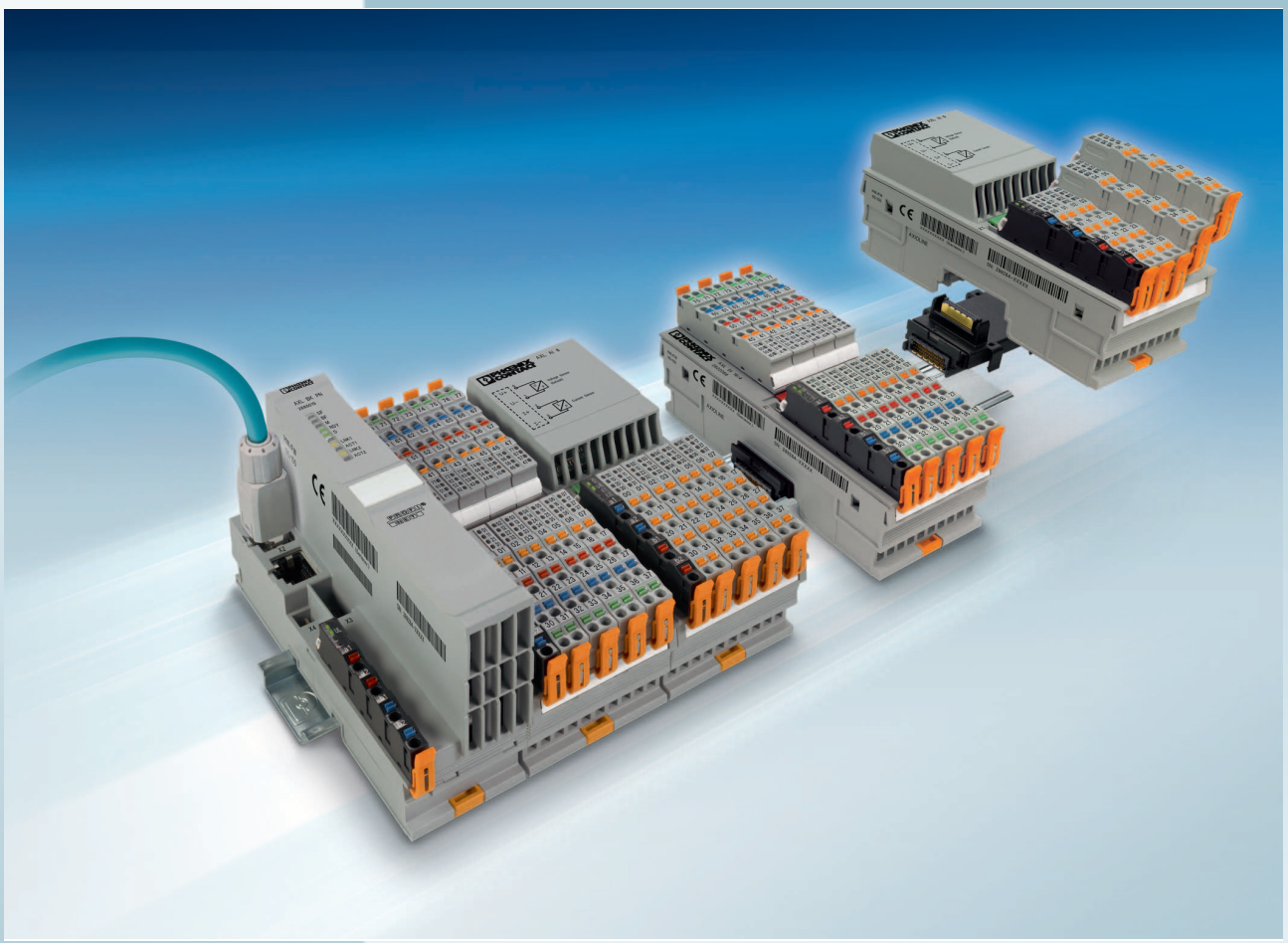
AUTOMATION



User manual

UM EN AXL SYS INST

Order No.: —

Axioline: System and installation

PHOENIX CONTACT
INSPIRING INNOVATIONS

AUTOMATION

User manual
Axioline: System and installation

2011-10-17

Designation: UM EN AXL SYS INST

Revision: 02

Order No.: —

This user manual is valid for:

All modules of the Axioline product range without bus-specific special features.

Please observe the following notes

User group of this manual

The use of products described in this manual is oriented exclusively to qualified electricians or persons instructed by them, who are familiar with applicable standards and other regulations regarding electrical engineering and, in particular, the relevant safety concepts.

Explanation of symbols used and signal words

This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety measures that follow this symbol to avoid possible injury or death.

There are three different categories of personal injury that are indicated with a signal word.

DANGER This indicates a hazardous situation which, if not avoided, will result in death or serious injury.

WARNING This indicates a hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION This indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

This symbol together with the signal word **NOTE** and the accompanying text alert the reader to a situation which may cause damage or malfunction to the device, hardware/software, or surrounding property.

This symbol and the accompanying text provide the reader with additional information or refer to detailed sources of information.

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Table of contents

1 Documentation landscape of Axioline

1.1 Available documents

The documentation for the Axioline product range is modular, providing you with the optimum information to meet your requirements, for example, for installation or startup with software.

Table 1-1 Axioline documentation

Document	Contents
User manual “Axioline: System und Installation” UM EN AXL SYS INST (this manual)	This manual is the generic system manual for Axioline. It describes the system and everything about Axioline module installation regardless of the network used.
User manuals	The additional user manuals either describe: – A network – A bus coupler connected to a network or – A special module Each manual only describes the relevant module and/or bus-specific special features. Being a generic manual, the “UM EN AXL SYS INST” user manual also applies.
Quick start guides	Quick start guides are available for various topics. A quick start guide describes step-by-step the startup of a system or a module using an example.
Module-specific data sheets	The data sheet for each module contains the complete information needed for use. These include at the very least: – Function description – Accessories – Technical data – Internal basic circuit diagram – Pin assignment/terminal point assignment – Local diagnostic and status indicators and – Connection examples

Table 1-1 Axioline documentation

Document	Contents
Application notes	Application notes provide additional information about special topics.
Package slips	A package slip contains key information for the electrical installation of a module or group of modules. These include, for example: – Brief description – Safety notes – Mounting/removal – Terminal point assignment
PDF version	The PDF version on the Internet provides up-to-date information on the product (see Section “Documentation on the Internet” on page 1-2). These include at the very least: – Short description – Technical data – Approvals – Drawings

1.2 Documentation on the Internet

This documentation can be downloaded at www.phoenixcontact.net/catalog.

The online catalog provides you with information on each product. During your search, take into account the differences between the PDF version and download.

PDF version

Under the “PDF version” menu item, you will find up-to-date information. It provides a **short overview** of the module.

The PDF version contains the essential product information. If you require further information, you can use the “Download” area.

Downloads

Under the “Downloads” menu item, you can access the **complete** documentation and all other downloads related to a module.

Module-specific documentation can be found in the download area for the corresponding module.

Comprehensive documentation can be found in the download area for the corresponding bus coupler.

2 Axioline product range

Axioline from Phoenix Contact is the high-speed realtime I/O system which is able to meet all your requirements in terms of the fastest possible cycle times and efficient production.

Thanks to its excellent performance and the design familiar from the CLIPLINE terminal block program, Axioline fits perfectly into your control cabinet or terminal box. Axioline is quick as regards response time, rugged in design and mechanics, and easy to handle.

2.1 Features

Fast:

- Synchronism in the station
- Synchronism to the higher-level network (depends on the bus coupler)
- The cycle time increases by just 1µs for every I/O module
- Fast I/O update times ensure short response times
- Short response times guarantee higher output and reduce the wear on the machine mechanics
- Fast and efficient station design, and fast system startup

Robust:

- Mechanically safe due to comprehensive continuous shock tests
- Extended temperature range as a standard feature
- EMC protection provided by adjustable filter times; noise emission values for residential buildings are kept
- Future-proof thanks to reduced radiation

Easy:

- Direct connection (push-in technology) for tool-free wiring
- Outlets on both sides for clear cabling
- Integrated I/O tester via USB for comfortable hardware check
- Intelligent imprinting for more clarity in the control cabinet
- Plug-in electronics module and I/O connection
- Modules can be easily installed side by side without tools

Other properties:

- High channel density
- 24 V DC voltage range (SELV)
- Transmission speed of 100 Mbps in the Axio bus
- Communication to the higher-level system over an Ethernet-based protocol (e.g., PROFINET, sercos III)
- Very good diagnostic properties for the Axioline system and the application

2.2 Product description

Modules with various functions are available within the Axioline product range.

The Axioline module consists of an electronics module, one or several connectors and a bus base module.

The electronics module can be changed without having to remove a wire from the connector.

The Axio bus connection is achieved by connecting bus base modules next to one another.

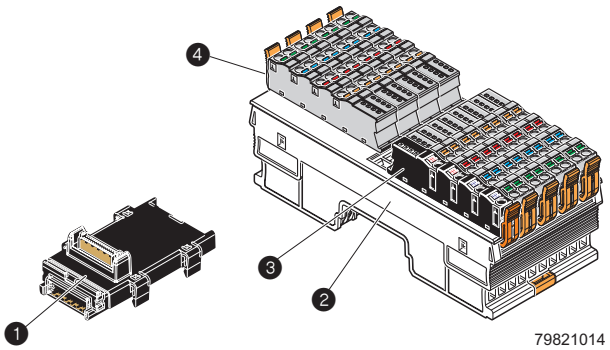

Figure 2-1 Components of an Axioline input/output module

Key:

1 Bus base module
2 Electronics module
3 Connector for connecting the supply voltage
4 I/O connector

Versions

Modules are available for the following automation tasks:

- Bus couplers for integrating the Axioline station into various networks (PROFINET, sercos III, ...).
- Input and output modules for digital and analog signals
- Module for temperature recording
- Module for open and closed-loop control, and position detection

This product range is growing continuously.

Mounting location

The Axioline modules meet IP20 protection and are designed for use in closed housings. The compact structure means that most of the Axioline modules can be installed in standard terminal boxes.

Mounting

The Axioline modules are snapped onto the DIN rail without using tools. The Axio bus is created automatically when the bus base modules are installed next to one another.

Removal

Only a standard tool is necessary for removing the electronics module (e.g., a flat-bladed screwdriver with a blade width of 2.5 mm)

Bus connection

The bus coupler integrates the Axioline station into the network.
The Axio bus internal station is led through the station over the backplane of bus base module.

Connector

The Axioline modules have connectors for connecting to the power supply and the I/Os. The connectors have spring-cage terminal blocks. Suitable wires can be connected with push-in technology) (see Section “Conductor cross sections and stripping/insertion lengths” on page 7-2).

Connecting the supply voltage

The communications power for the Axioline station is supplied at the bus coupler. The voltage for module I/O devices is supplied separately to each I/O module (see Section “Connecting the power supplies” on page 7-10).

I/O connection

Sensors or actuators are connected with connectors using the 1-, 2-, 3- or 4-wire method (see Section “Connecting sensors and actuators” on page 7-12).

Depending on the module, the sensor/actuator cables are connected to the top or to the bottom.

FE connection

At the bottom of each module there is at least one FE spring (metal contact) creating a functional earth connection when the module is snapped onto a grounded DIN rail.

The module also has an FE tab for optional functional earth ground connection. The module-specific data sheets provides information whether functional earth ground connection with this tab is required or not.
If the functional earth ground connection is not required via these tabs, it is used only to safely discharge interference in particularly harsh environments where the DIN rail may be contaminated and the normal FE contacts do not function correctly.
See also “Grounding concept: Functional earth ground (FE)” on page 6-12.

Startup/diagnostics tool for the bus coupler

Axioline bus couplers can be connected over a serial interface with a startup/diagnostics tool. Please refer to the corresponding documentation for more information.

Diagnostics

The Axioline system provides comprehensive diagnostics:

- Remote diagnostics
- Process diagnostics (e.g., cycle time monitoring)
- Communication diagnostics
- Module diagnostics (status of Axioline module)
- I/O device diagnostics (status of sensors/actuators)

Diagnostics depends on the type of module. For the diagnostic options of a specific module, please refer to the module-specific data sheets.

2.3 Intended use

Axioline modules should only be used according to the instructions in the module-specific data sheets and this user manual (see Section “Technical data” on page 9-1).
Phoenix Contact accepts no liability if the device is used for anything other than its designated use.

NOTE: Disregarding this warning may result in malfunction

Do not replace modules while the power is connected!

Before removing a terminal from or inserting a terminal in the station, disconnect power to the entire station.

Make sure the entire station is reassembled before switching the power back on.

