IB IL 24 DI 32/HD (2MBD)-PAC

Inline, digital input terminal, digital inputs: 32, 24 V DC, connection method: 1-wire

Data sheet
6842_en_04

1 Description

The terminal is designed for use within an Inline station.
It is used to acquire digital signals.

Features

- 32 digital inputs
- Connection of sensors in single-wire technology

IB IL 24 DI 32/HD-PAC

WARNING: Explosion hazard when used in potentially explosive areas

When using the terminal in potentially explosive areas, observe the corresponding notes.

This data sheet is only valid in association with the IL SYS INST UM E user manual.

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

2 Table of contents

3 Ordering data

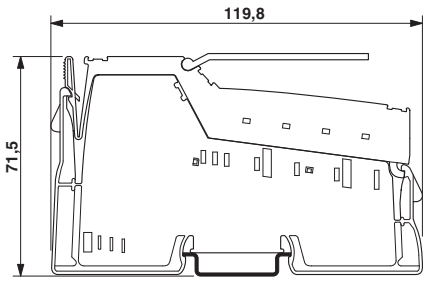
Description	Type	Order No.	Pcs./Pkt.
Inline, digital input terminal, digital inputs: 32, 24 V DC, connection method: 1-wire, transmission speed in the local bus: 500 kbps, degree of protection: IP20, including Inline connectors and marking fields	IB IL 24 DI 32/HD-PAC	2862835	1
Inline, digital input terminal, digital inputs: 32, 24 V DC, connection method: 1-wire, transmission speed in the local bus: 2 Mbps, degree of protection: IP20, including Inline connectors and marking fields	IB IL 24 DI 32/HD-2MBD-PAC	2692885	1

Accessories	Type	Order No.	Pcs./Pkt.
Inline terminal for power distribution (24 V), complete with accessories, (connector and labeling field) 24 V supply voltage is fed out from the segment circuit (US)	IB IL PD 24V-PAC	2862987	1
Inline terminal for power distribution (GND), complete with accessories, (connector and labeling field) connections for GND	IB IL PD GND-PAC	2862990	1
Connector set	IB IL DI/DO 8-PLSET	2860950	1
Labeling field, width: 12.2 mm (Marking)	IB IL FIELD 2	2727501	10
Labeling field, width: 48.8 mm (Marking)	IB IL FIELD 8	2727515	10
Insert strip, Sheet, white, unlabeled, can be labeled with: Office printing systems: Laser printer, mounting type: insert, lettering field size: 62 x 10 mm (Marking)	ESL 62X10	0809492	1
Insert strip, Sheet, white, unlabeled, can be labeled with: Office printing systems: Laser printer, mounting type: insert, lettering field size: 62 x 46 mm (Marking)	ESL 62X46	0809502	5
VARIOFACE front adapter for Inline modules, for transferring 32 (4 x 8) digital signals. (Connector/Adapter)	FLKM 14-PA-INLINE/32	2302777	1

Documentation	Type	Order No.	Pcs./Pkt.
User manual, English, Automation terminals of the Inline product range	IL SYS INST UM E	-	-
Data sheet, English, INTERBUS addressing	DB GB IBS SYS ADDRESS	-	-
Application note, addressing of 32-channel Inline terminals	AH IB IL 24 DI/DO 32 ADDRESS	-	-
Application note, English, Inline terminals for use in zone 2 potentially explosive areas	AH EN IL EX ZONE 2	-	-

4 Technical data

Dimensions (nominal sizes in mm)	



Width	48.8 mm
Height	119.8 mm
Depth	71.5 mm
Note on dimensions	Housing dimensions

General data	
Color	green
Weight	185 g (with connectors)
Operating mode	Process data operation with 2 words
Ambient temperature (operation)	-25 °C ... 55 °C
Ambient temperature (storage/transport)	-25 °C ... 85 °C
Permissible humidity (operation)	10 % ... 95 % (non-condensing)
Permissible humidity (storage/transport)	10 % ... 95 % (non-condensing)
Air pressure (operation)	70 kPa ... 106 kPa (up to 3000 m above sea level) 80 kPa ... 106 kPa (up to 3000 m above sea level, in ATEX Zone 2)
Air pressure (storage/transport)	70 kPa ... 106 kPa (up to 3000 m above sea level)
Degree of protection	IP20
Protection class	III, IEC 61140, EN 61140, VDE 0140-1

