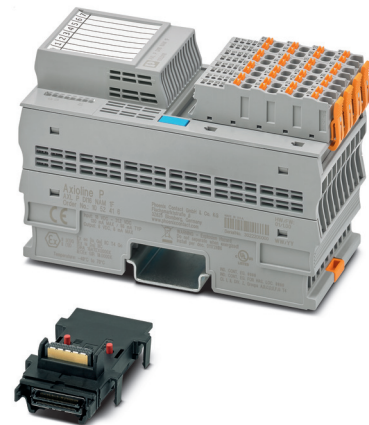


AXL P DI16 NAM 1F

**Axioline P digital input module,
16 NAMUR enabled inputs,
2-conductor connection technology**

Data sheet
109504_en_00

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1 Description

The module is an Axioline P I/O module for use in the Axioline P modular I/O system.

It is used to acquire digital signals.

The module is a modular I/O device that can be affixed to the Axioline P local bus, to communicate I/O data up to the Axioline P bus coupler, which forms the head of the station.

The digital input module with NAMUR capabilities collects digital input signals and supports NAMUR proximity and close contact switches and makes this information available to the bus coupler through the Axioline P local bus.

The module is fully hot-swappable on the Axioline P local bus, which also provides power to the module.

Features

- 16 NAMUR digital input signals for NAMUR proximity sensors according to EN 60947-5-6
- Open circuit contacts
- Switch contacts with resistance circuit in accordance with IEC/EN 60947-5-6
- Connection of sensors in 2-conductor technology
- Can be used under extreme ambient conditions
- Temperature range of -40°C ... +70°C
- Hot-swappable



Make sure you always use the latest documentation.

It can be downloaded at: phoenixcontact.net/product/1052416

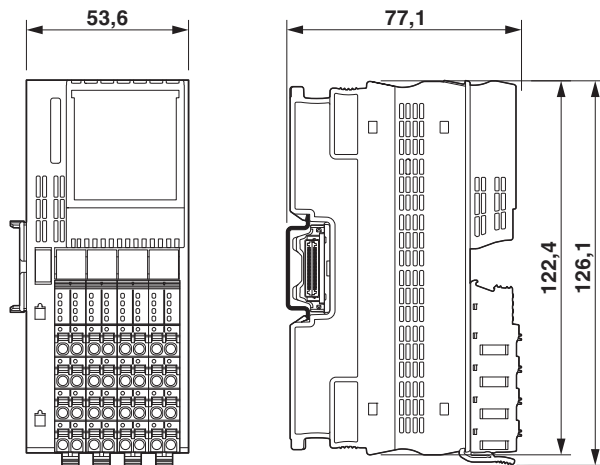
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3 Ordering data

Description	Type	Order No.	Pcs./Pkt.
Axioline P, Digital input module, Digital inputs: 16 (NAMUR), 8 V DC, connection method: 2-conductor, transmission speed in the local bus: 100 Mbps, degree of protection: IP20	AXL P DI16 NAM 1F	1052416	1
Accessories	Type	Order No.	Pcs./Pkt.
Axioline P bus base module for housing type F2	AXL P BS F2	1052428	1
Axioline shield connection set (contains 2 shield bus holders and 2 SK 5 shield connection clamps)	AXL SHIELD SET	2700518	1
Zack marker strip for Axioline F (device labeling), in 2 x 20.3 mm pitch, unprinted, 25-section, for individual labeling with B-STIFT 0.8, X-PEN, or CMS-P1-PLOTTER (Marking)	ZB 20,3 AXL UNPRINTED	0829579	25
Axioline P terminator pair	AXL P TERM PAIR	2316402	1
Replacement part	Type	Order No.	Pcs./Pkt.
Axioline P bus base module for housing type F2	AXL P BS F2	1052428	1
Optional accessories	Type	Order No.	Pcs./Pkt.
Axioline P terminator pair	AXL P TERM PAIR	2316402	1

4 Technical data

Dimensions (nominal sizes in mm)



Width	53.6 mm
Height	126.1 mm
Depth	77.14 mm
Note on dimensions	The depth is valid when a TH 35-7,5 DIN rail is used (according to EN 60715).

General data

Color	traffic grey A RAL 7042
Ambient temperature (operation)	-40 °C ... 70 °C (Standard)
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)	70 kPa ... 106 kPa (up to 2000 m above sea level)
Air pressure (storage/transport)	70 kPa ... 106 kPa (up to 2000 m above sea level)
Degree of protection	IP20
Protection class	III (IEC 61140, EN 61140, VDE 0140-1)
Overvoltage category	II
Degree of pollution	2
Maximum altitude	2000 m

Connection data: Axioline P connector

Connection method	Push-in connection
Conductor cross section solid / stranded	0.2 mm ² ... 1.5 mm ² / 0.2 mm ² ... 1.5 mm ²

Connection data: Axioline P connector

Conductor cross section [AWG] 24 ... 16

Stripping length 8 mm



Please observe the information provided on conductor cross sections in the “Axioline P: system and installation” user manual.

