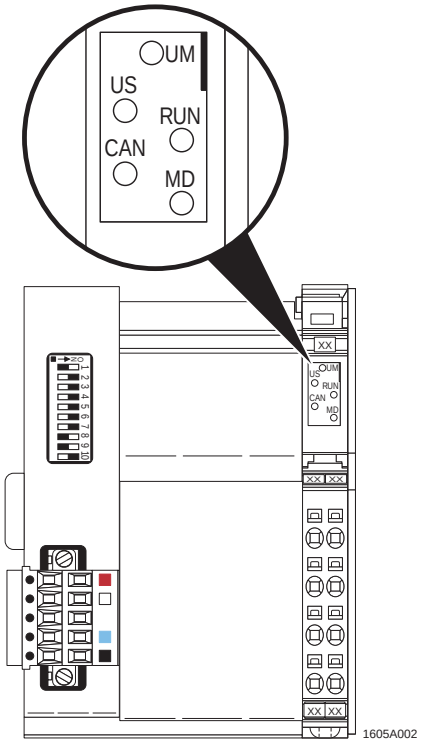
Note

A detailed explanation of the following explanations can be found in the IL CAN BK-TC Users Manual.

Diagnostic information is made available through several mechanisms. The Emergency Message and Service Data Objects (SDOs) allow for the user to read the status of the Inline station.

- Emergency Message

  The CANopen bus coupler produces an emergency message when a fault occurs. This emergency message contains the Inline Status and the Faulted Module number along with other useful information.



LED	Status	Meaning
CAN	Green/Red LED	**Network status**
	OFF:	Not powered/not online
	Blinking Green:	Online, pre-operational
	Single Green Flash:	Stopped state
	Green:	Link OK, online, operational
	Flashing Red	Connection timeout
	Red:	Critical link failure
	Red 1 Flash:	Warning level reached
	Red 2 Flash:	Guard or heartbeat event
	Red 3 Flash:	Sync. time out error
MD	Green/Red LED	**Module status**
	OFF:	No power present
	Green:	Device operational
	Green/Red:	Self test/read local bus
	Flashing Red:	Recoverable fault
	Red:	Unrecoverable fault
RUN	Multi-color LED	**Backplane communications**
	Solid Green:	Local bus is running data cycles
	Flashing Green:	Peripheral fault (1 Hz)
	Solid Red:	Local bus has stopped
	Red/Amber:	Configuration mismatch
	Green/Amber:	Preprogrammed fault values are being written to outputs
	OFF:	UL supply not present
US	Green LED	**Segment supply**
	ON:	Segment supply present
	OFF:	Segment supply not present
UM	Green LED	**Main supply**
	ON:	Main supply present
	OFF:	Main supply not present

Figure 6. Diagnostic Indicators

- Error Register Object Index (0x1001 hex)

  Allows the user to receive, through a Service Data Object (SDO), the manufacturers specific bit 7 which signifies an error on the Inline Station. The use of this bit or an emergency message allows the user to retrieve further diagnostic information.

- Manufacturer Status Register Object Index (0x1002 hex)

  Manufacturer specific Inline Station Status and the Inline Failed Module Number are available.

- Predefined Error Field Object Index (0x1003 hex)

  Read up to the last ten failures (subindexes) with subindex 0 designating the total number of available error in the "stack".

- Inline Station Status Object Index (0x3101 hex)

  Displays the current Inline Station Status. (fault code) See Table 4.

- Inline Faulted Module Number Object Index (0x3102 hex)

  Displays the current Inline Faulted Module number.

- Inline Latched Fault Object Index (0x310C hex)

  Latches and displays the last Inline Station Status (low byte). This object index is the same bit meanings as the Inline Station Status Object Index (0x3101 hex) except that the bits are latched.

- Inline Latched Faulted Module Object Index (0x310D hex)

  Latches and displays the last Inline Faulted Module number. This object index is the same bit meanings as the Inline Faulted Module Object Index (0x3103 hex) except that the module number is latched.