3 Axioline product groups

An Axioline station comprises individual modules, which are snapped onto a DIN rail. A bus coupler forms the head of a station. Bus base modules are mounted next to it. The electronics modules are inserted into the base and snapped onto the DIN rail.

For more detailed information about the function, properties, wiring, and parameterization of the individual modules, please refer to the module-specific documentation.

3.1 Axioline order designation

The order designation helps you to identify the function of a module.

	Product range	Function	System	Number of inputs or outputs	Connection method	Extension
Examples:	AXL	BK	PN			
	AXL	DI		16	/4	-ME
	AXL	RTD		8		

Table 3-1 Breakdown of the order designations

Product range	AXL	Axioline
Function	BK	Bus coupler
	DI	Digital input
	DO	Digital output
	AI	Analog input
	AO	Analog output
	RTD	Analog input for the connection of resistance temperature detectors
	CNT	Counter
	INC	Incremental encoder input
System (for bus couplers only)	PN	PROFINET
	S3	sercos III
Number of inputs or outputs	2	2 channels
	8	8 channels
	16	16 channels
	32	32 channels
Connection method (for digital modules only)	/4	4-wire technology
	/3	3-wire technology
	/1	1-wire technology
Extension	-ME	Module electronics (without bus base module and without connectors) as a replacement item

3.2 Typical structure of an Axioline station

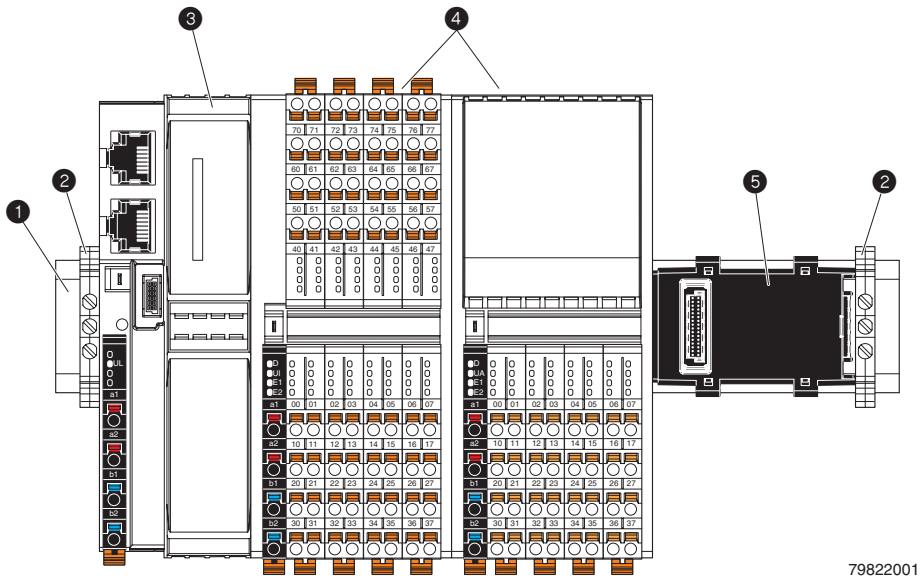

Figure 3-1 Example of an Axioline station

1 DIN rail
2 End clamp (for securing the station; see “End clamps” on page 6-2)
3 Bus coupler
4 Input/output modules
5 Bus base module

3.3 Bus coupler

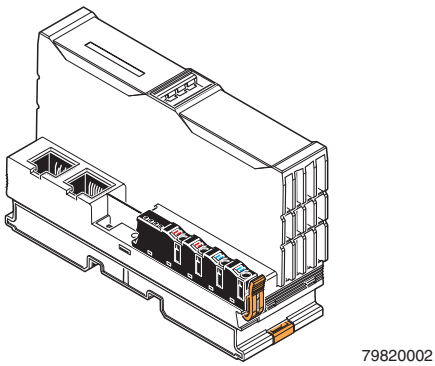

Figure 3-2 Example: AXL BK PN

The bus coupler connects the Axioline station to your network.

3.4 Bus base module

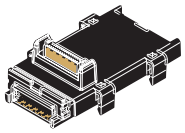

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Figure 3-3 Bus base module

Bus base modules carry communications power and bus signals coming from the bus coupler through the Axioline station (Axio bus).

A bus base module is supplied with each Axioline module. Excluded from this are bus couplers into which the bus base is integrated, and ME products, which serve as replacement parts for the electronics module.

3.5 Input/output modules

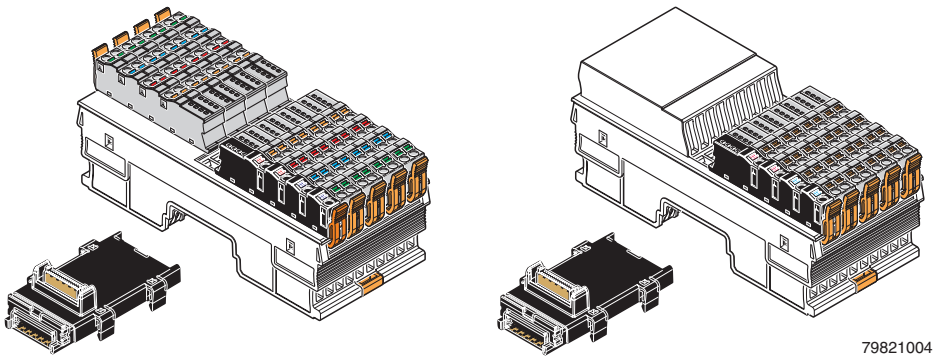

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Figure 3-4 Example: AXL DI 16/4 und AXL AO 8

Modules are available with various functions. These include the modules listed below. The text in brackets indicates the function according to the order designation.

- Digital input and output modules (DI, DO)
- Analog input and output modules (AI, AO)
- Temperature measurement modules (TEMP)
- Modules for open and closed-loop control, communication, and position detection (CNT/INC)

4 Structure and dimensions

4.1 Housing types

Various housing types are available in the Axioline portfolio; they are shown in Figure 4-1.

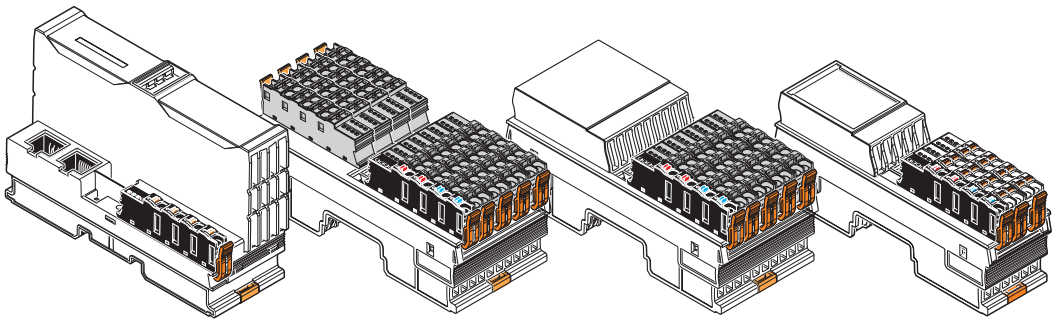


Figure 4-1 Housing types

Table 4-1 Housing types

Designation	Housing type	Number of terminal blocks	Example
BK	Bus coupler		AXL BK PN, AXL BK PN
F-2KF	F	2	AXL DI 16/4
F-1KF	F	1	AXL AI 8, AXL DO 32/1
FH-1KF	F half (half the number of I/O connectors)	1	AXL DI 16/1

4.2 Basic structure of Axioline modules

4.2.1 Bus coupler

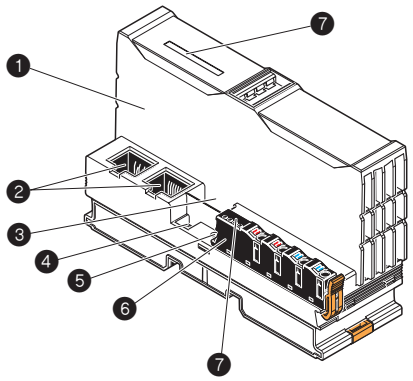


Figure 4-2 Structure of a bus coupler (Example: AXL BK PN)

1 Electronics module
2 Bus connection (here: Ethernet connections)
3 Service interface
4 FE tab 2.8 mm for optional connection to functional earth ground
5 Reset button
6 Connector for connecting the communications power U_L
7 Diagnostic and status indicators (here: LEDs)

4.2.2 Bus base module

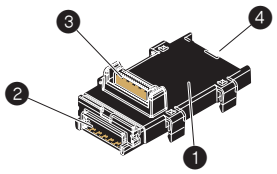


Figure 4-3 Structure of a bus base module

1 Bus base module
2 Connection to the bus coupler or the previous bus base module (pin connector)
3 Connection of the Axio bus to an I/O electronic module (socket)
4 Connection for the following bus base module (socket)

4.2.3 Input/output module (electronics module)

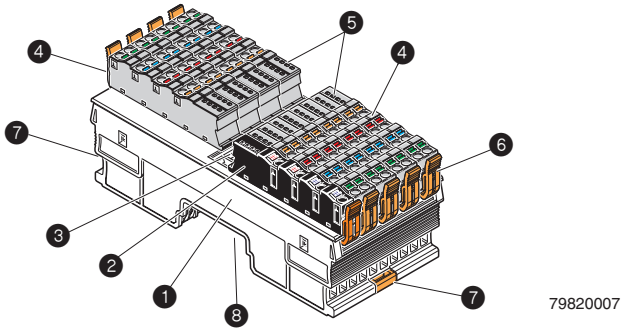


Figure 4-4 Structure of an input/output module (example: AXL DI 16/4)

1 Electronics module
2 Connector for connecting the supply voltage (U_I, U_O or U_A)
3 FE tab 2.8 mm for optional connection to functional earth ground
4 Connectors for connecting the I/O
5 Diagnostic and status indicators
6 Latches of the I/O connectors
7 Mechanism for latching to the DIN rail (2 x)
8 Device connector for connecting to the Axio bus via the bus base module (at the bottom, not illustrated)

4.3 Axioline connectors

The new Axioline connectors are available as of May 2011. They accept cables with ferrules up to 1.5 mm^2 and a stripping length of 8 mm.

Detailed information on the conductor cross section and stripping length can be found in Section “Conductor cross sections and stripping/insertion lengths” on page 7-2.

Connector types

Two types of Axioline connectors are currently available.

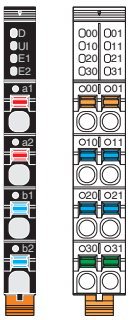


Figure 4-5 Connector types

1	Black	Connectors for feeding the supply voltage
2	Gray	Connectors for connecting the I/O

Basic structure

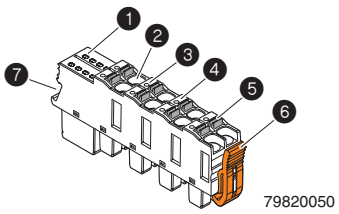


Figure 4-6 Basic structure of an Axioline connector

1 Local diagnostic and status indicators
2 Terminal point
3 Measuring point
4 Terminal point labeling
5 Release mechanism; color of the release mechanism corresponds to the function (see Section “Color and labeling” on page 4-5)
6 Locking latch
7 Labeling field

4.4 Color and labeling

Housing

The housing is gray.

Connectors

All connectors for the voltage supply are black.

The connectors for connecting the I/O are gray.

Indicating and operating elements

Each indicator (e.g., LED for diagnostics or status indication) and every operating element (e.g., switch, bus connection) is labeled.

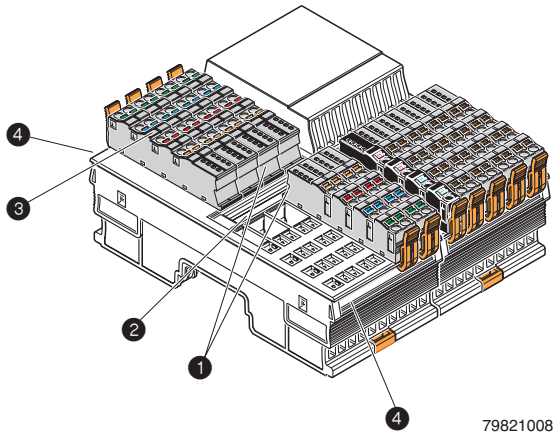


Figure 4-7 Module labeling

1 Space for connector labeling (Zack marker strip ZBF 10/5,8 AXL or ZBF 5)
2 Space for module identification (zack marker strip ZB 20,3 AXL or ZB 10)
3 Terminal point labeling (applied with laser upon delivery)
4 Space for slot labeling (zack marker strip ZBF 10/5,8 AXL or ZBF 5)

The ordering data for the zack marker strip can be found in Section “Ordering data” on page 9-4.