Interface: Axioline P local bus

Connection method Connection for bus base module

Transmission speed 100 Mbps

Supply of the logic voltage U_L

Supply voltage range 19.2 V DC ... 30 V DC (via bus base module (U_L) at AXL P BK...)

Supply of the Axioline P local bus U_{Bus}

Supply voltage 5 V DC (via bus base module)

Current consumption max. 135 mA

Axioline P extension module supply voltage

Supply voltage U_L (via bus base module)

Current consumption max. 130 mA (via bus base module)

Digital inputs

Number of inputs 16 (NAMUR)

Connection method Push-in connection

Connection technology 2-conductor

Description of the input NAMUR enabled digital input signals

Nominal input voltage 8.2 V DC

Polarity reversal protection of the inputs yes

Electrical isolation/isolation of the voltage areas

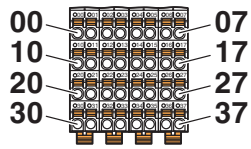
Test section	Test voltage
5 V supply of the local bus (U_{Bus}) / functional ground	500 V AC, 62 Hz, 1 min.
24 V supply (I/O)/functional ground	500 V AC, 62 Hz, 1 min.
Field to functional earth	500 V AC, 62 Hz, 1 min.
Field to 5 V and 24 V supplies	1500 V AC, 62 Hz, 1 min.

Approvals

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

5 Terminal point assignment

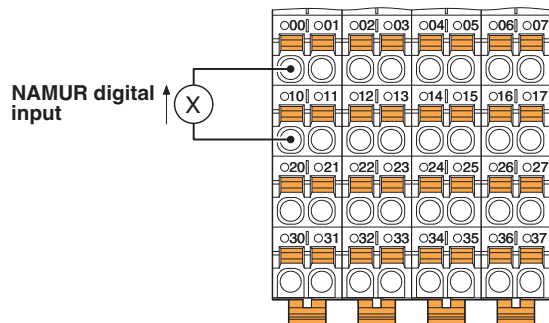
Figure 1 Terminal point assignment



Terminal point	Color	Assignment	
Digital inputs			
00 ... 07	Orange	IN01- ... IN08-	Negative connection for channels 1 ... 8
10 ... 17	Orange	V01+ ... V08+	Positive connection for channels 1 ... 8
20 ... 27	Orange	IN09- ... IN16-	Negative connection for channels 9 ... 16
30 ... 37	Orange	V09+ ... V16+	Positive connection for channels 9 ... 16

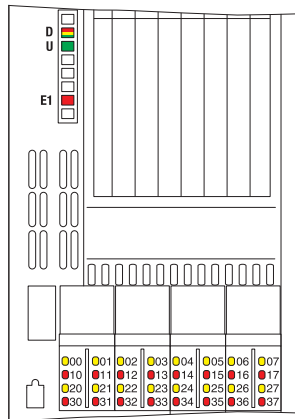
6 Connection examples

Figure 2 Connection for NAMUR digital input



7 Local diagnostic and status indicators

Figure 3 Local diagnostic and status indicators



Channel errors are errors that can be associated with a channel.
I/O errors are errors that affect the entire module.

Designation	Color	Meaning	State	Description
D	Red/ yellow/ green	Diagnostics of local bus communication		
		Run	Green on	The device is ready for operation, communication within the station is OK. All data is valid. An error has not occurred.
		Active	Green flashing	The device is ready to operate, communication within the station is OK. The data is not valid. The controller or superordinate network is not delivering valid data. There is no error on the module.
		Ready	Yellow on	The device is ready for operation but did not detect a valid cycle after power-up.
		Connected	Yellow flashing	The device is not (yet) part of the active configuration.
		Reset	Red on	The device is ready for operation but has lost the connection to the bus head.
		Power down	Off	Device is in (power) reset.
U	Green	U _{Logic}	On	Supply for digital input modules (U _L) is present.
			Off	Supply for digital input modules (U _L) is not present.
E1	Red	Supply voltage error	On	Feed-in for digital input modules (U _L) is faulty.
			Off	Feed-in for digital input modules (U _L) is OK.
00 ... 07, 20 ... 27	Yellow	Status of the inputs	On	Input is set.
			Off	Input is not set.
10 ... 17, 30 ... 37	Red	Channel error	On	Short-circuit/overload of the input.
			Off	No short-circuit/overload of the input.