Note

Inline Station faults will always generate an emergency message in the operational state. By default, due to the mode settings of the fault bits, preprogrammed fault data (zero by default) will be sent to the local outputs. It is possible that your diagnostic information could be over written due to intermittent error conditions. For such a condition it is recommended to access the Predefined Error Field Object Index (0x1003 hex). Each subindex in Object Index (0x1003 hex) represents a stored fault sequence.

9. Inline Fault Control

Objects 0x1029hex, and 0x3002-0x300A hex allow the user to control how the outputs behave during various faults.

- Object 0x1029hex controls what mode the module will be put in during a communication error.
- Object 0x3003-0x300A hex determine the CANopen state depending on specific fault types.
- Object 0x3002hex allows the user to determine how the bus coupler attempts to control outputs when specific errors occur. There are four modes for controlling outputs. Each mode is defined in the following paragraphs.

(1) Inline Fault Mode 0: Stop Running Data Cycles on Fault

Outputs are turned OFF automatically when a local failure occurs.

(2) Inline Fault Mode 1: Auto Restart (Default)

Outputs are turned OFF automatically when a local failure occurs and waits for the failure correction. Once the failure is corrected the outputs can be controlled.

(3) Inline Fault Mode 2: Goto Fault State

Outputs are turned OFF automatically for up to two seconds when a local failure occurs. After two seconds the station will always set the outputs to the preprogrammed CANopen fault states.

Table 4. Inline Station Status, Object Index 0x3101 hex, Bit Meanings

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Reserved	Faulted Cycles Mode	Inline Connection Fault	Inactive Local Bus Fault	Module Change Fault	Power Fault	Peripheral Fault	CRC Fault

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(4) Inline Fault Mode 3: Continue on Fault

Outputs are turned OFF automatically for up to two seconds when a local failure occurs. After two seconds the station will continue to update all I/O that is still on line.

Note

The use of Loop 2 I/O will only allow the station to operate in modes 0 or 1. If you are running your station in modes 2 or 3 and Loop 2 is added, the mode will automatically change to 1.

a. Error States

The bus coupler supports the standard CANopen digital output, analog output, error mode and values.

- Digital outputs support:
  - Holds last state
  - Turn off during a faulted condition (default)
  - Turn on during a faulted condition

- Analog Outputs support:
  - Hold last value
  - Set to value determined by the error value object

10. Technical Data (see Tables 5 thru 13)

Table 5. General Bus Coupler Data

Order designation	IL CAN BK-TC-PAC (includes power connector and end clamps)
Order number (IL CAN BK-TC-PAC)	27 18 70 1
Order designation	IL CAN BK-TC (no power connector or end clamps)
Order number (IL CAN BK-TC)	28 62 25 9
Housing dimensions (width x heigh x depth)	91 mm x 120 mm x 71.5 mm
Degree of protection	IP20 according to IEC 60536
Class of protection	Class 3, according to VDE 0106, IEC 60536
Weight	210 g (without connector)

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Table 6. Bus Coupler Technical Data

Maximum number of I/O modules	63
Number of PDO	6 Tx/Rx
umber of SDO	1 Tx/Rx
Maximum number of digital points IN and OUT	510
Maximum number of analog points IN and OUT	254
Communication profile	DS-301 V3.0
Device profile	DS-401 V1.4

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Table 7. Inline I/O System Data

Number of I/O devices in an Inline system	63 max.
Maximum current of the bus coupler module in the logic area (UL)	2 A
Maximum current consumption of the I/O modules	see module-specific data sheet
Maximum current carrying capacity of the voltage jumper U_{ANA}	0.5 A
Maximum current carrying capacity of the voltage jumpers U_M and U_S (total current)	8 A

Note:
Observe the current consumption of every device when configuring an Inline station. The logic current consumption values are listed in each terminal-specific data sheet. Current consumption can differ, depending on the type of module. If the maximum current carrying capacity of a voltage jumper (8 A) is reached, an additional power terminal must be used.

