AXL E PN IOL8 DI4 M12 6P

Axioline E PROFINET IO-Link device, plastic housing, 8 IO-Link ports, 4 inputs, 24 V DC, M12 fast connection technology

Data sheet
8450_en_13

1 Description

The Axioline E device is designed for use within a PROFINET network.
It enables the operation of up to eight IO-Link sensors/ actuators and is also used to acquire digital signals.

PROFINET features

- Connection to PROFINET network
  using M12 connectors (D-coded)
- PROFINET features:
  Prioritized startup 2.3 s, shared device, I&M functions
- Transmission speed 100 Mbps
- 2 Ethernet ports (with integrated switch)
- PROFINET RT
- Supported protocols: SNMP, LLDP, MRP, DCP
- Device description using GSDML file
- Firmware can be updated
- Integrated web server for web-based management

IO-Link features

- Connection of eight IO-Link devices
  - 4 IO-Link A ports with additional digital input
  - 4 IO-Link B ports with additional power supply
- Connection of IO-Link ports
  using M12 connectors (A-coded, 5-pos.)
- Parameter data storage on the master
- Parameterizable process data width
- Supported function blocks
  - Siemens IOL_CALL and IO_LINK_CALL for Step7 and TiA portal
  - PC Worx IOL_COM in the library function modules
- IO-Link specification V1.1.2

General features

- Diagnostic and status indicators
- Short-circuit and overload protection
  of the sensor supply
- IP65/67 degree of protection

This data sheet is only valid in association with the corresponding documentation.
Make sure you use the latest documentation.
It can be downloaded via the product at phoenixcontact.net/products.

Abbreviations used:
– MRP: Media Redundancy Protocol
– I&M: Identification and maintenance

For the latest device description files, visit phoenixcontact.net/products.
If several versions of the device description file are available, make sure that you are working with the file version that corresponds to the firmware/hardware version used.

2 Table of contents

1 Description 1
2 Table of contents 2
3 Ordering data 3
4 Technical data 4
5 Internal circuit diagram 9
6 Pin assignment 10
6.1 PROFINET and power supply connection 10
6.2 PROFINET pin assignment 10
6.3 Pin assignment of the power supply U_S/U_A 10
6.4 Connecting IO Link Ports and inputs 11
6.5 Pin assignment of the IO-Link ports and inputs 11
7 Connection example 12
8 Connection notes 12
9 Factory reset via rotary encoding switch 13
10 Local status and diagnostic indicators 14
10.1 Indicators for Ethernet ports and power supply 14
10.2 Displaying the IO-Link ports and inputs 15

3 Ordering data

Description	Type	Order No.	Pcs./Pkt.
Axioline E PROFINET IO-Link device in a plastic housing with 8 IO-Link ports and 4 digital inputs, 24 V DC, M12 fast connection technology degree of protection: IP65/67	AXL E PN IOL8 DI4 M12 6P	2701513	1

Accessories	Type	Order No.	Pcs./Pkt.
An M12 screw plug for the unoccupied M12 sockets of the sensor/actuator cable, boxes and flush-type connectors (Protection and sealing elements)	PROT-M12	1680539	5
Snap-in markers, Sheet, white, unlabeled, can be labeled with: THERMOMARK PRIME, THERMOMARK CARD, BLUEMARK ID, BLUEMARK ID COLOR, BLUEMARK CLED, TOPMARK NEO, TOPMARK LASER, mounting type: snapped into marker carrier, lettering field size: 7 x 10 mm (Marking)	UCT-EM (7X10)	0830765	10