8 Process data

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

IN process data

Byte	0							
Bit	7	6	5	4	3	2	1	0
Signal	IN08	IN07	IN06	IN05	IN04	IN03	IN02	IN01
Terminal point	07	06	05	04	03	02	01	00

Byte	1							
Bit	7	6	5	4	3	2	1	0
Signal	IN16	IN15	IN14	IN13	IN12	IN11	IN10	IN09
Terminal point	27	26	25	24	23	22	21	20

9 Parameter, diagnostics and information (PDI)

Parameter and diagnostic data as well as other information is transmitted as objects via the PDI channel of the Axioline P station.

The standard and application objects stored in the module are described in the following section.

The following applies to all tables below:

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

10 Standard objects

10.1 Objects for identification (device rating plate)

Index (hex)	Object name	Data type	A	L	Rights	Meaning	Contents
Manufacturer							
0001	VendorName	Visible String	1	32	R	Vendor name	Phoenix Contact
0002	VendorID	Visible String	1	7	R	Vendor ID	00A045
0003	VendorText	Visible String	1	58	R	Vendor text	Components and systems for industrial automation
0012	VendorURL	Visible String	1	58	R	Vendor URL	http://www.phoenixcontact.com
Module - general							
0004	DeviceFamily	Visible String	1	Max. 58	R	Device family	I/O digital IN
0006	ProductFamily	Visible String	1	32	R	Product family	AXL P
000E	CommProfile	Visible String	1	Max. 4 + 1	R	Communication profile	633
000F	DeviceProfile	Visible String	1	Max. 4 + 1	R	Device profile	0010
0011	ProfileVersion	Record of Visible Strings	2	Max. 51	R	Profile version	2018-04-19; Basic profile V3.0
0017	Language	Array of Records	2	Max. 56	R	Language	en-us; English
Module - special							
0005	Capabilities	Array of Octet Strings	8	N x 8	R	Capabilities	46 77 55 70 64 74 5F 30
0007	ProductName	Visible String	1	32	R	Product name	AXL P DI16 NAM 1F (16-channel associated apparatus)
0008	SerialNo	Visible String	1	22	R	Serial number	e. g., 1234512345
0009	ProductText	Visible String	1	58	R	Product text	16 digital inputs with fault detection
000A	OrderNumber	Visible String	1	32	R	Order No.	1052416
000B	HardwareVersion	Record of Visible Strings	2	11	R	Hardware version	e. g., 2010-06-21; 01
000C	FlexwareVersion	Record of Visible Strings	2	11	R	Firmware version	e. g., 2010-06-21; V1.10
000D	PChVersion	Record of Visible Strings	2	Max. 51	R	PDI version	2016-12-01; PDI V1.10
0037	DeviceType	Octet string	8	8	R	Device type	04 80 00 02 00 0B 0D 01 _{hex}
003A	VersionCount	Array of UINT16	4	8	R	Version counter	e. g., 0007 0001 0001 0001 _{hex}
Use of the device							
0014	Location	Visible String	1	58	R/W	Location	Can be completed by the user.
0015	EquipmentIdent	Visible String	1	58	R/W	Equipment identifier	Can be completed by the user.
0016	ApplDeviceAddr	UINT16	1	2	R/W	Application-specific device address	Can be completed by the user.

10.2 Miscellaneous standard objects

Index (hex)	Object name	Data type	A	L	Rights	Meaning/contents	
Diagnostics objects							
0018	DiagState	Record	1	Max. 207	R	Diagnostic state	*
0019	ResetDiag	UINT8	1	1	R/W	Acknowledge diagnostic messages	*
Objects for process data management							
0025	PDIN	Array of Records	1	48	R	Input process data	*
003B	PDIN_Descr	Array of Records	3	24	R	Description of the IN process data	
003C	PDOOUT_Descr	Array of Records	3	12	R	Description of the output process data	
Objects for device management							
002D	ResetParam	UINT8	1	1	R/W	Reset parameterization	*

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

The objects 003B_{hex} and 003C_{hex} are only applicable to tools.

10.3 Diagnostics objects

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

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

0018_{hex}: Diagnostics state (read)					
Subindex	Data type	Length in bytes	Meaning	Contents	
0	Record	21	Diagnostic state	Complete diagnostics information	
1	UINT16	2	Error number	0 ... 65535 _{dec}	
2	UINT8	1	Priority	00 _{hex}	No error
				01 _{hex}	Error
				02 _{hex}	Warning
				81 _{hex}	Error removed
				82 _{hex}	Warning eliminated
3	UINT8	1	Channel/group/module	00 _{hex}	No error
				01 _{hex}	Channel 1
				:	:
				08 _{hex}	Channel 8
				FF _{hex}	Entire device
4	UINT16	2	Error code	See table below	
5	UINT8	1	More follows	00 _{hex}	
6	Visible String	14	Text	See table below	



The message with priority 81_{hex} or 82_{hex} is a one-off, internal message to the bus coupler. The bus coupler transfers this error message to the error mechanisms of the higher-level system.

