AXL SE DOR2 W 230



Axioline Smart Elements, relay module, relay outputs: 2 (floating), changeover contact, 220 V DC, 230 V AC

Data sheet
109632_en_04

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1 Description

You can integrate Axioline Smart Elements into systems with the Smart Element interface.
This Smart Element has two relay changeover contacts that are independent of each other and floating.
You can install low-voltage and extra-low-voltage modules directly next to each other on one Axioline F backplane.

Features

- 2 mono-stable relays
- Floating connections for 2 actuators
- Switching current per channel: 6 A, maximum
- Device rating plate stored

WARNING: dangerous contact voltage

When working on the Smart Element and on the wiring, always switch off the supply voltage and ensure it cannot be switched on again.

Observe the safety notes in “Installation and startup”.

This data sheet is only valid in association with the UM EN AXL SE SYS INST user manual.

Make sure you always use the latest documentation.
It can be downloaded at: phoenixcontact.net/product/1105562

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3 Ordering data

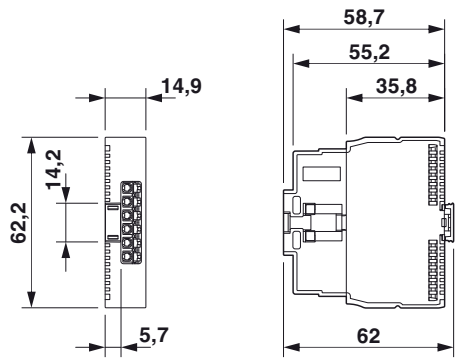
Description	Type	Item no.	Pcs./Pkt.
Axioline Smart Elements, Relay module, Relay outputs: 2 (floating), Changeover contact, 220 V DC, 230 V AC, degree of protection: IP20	AXL SE DOR2 W 230	1105562	1

Documentation	Type	Item no.	Pcs./Pkt.
User manual, English, Axioline Smart Elements	UM EN AXL SE SYS INST	-	-
User manual, English, Axioline F: System and installation	UM EN AXL F SYS INST	-	-
User manual, English, Axioline F: Diagnostic registers, and error messages	UM EN AXL F SYS DIAG	-	-
Application note, English, Fundamentals of relay technology and of solid-state relay technology	AH EN RELAY TECHNOLOGY	-	-

Additional ordering data	
For additional ordering data (accessories), go to:	www.phoenixcontact.net/product/1105562

4 Technical data

Dimensions (nominal sizes in mm)



Width	14.9 mm
Height	62.2 mm
Depth	62 mm

General data	
Color	traffic grey A RAL 7042
Weight	41 g
Ambient temperature (operation)	-25 °C ... 60 °C
Ambient temperature (storage/transport)	-40 °C ... 85 °C
Permissible humidity (operation)	5 % ... 95 % (non-condensing)
Permissible humidity (storage/transport)	5 % ... 95 % (non-condensing)
Air pressure (operation)	80 kPa ... 106 kPa
Air pressure (storage/transport)	70 kPa ... 106 kPa (up to 3000 m above sea level)
Degree of protection	IP20
Overvoltage category	III (EN 61010-2-201/IEC 61010-2-201)
Degree of pollution	2 (IEC 60664-1, EN 60664-1)
Mounting type	Smart Element slot
Mounting position	See the system in which the Smart Element is used.

Do not use the Smart Element in an atmosphere that contains corrosive gas.

Connection data: I/O	
Connection method	Push-in connection
Conductor cross section, rigid	0.25 mm² ... 1.5 mm²
Conductor cross section, flexible	0.25 mm² ... 1.5 mm²
Conductor cross section [AWG]	24 ... 16
Conductor cross section flexible, with ferrule with plastic sleeve	0.25 mm² ... 0.75 mm²
Conductor cross section flexible, with ferrule without plastic sleeve	0.25 mm² ... 1.5 mm²
Stripping length	8 mm

Please observe the information provided on conductor cross sections in the “Axioline Smart Elements” user manual.

When selecting the cables, observe the permissible operating temperature in accordance with IEC or UL.