Dokumentation	Typ	Art.-Nr.	VPE
User manual, English: Axioline E: system and installation	UM EN AXL E SYS INST	-	-
User manual, English: Network-specific properties of the Axioline E PROFINET IO-Link devices	UM EN AXL E PN IOL	-	-
Application note, English: Updating the firmware of AXL E devices using the Windows Explorer	AH EN FW UPDATE AXL E	-	-
Application note, English: Changing the partner ports with AXL E PROFINET devices under STEP 7	AH EN AXL E PN S7 PARTNER PORT CHANGE	-	-
Application note, English: Changing the partner ports with AXL E PROFINET devices under STEP 7 in TIA Portal	AH EN AXL E PN S7 TIA PARTNER PORT CHANGE	-	-
Application note, English: Measures to protect network-capable devices with Ethernet connection against unauthorized access	AH EN INDUSTRIAL SECURITY	-	-
Application note, English: Wiring of Axioline E devices	AH EN AXL E CABLE / WIRING	-	-

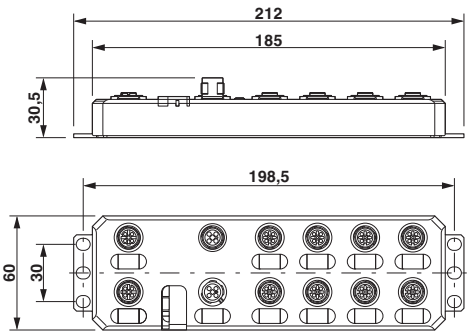
Dokumentation	Typ	Art.-Nr.	VPE
Quick start guide, English: Startup of Axioline E PROFINET IO-Link devices on a Phoenix Contact controller	UM QS EN AXL E PN IOL PC WORX	-	-
Quick start guide, English: Startup of Axioline E PROFINET IO-Link-devices using a SIMATIC® S7 controller	UM QS EN AXL E PN IOL S7	-	-
Quick start guide, English: Startup of Axioline E PROFINET IO-Link devices using a SIMATIC® S7 controller (TIA portal)	UM QS EN AXL E PN IOL S7 TIA	-	-

Additional ordering data

For additional accessories, visit phoenixcontact.net/products.

4 Technical data

Dimensions (nominal sizes in mm)



Width	60 mm
Height	185 mm
Depth	30.5 mm
Note on dimensions	The height is 212 mm including fixing clips.

General data

Housing material	Pocan®
Color	anthracite
Weight	480 g
Ambient temperature (operation)	-25 °C ... 60 °C

CAUTION: Risk of burns

If the device is used at an ambient temperature above 50°C, the contact temperature of metal surfaces may exceed 70°C.

Ambient temperature (storage/transport)	-25 °C ... 85 °C
Permissible humidity (operation)	5 % ... 95 %
Permissible humidity (storage/transport)	5 % ... 95 %

General data	
Air pressure (operation)	70 kPa ... 106 kPa (up to 3000 m above sea level)
Air pressure (storage/transport)	70 kPa ... 106 kPa (up to 3000 m above sea level)
Degree of protection	IP65/67
Protection class	III, IEC 61140, EN 61140, VDE 0140-1

Connection data	
Connection method	M12 connector

Interface PROFINET	
Number	2
Designation connection point	Copper cable
Connection method	M12 fast connection technology
Note on connection method	D-coded
Number of positions	4
Transmission speed	100 MBit/s (with autonegotiation)

PROFINET	
Equipment type	PROFINET Device
Conformance class	B
Update rate	1 ms
Number of supported application relationships (AR)	2
PROFINET protocols	LLDP, MRP client, DCP, DCE-RPC
Additional protocols	SNMP v1, HTTP, TFTP, FTP

Supply: Module electronics and sensors (U_S)	
Connection method	M12 connector (T-coded)
Number of positions	4
Supply voltage	24 V DC
Supply voltage range	19.5 V DC ... 31.2 V DC (including all tolerances, including ripple)
Current consumption	typ. 180 mA ±15 % (at 24 V DC) max. 12 A

Supply: Actuators (U_A)	
Connection method	M12 connector (T-coded)
Number of positions	4
Supply voltage	24 V DC
Supply voltage range	18 V DC ... 31.2 V DC (including all tolerances, including ripple)
Current consumption	typ. 28 mA ±15 % (at 24 V DC) max. 12 A