Terminal point

The terminal points are labeled. The associated colored spring lever indicates the function (signal, potential).

Table 4-2 Color coding of terminal points functions

Color	Terminal point function
Orange	Signal
Red	24 V
Blue	GND
Green	FE (Functional earth ground)

The actual labeling and function identification of a module can be found in the module-specific data sheets.

Slot and connector labeling

Each slot on the module and the associated connector can be labeled individually to ensure clear assignment between the slot and connector.

4.5 Module dimensions

Today, small I/O stations are frequently installed in 80 mm standard control boxes. Axioline modules are designed so that they can be used in this type of control box.

The given depths in the following figures apply for use of a TH 35-7.5 DIN rail according to EN 60715 (e.g., NS 35/7.5... from Phoenix Contact, see “Ordering data” on page 9-4).

The nominal module dimensions can also be found in the relevant module-specific data sheets.

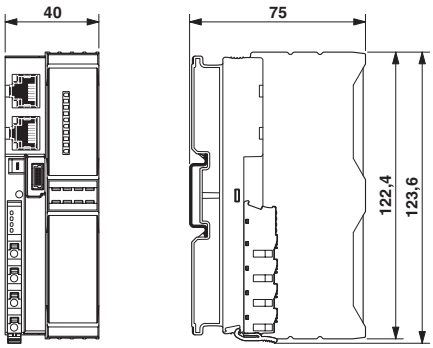


Figure 4-8 Nominal dimensions of the bus coupler housing (e.g., AXL PN BK)

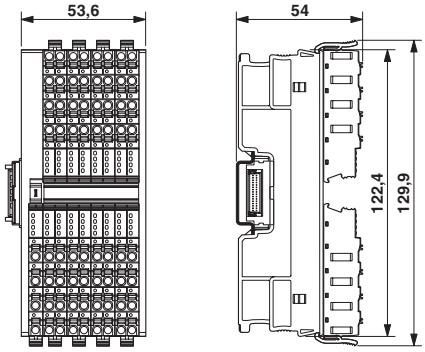


Figure 4-9 Nominal dimensions of the F housing with two terminal blocks (type F-2KF; e.g., AXL DI 16/4, AXL DO 16/3)

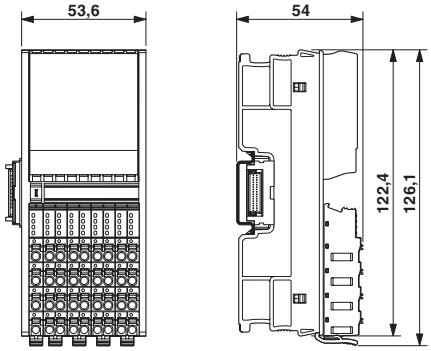


Figure 4-10 Nominal dimensions of F housing with one terminal block (type F-1KF; e.g., AXL AI8, AXL DI 32/1)

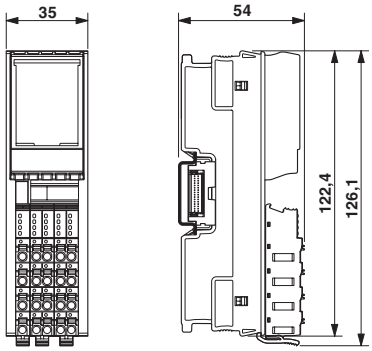


Figure 4-11 Nominal dimensions of F half housing with one terminal block (type FH-1KF; e.g., AXL DI 16/1, AXL DO 16/1)

5 Diagnostic and status indicators

All Axioline modules are provided with diagnostic and status indicators for quick local error diagnostics. They enable the clear localization of system errors (bus errors) or I/O errors.

Diagnostics

The diagnostic indicators (red, yellow or green) provide information about the state of the module and, in the event of an error, provide information about the type and location of the error. The module is functioning correctly if all of the green LEDs are on.

Status

The status indicators (yellow) display the status of the relevant input/output and the connected I/O device.

Extended diagnostics

Some modules have extended diagnostics. For example, a short circuit or an overload of the sensor supply can be detected and reported. If a short circuit occurs at an output, each channel can be diagnosed individually. Information about the supply voltage is also reported. Information about I/O errors is sent to the controller with precise details of the error type and is displayed using status indicators.

Refer to the module-specific data sheet for information about the diagnostic and status indicators on each module.

5.1 LEDs on bus couplers

Bus couplers have supply voltage LEDs, as well as network and module LEDs.

The supply voltage LEDs are located on the power connector. The other LEDs are located on the module.

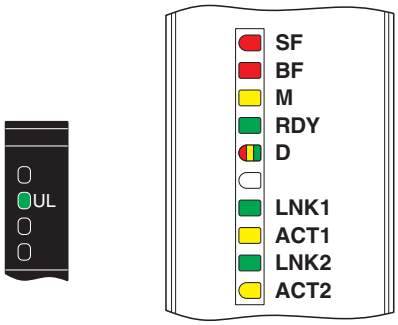


Figure 5-1 LEDs of a bus coupler (example: AXL BK PN)

All bus couplers have the following LEDs:

Designation	Color	Meaning	Status	Description
U_L	Green	U_{Logic}	ON	Communications power supply present
			OFF	Communications power supply not present
RDY	Green	Ready	ON	Device is ready for operation
			OFF	Device not ready for operation
			Flashing	Device booting (for firmware update with boot requests)
D	Red/ yellow/ green	Diagnostics	Red ON	Bus error
			Yellow ON	READY: Device is ready for operation, no data exchange takes place
			Flashing yellow	I/O error in ACTIVE state
			Green ON	RUN: Data exchange; status and data from the higher-level system is being transmitted
			Flashing green	ACTIVE: Configuration is active, data exchange with invalid process data
			Green/ yellow alternating	I/O error in RUN state

Please refer to the bus coupler documentation for the meanings of all other diagnostic and status LEDs on the bus coupler.

5.2 LEDs on input/output modules

The LEDs of the input/output modules are located in the connectors.

5.2.1 LEDs on the power connectors

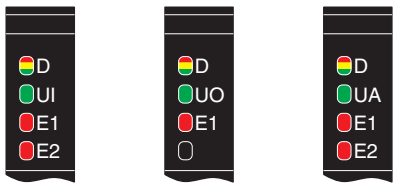


Figure 5-2 LEDs on the power connectors

Designation	Color	Meaning	Status	Description
D	Red/ yellow/ green	Diagnostics of local bus communication		
		Power down	OFF	Device in (power) reset
		Not connected/ Reset	Flashing red	Device operating, but there is no connection to previous device.
		Reset	Red ON	Application reset Device operating, but there is still a connection to the previous device, the application is reset.
		Ready	Yellow ON	Device operating, there is a connection to previous device, device has still not detected a valid cycle after power on.
		Connected	Flashing yellow	Valid data cycles have been detected, but the device is not (yet) part of the current configuration.
		Device application not ready	Green/ yellow alternating	Valid data cycles are being detected. The master application has set the user data to valid, however, the slave application has not yet set the user data to valid or cannot output them (e.g., I/O error)
		Run	Green ON	Valid data cycles are being detected. All data is valid.
U_x	Green	U_x	ON	I/O supply present
			OFF	I/O supply not present
E1/E2	Red	I/O error or channel error	ON	I/O error or channel error present Channel errors are directly relatable to a channel. I/O errors are not directly relatable to a channel.
			OFF	No I/O error or channel error.

Voltages U_x:

UI	(U_{Input})	Supply for digital input modules
UO	(U_{Output})	Supply for digital output modules
U_A	(U_{Analog})	Supply for analog modules

5.2.2 LEDs on the I/O connector

The LEDs on the I/O connector are numbered according to the terminal points. All LED locations are numbered, even if the LED is not used.

The available LEDs of a module and their meanings can be found in the module-specific data sheets.

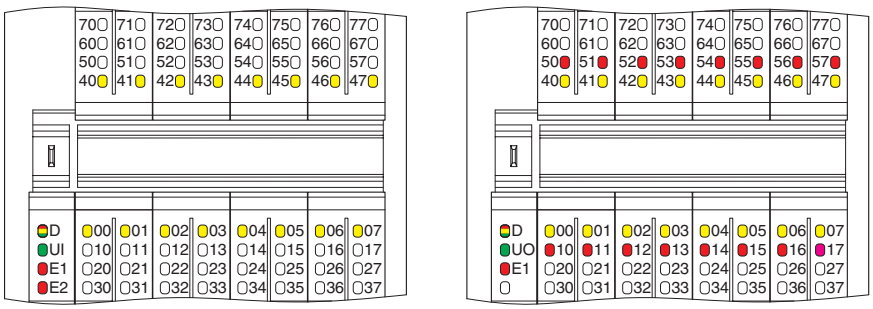


Figure 5-3 LEDs on the I/O connector (e.g., AXL DI 16/4, AXL DO 16/3)

Table 5-1 LEDs on the I/O connector

Designation	Color	Meaning	Status	Description
xx	**Yellow**	Status of the input/output	ON	Corresponding input/output set.
			OFF	Corresponding input/output not set
yy	**Red**	Diagnostics of the output	ON	Error at the input/output.
			OFF	No error at the input/output.

xx Channel identification

yy Channel identification

Table 5-1 lists commonly used LEDs. More LEDs can also be found on the modules.

The available LEDs of a module and their meanings can be found in the module-specific data sheets.

6 Mounting and removing modules

6.1 Basic information about mounting

NOTE: Electrostatic discharge!

Danger of destroying the module

The module contains components that can be damaged or destroyed by electrostatic discharge. When handling the module, observe the necessary safety precautions against electrostatic discharge (ESD) according to EN 61340-5-1.

When using the module for the first time, protect the Axioline system with a 5 A fuse. When all modules in the system are correctly connected, the 5 A fuse can be replaced by an 8 A fuse. The system can then be loaded with up to 8 A.

NOTE: Electrical damage from insufficient external fuse protection

Fuse may not blow in case of an error

Provide the module with an external fuse to protect it against polarity reversal. The power supply unit must be able to supply four times the nominal current of the external fuse, to ensure that it blows in the event of an error.

Mounting location

The Axioline modules have IP20 protection and can be used in closed control cabinets or in control boxes (terminal box) with IP54 protection or higher.

DIN rail

All Axioline modules are mounted on 35 mm standard DIN rails. The preferred height of the DIN rail is 7.5 mm (corresponds to TH 35-7.5 according to EN 60715).

The recommended DIN rails from Phoenix Contact or recommended mounting straps from Lütze can be found in Section “Ordering data” on page 9-4.

Mount the module vertically on the DIN rail. This way, the module does not need to be tilted and it provides easy installation and removal, even in confined spaces.

The distance between DIN rail fasteners must not exceed 200 mm. This distance is necessary for the stability of the rail when mounting and removing modules.

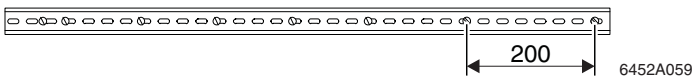


Figure 6-1 Fixing the DIN rail (in mm)

NOTE: Electrical damage from the fixing elements

Danger of malfunction

If the fixing elements (screw, rivet, ...) are too high, the bus base modules are not correctly snapped onto the DIN rail.

For fixing the DIN rail, only use elements with an installation height of maximum 3 mm.

Mounting position

The standard mounting position of the DIN rail on the wall is horizontal (Figure 6-2, A).

Other mounting positions are possible, however, derating may be required (see Section “Technical data” on page 9-1). Please refer to the ambient temperatures and any other special requirements (such as derating) specified in the data sheets.

Analog modules are a special case. The tolerance values specified in the data sheets for these devices refers to the documented mounting position (usually horizontal DIN rail; Figure 6-2, A). The **typical tolerance values** for the relevant configurations are determined in this mounting position. Experience from previous testing indicates that the typical tolerances of analog modules are slightly affected by the mounting position. This means that another mounting position is also possible in principle.