Interface: Smart Element interface	
Number of interfaces	1
Connection method	Card edge connector
Start time until ready to operate	< 500 ms

Communications power supply of the Smart Elements (U_{SE})	
Supply voltage	using card edge connectors
Current draw	See documentation for the system in which the Smart Element is used.

I/O supply (U_P)	
Nominal supply voltage	24 V DC (using card edge connectors)
Supply voltage range	19.2 V DC ... 30 V DC (including all tolerances, including ripple)
Current consumption	typ. 36 mA (18 mA per relay, all contacts floating)
Power consumption	typ. 0.864 W
Surge protection	See the system in which the Smart Element is used.
Reverse polarity protection	parallel diode
Protection	See the system in which the Smart Element is used.

Relay outputs	
Number of outputs	2 (floating)
Connection method	Push-in connection
Connection technology	2-conductor
Contact type	Changeover contact
Contact material	$AgSnO_2$, hard gold-plated
Nominal output voltage	220 V DC 230 V AC
Output voltage range	24 V DC ... 220 V DC -20 % / +15 % 24 V AC ... 230 V AC -20 % / +15 % (50/60 Hz)
Inrush current	max. 10 A (for 4 s) max. 20 A (for 0.02 s)
Switching current	max. 6 A (up to 250 V AC, cos phi = 0.75 ... 0.8) max. 6 A (up to 30 V DC, N/O contact, general use) max. 3 A (up to 30 V DC, N/C contact, general use) max. 580 mA (at 48 V DC) max. 250 mA (at 110 V DC) max. 125 mA (at 220 V DC) max. 220 mA DC (125 V DC, L/R ≤ 50 ms) max. 110 mA DC (250 V DC, L/R ≤ 50 ms)

NOTE: Damage to the electronics

Limit the switching current per channel to a maximum of 6 A. Use a fuse with the following properties for this:
≤6 A/≥250 V for low-voltage applications
≤6 A/≥60 V for SELV/PELV applications

Switching capacity	max. 1500 VA (AC applications up to 55°C, observe derating above that) max. 180 W (up to 30 V DC, N/O contact, general use) max. 90 W (up to 30 V DC, N/C contact, general use) max. 28 W (above 30 V DC) For further DC values, see DC load limit curve.

Relay outputs	
Switching capacity in accordance with IEC 60947-5-1	3 A (24 V (AC15)) 3 A (120 V (AC15)) 3 A (230 V (AC15)) 2 A (24 V (DC13), L/R = 100 ms) 0.2 A (110 V (DC13), L/R = 44 ms) 0.1 A (220 V (DC13), L/R = 44 ms)
Switching capacity in accordance with UL/CSA 61010-2-201	5 A (AC, B300, up to max. 55°C) 1 A (DC, R300, up to max. 60°C)
Switching frequency	0.1 Hz (with load); 20 Hz (without load)
Typical response time	8 ms
Bouncing time	typ. 2 ms (N/O contact) max. 6 ms (N/O contact) typ. 7 ms (N/C contact) max. 15 ms (N/C contact)
Typical release time	< 12 ms
Service life electrical	5x 10^4 switching cycles
Mechanical service life	20x 10^6 cycles
Common potentials	all contacts floating

Input and output address area	
Input address area	0 Byte
Output address area	1 Byte

Configuration and parameter data in a PROFIBUS system	
Required parameter data	9 Byte
Required configuration data	6 Byte

Electrical isolation/isolation of the voltage areas	
Test section	**Test voltage**
Communications supply / 24 V supply (I/O)	500 V AC, 50 Hz, 1 min.
Communications supply / functional ground	500 V AC, 50 Hz, 1 min.
24 V supply (I/O) / functional ground	500 V AC, 50 Hz, 1 min.
Supply logic / relay contact	4 kV, Rated surge voltage (safe isolation according to EN 61010-2-201/IEC 61010-2-201)
24 V supply (devices) / relay contact	4 kV, Rated surge voltage (safe isolation according to EN 61010-2-201/IEC 61010-2-201)
Relay contact / functional ground	4 kV, Rated surge voltage (safe isolation according to EN 61010-2-201/IEC 61010-2-201)