IO-Link ports: Class A	
Number of ports	4
Connection method	M12 fast connection technology
Connection method	3-wire
MasterCycleTime	min. 2 ms (PDInput* + PDOutput* + OnReqData* < = 17 Byte, COM3) * see "IO-Link Interface and System Specification V1.1.2"

IO-Link ports: Class B	
Number of ports	4
Connection method	M12 fast connection technology
Connection method	3-wire
MasterCycleTime	min. 2 ms (PDInput* + PDOutput* + OnReqData* < = 17 Byte, COM3) * see "IO-Link Interface and System Specification V1.1.2"

IO-Link port supply	
Nominal voltage for I/O supply	24 V DC
Nominal current for every IO-Link port	150 mA at C/Q (pin 4), maximum of 1.6 A over all 8 IO-Link C/Q and L+ cables 200 mA at L+/L- (pin 1 and pin 3), during startup, up to 1.6 A for short periods max. 2 A at U_A (IO-Link B ports, pin 2 and pin 5)
Overload protection	yes
Permissible conductor length to the sensor	< 20 m

IO-Link ports in digital input (DI) mode	
Number of inputs	max. 8 (EN 61131-2 type 1)
Connection method	M12 connector, X01 ... X04 have double occupancy
Connection method	3-wire
Nominal input voltage	24 V DC
Nominal input current	typ. 3 mA
Sensor current per channel	max. 200 mA (from L+/L-)
Total sensor current	max. 1.6 A (from L+/L-)
Input voltage range "0" signal	-0.3 V DC ... 5 V DC
Input voltage range "1" signal	15 V DC ... 30 V DC
Input filter time	< 1000 µs
Input frequency	0.5 kHz
Overload protection	yes
Short-circuit protection for the sensor supply	yes

IO-Link ports in digital output (DO) mode	
Number of outputs	max. 8
Connection method	M12 connector, X01 ... X04 have double occupancy
Connection method	3-wire
Nominal output voltage	24 V DC
Maximum output current per channel	150 mA
Maximum output current per device	1.2 A
Nominal load, ohmic	3.6 W (160 Ω, at nominal load)
Nominal load, inductive	3.6 VA (0.8 H, 160 Ω, at nominal load)
Signal delay	max. 150 µs (when switched on) max. 200 µs (when switched off)
Switching rate	1 per second, maximum (at nominal inductive load) 5500 per second, maximum (at nominal ohmic load)
Limitation of the voltage induced on circuit interruption	-15 V DC
Output voltage when switched off	max. 1 V
Output current when switched off	max. 300 µA
Behavior with overload	Shutdown with automatic restart
Overload protection	yes
Short-circuit protection	yes

Digital inputs at pin 2 for type A ports	
Number of inputs	4 (EN 61131-2 type 1)
Connection method	M12 connector, X01 ... X04 have double occupancy
Connection method	3-wire
Nominal input voltage	24 V DC
Nominal input current	typ. 3 mA
Sensor current per channel	max. 200 mA (from L+/L-)
Total sensor current	max. 1.6 A (from L+/L-)
Input voltage range "0" signal	-0.3 V DC ... 5 V DC
Input voltage range "1" signal	15 V DC ... 30 V DC
Input filter time	< 1000 µs
Input frequency	0.5 kHz
Overload protection	yes
Short-circuit protection for the sensor supply	yes

Electrical isolation/isolation of the voltage areas	
Test section	**Test voltage**
24 V supply (communications power and sensor supply, IO-Link ports)/bus connection (Ethernet 1)	500 V AC, 50 Hz, 1 min.
24 V supply (communications power and sensor supply, IO-Link ports)/bus connection (Ethernet 2)	500 V AC, 50 Hz, 1 min.
24 V supply (communications power and sensor supply, IO-Link ports)/FE	500 V AC, 50 Hz, 1 min.
Bus connection (Ethernet 1)/FE	500 V AC, 50 Hz, 1 min.
Bus connection (Ethernet 2)/FE	500 V AC, 50 Hz, 1 min.
Bus connection (Ethernet 1)/bus connection (Ethernet 2)	500 V AC, 50 Hz, 1 min.
24 V supply (actuator supply)/24 V supply (communications power and sensor supply, IO-Link ports)	500 V AC, 50 Hz, 1 min.
24 V supply (actuator supply)/bus connection (Ethernet 1)	500 V AC, 50 Hz, 1 min.
24 V supply (actuator supply)/bus connection (Ethernet 2)	500 V AC, 50 Hz, 1 min.
24 V supply (actuator supply)/FE	500 V AC, 50 Hz, 1 min.