Error and status of the local diagnostics and status indicators

Subindex	2	3	4	6					
Error	Priority	Channel/ group/ module	Error code	Text	Process data	LED			
	hex	hex	hex			D	U	E1	CH
No error	00	00	0000	Status OK	xxxx	●	●	○	○
Supply voltage faulty (supply for digital modules (U _L))	01	FF	5160	Supply fail	0000	●	○	●	○
Device error	01	FF	6301	CS FLASH	0000	●	●	○	○
Flash format error	01	FF	6302	FO FLASH	0000	●	●	○	○
Short circuit	01	01 ... 08	2211	Short circuit	xxxx	●	●	○	●
Wire break	01	01 ... 08	7710	Open circuit	xxxx	●	●	○	●

- Off ● Green on
● On ✱ Green/yellow flashing

10.3.2 Acknowledge diagnostic messages (0019_{hex}: ResetDiag)

You can delete the diagnostics memory and acknowledge the diagnostic messages with this object.

0019 _{hex} : Acknowledge diagnostic messages (read, write)				
Subindex	Data type	Length in bytes	Code (hex)	Meaning
0	UINT8	1	00	Permit all diagnostic messages
			06	Delete and acknowledge all diagnostic messages and do not permit new diagnostic messages
			Other	Reserved

10.4 Objects for process data management

IN process data (0025_{hex}: PDIN)

You can read the IN process data of the module with this object.

The structure corresponds to the representation in the "Process data" section.

0025 _{hex} : IN process data (read)			
Subindex	Data type	Length in bytes	Meaning
0	Octet string	2	Input process data

10.5 Objects for device management

Reset parameterization (002D_{hex}: ResetParam)

This object is used to reset the module to the default settings.

To reset the parameters, value 01_{hex} must be transferred during write access. All other values are invalid and will be acknowledged with an error.

Then the default settings of the channels are loaded and all the user-set parameters are reset.

11 Digital input objects

Index	Subindex (hex)	Object name	Data type	L	Rights	Meaning	Contents	
01A0	Per module: 00	DI_Filter	UINT16	2	R/W	Input filter	0 _{dec}	< 200 µs (5 kHz)
							1000 _{dec}	1000 µs (1 kHz)
							3000 _{dec} (De-fault)	3000 µs (333 Hz)
01A5	Per channel: 00, 01 ... 10	DI_LineMonitoring	UINT8	16 1	R/W	Line monitoring	00 _{hex} (De-fault)	Enable
							01 _{hex}	Disable
01A6	Per module: 00	DI_ChannelError	UINT16	2	R	Channel error	Bit field enumeration	Example with error on CH15 and CH1: 0x0140 or 0000 0001 0100 0000

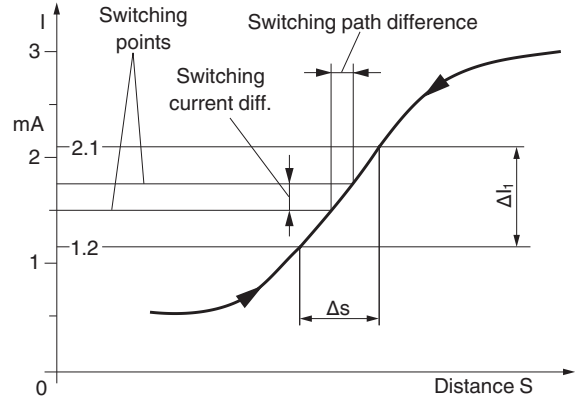
12 NAMUR

The module allows for connection to either NAMUR switches or closed contact switches configurable on a per channel basis. It can be configured to enable / disable error reporting (line break / short circuit) for each individual channel. Choose whether to mask error flags and error LEDs in case of sensor short circuit and open circuits on a non NAMUR rated switch.

The following table and diagram indicate the error conditions and status of the 16 digital inputs.

Condition	Status LED (yellow)	Error LED (red)
Channel conducting / on	ON	OFF
Channel non-conducting / off	OFF	OFF
Channel short circuit (overload)	ON	ON
Channel open circuit (line break)	OFF	ON

Figure 4 Switching point



As shown in the following table, the input values for the module are condensed into a single 16-bit word.

Byte	0								1							
Bit	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
Channel	8	7	6	5	4	3	2	1	16	15	14	13	12	11	10	9

13 Power supply

The Axioline P I/O modules receive power from the Axioline P bus coupler. This supply voltage (U_L) is provided via the Axioline P local bus.

The modules are fully hot swappable and may be removed while under power.