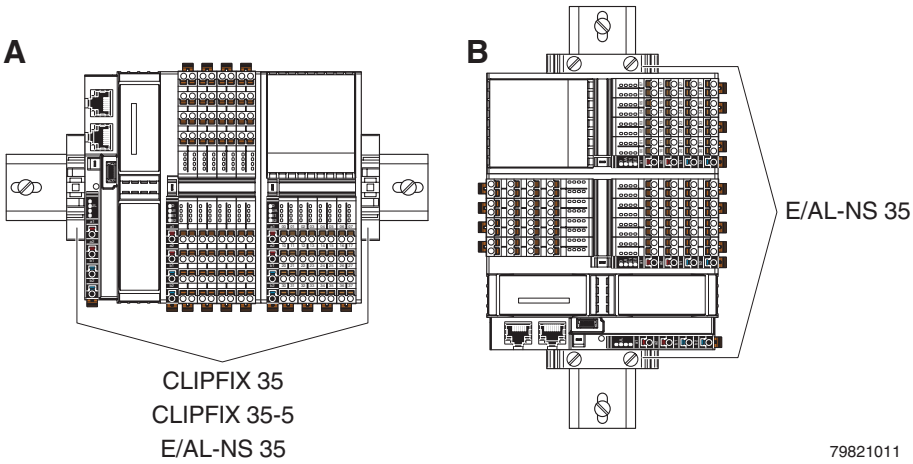


Figure 6-2 Mounting positions for an Axioline station

Tools

No tools are required for mounting the module.

A standard tool, e.g., a flat-bladed screwdriver with blade width of 2.5 mm, is necessary for removing the electronic module and using the spring lever.

Order of the modules

The modules on the DIN rail can be put in any order behind the bus coupler. To secure the function, assemble the modules one after the other, without a gap.

If you are using modules with shield connection, installing them next to each other is recommended in order to make optimal use of the busbar for shield connection.

Maximum number of modules

Maximum number of Axioline modules within a station is 63.

The actual number of modules within an Axioline station depends on the current consumption. The total current consumption of all Axioline modules must not exceed the maximum current delivered by the bus coupler for the Axio bus (see technical data of the used bus couplers).

The maximum current supplied by the bus coupler and the maximum current that can be taken up by the connected modules, are noted in the device description files (e.g., gsdml file). You can use these maximum currents in the engineering tool for configuration in order to prevent overloading the bus couplers.

End clamps

Mount end clamps on both sides of the Axioline station (see also Figure 6-2 on page 6-2). The end clamps ensure that the Axioline station is correctly mounted. End clamps secure the station on both sides and keep it from moving from side to side on the DIN rail.

Always attach the left end clamp of the station when beginning to mount the station. This ensures the following:

– It prevents the station from slipping on the DIN rail.
– The space for the end clamp is secured.
– If the bus coupler needs to be replaced you have enough space to separate the bus coupler from the bus base modules.
– There is a counter pressure for the insertion force that occurs when the bus base modules are installed next to the bus coupler.

Table 6-1 Recommended end clamps

Mounting position	Ambient conditions	End clamp
Horizontal; Figure 6-2, B	Normal	CLIPFIX 35, CLIPFIX 35-5
	High shock and vibration load	E/AL-NS 35
Vertical; Figure 6-2, B	Any	E/AL-NS 35

6.2 Mounting distances

The space required for cable routing depends on the number of cables to be installed and must be left free at the top and/or at the bottom.

For the distances of the upper and lower cable ducts or the cable routing to the modules, please refer to Figure 6-3 and Figure 6-4.

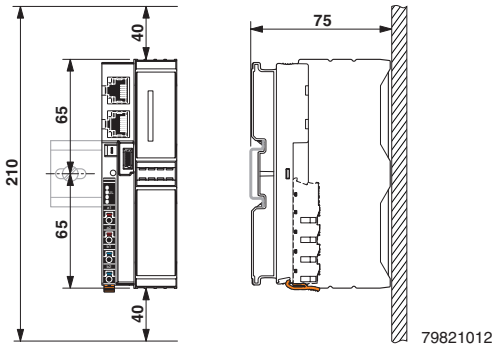


Figure 6-3 Mounting distances: bus coupler

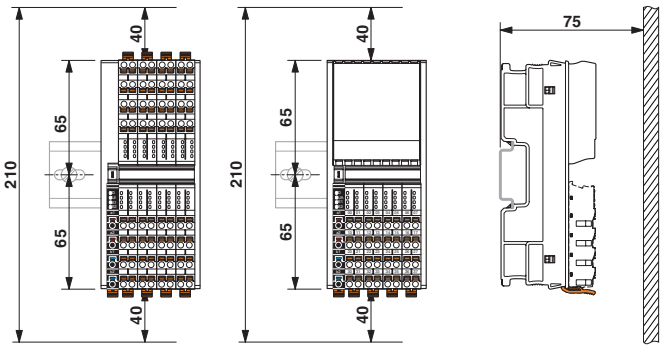


Figure 6-4 Mounting distances: I/O modules

If the distances are smaller, the minimum bending radius of the cables, easy handling during installation, and a clear structure cannot be guaranteed.

6.3 Mounting/removal

First mount the end clamp on the DIN rail.

Note that you need at least 5 mm of space to slide the bus coupler to the left if you want to remove it (e.g., for a replacement).

6.3.1 Mounting modules

No tools are required for mounting.

- Only mount devices when the power supply is disconnected.
- Place the bus coupler vertically on the DIN rail until it snaps into place with a click.

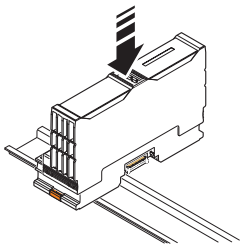


Figure 6-5 Snapping the bus coupler into place

- Place all bus base modules necessary for the station on the DIN rail (A).
  Observe the proper orientation of the bus base modules. When mounting on horizontal DIN rails on the wall, the logo must be readable and the laser-engraved arrow should point to the left (towards the bus coupler).
- Push the bus base module into the bus coupler connector or the previous bus base module (B).

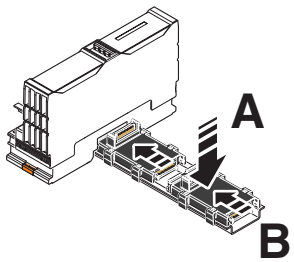


Figure 6-6 Connecting bus base modules with each other and with the bus coupler

It is not possible to snap bus base modules onto the previous bus base module if there is already an electronics module on it. In this case, first remove the last electronics module before snapping on more bus base modules.

- Place the necessary I/O modules vertically on the corresponding bus base module and DIN rail until they audibly click into place.
  Pay attention to the correct position. The connector for the bus base module must be at the corresponding plug of the bus base module.

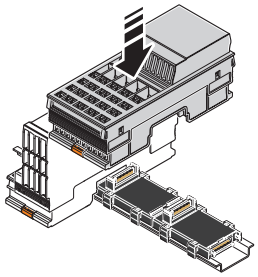


Figure 6-7 Mounting I/O modules

If you are using analog modules:

- Mount the necessary shield connection elements.

For connecting the shield, Phoenix Contact recommends the Axioline shield connection set AXL SHIELD SET or the shield connection clamp products from the CLIPLINE catalog.

NOTE:
The shield connection is not a strain relief.

6.3.2 Removing modules

A standard commercial tool, e.g., a flat-bladed screwdriver with a blade width of 2.5 mm is necessary for removing modules.

- Disconnect the power to the station!

Bus coupler

NOTE: Module can be damaged when removed forcibly

Danger of destroying components

The bus coupler can only be removed from the station after the bus coupler has been disconnected from the subsequent module.

- Remove the left end clamp.
- Disconnect the bus coupler from the subsequent bus base module by sliding it approximately 5 mm to the left (A), for example. It must have been completely removed from the neighboring bus base module.
- Insert a suitable tool (e.g.,flat-bladed screwdriver) first in the upper **and** then in the lower snap-on mechanism (base latch) of the bus coupler and release it (B). The base latches are locked in place in the open position.

You can swap steps A and B. In this case, make sure to align the bus coupler properly to avoid damage of the bus contacts.

- Pull the bus coupler straight back from the DIN rail. The base latch returns to the normal position.

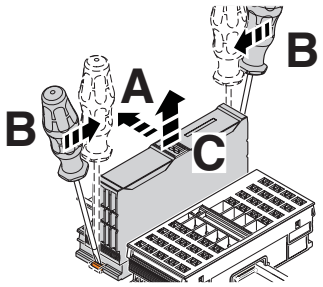


Figure 6-8 Removing the bus coupler.

I/O module

Each I/O module can be removed individually from the station.

- Insert a suitable tool (e.g., flat-bladed screwdriver) into the upper **and** lower snap-in mechanism (base latches) of the module one after the other and unlock it (A). The base latches are locked in place in the open position.
- Pull the electronics module straight back from the DIN rail (B). The base latch returns to the normal position.

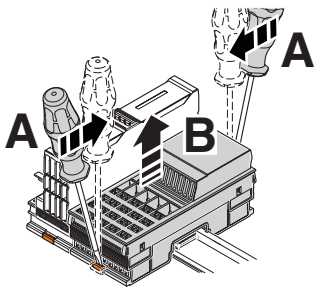


Figure 6-9 Removing the I/O module

The bus base module remains on the DIN rail.

Bus base module

Please proceed as follows if, after having removed the modules, you want to remove bus base modules as well:

- If a module is located on the neighboring bus base module to the left, remove it.

If the bus base module is at the end position:

- Remove the bus base module from the connection of the previous bus base module by sliding it approximately 5 mm to the right (A).
- Insert a suitable tool (e.g., flat-bladed screwdriver) into the base latching on one side (B, B1, B2) one after the other.
- Swivel the bus base module upwards and remove it (C).

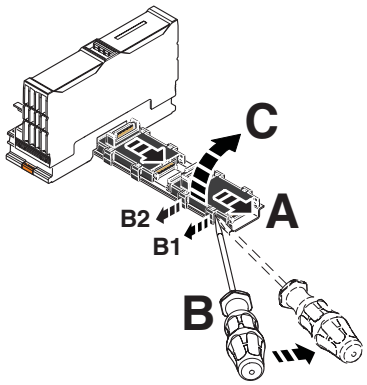


Figure 6-10 Removing the bus base module

If the bus base module to be removed is inside the station:

- If possible, push the following bus base module and module that may be fitted approx. 15 mm to the right.
  Remove the bus base module you want to remove from the connection with the following bus base module.
- If this is not possible, slide the following bus base module and module, detach the module, and, starting at the end of the station, remove the bus base module.
- Disconnect the bus base module to be removed from the connection to the previous bus base module by pushing it about 5 mm to the right (A).
- Insert a suitable tool (e.g., flat-bladed screwdriver) into the base latching on one side (B, B1, B2) one after the other.
- Swivel the bus base module upwards and remove it (C).
- Push the rest of the station back to the left until the bus base modules touch each other again.

6.3.3 Removing the connector

Detach the connector from housing type FH-1KF as follows:

- Release the locking latch (A), tip the connector slightly upwards (B) and remove it from the module (C).

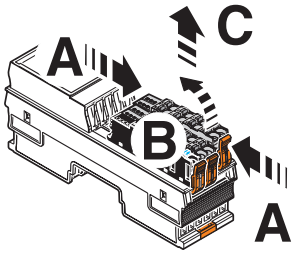


Figure 6-11 Removing the connector

For all other housing types, the connector can be detached without swiveling it.

- Release the locking latch (A) and remove the connector vertically out of the module (B).

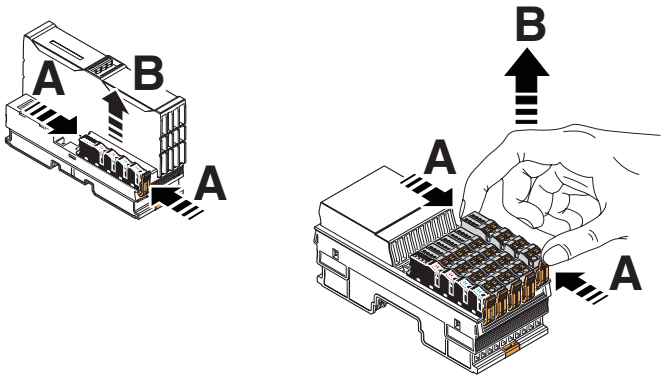


Figure 6-12 Removing the connector

As of 2012, all other housing will be converted so that the connector snaps into place more securely. From then on, the procedure shown in Figure 6-11 applies for all modules.

6.3.4 Inserting the connector

- Place the connector vertically into its position and press firmly. Ensure that it engages with a click.

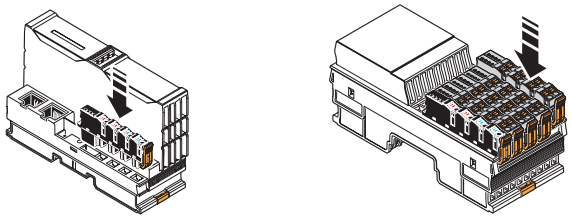


Figure 6-13 Snapping the connectors on

6.3.5 Replacing a module

- Disconnect the power to the station.
- To replace a module, proceed as described in Sections “Removing modules” on page 6-7 and “Mounting modules” on page 6-5.