Connection data: Inline connector	
Connection method	Spring-cage connection
Conductor cross section solid / stranded	0.08 mm² ... 1.5 mm² / 0.08 mm² ... 1.5 mm²
Conductor cross section [AWG]	28 ... 16
Stripping length	8 mm

Connection data for UL approvals: Inline connector	
Connection method	Spring-cage connection
Conductor cross section solid / stranded	0.2 mm² ... 1.5 mm² / 0.2 mm² ... 1.5 mm²
Conductor cross section [AWG]	24 ... 16
Stripping length	8 mm

Interface: Inline local bus	
Number	2
Connection method	Inline data jumper

Transmission speed Inline local bus	
IB IL 24 DI 32/HD-PAC	500 kbps
IB IL 24 DI 32/HD-2MBD-PAC	2 Mbps

Communications power (U_L)	
Supply voltage	7.5 V DC (via voltage jumper)
Current draw	max. 90 mA
Power consumption	max. 0.675 W

Segment circuit supply (U_S)	
Supply voltage	24 V DC (via voltage jumper)
Supply voltage range	19.2 V DC ... 30 V DC (including all tolerances, including ripple)
Current draw	max. 50 mA

IB IL 24 DI 32/HD-PAC

WARNING – Explosion hazard when used in ATEX Zone 2

Make sure that the maximum permissible current of 4 A flowing through potential jumpers U_M and U_S (total current) is not exceeded.

Power consumption	
Power consumption	max. 2.16 W (Module, complete)

Digital inputs	
Number of inputs	32
Connection method	Spring-cage connection
Connection technology	1-wire
Description of the input	EN 61131-2 type 1
Nominal input voltage	24 V DC
Nominal input current	typ. 2.8 mA
Input voltage range "0" signal	-3 V DC ... 5 V DC
Input voltage range "1" signal	15 V DC ... 30 V DC
Delay at signal change from 0 to 1	typ. 2 ms
Delay at signal change from 1 to 0	typ. 4 ms
Permissible conductor length to the sensor	30 m
Short-circuit and overload protection	yes

Programming data (INTERBUS, local bus)	
ID code (hex)	BE
ID code (dec.)	190
Length code (hex)	02
Length code (dec.)	02
Process data channel	32 Bit
Input address area	4 Byte
Output address area	0 Byte
Parameter channel (PCP)	0 Byte
Register length (bus)	32 Bit

For the programming data/configuration data of other bus systems, please refer to the corresponding electronic device data sheet (e.g., GSD, EDS).

Configuration and parameter data in a PROFIBUS system	
Required parameter data	1 Byte
Required configuration data	4 Byte

Error messages to the higher level control or computer system

No

Electrical isolation/isolation of the voltage areas	
Test section	**Test voltage**
7.5 V supply (bus logics)/24 V supply (I/O)	500 V AC, 50 Hz, 1 min.
24 V supply (I/O) / functional earth ground	500 V AC, 50 Hz, 1 min.
7.5 V supply (bus logics) / functional earth ground	500 V AC, 50 Hz, 1 min.

To achieve electrical isolation between the logic level and the I/O area, supply these areas from separate power supply units. Interconnection of the power supply units in the 24 V area is not permitted (see IL SYS INST UM E user manual).

Approvals

For the latest approvals, please visit phoenixcontact.net/products.

5 Additional tables

5.1 Input characteristic curve

Input characteristic curve	
Input voltage U [V]	**Typical input current I [mA]**
-30 < U ≤ 0.7	0
3	0.46
6	1.87
9	2.66
12	2.70
15	2.73
18	2.76
21	2.78
24	2.81
27	2.83
30	2.86

5.2 Power dissipation

Formula for calculating the power dissipation of the electronics

$$P_{EL} = 0{,}675\ W + \sum_{i=1}^{n} [U_{INi} \times I_{INi}]$$

Where:

P_{EL}	Total power dissipation in the terminal
i	Continuous index
n	Number of set inputs (n = 1 ... 32)
U_{INi}	Input voltage of input i
I_{INi}	Input current of input i according to the input characteristic curve