Mechanical tests	
Vibration resistance in acc. with EN 60068-2-6/IEC 60068-2-6	5g
Shock in acc. with EN 60068-2-27/IEC 60068-2-27	30g, 11 ms period, half-sine shock pulse
Continuous shock according to EN 60068-2-27/IEC 60068-2-27	10g

Conformance with EMC Directive 2014/30/EU	
Noise immunity test in accordance with EN 61000-6-2	
Electrostatic discharge (ESD) EN 61000-4-2/IEC 61000-4-2	Criterion B, 6 kV contact discharge, 8 kV air discharge
Electromagnetic fields EN 61000-4-3/IEC 61000-4-3	Criterion A, Field intensity: 10 V/m
Fast transients (burst) EN 61000-4-4/IEC 61000-4-4	Criterion B, 2 kV
Transient overvoltage (surge) EN 61000-4-5/IEC 61000-4-5	Criterion B, DC supply lines: ±0.5 kV/±0.5 kV (symmetrical/asymmetrical)
Conducted interference EN 61000-4-6/IEC 61000-4-6	Criterion A; Test voltage 10 V
Noise emission test as per EN 61000-6-4	
Radio interference properties EN 55022	Class A

Approvals

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

5 Internal circuit diagram

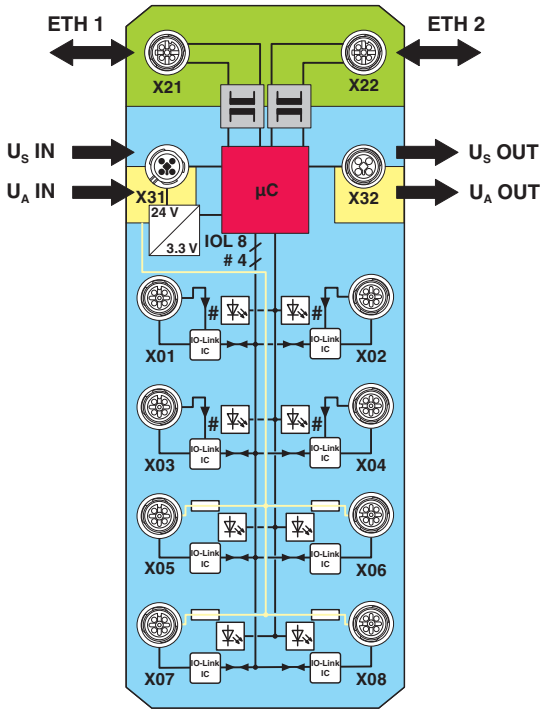


Figure 1 Internal wiring of connections

Key:

Green area:	Network
Blue area:	U_S
Yellow area:	U_A

Transmitter with electrical isolation

Power supply unit with electrical isolation

Microcontroller

Digital input

IO-Link circuit

LED

Fuse

6 Pin assignment

6.1 PROFINET and power supply connection

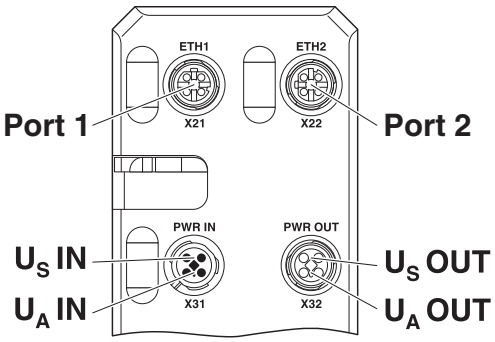


Figure 2 Connections for PROFINET and power supply

Designation	Meaning
Port 1 (X21)	Ethernet port 1
Port 2 (X22)	Ethernet port 2
U_S IN (X31)	Power supply IN (logic and sensors)
U_A IN (X31)	Power supply IN (actuators)
U_S OUT (X32)	Power supply OUT for additional devices
U_A OUT (X32)	Power supply OUT for additional devices