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Table 8. Bus Coupler Immunity Tests

Immunity Test Regulations: EN61000-6-2:1999, In accordance with:	
Voltage fluctuations and flickers	EN61000-3-3
Electrostatic discharge (ESD)	EN 61000-4-2, Criteria B
Air discharge	±8 kV
Contactr discharge	±6 kV
Continuous radiated fields	EN61000-4-3
Electrical fast transients (EFT) / bursts	EN 61000-4-4, Criteria B
AC/DC power ports	4 kV
Signal port	2 kV
Conducted immunity	EN61000-4-6, Criteria B, 10 V
Voltage surge	EN 61000-4-5, Criteria B
DC power port (differential and common)	±2 kV, ±1 kV, ±0.5 kV
Shield for Signal lines	±2 kV, ±1 kV, ±0.5 kV
Power frequency magnetic fields	EN 61000-4-8, Criteria A, 50 Hz, 30 A/m
Voltage dips and interruptions	EN 61000-4-11, Criteria B

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10. Technical Data (continued)

Table 9. Bus Coupler Emissions Tests

Housing emissions	
Radiated	EN55011, Group 1, Class A
Conducted	EN55011, Group 1, Class A
Harmonic disturbances	EN61000-3-2

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Table 10. Mechanical Data

Vibration test according to IEC 60068-2-6	
Low-level signal, 24VDC, 120VAC, 230VAC areas (bus coupler, digital and analog I/O modules, etc.)	5 g load, 2 hours for each space direction
Power level, 400VAC areas (motor starter, etc.)	2 g load, 2 hours for each space direction
Shock test according to IEC 60068-2-27	30 g load for 11 ms, half sinusoidal wave, three shocks in each space direction and orientation

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Table 11. Ambient Conditions

Regulations	developed according to VDE 0160, UL 508
Ambient temperature, operating	-25°C to +55°C
Ambient temperature, storage/transport	-25°C to +85°C
Temperature cycles (speed of changing from positive-to-negative and vice versa)	0.5 K/min. (no condensation)
Humidity, operating	75% on average; 85% occasionally (no condensation)
Note: Ranging from -25°C to +55°C, appropriate measures must be taken against increased humidity (>85%).	
Humidity, storage/transport	75% average; 85% occasionally
Note: For a short period, slight condensation may appear on the housing, if for example, the terminal is brought into a closed room with a vehicle.	
Degree of protection according to IEC 60529	IP20
Degree of protection according to IEC 60536	Class 3
Housing material, basic	plastic Arnite PVC-Free PA6.6, self-extinguishing (V0)
Degree of pollution according to EN 50178	2; condensation not permissible in operation
Surge voltage class	II (low-level signal); III (power level)
Gases that endanger the functions (according to DIN 40046-36, DIN 40046-37)	
Sulphur dioxide (SO_2) concentration 10 ± 0.3 ppm. Ambient conditions:	
Temperature	25°C (± 2°C)
Humidity	75% (± 5%)
Test duration	10 days
Hydrogen sulfide (H_2S) concentration 1 ± 0.3 ppm. Ambient conditions:	
Temperature	25°C (± 2°C)
Humidity	75% (± 5%)
Test duration	4 days
Resistance of the housing material to termites	resistant
Resistance of the housing material to fungi	resistant

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10. Technical Data (continued)

Table 12. U_L (7.5Volt Logic Supply)

Nominal voltage .....7.5 V (converted from external 24 V dc)
Ripple .....± 5%
Load current .....2 A maximum
Connection .....voltage jumpers on the sides of the module housing

Notes:

1. Voltage is produced in the bus coupler by a DC/DC converter from the 24 V supply voltage.
2. U_L is not electrically isolated from the 24 V bus coupler voltage.
3. U_L is not electrically isolated from the I/O voltage U_M and U_S.
4. Communications power U_L is electronically short-circuit protected.

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Table 13. U_S and U_M (24Vdc Digital Signal Supplies)

Nominal voltage.....24 V dc
Tolerance .....-15%/+20%
Ripple .....± 5%
Permissible voltage range .....19 V dc to 30 V dc, ripple included
Load current .....8 A maximum
Connection .....voltage jumpers on the sides of the module housing

Notes:

1. Segment circuit U_S — All digital outputs and initiator supplies without individual short- circuit protection are connected to the segment circuit U_S.
2. Main circuit U_M — Initiator supplies with individual short-circuit protection are connected to the main U_M.