Power dissipation of the housing

2.8 W, maximum (within the permissible operating temperature)

5.3 Limitation of simultaneity, derating

No limitation of simultaneity, no derating

6 Internal circuit diagram

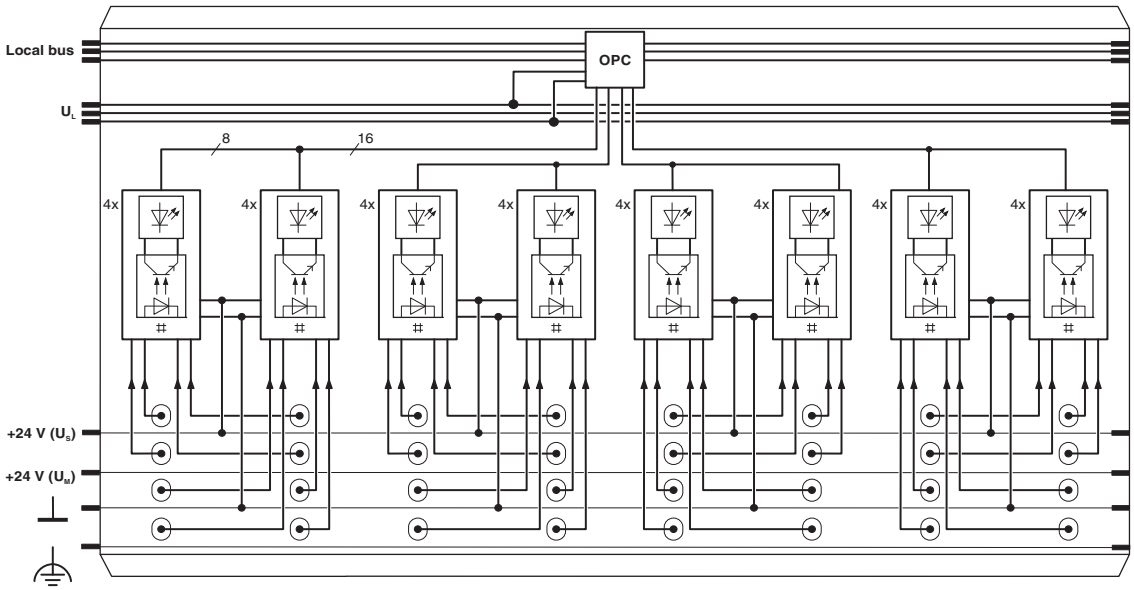


Figure 1 Internal wiring of the terminal points

Key:

OPC Protocol chip

LED (status indicator)

Optocoupler

Digital input

Please refer to the IL SYS INST UM E user manual for an explanation of other symbols used.

7 Notes on using the terminal block in potentially explosive areas

Valid for: **IB IL 24 DI 32/HD-PAC**

WARNING: Explosion hazard

Please make sure that the following notes and instructions are observed.

Approval according to ATEX Directive 2014/34/EU

Ⓔx II 3 G Ex nA IIC T4 Gc X

Installation notes

T_{amb} = -25 °C ... +55 °C

The category 3 device is designed for installation in zone 2 potentially explosive areas.

The device meets the requirements of EN 60079–0:2012 + A11:2013 and EN 60079–15:2010.

- Observe the specified conditions for use in potentially explosive areas! Also observe the requirements of EN 60079-14.
- Install the device in a suitable approved housing (with at least IP54 protection) that meets the requirements of EN 60079-15.
- Only assemble, disassemble as well as connect and disconnect cables when the power is disconnected.
- Only devices that are designed for operation in Ex Zone 2 and the conditions at the installation location may be connected to the circuits in Zone 2.
- For safe operation, lockable plug connections must have a functional interlock (e. g. locking clip, screw connection etc.). Insert the interlock. Repair any damaged connectors immediately.
- Only connect one cable per terminal point.
- Use transient protection so that short-term surge voltages do not exceed 119 V.
- The air pressure during operation must not exceed 106 kPa.
- Perform a dielectric test after installing the device in the housing.
- For all supply and signal lines connected to the station, make sure that there is a connection to ground potential.
- Make sure that the maximum permissible current of 4 A flowing through potential jumpers U_M and U_S (total current) is not exceeded.
- When using the device in potentially explosive areas, observe the specifications in the application note AH DE IL EX ZONE 2 (German) / AH EN IL EX ZONE 2 (English).