Ground the device by means of the mounting screws.

6.2 PROFINET pin assignment

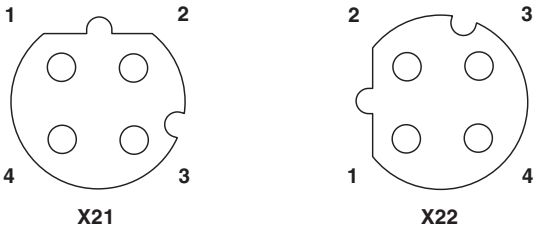


Figure 3 Pin assignment, D-coded

Pin	Ethernet port 1 (X21)	Ethernet port 2 (X22)
1	TX+	TX+
2	RX+	RX+
3	TX-	TX-
4	RX-	RX-

The shield is connected to FE in the device.

The thread is used for additional shielding.

6.3 Pin assignment of the power supply U_S/U_A

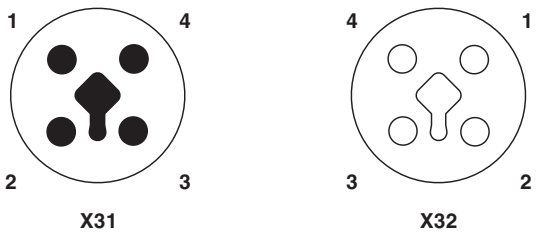


Figure 4 Pin assignment of the power supply, T-coded

Pin	IN	OUT	Conductor colors
1	+24 V DC (U_S)	+24 V DC (U_S)	Brown
2	GND (U_A)	GND (U_A)	White
3	GND (U_S)	GND (U_S)	Blue
4	+24 V DC (U_A)	+24 V DC (U_A)	Black

Make sure that the power supply U_A and the power supply U_S of two independent connected, electrically isolated power supplies takes place.

6.4 Connecting IO Link Ports and inputs

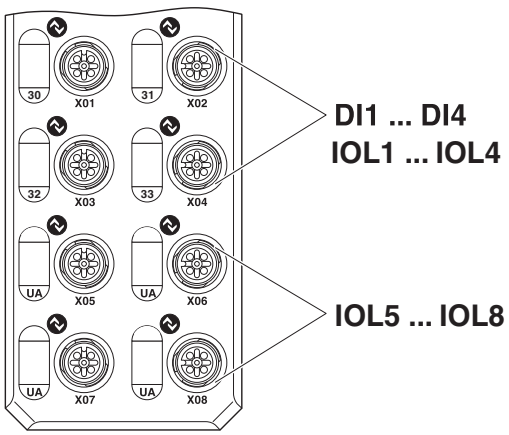


Figure 5 IO-Link port and digital input connections

Designation	Meaning
DI1 ... DI4 (X01 ... X04)	Inputs 1 ... 4 (pin 2)
IOL1 ... 4 (X01 ... X04)	IO-Link A ports 1 ... 4
IOL 5 ... 8 (X05 ... X08)	IO-Link B ports 5 ... 8

IO-Link A port
The IO-Link A port is assigned an additional hardwired DI (digital input) at pin 2.

IO-Link B port
The IO-Link B port has an additional supply voltage via pins 2 and 5. This port is suitable for connecting devices that have a higher current consumption. There are max. 2 A nominal current provided.