6.4 Grounding concept: Functional earth ground (FE)

Only the functional earth ground (FE) is used within an Axioline station.

Functional earth ground (FE) is only used to discharge interference. It does not provide shock protection for people.

Functional earth grounding is used to improve immunity to interference. All devices must be grounded so that any possible interference from data transmission paths is shielded and discharged to ground.

Functional earth ground is a low-impedance current path between circuits and ground. It is not designed as a safety measure but rather for the improvement of noise immunity.

To ensure reliable functional earth grounding of the station, please observe the following:

1 The modules have at least onen FE spring (metal clip, 1 in Figure 6-14) at the bottom of the electronics base. This spring establishes an electrical connection to the DIN rail. The bus coupler has one FE spring, the I/O modules have one or two FE springs.Use grounding terminals to connect the DIN rail to protective earth ground. The modules are grounded when they are snapped onto the DIN rail.

2 Each module also has an FE tab for a push-on sleeve of 2.8 mm for **optional** connection to a direct FE down conductor (2 in Figure 6-14).
The module-specific data sheet provides information whether functional earth ground connection with this tab is required or not.
If the connection is not required in the data sheet, it is only used to safely discharge interference in particularly harsh environments where the DIN rail may be contaminated and the normal FE contacts do not function correctly.

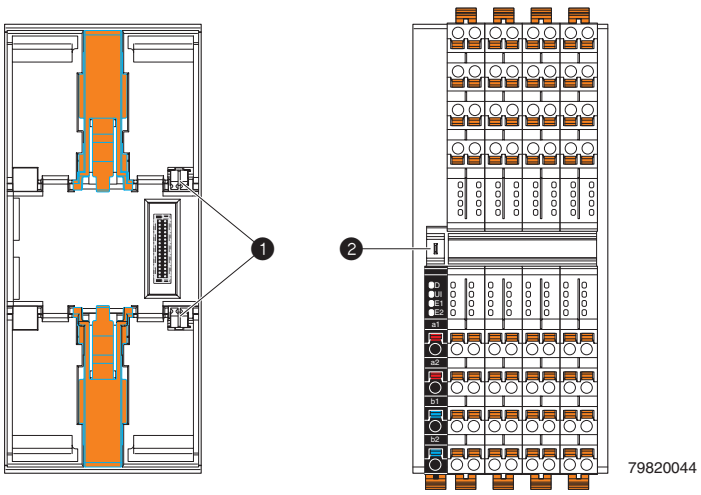


Figure 6-14 FE spring (1) and FE tab (2).

3 When using modules for surge protection (TRABTECH), connect their functional earth ground directly to the grounded DIN rail.
Do not connect the functional earth ground of the module for surge protection to an Axioline module (e.g., on the FE tab or an FE contact of an Axioline connector).
This ensures that interference is discharged before it enters the Axioline module. Only then is good electromagnetic compatibility ensured.

6.5 Shielding concept

Shielding is used to reduce the effects of interference on the system.

6.5.1 Shielding with Axioline

In the Axioline system, shielded cables are used with the following modules:

- Network cables
- Connecting cables
  - On modules for analog signals (analog input, analog output, temperature recording),
  - On special-function and acquisition modules.

Observe the following points when you install the shielding:

- Ensure a large surface connection of the shield.
- Make sure there is good contact between the shield and busbar.
- Do not damage or squeeze the wires.
- When connecting the shielding, observe the specifications for wiring.
- Place the shield is as close as possible to the signal terminal point.

6.5.2 Shielding when connecting analog sensors and actuators

– Always connect analog sensors and actuators with shielded, twisted pair cables.
– Connect the shield via a busbar. (See Figure 6-16)

When connecting the cables, observe the instructions in the module-specific data sheets.

– As a rule, shielding must only be connected directly to the PE potential on one side. This is to prevent any occurrence of voltage equalization currents via the shielding (see Figure 6-16 and Figure 6-17).
– If necessary, integrate the shielding concept for analog I/O cables in the system concept. For example, it is recommended to use a central FE shield connection at the control cabinet entry (see Figure 6-17).

For connecting the shield, Phoenix Contact recommends the Axioline shield connection set AXL SHIELD SET or the shield connection clamp products from the CLIPLINE catalog.

6.5.3 Connecting the shielding using an Axioline shield connection set

The shield connection set consists of two shield rail clamps and two SK 5 busbar holders. This shield connection set can be used to connect cable shields in an Axioline station in the vicinity of modules or Axioline connectors.

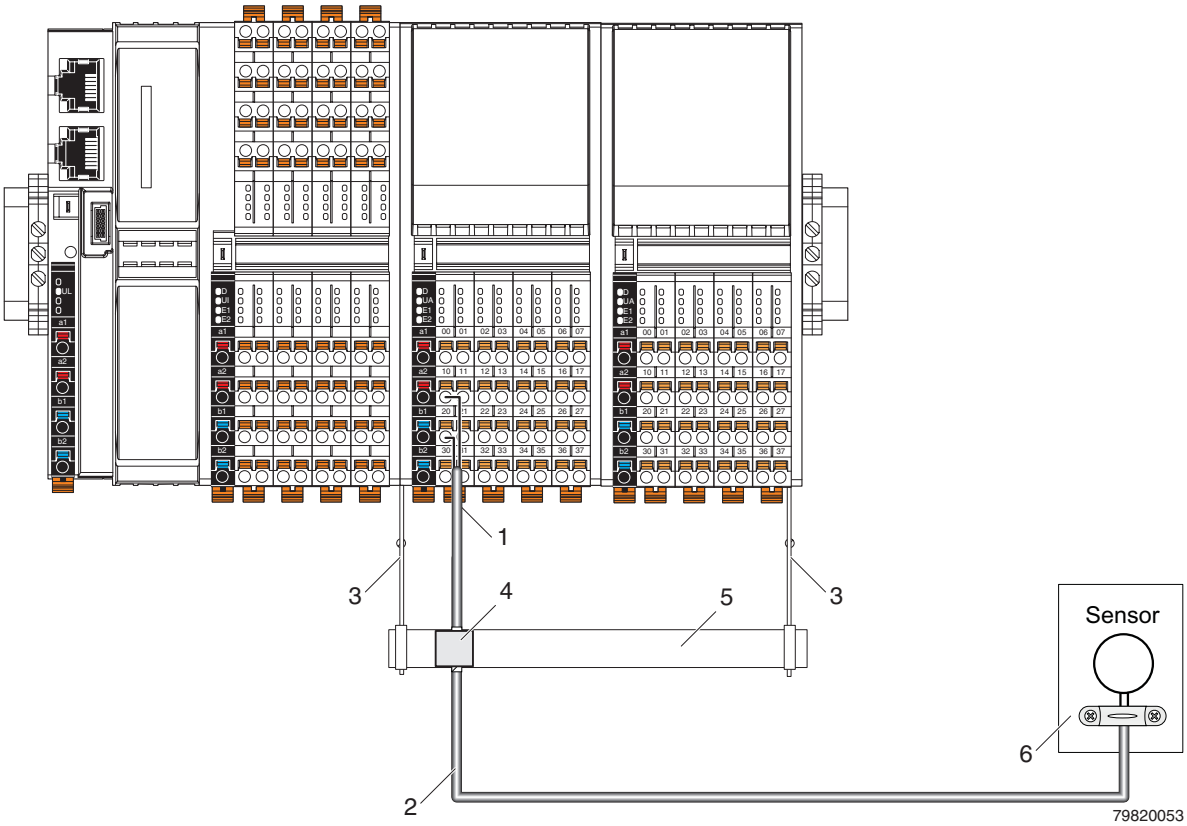


Figure 6-15 Connecting the shield with AXL SHIELD SET

1 Lead the analog cable into the connector making sure to maintain the cable insulation.

2 Use shielded twisted pair cables.

3 Busbar holder

4 Shield connection clamp for shield support on the busbar (SKS ..., see Section “Ordering data for accessories” on page 9-4)
Connect the shield directly to the FE potential.
Connect the shield for the entire analog transmission path to FE potential at only one point. In this example, this point is the busbar.

5 Busbar (NLS-CU 3/10 ..., see Section “Ordering data for accessories” on page 9-4)

6 Lead the sensor cable into the sensor making sure to maintain the cable insulation.

6.5.4 Connecting the shielding to a busbar

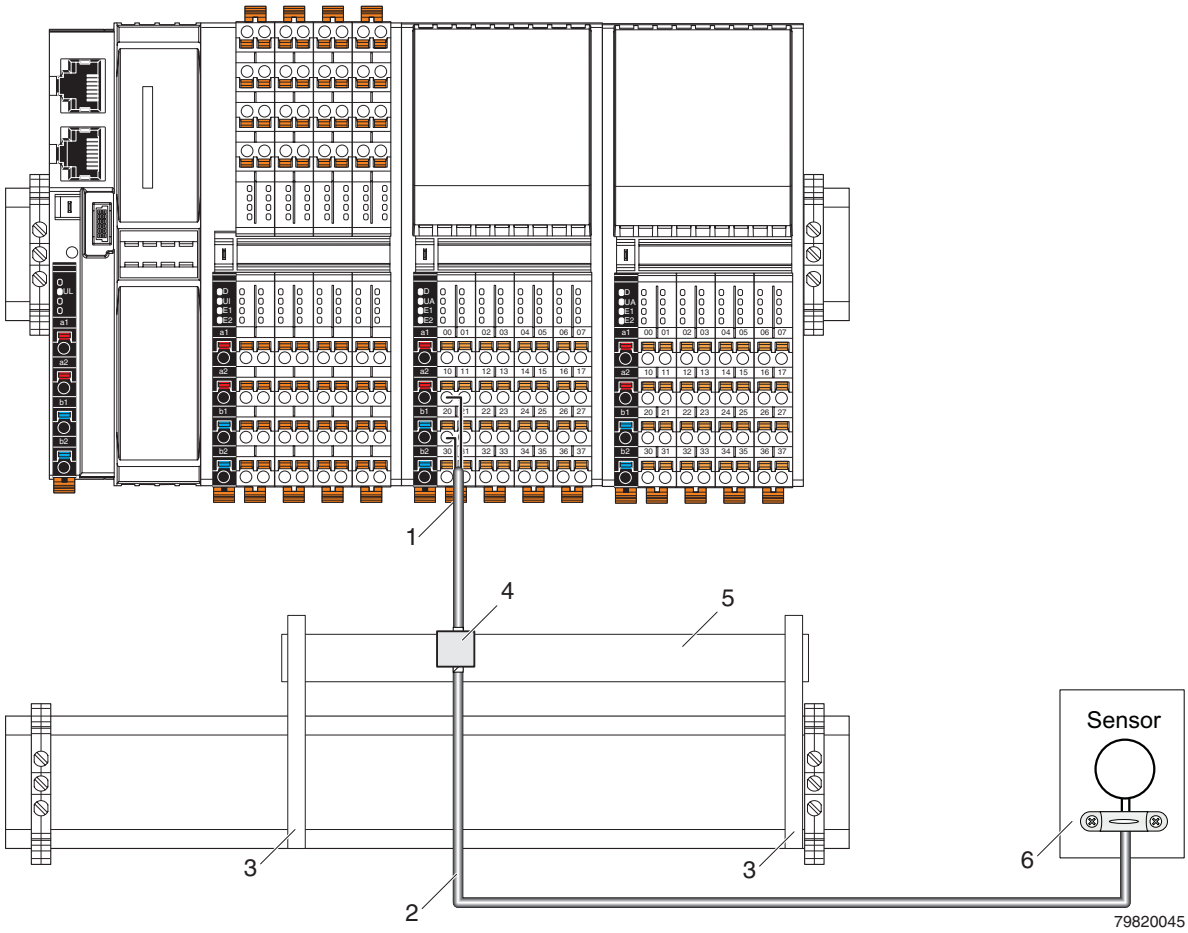


Figure 6-16 Connecting the shielding to a busbar

1 Lead the analog cable into the connector making sure to maintain the cable insulation.

2 Use shielded twisted pair cables.

3 Support (AB ..., see Section “Ordering data for accessories” on page 9-4)

4 Shield connection clamp for shield support on the busbar (SKS ..., see Section “Ordering data for accessories” on page 9-4)
Connect the shield directly to the FE potential.
Connect the shield for the entire analog transmission path to FE potential at only one point. In this example, this point is the busbar.