8 Terminal point assignment

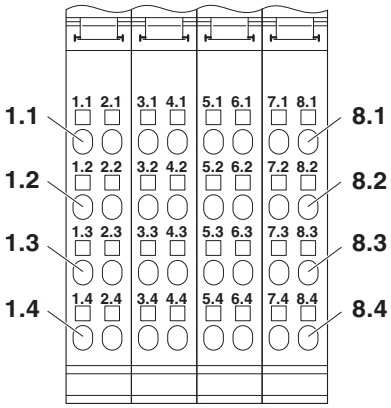


Figure 2 Terminal point assignment

Terminal point	Assignment
1.1 / 2.1	Signal input (IN01 / IN02)
1.2 / 2.2	Signal input (IN03 / IN04)
1.3 / 2.3	Signal input (IN05 / IN06)
1.4 / 2.4	Signal input (IN07 / IN08)
3.1 / 4.1	Signal input (IN09 / IN10)
3.2 / 4.2	Signal input (IN11 / IN12)
3.3 / 4.3	Signal input (IN13 / IN14)
3.4 / 4.4	Signal input (IN15 / IN16)
5.1 / 6.1	Signal input (IN17 / IN18)
5.2 / 6.2	Signal input (IN19 / IN20)
5.3 / 6.3	Signal input (IN21 / IN22)
5.4 / 6.4	Signal input (IN23 / IN24)
7.1 / 8.1	Signal input (IN25 / IN26)
7.2 / 8.2	Signal input (IN27 / IN28)
7.3 / 8.3	Signal input (IN29 / IN30)
7.4 / 8.4	Signal input (IN31 / IN32)

9 Connection notes and examples

When connecting the sensors observe the assignment of the terminal points to the process data.

NOTE: Malfunction

Please note that the terminal must be provided with supply voltage U_S, as it is used internally as the auxiliary voltage.

NOTE: Malfunction

The sensors and U_S must be supplied from the same voltage supply.

The easiest way to meet this requirement is to use the IB IL PD 24V-PAC terminal (four terminals for 32 sensors). Wire the 24 V sensor connections to these terminals. In this way, they are supplied from the potential jumper U_S of the Inline station.

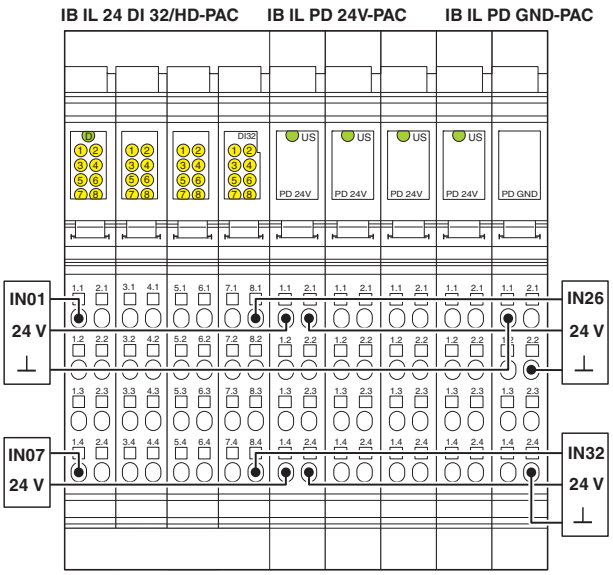


Figure 3 Typical connection of sensors when terminals for potential distribution are used

The slot numbering corresponds to the connector marking of the recommended connector set IB IL DI/DO 8-PLSET or the original connectors of the PAC version.

The sensors can also be connected via external busbars. Ensure that the sensors and U_S are supplied from the same voltage supply.