Operating modes
The C/Q cable (pin 4) can be configured independently of the other pins.
The IO-Link ports can be operated in the following operating modes:
- DI (behaves like a digital input)
- DO (behaves like a digital output)
- DI with IO-Link
- IO-Link

6.5 Pin assignment of the IO-Link ports and inputs

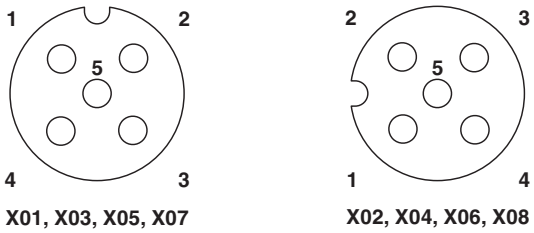


Figure 6 IO-Link ports pin assignment, A-coded

Pin	IO-Link A ports (X01 ... X04)	IO-Link B ports (X05 ... X08)
1	24 V DC (L+)	24 V DC (L+)
2	DI	24 V DC (U_A)
3	GND (L-)	GND (L-)
4	C/Q, I/O link data transmission cable	C/Q, I/O link data transmission cable
5	Not used	GND (U_A)

NOTE: Sensor damage
When connecting an IO-type A sensor to an IO-Link B port that a voltage is applied to pin 2 and pin 5. Do not connect it to the sensor. Use a three-conductor cable between port and sensor,
e.g., cable type SAC-3P-M12MS/.../...
Order No. 1696662.

Nominal current L+/L-
Pin 1 and Pin 3 provide max. 200 mA nominal current. Higher currents are briefly permitted during startup. The current is then limited electronically.

7 Connection example

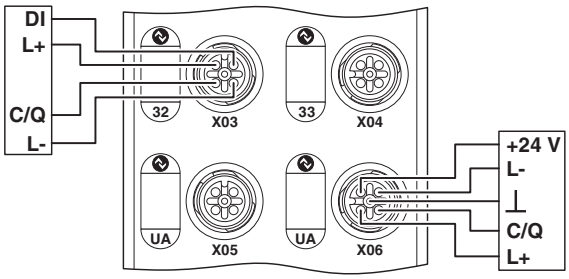


Figure 7 Typical connection of IO Link devices (A port, X03) and (B port, X06)

8 Connection notes

NOTE: Data corruption or loss

Implement the FE connection using mounting screws, in order to ensure immunity to interference.

NOTE: Device damage

To ensure IP65/67 degree of protection, cover unused sockets with protective caps.

NOTE: Damage to the electronics

Only supply the IO-Link master and the IO-Link devices with the voltage U_S and U_A provided at the terminal points.

NOTE: Damage to the electronics

Observe the correct polarity of the supply voltages U_S and U_A in order to prevent damage to the device.

NOTE: Malfunction

When connecting the IO-Link devices, observe the assignment of the connections to the PROFINET input data.

Secure the device to a level surface or to a profile. Do not use this device to bridge gaps, in order to prevent forces being transmitted via the device.

Use standard M5 screws with toothed lock washer and self-locking nuts. Observe the maximum torque of the screws.

9 Factory reset via rotary encoding switch

You can do a factory reset using the rotary encoding switches.

After modifying the switch position, restart the device, as the modification to the switch position does not take effect during operation.

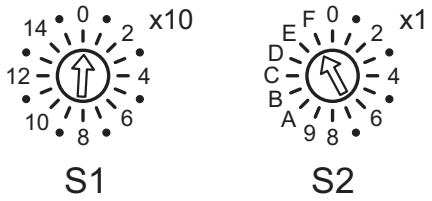


Figure 8 Rotary encoding switch

The image shows code 0F.

S1	S2	Code	Function
0	F	0F	Resetting to the default settings

Switch position 0F

All settings are reset to default settings, including IP parameters.

The device is ready for operation after powering up, as soon as the RDY LED lights up green.
A connection to the device however cannot be established in this switch position.
As soon as the RDY LED lights up green, a new switch position can be selected on the rotary encoding switch and the device can be restarted.