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Table 14. U_{ANA} (24Vdc Analog Supply)

Nominal voltage.....24 V dc
Tolerance .....-15%/+20%
Ripple .....± 5%
Permissible voltage range .....19 V dc to 30 V dc, ripple included
Load current .....500 mA maximum
Connection .....voltage jumpers on the sides of the module housing

Notes:

1. Isolation of the 24 V input voltage by means of a diode.
2. Smoothing through π-filter; corner frequency 9.8 kHz and attenuation of 40 dB/decade.
3. U_{ANA} is not electrically isolated from the 24 V bus coupler supplies and the 7.5 V communications power.

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11. Supported Object Indexes

Objects listed in the following paragraphs are described in greater detail in the Inline CANopen Users Manual (IL CAN BK-TC UME). Some of the abbrreviations used in this index are:

RO = Read Only const = Constant M = Mandatory
O = Optional C = Conditional RW = Read/Write
RWW = Read/Write and can be mapped into a receive process data object

11.1 Object Dictionary Entries for Communication

a. Standard Objects

Index (hex)	Object (Symbolic Name)	Name	Type	Acc. 1	M/O
1000	VAR	Device type	UNSIGNED32	RO	M
1001	VAR	Error register	UNSIGNED8	RO	M
1002	VAR	Manufacturer status register	UNSIGNED32	RO	O
1003	VAR	Predefined error field	UNSIGNED32	RO	O
1005	VAR	COB-ID SYNC	UNSIGNED32	RW	O
1008	VAR	Manufacturer device name	Vis-String	const	O
1009	VAR	Manufacturer hardware version	Vis-String	const	O
100A	VAR	Manufacturer software version	Vis-String	const	O
100C	VAR	Guard time	UNSIGNED16	RW	O
100D	VAR	Life time factor	UNSIGNED8	RW	O
1010	ARRAY	Store parameters	UNSIGNED32	RW	O
1011	ARRAY	Restore default parameters	UNSIGNED32	RW	O
1012	VAR	COB-ID TIME	UNSIGNED32	RW	O
1014	VAR	COB-ID EMCY	UNSIGNED32	RW	O
1015	VAR	Inhibit Time EMCY	UNSIGNED16	RW	O
1016	ARRAY	Consumer heartbeat time	UNSIGNED32	RW	O
1017	VAR	Producer heartbeat time	UNSIGNED16	RW	O
1018	RECORD	Identity Object	Identity (23h)	RO	M
1020	ARRAY	Verify Configuration	UNSIGNED32	RW	O
1027	ARRAY	Module List	UNSIGNED16	RO	O
1029	ARRAY	Error Behavior	UNSIGNED8	RW	O

b. Server SDO Parameter

Index (hex)	Object (Symbolic Name)	Name	Type	Acc. 1	M/O
1200	RECORD	1st Server SDO parameter	SDO Par. (22h)	RO	O
1201	RECORD	2nd Server SDO parameter	SDO Par. (22h)	RW	O

c. Client SDO Parameter

Not Supported

d. Receive PDO Communication Parameter

Index (hex)	Object (Symbolic Name)	Name	Type	Acc. 1	M/O
1400	RECORD	1st receive PDO Par.	PDO CommPar (20h)	RW	M/O
1401	RECORD	2nd receive PDO Par.	PDO CommPar (20h)	RW	M/O
↓	↓	↓	↓	↓	↓
141F	RECORD	32nd receive PDO Par.	PDO CommPar (20h)	RW	M/O

e. Receive PDO Mapping Parameter

Index (hex)	Object (Symbolic Name)	Name	Type	Acc. 1	M/O
1600	RECORD	1st receive PDO	PDO Mapping (21h)	RW	M/O
1601	RECORD	2nd receive PDO	PDO Mapping (21h)	RW	M/O
↓	↓	↓	↓	↓	↓
161F	RECORD	32nd receive PDO	PDO Mapping (21h)	RW	M/O

f. Transmit PDO Communication Parameter

Index (hex)	Object (Symbolic Name)	Name	Type	Acc. 1	M/O
1800	RECORD	1st transmit PDO Par.	PDO CommPar (20h)	RW	M/O
1801	RECORD	2nd transmit PDO Par.	PDO CommPar (20h)	RW	M/O
↓	↓	↓	↓	↓	↓
181F	RECORD	32nd transmit PDO Par.	PDO CommPar (20h)	RW	M/O

g. Transmit PDO Mapping Parameter

Index (hex)	Object (Symbolic Name)	Name	Type	Acc. 1	M/O
1A00	RECORD	1st transmit PDO	PDO Mapping (21h)	RW	M/O
1A01	RECORD	2nd transmit PDO	PDO Mapping (21h)	RW	M/O
↓	↓	↓	↓	↓	↓
1A1F	RECORD	32nd transmit PDO	PDO Mapping (21h)	RW	M/O