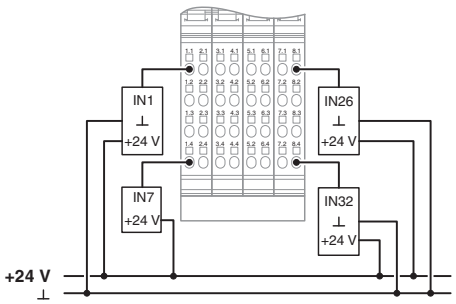


Figure 4 Example of a connection of sensors when using external busbars

10 Application examples

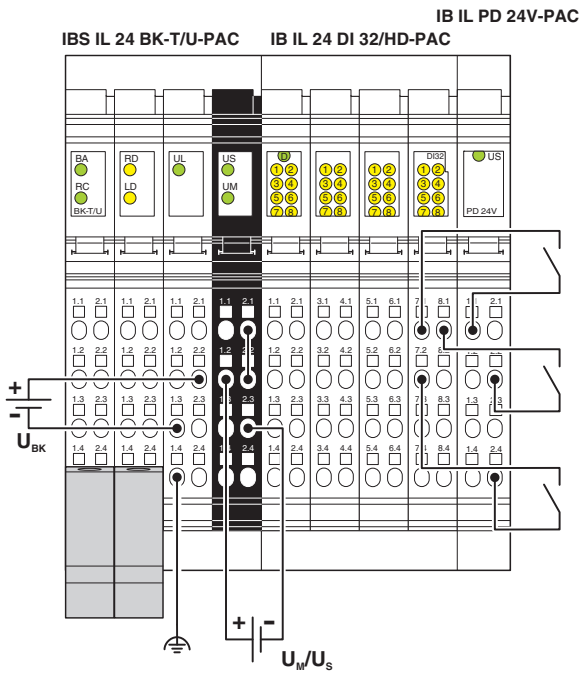


Figure 5 Connection of sensors when using the IB IL PD 24V-PAC terminal

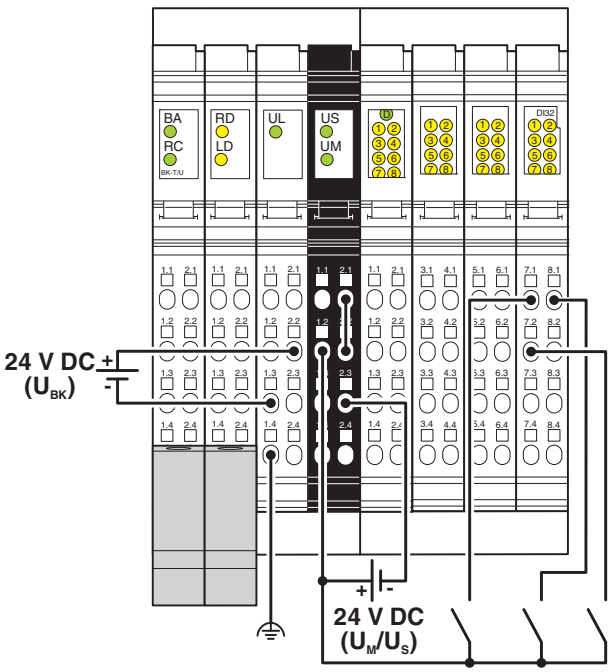


Figure 6 Connection of sensors when using external busbars

11 Local diagnostic and status indicators

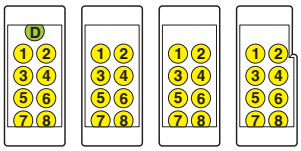


Figure 7 Local diagnostic and status indicators

Designation	Color	Meaning
D	Green	Diagnostics (bus and logic voltage)
For each connector		
1 ... 8	Yellow	Status of the inputs

Function identification

Light blue

2 Mbps: White stripe in the vicinity of the D LED

12 Process data

Assignment of the terminal points to IN process data

(Word.bit) view	Word	Word 0															
	Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
(Byte.Bit) view	Byte	Byte 0								Byte 1							
	Bit	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
Assignment	Slot	4								3							
	Signal	IN32	IN31	IN30	IN29	IN28	IN27	IN26	IN25	IN24	IN23	IN22	IN21	IN20	IN19	IN18	IN17
	Terminal point (signal)	8.4	7.4	8.3	7.3	8.2	7.2	8.1	7.1	6.4	5.4	6.3	5.3	6.2	5.2	6.1	5.1
Status indicator	LED	8	7	6	5	4	3	2	1	8	7	6	5	4	3	2	1

(Word.bit) view	Word	Word 1															
	Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
(Byte.Bit) view	Byte	Byte 2								Byte 3							
	Bit	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
Assignment	Slot	2								1							
	Signal	IN16	IN15	IN14	IN13	IN12	IN11	IN10	IN09	IN08	IN07	IN06	IN05	IN04	IN03	IN02	IN01
	Terminal point (signal)	4.4	3.4	4.3	3.3	4.2	3.2	4.1	3.1	2.4	1.4	2.3	1.3	2.2	1.2	2.1	1.1
Status indicator	LED	8	7	6	5	4	3	2	1	8	7	6	5	4	3	2	1

For the assignment of the illustrated (byte.bit) view to your INTERBUS control or computer system, please refer to the DB GB IBS SYS ADDRESS data sheet.

For the assignment of the illustrated (byte.bit) view to controllers for other bus systems, please refer to document AH IB IL 24 DI/DO 32 ADDRESS.