5 Busbar

6 Lead the sensor cable into the sensor making sure to maintain the cable insulation.

6.5.5 Integration of analog shielding in a concept with central equipotential bonding at the control cabinet entry

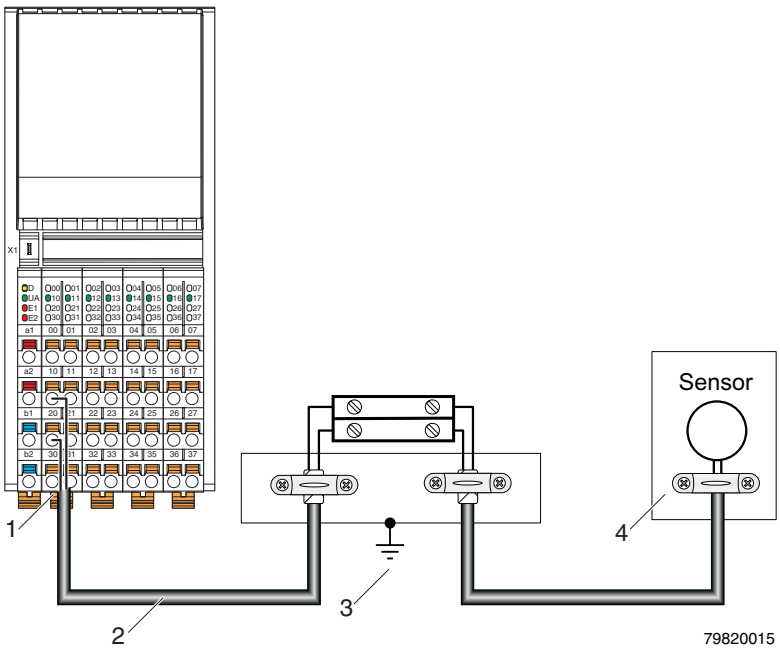


Figure 6-17 Integration of analog shielding in a concept with central equipotential bonding at the control cabinet entry

1 Lead the analog cable into the connector making sure to maintain the cable insulation.

2 Use shielded twisted pair cables.

3 Connect the strain relief directly to the FE potential.
Connect the shield for the entire analog transmission path to FE potential at only one point. In this example, this point is the jumpering level.

4 Lead the sensor cable into the sensor making sure to maintain the cable insulation.

NOTE: Functions may be impaired

When integrating the shielding of analog I/O cables in an equipotential bonding concept, make sure that direct connection to the FE potential is only made at one point (e.g., at the central grounding point of the jumpering level).

7 Connecting cables

7.1 Installing and removing cables

The cables for the I/O devices and supply voltages are connected withAxioline connectors.

When using Axioline modules you can use shielded and unshielded, solid and flexible cables, with or without ferrules.

Please observe the following when wiring:

– Twist flexible cable ends.
– Make sure to install the conductor in the middle of the connection space, especially with small cross sections.

If using ferrules, use those which correspond to the specifications in Section “Conductor cross sections and stripping/insertion lengths” on page 7-2.

Make sure the ferrules are properly crimped.

7.2 Conductor cross sections and stripping/insertion lengths

Conductor cross sections

Table 7-1 Permissible conductor cross sections for the direct plug-in method (with push-in technology; without using the spring lever for inserting the conductor)

Conductor	Cross section
Solid	0.5 mm^2... 1.5 mm^2
Stranded with ferrule without plastic sleeve	0.25 mm^2 .... 1.5 mm^2
Stranded with ferrule with plastic sleeve	0.25 mm^2 .... 1.5 mm^2

Stranded cables without ferrules are not suitable for push-in technology.

Table 7-2 Permissible conductor cross sections when using the spring lever for inserting the conductor

Conductor	Cross section
Solid	0.2 mm^2 .... 1.5 mm^2
Stranded without ferrule	0.2 mm^2 .... 1.5 mm^2
Stranded with ferrule without plastic sleeve	0.25 mm^2 .... 1.5 mm^2
Stranded with ferrule with plastic sleeve	0.25 mm^2 .... 1.5 mm^2

Table 7-3 Permissible conductor cross sections for optional connection of the functional earth ground via the plug-in tabs

Connection	Cross section
Push-on sleeve A 2.8- according to DIN 46247-BZ (not insulated)	0.5 mm^2 0.75 mm^2 1.0 mm^2
Push-on sleeve with plastic sleeve according to DIN 46245	

Stripping/ insertion lengths

NOTE: Malfunction when stripping/insertion length is too short

The stripping length or insertion length of the ferrules **is 8 mm.**

If the length is less than 8 mm, it is not ensured that the conductor will stay fixed in the terminal point.

Conductor without ferrule: stripping length 8 mm

Conductor with ferrule: insertion length 8 mm

Ferrules: see Section “Ordering data for accessories” on page 9-4.

Crimping pliers: CRIMPFOX 6 or CRIMPFOX 6T (both for Trapez Crimp), see Section “Ordering data for accessories” on page 9-4.

TWIN ferrules

TWIN ferrules are **not permitted** in the Axioline system.

7.2.1 Terminal point, corresponding spring lever and tip contacting

When inserting the screwdriver, pay attention to the position of the spring lever to the assigned terminal point.

When testing the signals with a measuring tip, pay attention to the position of the tip contacting to the assigned terminal point.

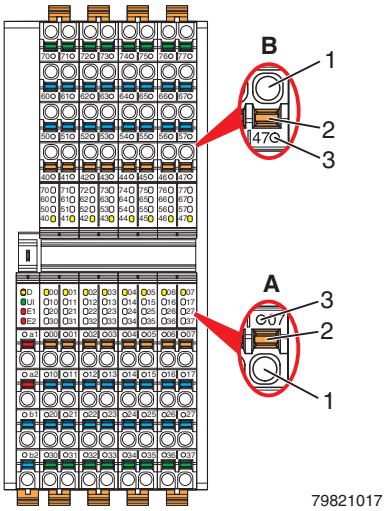


Figure 7-1 Terminal point with corresponding spring lever and tip contacting

A	Conductor outlet to the bottom:	Spring lever and tip contacting **above** the terminal point
B	Conductor outlet to the top:	Spring lever and tip contacting **below** the terminal point (B)
1	Terminal point	
2	Spring lever	
3	Tip contacting	

7.2.2 Connecting unshielded cables

Wire the connectors according to your application.

For the terminal point assignment, please refer to the corresponding module-specific data sheet.

When wiring, proceed as follows:

- Strip 8 mm off the cable.

Solid cable/ferrules with direct push-in technology

- When using solid cables from 0.5 mm^2 onwards or cables with ferrules:
  Insert the cable into the terminal point (Figure 7-2, A). It is clamped automatically.

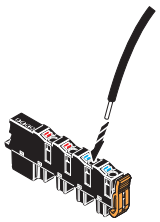


Figure 7-2 Connecting a solid unshielded cable

Stranded cable without ferrules

- When inserting the stranded cable:
  Open the spring by pressing the screwdriver onto the spring lever. (Figure 7-3, A).
  For this, use a flat-bladed screwdriver with a blade width of 2.5 mm.
  Phoenix Contact recommends the SZS 0.4 x 2.5 screwdriver
  (see Section “Ordering data” on page 9-4).
- Insert the cable in the terminal point (B).
- Secure the cable by removing the screwdriver.

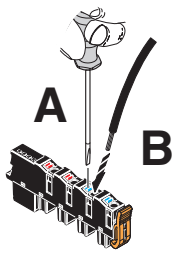


Figure 7-3 Connecting the stranded cable

After installation, labeling the cables as well as the module and connectors is recommended.
Labeling modules: see Section “Color and labeling” on page 4-5.

7.2.3 Connecting shielded cables

With Axioline, the shield is applied before the module.

When connecting the cables proceed as follows:

Stripping the cables and connecting the shield

- Strip approximately 20 mm off the outer sheath of the cable from the necessary distance from the end of the cable (a in Figure 7-4).
  The necessary distance a depends on the distance to the busbar.
- Strip 8 mm off the wires.

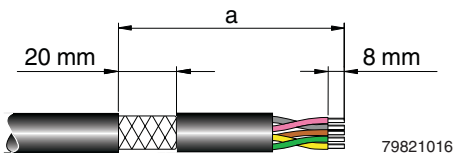


Figure 7-4 Connecting the shielded cables

- If present, remove the protective foil.
- Lay the cable with the braided shield under a shield connection clamp and tighten it with a screw.
  Malfunctions will then be lead via a busbar to the supports, which are connected to the grounded DIN rail.
  Ordering data can be found in Section “Ordering data” on page 9-4.

Make sure the shield is as close as possible to the signal terminal point.
When using twisted pair cables, keep the cable twisted until just before the terminal point.

NOTE:
The busbar is only for shielding the module, not for the strain relief of the connected cables.

Wiring the connectors

- Connect the cables to the connector. To do this, proceed as described in Section “Connecting unshielded cables” on page 7-4.

7.2.4 Connecting the shield using Axioline shield connection set

The shield connection set can be used to connect cable shields in an Axioline station in the vicinity of modules or Axioline connectors.

The set consists of two shield rail supports (1 in Figure 7-5) and two SK 5 shield connection clamps for fastening the busbar to the shield rail supports.

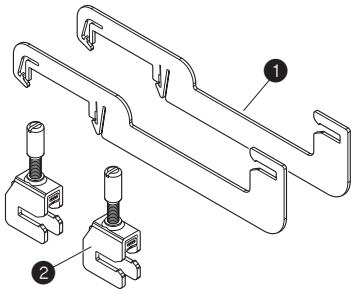


Figure 7-5 Set components

Contact is made with the shield on the busbar using shield connection clamps (both are available as accessories). Select the shield connection clamp according to the cable cross section and type (SK or SKS), see Section “Material for shield connection” on page 9-5.

Mounting

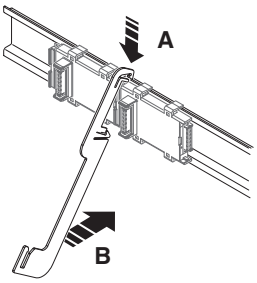
Mount the shield rail supports after mounting the bus base modules and before mounting the electronics modules.

Polished surfaces indicate the positions of the shield rail supports on the bus base modules.

The maximum distance between two adjacent shield rail supports should not exceed 215 mm (e.g., four modules with four connectors next to each other).

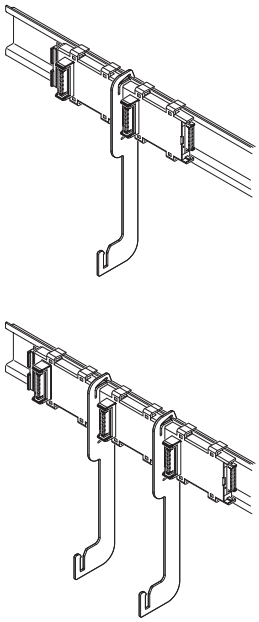
If the busbar is secured using more than two shield rail supports, distribute the supports equally over the width of the busbar.

If using a shield rail support at the end of an Axioline station, mount the shield rail support after the last module. In this case the support is not positioned above a bus base module. Secure the shield rail support using an end clamp (accessory).



- Hook the shield rail support onto the DIN rail.

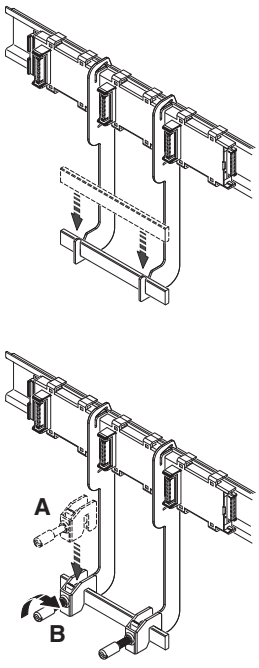
Figure 7-6 Hooking the shield rail support



- Snap the shield rail support onto the DIN rail.

- Then snap on the second shield rail support.

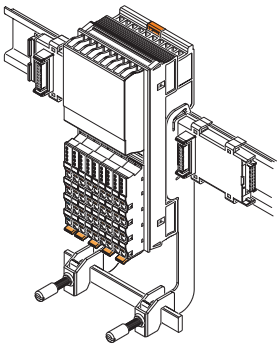
Figure 7-7 Snapping on the shield rail support



- Push the busbar into the shield rail support.

- Secure the busbar using the SK 5 shield connection clamps included in the scope of supply.

Figure 7-8 Mounting the busbars

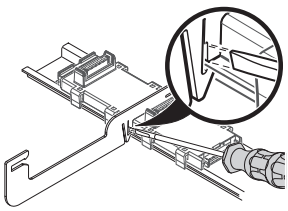


- Mount the electronics modules.