Mechanical tests	
Vibration resistance in accordance with EN 60068-2-6/IEC 60068-2-6	1g
Shock in accordance with EN 60068-2-27/IEC 60068-2-27	10g (contact interruption) / 5g (contact closure)

Conformance with EMC Directive 2014/30/EU	
Immunity test in accordance with EN 61000-6-2/IEC 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, I/O cables: ±1 kV asymmetrical
Conducted interference EN 61000-4-6/IEC 61000-4-6	Criterion A, Test voltage 10 V
Noise emission test in accordance with EN 61000-6-4/IEC 61000-6-4	Class A

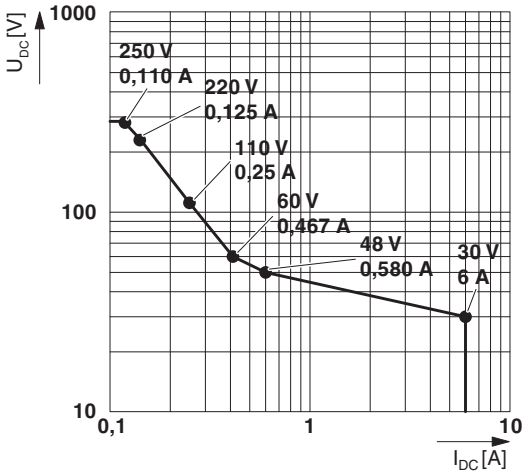
Approvals	
For the current approvals, go to:	www.phoenixcontact.net/product/1105562

Manufacturer's declarations	
For the current manufacturer’s declarations, go to:	www.phoenixcontact.net/product/1105562

5 Supplementary data

5.1 DC load limit curve (N/O contact)

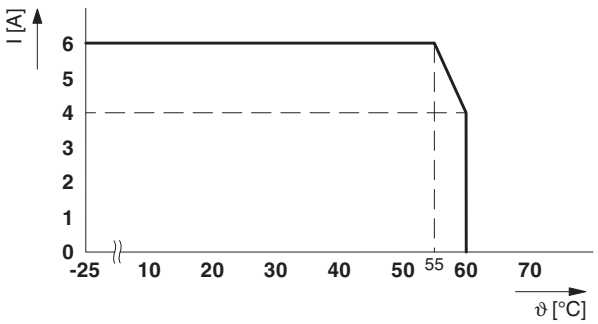
Figure 1 DC load limit curve (N/O contact)



For more detailed information on the basics of relay technology, please refer to the RELAY TECHNOLOGY application note.

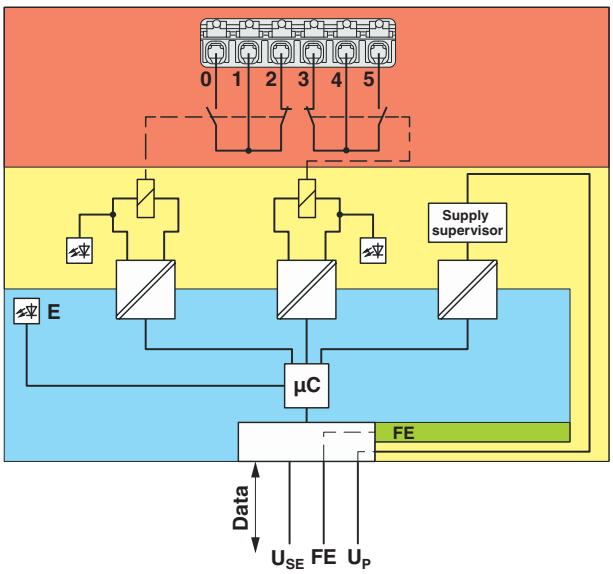
5.2 Derating

Figure 2 Derating diagram



6 Internal circuit diagram

Figure 3 Internal wiring of the terminal points



Key:

Data	Data transmission
U_{SE}	Communications power supply of the Smart Element
FE	Functional ground
U_P	I/O supply of the Smart Element
µC	Microcontroller
	Electrical isolation for data or power supply
	LED
Output circuit ...	Output circuit and voltage monitoring
	Monostable relay
	Electrically isolated areas

7 For your safety

7.1 Intended use

Use Smart Elements exclusively in accordance with the specifications in the data sheet and the “Axioline Smart Elements” user manual.
Please also refer to the documentation for the system in which the Smart Elements are used.