10 Local status and diagnostic indicators

10.1 Indicators for Ethernet ports and power supply

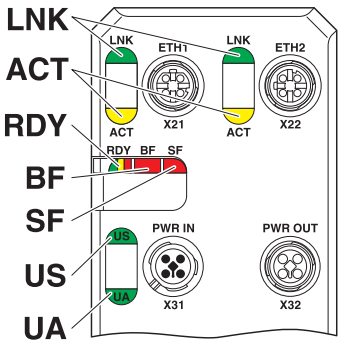


Figure 9 Indicators for Ethernet ports and power supply

Designation	Color	Meaning	State	Description
LNK 1/2	Green	**Link**	Green On	Connection is present at port 1/2.
			Off	Connection is not present at port 1/2.
ACT 1/2	Yellow	**Act**ivity	Yellow flashing	Data transmission is present at port 1/2.
			Off	Data transmission is not present at port 1/2.
RDY	Green/ yellow/ red	**Ready**	Green on	Device is ready for operation.
			Yellow flashing	Firmware update is being performed.
			Flashing green/ yellow	Over- or undervoltage at U_S
				Temperature of the device is in the critical area.
				Failure of the actuator supply U_A
				And red US LED: sensor supply overload
			Off	Device is not ready for operation.
BF	Red	**B**us **F**ault	Red on	No link status is available on any port.
			Flashing	SF LED not flashing: Link status available, no communication connection to the PROFINET controller
			Flashing	SF LED flashing: hardware watchdog has been triggered.
			Off	A PROFINET controller has established an active communication connection to the PROFINET device.
SF	Red	**S**tation **F**ail	On	PROFINET diagnostics available
			Flashing	Flashes only together with the BF LED; watchdog triggered
			Off	PROFINET diagnostics not available
US	Green/ red	**U_S**ensors	Green On	Communications power/sensor voltage present
			Off	Communications power/sensor voltage not present or too low.
			Red on	Sensor voltage overload
UA	Green	**U_A**ctuators	On	Actuator voltage is present.
			Off	Actuator voltage is not present.

10.2 Displaying the IO-Link ports and inputs

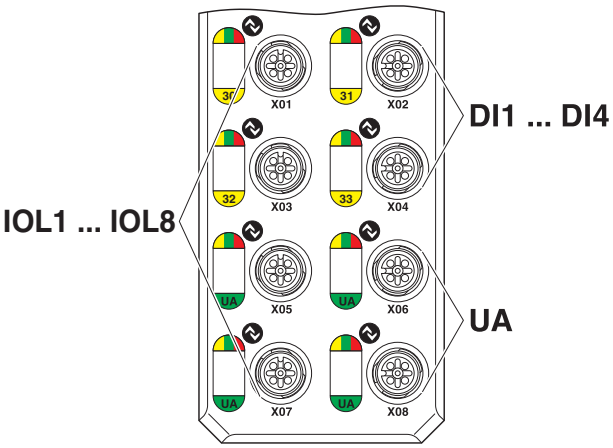


Figure 10 Displaying the IO-Link port and inputs

Designation	Color	Meaning	State	Description
IO-Link LED	Green/ yellow/ red	Status of the IO-Link ports X01 ... X08	Green on	In IO-Link mode: IO-Link communication present.
			Green flashing	In IO-Link mode: no IO-Link communication.
			Yellow on	The digital input or output is set in DI or DO mode.
			Red on	In IO-Link mode: IO-Link communication error
			Red on	In IO-Link mode: overload of the L+/L- cable
			Red on	In DI or DO mode: overload of the L+/L- cable
			Red on	Overload of the C/Q cable
			Off	The digital input or output is not set in DI or DO mode.
30 ... 33	Yellow	Status of the digital inputs	On	Input is set.
			Off	Input is not set.
UA	Green/ red	Actuator supply for X05 ... X08	Green on	Actuator voltage is present.
			Off	Actuator voltage is not present.
			Red on	Short circuit between pin 2 and pin 5

The numbering of the LEDs is as follows: the first number specifies the byte, the second number specifies the bit.