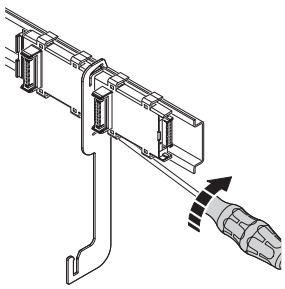
Figure 7-9 Mounting the electronic modules

Removal

For removal, use a screwdriver with a blade width of 4 mm (e.g., see accessories).



- First, remove the adjacent electronics modules (to the right and left of each shield rail support).
- Insert the screwdriver in the release slot.



- Turn the screwdriver to release the locking clip from the DIN rail. (Fig. 9)
- Remove the shield rail support.

Figure 7-10 Removing the shield connection

NOTE:
The locking clip may become deformed following contact with the screwdriver. In this case, bend it back into shape prior to reassembly.

7.2.5 Removing the cables from the terminal point

- To remove a cable from the terminal point, press on the spring lever with a suitable tool (e.g., flat-bladed screwdriver with a blade width of 2.5 mm). This opens the push-in connection of the relevant terminal point (Figure 7-11, A).
- Remove the conductor (Figure 7-11, B).

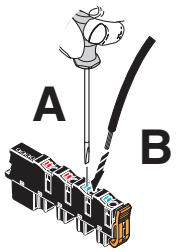


Figure 7-11 Removing the conductor

7.2.6 FE push-on sleeve as additional grounding

To ensure a reliable functional earth ground, even with possible contamination of the DIN rail or damage to the FE spring, it is possible to additionally ground the Axioline module via the FE tabs (see Section “Grounding concept: Functional earth ground (FE)” on page 6-12).

- Insert a push-on sleeve of 2.8 mm onto the FE tab on the module and connect it to the DIN rail with an FE clamp.

It is indicated in the module-specific data sheets if additional grounding is absolutely necessary.

7.3 Connecting the power supplies

7.3.1 Axioline system supply

To operate an Axioline station you must provide the supply voltage for the bus coupler, for the Axio bus (logic of the connected modules) and for the sensors and actuators.

Unshielded cables are usually sufficient for connecting the voltage supply. Connect them as shown in Section “Connecting unshielded cables” on page 7-4.

For the connector pin assignment of the supply voltage connections please refer to the module-specific data sheets.

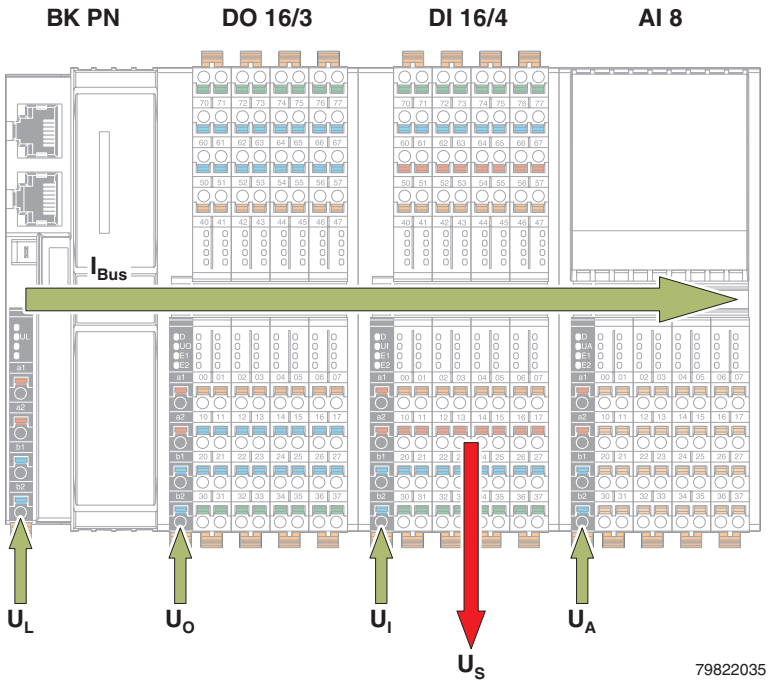


Figure 7-12 Supply voltages in the Axioline system

Key:

U_L	(U_{Logic})	Communications power supply
UI	(U_{Input})	Supply for the digital input module
U_S	(U_{Sensor})	Sensor supply (generated from U_I)
UO	(U_{Output})	Supply for digital output modules
U_A	(U_{Analog})	Supply for analog modules
I_{Bus}	(I_{Bus})	Power supply unit for the Axio bus

7.3.2 Demands on the voltage supply

WARNING: Dangerous contact voltage

Only use power supply units that ensure safe isolation between the primary and secondary circuits according to EN 50178.

7.3.3 Bus coupler supply

Supply a communications power at the bus coupler (U_L). This supplies the module electronics (logic) of the bus coupler. Additionally, this generates the communications power for the Axio bus, which supplies the connected module with logic current.

If the communication power U_L is disconnected, the Axio bus will shut town.

7.3.4 Supply to the I/O modules

The I/O modules, as well as the sensors, are supplied directly at each module.

The input and output voltage supply ($U_I/U_O/U_I$) should be installed and fused independent of the communications power (U_L). In this way, the Axio bus can continue to run, even if some components of the I/O devices are switched off. This also prevents unnecessary interference between logic and I/O.

The use of isolated network parts for U_L and $U_I/U_O/U_I$ may also be necessary in particularly disturbed environments.

7.3.5 Jumpers in the power connector

Terminal points a1 and a2, as well as b1 and b2 are jumpered in the power connector. You can use one of the terminal points for supply and the second terminal point for forwarding a potential respectively.

NOTE: Module damaged when overloaded

Please note that the maximum current carrying capacity of a terminal point of 8 A must not be exceeded.

Protect the supply accordingly.

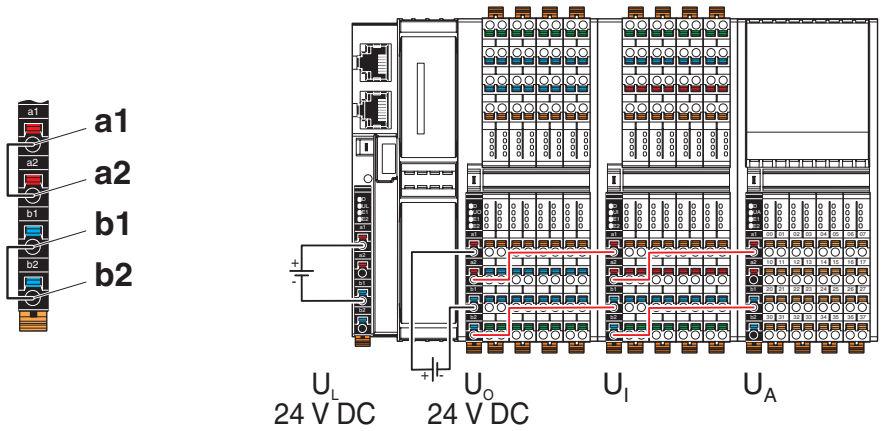


Figure 7-13 Jumpering in the power connector and example for voltage forwarding

Considering the current carrying capacity of the terminal points, the jumpering shown in Figure 7-13 must not be used if the digital output module is fully loaded (e.g., AXL DO 16/3 current consumption at U_O maximum of 8 A).

7.4 Connecting the network

The cable of your network is connected to a bus coupler.

Connect the network according to the documentation for your bus coupler.

7.5 Connecting sensors and actuators

Sensors and actuators are connected using I/O module connectors.

Connect the unshielded cables as described in Section “Connecting unshielded cables” on page 7-4.

Connect the shielded cables as described in Section “Connecting shielded cables” on page 7-5.

7.5.1 Connection methods for sensors and actuators

Most of the I/O modules of the Axioline product range permit the connection of sensors and actuators in 1-, 2-, 3- or 4-wire technology.

The relevant module-specific data sheets indicate whether such a connection method is possible for individual modules.

For the connection method for analog modules, please refer to the module-specific data sheets.

7.5.2 Connections used for digital I/O modules

A connection example is given in each module-specific data sheet.

Table 7-4 Overview of the connections used for digital input modules

Connection	Representation in the figure	1-wire	2-wire	3-wire	4-wire
Sensor signal IN	IN	X	X	X	X
Sensor supply U_S	U_S (+24 V)	–	X	X	X
Ground GND	GND (⊥)	–	–	X	X
Ground/FE shielding	FE (⏚)	–	–	–	X

X Used

– Not used

Table 7-5 Overview of the connections used for digital output modules

Connection	Representation in the figure	1-wire	2-wire	3-wire
Actuator signal OUT	OUT	X	X	X
Actuator supply U_O	U_O (+24 V)	–	–	–
Ground GND	GND (⊥)	–	X	X
Ground/FE shielding	FE (⏚)	–	–	X

X Used

– Not used

7.5.3 The various connection methods for digital sensors and actuators

1-wire technology

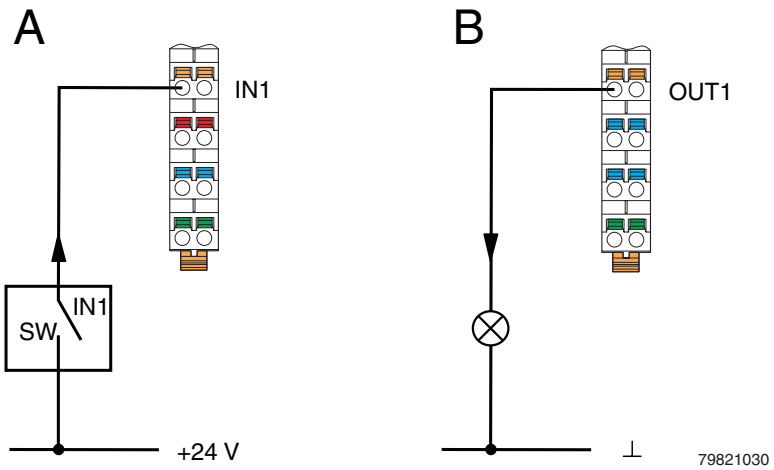


Figure 7-14 1-wire termination for digital modules

Sensor

Figure 7-14, A, shows the connection of a 1-wire sensor.

– The SW switch provides the input signal.
– The sensor signal is routed to the IN1 terminal point.
– The sensor is supplied with a 24 V voltage.

NOTE: Malfunction in the event of potential shifts

Supply the sensors and U_I from a power supply with a common GND as a reference potential.

This will prevent potential shifts, which can have undesirable effects on the station's operation.

Actuator

Figure 7-14, B, shows the connection of a 1-wire actuator.

– The actuator is supplied by output OUT1.
– The load is switched directly via the output.

NOTE: Malfunction in the event of potential shifts

Make sure that GND of the actuators and GND of the supply voltage Uo, which supply the actuators, have the same potential.

This will prevent potential shifts, which can have undesirable effects on the station's operation.

2-wire technology

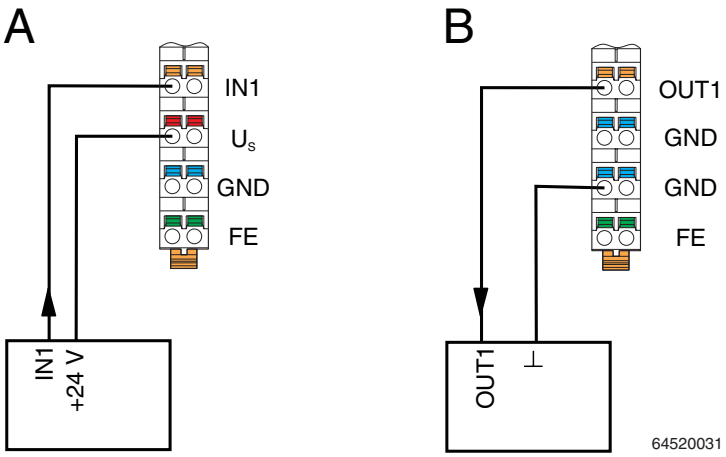


Figure 7-15 2-wire termination for digital modules

Sensor

Figure 7-15, A, shows the connection of a 2-wire sensor.

– The sensor signal is routed to the IN1 terminal point.
– The sensor is supplied by the voltage U_S.

Actuator

Figure 7-15, B, shows the connection of an actuator.

– The actuator is supplied by output OUT1.
– The load is switched directly via the output.