11.2 I/O Manufacturer Specific Objects

Index	Object	Name	Type	Access
2000	ARRAY	DIP Latch Enable 8-Bit	UNSIGNED8	RW
2001	ARRAY	DIP Latch State 8-Bit	UNSIGNED8	RW
2400	ARRAY	AIP Range	UNSIGNED16	RW
2410	ARRAY	AOP Response Data	UNSIGNED16	RW

11.3 Inline Configuration Objects

Index	Object	Name	Type	Access
3000	VAR	Reconfigure I/O	BOOLEAN	RW
3002	VAR	Fault Mode	UNSIGNED8	RW
3003	VAR	CRC Fault Mode	UNSIGNED8	RW
3004	VAR	PF Fault Mode	UNSIGNED8	RW
3005	VAR	Power Fault Mode	UNSIGNED8	RW
3006	VAR	Module Change Fault Mode	UNSIGNED8	RW
3007	VAR	Local Bus Inactive Fault Mode	UNSIGNED8	RW
3008	VAR	Connection Fault Mode	UNSIGNED8	RW
3009	VAR	Faulted Cycles Fault Mode	UNSIGNED8	RW
300A	VAR	Processor Power Fault Mode	UNSIGNED8	RW
300F	VAR	Erase Configuration	BOOLEAN	RW

11.4 Inline Interface Objects

Index	Object	Name	Type	Access
3100	VAR	Baud Rate	UNSIGNED8	RO
3101	VAR	Station Status	UNSIGNED16	RO
3102	VAR	Faulted Module	UNSIGNED8	RO
3103	VAR	Retry Max	UNSIGNED8	RW
3104	VAR	Number Modules	UNSIGNED8	RO
3105	VAR	Count of Bits	UNSIGNED16	RO
3106	VAR	Count of Bytes	UNSIGNED16	RO
3109	VAR	Loop Diagnostic Count	UNSIGNED16	RO
310A	VAR	Faulted Module (Before Break)	UNSIGNED8	RO
310B	VAR	Faulted Module (After Break)	UNSIGNED8	RO
310C	VAR	Latched Fault	UNSIGNED8	RO
310D	VAR	Latched Faulted Module	UNSIGNED8	RW

11.4 Inline Interface Objects (continued)

Index	Object	Name	Type	Access
310E	VAR	Latched Faulted Module (Before Break)	UNSIGNED8	RO
310F	VAR	Latched Faulted Module (After Break)	UNSIGNED8	RO
3110	VAR	Inline Power Status	UNSIGNED8	RO
3111	VAR	Inline Control Byte	UNSIGNED8	RW

11.5 Inline Module Objects

Index	Object	Name	Type	Access
3200	ARRAY	Stored Module ID	UNSIGNED16	RO
3201	ARRAY	Current Module ID	UNSIGNED16	RO
3202	ARRAY	IN Data COP Index	UNSIGNED16	RO
3203	ARRAY	IN Data COP First Subindex	UNSIGNED8	RO
3204	ARRAY	IN Data COP Last Subindex	UNSIGNED8	RO
3205	ARRAY	OUT Data COP Index	UNSIGNED16	RO
3206	ARRAY	OUT Data COP First Subindex	UNSIGNED8	RO
3207	ARRAY	OUT Data COP Last Subindex	UNSIGNED8	RO