SCATTERGOOD & JOHNSON LTD
ELECTRICAL ENGINEERING & FLUID CONTROL DISTRIBUTORS
Est.1899

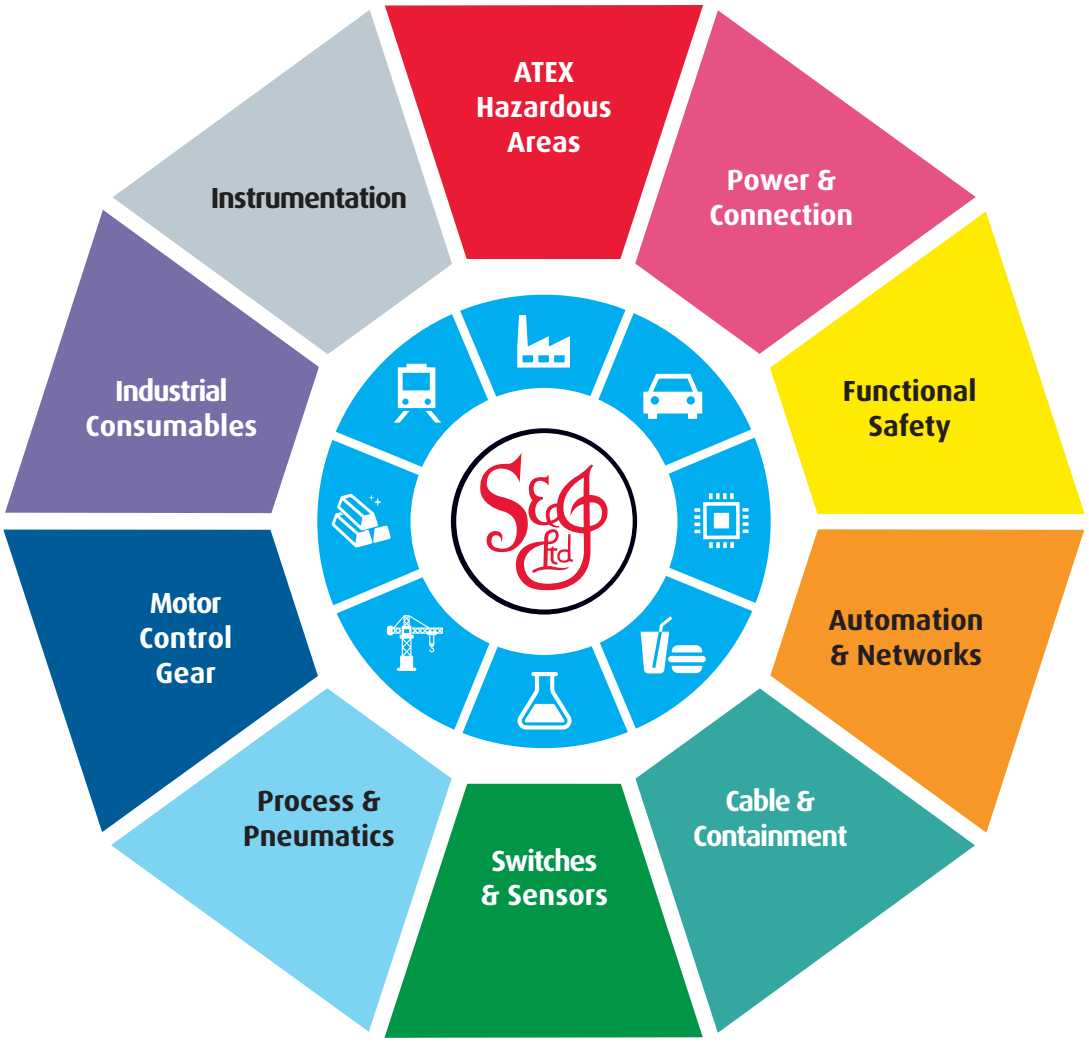
At Scattergood & Johnson Ltd, we pride ourselves on being a technical distributor to specialist industries.

Working with a range of quality product suppliers across a number of specialist markets, we are not your average 'box shifter' - we are your technical and supply chain partner.

We fully support every product we sell - for free! Our internal team and external sales engineers can answer any product or application question, no matter the complexity.

Backing up this technical ability is a range of 50,000+ products available from stock for nationwide next day delivery (same day if required!), or you can collect what you need from any of our trade counters around the UK.

Select your specialist interest below to learn more about how we can help.



Online, In Branch and On the Road - Scattergood & Johnson Ltd, there when you need us.

www.scatts.co.uk