7.2 Qualification of users

The use of products described in this data sheet is oriented exclusively to electrically skilled persons or persons instructed by them. The users must be familiar with the relevant safety concepts of automation technology as well as applicable standards and other regulations.

7.3 Disconnecting or plugging in a Smart Element

NOTE: Damage to contacts or malfunction

Before performing work on a Smart Element, disconnect the power to the Smart Element.

This means:

- Disconnect the connected I/O devices from the power.
- Switch off the I/O supply voltage U_P!
- Switch off the communications power U_{SE}. For the system in which the Smart Element is used, this means the following: Switch off the voltage that generates the U_{SE}.

7.4 Strain relief

NOTE: damage to the contacts

Physical overloads can result in damage to the terminal points.

- Relieve strain in the connected cables.

7.5 Locking a Smart Element

Make sure that each Smart Element is locked in its slot. This is only ensured if the unlocking mechanism has been pushed into the guide as far as it will go.

See “Axioline Smart Elements” user manual.

8 Installation and startup

WARNING: loss of electrical safety

If used incorrectly, device safety may be impaired.

The instructions given in this data sheet as well as the UM EN AXL SE SYS INST user manual must be observed during installation, startup, and operation.

8.1 Installing the system

Install the system according to the requirements of EN 50178!

WARNING: dangerous contact voltage

Please be aware of dangerous voltages when working on circuits that do not meet SELV requirements.

Failure to observe these instructions can lead to damage to health or even life-threatening injuries.

- Only mount and remove the Smart Elements for the low-voltage range when the power supply is disconnected.
- When working on the modules and wiring, always switch off the supply voltage and ensure it cannot be switched on again.
- Only install the Smart Elements for the low-voltage range in a control cabinet or junction box.
  They must satisfy the requirements on electrical and flameproof housings in accordance with the following standards:
  - EN 50178 or EN 61010-1
  - UL 61010-1 (for applications with UL approval)

WARNING: dangerous contact voltage in the event of ground faults

Only operate the Smart Elements for the low-voltage range in grounded grids.

WARNING: dangerous contact voltage

Do not operate one channel with low voltage and another channel with protective extra-low voltage (PELV) or safety extra-low voltage (SELV).

Only the following operating states are permitted:

– All outputs used switch low voltage
  or
– All outputs used switch protective extra-low voltage (PELV) or safety extra-low voltage (SELV)

8.2 Switch or circuit-breaker

Please observe the following during planning and installation:

– A switch or circuit-breaker must be included in the installation.
– It must be suitably located and easily reached.
– It must be marked as the disconnecting device for the equipment.

8.3 Applications with UL approval

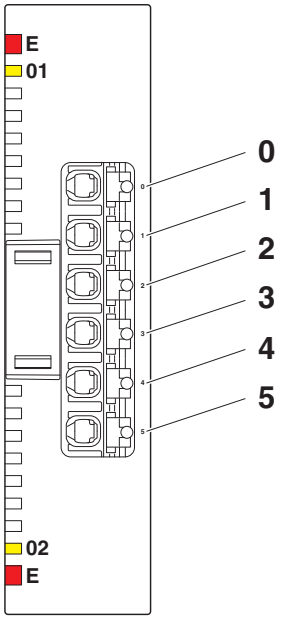
Information:

To install the device in accordance with UL/CSA/IEC standard, the following notes must be observed.