11.6 Inline Special Function Module Objects

Index	Object	Name	Type	Access
3300	ARRAY	Special Func. Data Size	UNSIGNED8	RO
3301	ARRAY	Special Func. Status	BOOLEAN	RO
3302	ARRAY	Special Func. Data In (1 Byte)	UNSIGNED8	RO
3303	ARRAY	Special Func. Data Out (1 Byte)	UNSIGNED8	RWW
3304	ARRAY	Special Func. Data In (2 Bytes)	UNSIGNED16	RO
3305	ARRAY	Special Func. Data Out (2 Byte)	UNSIGNED16	RWW
3306	ARRAY	Special Func. Data In (3 Byte)	UNSIGNED24	RO
3307	ARRAY	Special Func. Data Out (3 Byte)	UNSIGNED24	RWW
3308	ARRAY	Special Func. Data In (4 Byte)	UNSIGNED32	RO
3309	ARRAY	Special Func. Data Out (4 Byte)	UNSIGNED32	RWW
330A	ARRAY	Special Func. Data In (6 Byte)	UNSIGNED48	RO
330B	ARRAY	Special Func. Data Out (6 Byte)	UNSIGNED48	RWW
330C	ARRAY	Special Func. Data In (8 Byte)	UNSIGNED64	RO
330D	ARRAY	Special Func. Data Out (8 Byte)	UNSIGNED64	RWW
330E	ARRAY	Special Func. Data In (>8 Byte)	UNSIGNED8	RO
330F	ARRAY	Special Func. Data Out (>8 Byte)	UNSIGNED8	RWW

11.7 Digital Input Objects

Index	Object Code	Name	Data Type	Category
6000h	Array	Read Input 8-bit	UNSIGNED8	C: DI
6005h	Var	Global Int. Enable Dig.	BOOLEAN	O
6006h	Array	Int. Mask Any Change 8-bit	UNSIGNED8	O
6100h	Array	Read Input 16-bit	UNSIGNED16	O
6106h	Array	Int. Mask Any Change 16-bit	UNSIGNED16	O
6120h	Array	Read Input 32-bit	UNSIGNED32	O
6126h	Array	Int. Mask Any Change 32-bit	UNSIGNED32	O

11.8 Digital Output Objects

Index	Object Code	Name	Data Type	Category
6200h	Array	Write Output 8-Bit	UNSIGNED8	C: DO
6206h	Array	Error Mode Output 8-Bit	UNSIGNED8	O
6207h	Array	Error State Output 8-Bit	UNSIGNED8	O
6300h	Array	Write Output 16-Bit	UNSIGNED16	O
6306h	Array	Error Mode Output 8-Bit	UNSIGNED16	O
6307h	Array	Error State Output 8-Bit	UNSIGNED16	O
6320h	Array	Write Output 32-Bit	UNSIGNED32	O
6326h	Array	Error Mode Output 32-Bit	UNSIGNED32	O
6227h	Array	Error State Output 32-Bit	UNSIGNED32	O

11.9 Analog Input Objects

Index	Object Code	Name	Data Type	Category
6400h	Array	Read Analog Input 8-Bit	INTEGER8	O
6401h	Array	Read Analog Input 16-Bit	INTEGER16	C: AI

11.10 Analog Output Objects

Index	Object Code	Name	Data Type	Category
6410h	Array	Write Analog Output 8-Bit	INTEGER8	O
6411h	Array	Write Analog Output 16-Bit	INTEGER16	C: AO

11.11 Analog Input Configuration Objects

Index	Object Code	Name	Data Type	Category
6421h	Array	AI Int. Trigger Selection	UNSIGNED8	O
6423h	Var	AI Global Int. Enable	Boolean	C: AI
6424h	Array	AI Int. Upper Limit Integer	INTEGER32	O
6425h	Array	AI Int. Lower Limit Integer	INTEGER32	O
6426h	Array	AI Int. Delta Unsigned	UNSIGNED32	O

11.12 Analog Output Configuration Objects

Index	Object Code	Name	Data Type	Category
6443h	Array	Analog Output Error Mode	UNSIGNED8	O
6444h	Array	Analog Output Error Value	INTEGER32	O