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

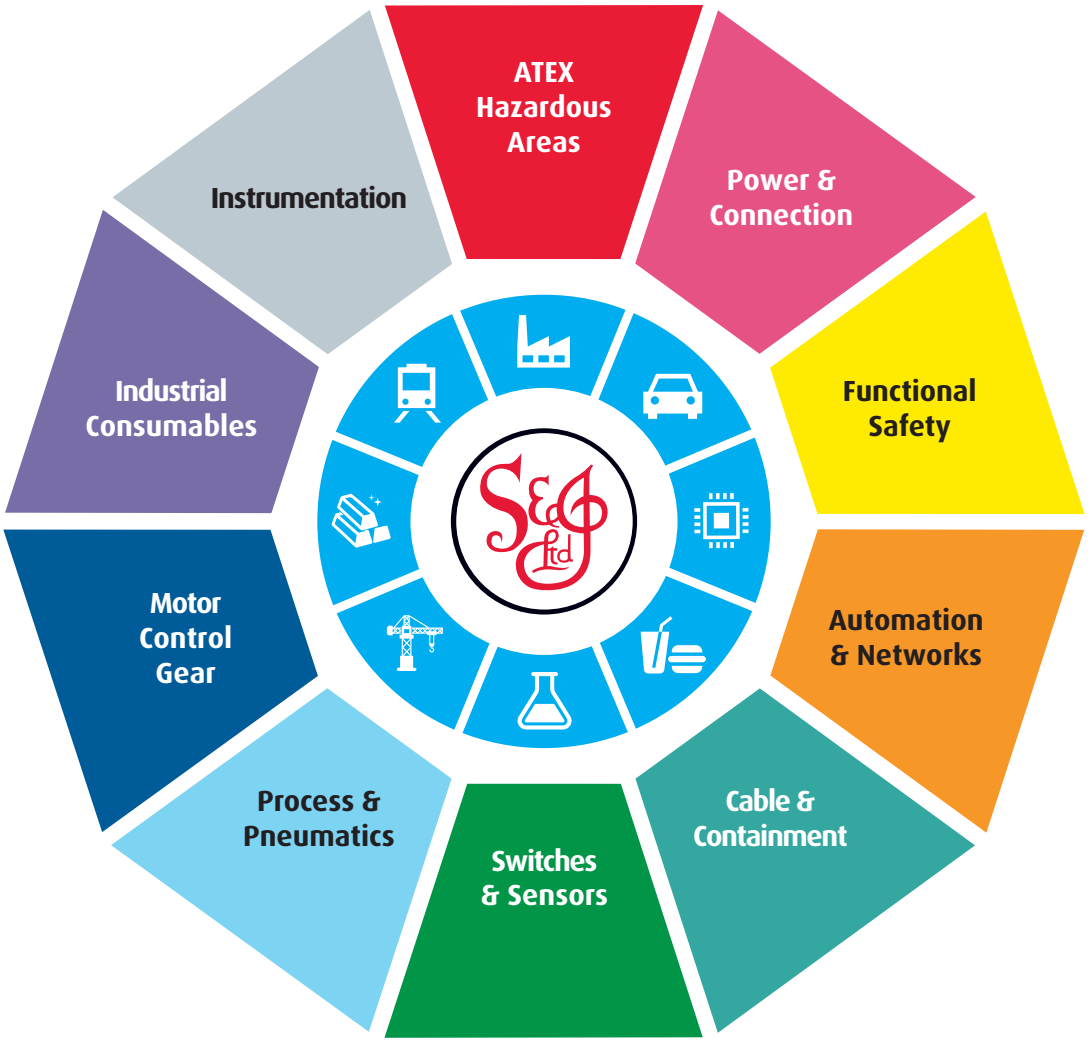
At Scattergood & Johnson Ltd, we pride ourselves on being a technical distributor to specialist industries.

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