- A switch or circuit breaker must be included in the installation, be suitably located, easily reached and marked as the disconnecting device for the equipment. If there is only one device - one switch or one circuit breaker - symbols 9 and 10 of Table 1, UL/CSA/IEC 61010 are sufficient if the symbols are marked on or adjacent to the switch or circuit breaker.
  a) Circuit breakers used as a disconnecting device shall meet the relevant requirements of UL Standard 489 / CSA Standard (C22.2) No. 5 / IEC 60947-2, be suitable for the application and installed near the equipment.
  b) Switch used as a disconnecting device shall meet the relevant requirements of UL Standard 508 / CSA Standard (C22.2) No. 14 / IEC 60947-3, be suitable for the application and installed near the equipment.
- Equipment intended to be energized from a MAINS supply shall be protected by fuses, circuit breakers, thermal cut-outs, impedance limiting circuits or similar means, to provide protection against excessive current being drawn from the MAINS in case of a fault in the equipment.
  a) Overcurrent protection devices shall not be fitted in the protective conductor. Fuses or single pole circuit breakers shall not be fitted in the neutral conductor of multi-phase equipment.
  b) A single-pole circuit breaker used as an overcurrent protective device shall be connected in the ungrounded supply conductor.
  c) A multiple-pole circuit breaker used as an overcurrent protective device or devices shall be so constructed as to interrupt all of the neutral (grounded) and ungrounded conductors of the MAINS supply simultaneously.
  d) Fuses shall meet the relevant requirements of UL Standard 248 / CSA Standard (C22.2) No. 248 / IEC 60127, be suitable for the application and installed near the equipment.
  e) A single fuse used as an overcurrent protective device shall be connected in the ungrounded supply conductor.
  f) Where fuses are used as overcurrent protective devices in both the neutral (grounded) and ungrounded supply conductors, the fuseholders shall be mounted adjacent to each other and the fuses shall be of the same RATING and characteristics.
  g) The screw shell of a plug fuseholder and the ACCESSIBLE contact of an extractor fuseholder connected to the ungrounded supply conductor shall be connected towards the load. The ACCESSIBLE contact or screw shell of fuseholders connected in the neutral (grounded) conductor shall be located towards the grounded supply line.

9 Terminal point assignment as well as diagnostics and status indicators

Figure 4 Terminal point assignment as well as diagnostics and status indicators



9.1 Terminal point assignment

Terminal point	Assignment	Channel	Signal
0	Relay N/O contact	1	OUT01
1	Relay main contact		
2	Relay N/C contact		
3	Relay N/C contact	2	OUT02
4	Relay main contact		
5	Relay N/O contact		

9.2 Local diagnostics and status indicators

Designation	Color	Description	
E	Red	Error	
		Off	No error
		Flashing (0.5 Hz)	Error in Smart Element Replace the Smart Element.
		Flashing (4 Hz)	Communication error Check whether the Smart Element has been plugged in correctly.
		On	I/O error Check the connected components and wiring. Remove the error.
01 ... 02	Yellow	Output status	
		On	Relay is activated.
		Off	Relay is not activated.

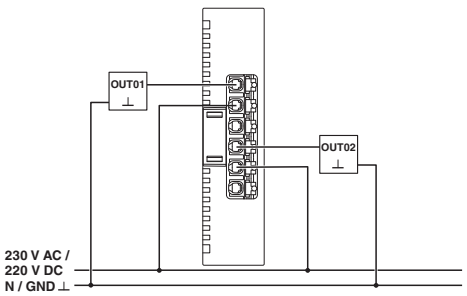
See also “Diagnostic state (0018_{hex}: DiagState)” section, “Possible error codes” table.

10 Connection example

Connect the power source to the main contact of the changeover contact (terminal points 1, 4). Connect the load to the N/C contact (terminal points 2, 3) or the N/O contact (terminal points 0, 5).

The process data maps the status of the N/O contact.

Figure 5 Connection of actuators



11 Process data

The process data is mapped in Motorola format (Big Endian).

Output process data								
Byte	0							
Bit	7	6	5	4	3	2	1	0
Signal	-	-	-	-	-	-	OUT02	OUT01
Terminal point	-	-	-	-	-	-	5	0

12 Parameter, diagnostics and information (PDI)

Parameter and diagnostic data as well as other information are transmitted as objects via the PDI channel.

For more detailed information on all possible standard objects for Axioline Smart Elements, please refer to the UM EN AXL SE SYS INST user manual.

The standard objects necessary for operation are described in the following section.