11.13 PCP Interface Objects

Index	Object Code	Name	Data Type	Category
3400h	Array	PCP PDU Size	UNSIGNED8	Ro
3401h	Array	PCP PCP Size	UNSIGNED8	Ro
3402h	Array	PCP Status	UNSIGNED8	Ro
3403h	Array	PCP Request	DOMAIN	Rw
3404h	Array	PCP Response	DOMAIN	Ro
3405	Array	PCP Module	UNSIGNED8	Rw
3406	Array	PCP Write Index	UNSIGNED16	Rw
3407	Array	PCP Write Subindex	UNSIGNED8	Rw
3408	Array	PCP Write Data	DOMAIN	Rw
3409	Array	PCP Read Index	UNSIGNED16	Rw
340A	Array	PCP Read Subindex	UNSIGNED8	Rw
340B	Array	PCP Read Data	DOMAIN	Ro
340C	Array	PCP Request Fragment	PCP_FRAG_REQUEST	Rw
340C	Array	PCP Response Fragment	PCP_FRAG_RESPONSE	Ro
340D	Array	PCP Write Invoke ID	UNSIGNED8	Rw
340E	Array	PCP Read Invoke ID	UNSIGNED8	Rw
340F	Array	PCP Write Data Confirmation	DOMAIN	Ro
34010	Array	PCP Read Data Confirmation	DOMAIN	Ro

12. Ordering Data (see Tables 15 and 16)

Table 15. Bus Coupler

Description	Type	Order Number
CANopen Inline Bus Coupler(includes connectors and end clamps)	IL CAN BK-TC-PAC	27 18 70 1
Inline CANopen System Manual	IL CAN BK-TC UM E	56 03 32 8

1605A004

Table 16. Accessories

Description	Type	Order No.	Pcs/Pkt
Coding Profile (see COMBICON catalog)	CP-MSTB	17 34 63 4	100
Zack "Quick" Marker Strips for labeling terminals (see CLIPLINE catalog)	Marking Strips	ZBFM6..	—
Labeling Field, 2-row width	IB IL Field 2	27 27 50 1	10
Labeling Field, 8-row width	IB IL Field 8	27 27 51 5	10
DIN-Rail, perforated	NS 35/7.5	08 01 73 3	2 meters
DIN-Rail, unperforated	NS 35/7.5	08 01 68 1	2 meters
End Clamp	CLIPFIX 35	30 22 21 8	50
Grounding Terminal Block, 10 to 24 AWG	USLKG 5	04 41 50 4	50
Screwdriver, blade type, 3.5 mm wide	SZF 1	12 04 51 7	1
Wire stripper, 10 to 30 AWG	QUICK-WIREFOX 6	12 04 38 4	1
Wire stripper, up to 25 mm insulation dia.	KAMES 2	12 06 00 7	1
Power supply, 120 V ac to 24 V dc, 1 amp	QUINT-PS 120AC/24DC/1	29 39 24 7	1
Power supply, 120 V ac to 24 V dc, 2.5 amp	QUINT-PS 120AC/24DC/2.5	29 39 05 6	1
Power supply, 120 V ac to 24 V dc, 5 amp	QUINT-PS 120AC/24DC/5	29 39 06 9	1
Power supply, 120 V ac to 24 V dc, 10 amp	QUINT-PS 120AC/24DC/10	29 39 07 2	1
Power supply, 230 V ac to 24 V dc, 1 amp	QUINT-PS 230AC/24DC/1	29 39 44 1	1
Power supply, 230 V ac to 24 V dc, 2.5 amp	QUINT-PS 230AC/24DC/2.5	29 39 15 3	1
Power supply, 230 V ac to 24 V dc, 5 amp	QUINT-PS 230AC/24DC/5	29 39 16 6	1
Power supply, 230 V ac to 24 V dc, 10 amp	QUINT-PS 230AC/24DC/10	29 39 17 9	1
Power Connector, with color code	IB IL SCN-PWR IN-CP	27 27 63 7	10
Power Connector, without color code	IB IL SCN-PWR IN	27 27 46 2	10
I/O Connector, 2 signals, 4-wire connection, without color code	IB IL SCN-8	27 26 33 7	10
I/O Connector, 2 signals, 4-wire connection, color coded	IB IL SCN-8-CP	27 27 60 8	10
I/O Connector, 4 signals, 3-wire connection, without color code	IB IL SCN-12	27 26 34 0	10
I/O Connector, digital input modules, 4 signals, 3-wire connection, color coded	IB IL SCN-12-ICP	27 27 61 1	10
I/O Connector, digital output modules, 4 signals, 3-wire connection, color coded	IB IL SCN-12-OCP	27 27 62 4	10
I/O Connector with shield clamp	B IL SCN-6 SHIELD	27 26 35 3	5
Bus Coupler Network Connector	MSTBP 2,5/5-STF-5.08 AU PRTD	28 62 57 6	50