The following applies for the tables below:

Abbreviation	Meaning
A	Number of elements
L	Length of the elements in bytes
R	Read
W	Write

13 Standard objects

Index (hex)	Object name	Data type	A	L	Rights	Meaning/contents		Startup parameters	
Device type									
0037	DeviceType	Octet string	1	8	R	Device type	2040 001 0000 $1D22_{hex}$	No	
Diagnostics objects									
0018	DiagState	Record	11	74	R	Diagnostic state		No	*
0019	ResetDiag	UINT8	1	1	R/W	Handling diagnostic messages		No	*
Objects for process data management									
0024	ResetCode	UINT16	1	2	R/W	Substitute value behavior during bus reset (PDOUT)		Yes	*
0025	PDIN	Octet string	1	1	R	Input process data is not available.		No	
0026	PDOUT	Octet string	1	1	R	OUT process data The structure corresponds to the representation in the “Process data” section.		No	
Objects for device management									
002D	ResetParam	UINT8	1	1	R/W	Reset parameterization		No	*

Startup parameters are stored permanently in the Flash memory.

The objects identified with * in the last column are described in more detail in the following sections.

The description of the other objects is to be found in the user manual UM EN AXL F SYS INST.

13.1 Diagnostics state (0018_{hex}: DiagState)

This object is used for a structured message of an error.

A detailed description of the object is provided in user manual UM EN AXL F SYS INST.

Possible error codes

Subindex	02	03	04	08	0B		
Error	**Priority**	**Channel**	**Error code**	**Function group**	**Text**	**E LED**	**Corrective**
	hex	**hex**	**hex**				
No error	00	00	0000	General	Status OK	○	
I/O supply voltage (U_P) is not present.	01	FF	3130	General	Supply missing (U_P)	●	Check the supply voltage.
Error in the Smart Element firmware	01	FF	6100	General	Firmware error, update required	●	Replace the Smart Element.
Problem communicating with the Smart Element	01	FF	6130	General	Smart Element missing	✹	Check whether the Smart Element has been plugged in correctly. If the error is still present, replace the Smart Element.
Error in the parameter memory	01	FF	6320	General	Parameter error, repeat parameterization	●	Error in the parameter memory. Parameterize the Smart Element.

Key

Priority	00_{hex}	No error
	01_{hex}	Error
Channel	00_{hex}	No error
	FF_{hex}	Entire device

LED	○	Off
	●	On
	✹	Flashing (4 Hz)

13.2 Handling diagnostic messages (0019_{hex}: ResetDiag)

You can use this object to specify how the Smart Element should handle diagnostic messages.

Handling diagnostic messages	
Value (hex)	**Meaning**
00	Permit all diagnostic messages
02	Delete and acknowledge all diagnostic messages that are still pending
06	Delete and acknowledge all diagnostic messages and do not permit new diagnostic messages
Other	Reserved

13.3 Substitute value behavior during bus reset (PDOUT) (0024_{hex}: ResetCode)

Use this object to parameterize the behavior of the Smart Element outputs in the event that process data is missing.

0024_{hex}: substitute value behavior during bus reset (PDOUT) (read, write)			
Subindex (hex)	**Data type**	**Length in bytes**	**Meaning/contents**
00	UINT16	2	Read or write entire object.
			Substitute value behavior of the outputs

Value range			
Value (hex)	**Meaning**	**N/O contact**	**N/C contact**
0000	**0 is output to all output bits (default)**	**Open**	**Closed**
0001	1 is output to all output bits	Closed	Open
0002	Hold last value	Previous state	Previous state
Other	Reserved		

13.4 Reset parameterization ($002D_{hex}$: ResetParam)

Use this object to reset certain parameters to the factory default settings (default values).

To reset the parameters, value 01_{hex} must be transferred during write access.

Reset the following parameters using this object:

Index (hex)	Object name	Meaning
0024	ResetCode	Substitute value behavior during bus reset (PDOUT)

14 Device descriptions

The device is described in the device description files.
The device descriptions for controllers from Phoenix Contact are included in PC Worx and PLCnext Engineer, as well as in the corresponding service packs.
The device description files for other systems are available for download at www.phoenixcontact.net/products in the download area of the bus coupler installed.