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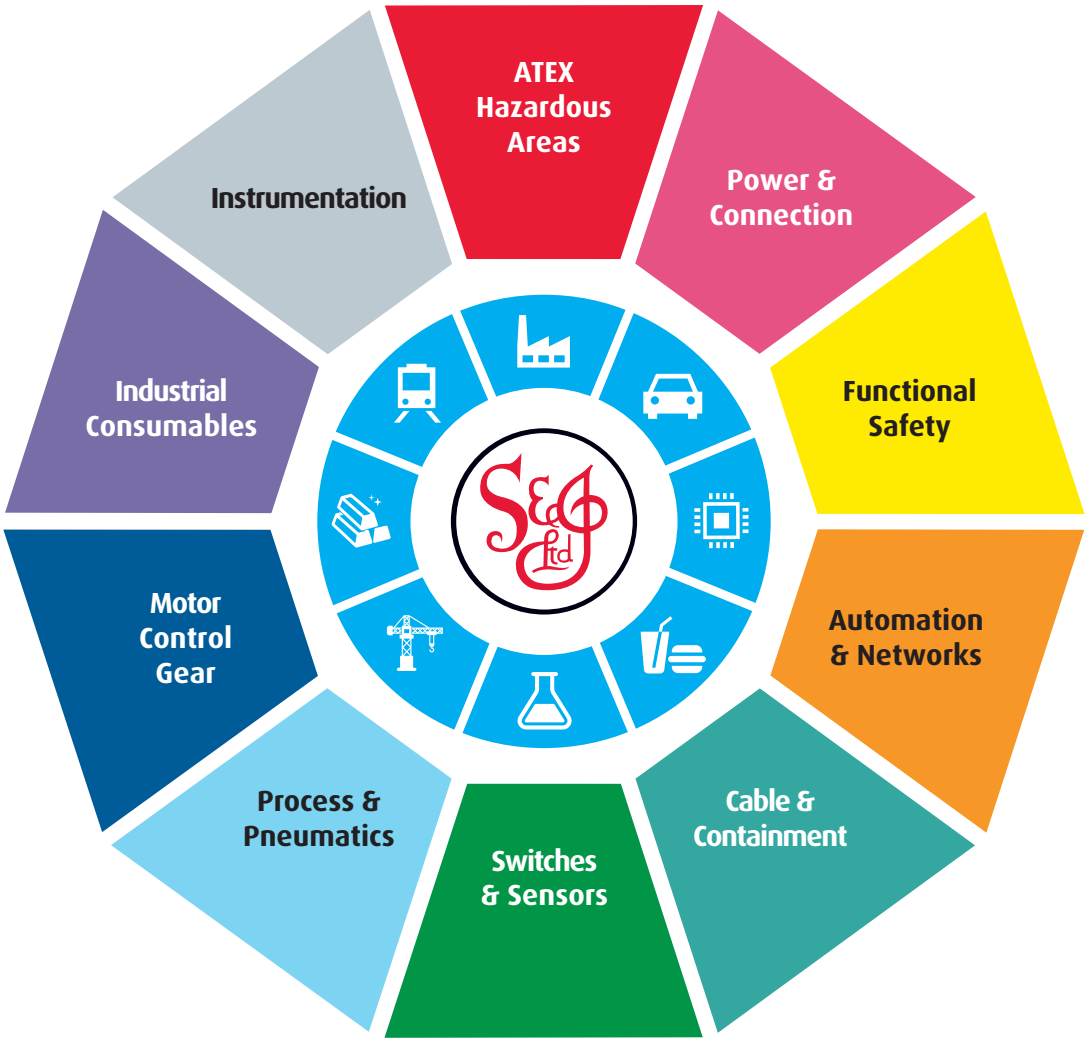

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