3-wire technology

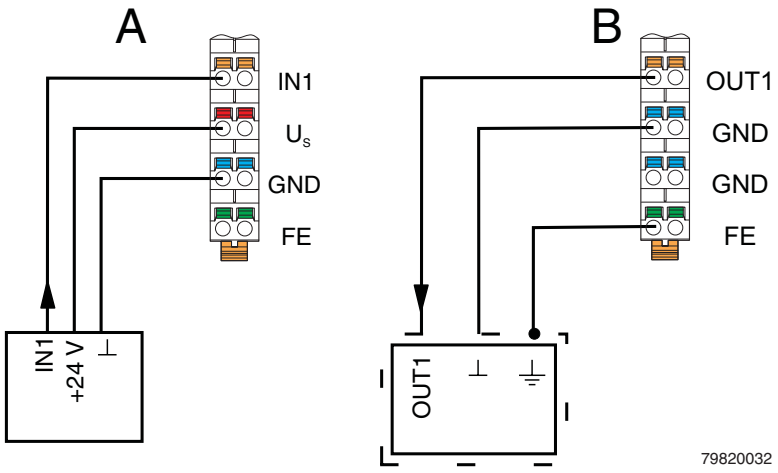


Figure 7-16 3-wire termination for digital modules

Sensor

Figure 7-16, A, shows the connection of a 3-wire sensor.

– The sensor signal is routed to the IN1 terminal point.
– The sensor is supplied with power via terminal points U_S and GND.

Actuator

Figure 7-16, B, shows the connection of a shielded actuator.

– The actuator is supplied by output OUT1.
– The load is switched directly via the output.

4-wire technology

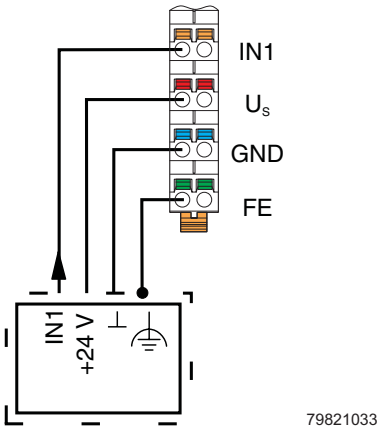


Figure 7-17 4-wire termination for digital modules

Sensor

Figure 7-17 shows the connection of a shielded 3-wire sensor.

– The sensor signal is routed to the IN1 terminal point.
– The sensor is supplied with power via terminal points U_S and GND.
– The sensor is grounded via the FE terminal point.

7.5.4 FLK adapter cable for connecting PLC relays

PLC relays can easily be connected to the Axioline using the FLK cable.

The system cable is a cable with a 14-pos. molded socket strip (90° outlet) and one open end with eight conductors. On the open end, the conductors are labeled 1 to 8 and have ferrules.

The cable is available in various lengths (see Section “Cable for connecting PLC relays” on page 9-5).

Figure 7-18 FLK adapter cable for connecting PLC relays

8 Software support

8.1 Overview of the software

Axioline is supported by the following software from Phoenix Contact:

– Startup+
– PC Worx
– CLIP-PROJECT

You can also integrate Axioline into any other system, e.g., via GSDML in Step 7 or via DTM (Device Type Manager) in FDT framework applications.

8.2 FDT/DTM and Startup+

FDT/DTM is a non-proprietary concept which enables parameterization of field devices from various manufacturers with only one program, an FDT framework application.

Any DTMs from various manufacturers can be integrated into an FDT framework application. Devices and sensors/actuators can be parameterized and diagnosed conveniently in point-to-point communication, as well as across network borders, e.g. via Ethernet, INTERBUS, Profibus, HART and, in the future, also via PROFINET IO or the IO link protocol.

FDT (Field Device Tool) defines the interfaces between the FDT framework application and the DTM.

A **DTM** (Device Type Manager) incorporates all functions, the structure, parameterization and graphical user interface for a device.

DTM is available for all Axioline modules. They can be integrated into each FDT framework application.

The **Startup+** software is an FDT framework application, which is best suited to Axioline. It enables easy selection and configuration of an Axioline station via a Windows user interface. The tool offers the following functions:

– Connection to the bus coupler via RJ45 or via the service interface.
– Reading the connected bus; all modules will be displayed
– Reading and forcing module process data
– Parameterization of the module (only online, no adoption in PC Worx or Step 7)
– Diagnostics of the I/O modules and the bus coupler
– Detailed online help for the documentation of software functions

Startup+ and the device-specific DTM can be downloaded at www.phoenixcontact.net/catalog.

Here you will also find a quick start guide for using the Axioline station under Startup+.

8.3 PC Worx

Additional information can be found in the latest AUTOMATION catalog or online at www.phoenixcontact.net/catalog.

Axioline is supported by AX SW Suite 1.50, Service Pack 3, or later .

PC WORX is the integrated programming tool for Phoenix Contact controllers. It includes I/O configuration for INTERBUS and PROFINET, programming according to IEC 61131-3 (IL, FBD, LD, ST, SFC), as well as diagnostics and startup tools. Data can be imported and exported to other tools via numerous interfaces.

In addition to the familiar functions, the tool offers the following special functions for Axioline:

- Reading the connected bus; all modules will be displayed
- Startup parameterization of the module via a drop-down menu.
- Automatic checking of the maximum number of modules
- Automatic checking of the communications power
- Display of the device rating plates stored on the modules; access via read and write services

8.4 CLIP-PROJECT

Additional information can be found in the latest CLIPLINE catalog or online at www.phoenixcontact.net/catalog.

The CLIP-PROJECT program enables easy selection, configuration, and ordering of Phoenix Contact products and complete terminal strips, via a Windows user interface. The tool offers the following functions:

- Intelligent product selection with photo support
- Configuration of terminal strips including logic tests
- Immediate color visualization of the created terminal strip
- Autocorrect function, whereby the cover, end clamp, and separating disks are positioned automatically
- Generation of parts lists, CAD drawings, and labeling data
- Data output to a printer, plotter or as a file
- Data output in AutoCAD.dxf format
- Data transfer to MS Excel and MS Word
- CSV interface for data exchange with other CAE systems
- Management of custom databases and material numbers

9 Technical data and ordering data

For the system data of your network, please refer to the corresponding documentation.

If you are using Axioline in a system with other product ranges, also observe the technical data for these product ranges. Please refer to the corresponding documentation for this technical data.

The following values are standard values for the preferred mounting position (horizontal DIN rail). For different values, please refer to the module-specific data sheets.

The technical data does not claim to be complete. Technical modifications reserved.

9.1 Technical data

System data	
Number of devices in an Axioline station	Maximum 63 devices; see documentation for bus couplers
Maximum current consumption of the Axioline modules	See module-specific data sheet

When configuring an Axioline station, observe the power supply through the bus couplers (U_L, U_{SB}), power terminals, and segment terminals, as well as the current consumption of each device. This data is given in every module-specific data sheet. It can differ depending on the individual module. Create a new station if the maximum current consumption at U_L/U_{SB} is reached.

General data	

This table provides standard data. For different values, please refer to the module-specific data sheets.

Ambient temperature	
Ambient temperature (operation)	-25°C ... +60°C
Ambient temperature (storage/transport)	-40°C ... +85°C
Temperature change	5 K/min (no condensation permitted)
Climatic class	3K6, DIN EN 60721-3-3
Permissible humidity (operation/storage/transport)	5% ... 95 %, DIN EN 61131-2
Permissible air pressure (operation/storage/transport)	70 kPa ... 106 kPa (up to 3000 m above sea level)
Degree of protection	IP20
Protection class	III, IEC 61140
Air and creepage distances	According to IEC 60644, EN 50178 and DIN EN 61131-2
Housing material	Plastic
Pollution degree according to EN 50178	2; no condensation permitted
Surge voltage category	III
Resistance of housing material to aggressive substances	Contact with graphite and other conductive dust is not permissible during operation (IP 20)
Resistance of housing material to UV light	Resistant

Mechanical tests	
Vibration resistance according to IEC 60068-2-6	5g
Shock test according to IEC 60068-2-27	25g, 11 ms period, half-sine shock pulse
Bump endurance test according to EN 60068-2-29	10g, 16 ms, 1000 shocks

Conformance with EMC directive 2004/108/EC

This table provides standard data. For different values, please refer to the module-specific data sheets.

Noise immunity test according to 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 strength: 10 V/m
Fast transients (Burst) EN 61000-4-4/IEC 61000-4-4	Criterion B, 2 kV
Transient surge voltage (surge) EN 61000-4-5/EN 61000-4-5	Criterion B; DC supply cables: ±0.5 kV/±0.5 kV (symmetrical/unsymmetrical) ; fieldbus cable shield 1 kV shielded I/O cables: ±1kV;
Conducted interference EN 61000-4-6/IEC 61000-4-6	Criterion A; test voltage 10 V
Noise emission test according to EN 61000-6-3	
Radiated noise emission EN 55022	Class B

Data transfer in the Axio bus	
Protocol	AXIO
Transmission speed	100 Mbps
Transmission	Data routing over the backplane of bus base modules

24 V supply (U_L, U_I, U_O, U_A)	
Nominal voltage	24 V DC
Ripple	± 5%
Maximum permissible voltage range including all tolerances	19.2 V DC ... 30.0 V DC, ripple included
Connection	Axioline connectors

The Axio bus supply U_{Bus} is generated from communications power U_L (24 V).

Axio bus supply (supplies the bus logic of the connected modules)	
Maximum load current in Axio bus (I_{Bus})	2 A
- When mounted horizontally on the wall (Figure 6-2, A)	2 A
- When mounted vertically or horizontally	1,5 A up to 60°C or 2 A up to 55°C
Connection	Backplane of bus base modules
Comment	Communications power of the module is generated from the U_L voltage and distributed over the bus base modules. These two voltages are not electrically isolated. The current through the Axio bus I_{Bus} is short-circuit-proof.

Voltage dips and interrupts to the I/O supply

Intensity level PS1	Interrupt time < 1 ms
Time interval between voltage dips	< 1 s
Behavior	Criterion A A supply voltage dip of < 1 ms has no effect.
Intensity level PS2	Interrupt time < 10 ms
Time interval between voltage dips	< 1 s
Behavior	Criterion C Bus disconnection, all system outputs are reset.

Cable connection method/cross section

Connection method	Spring-cage connection with direct push-in technology
Cable cross section (typical)	0.2 mm^2 ... 1.5 mm^2;S See Section “Conductor cross sections and stripping/insertion lengths” on page 7-2
Cable cross section (connection to the FE down conductor via the FE tab)	According to standard: 0.5 mm^2, 0.75 mm^2 or 1.0 mm^2; recommendation: 1.0 mm^2; See Section “Conductor cross sections and stripping/insertion lengths” on page 7-2
Stripping lengths	8 mm; see Section “Conductor cross sections and stripping/insertion lengths” on page 7-2

Electrically isolated areas

See module-specific data sheets

Test voltages

Isolating distance	Test voltage
For information about the test voltages between the network and other potential areas, please refer to the documentation for the bus coupler.	
5 V Axio bus, 24 V communications power/functional earth ground	500 V AC, 50 Hz, 1 min.
5 V Axio bus, 24 V communications power/24 V voltage of the digital or analog inputs/outputs	500 V AC, 50 Hz, 1 min.
24 V voltage of the digital and analog inputs/outputs / functional earth ground	500 V AC, 50 Hz, 1 min.

9.2 Ordering data

The complete product catalog is available in electronic form at www.phoenixcontact.net/catalog.

Ordering data Axioline module and corresponding connectors

For the ordering data for the Axioline module und corresponding connectors, please refer to the corresponding data sheet or the AUTOMATION catalog.

Ordering data for accessories

Description	Type	Order No.	Pcs. / Pkt.
Tool			
Screwdriver, bladed, matches all screw terminal blocks up to 1.5 mm² connection cross section: 0.4 x 2.5 mm	SZS 0.4 x2.5	1205037	1
Crimping pliers, for ferrules according to DIN 46228 Parts 1+4, 0.25 - 6.0 mm², lateral feed, trapezoidal crimping	CRIMPFOX 6	1212034	1
Crimping pliers, for ferrules according to DIN 46228 Parts 1+4, 0.5 - 6 mm², lateral feed, trapezoidal crimping	CRIMPFOX 6T	1212037	1
Crimping pliers, for ferrules according to DIN 46228 Parts 1+4, 0.25 - 6 mm², lateral feed, trapezoidal crimping	CRIMPFOX 6T-F	1212038	1
Probe tip	MPS-MT 1-S4-B RD	1982800	50
Labeling material			
Zack marker strip for Axioline (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	ZB 20.3 AXL:UNPRINTED	0829579	25
Zack marker strip flat for Axioline (connector/slot labeling), in 1 x 5.8 mm + 4 x 10.0 mm pitch, unprinted, 50-section, for individual labeling with B-STIFT 0.8, X-PEN, or CMS-P1-PLOTTER	ZBF 10/5.8 AXL:UNPRINTED	0829580	50
Zack marker strip, 10-section, unprinted, for individual labeling with B-STIFT, ZB-T or CMS system, sufficient for 100 terminal blocks, for a terminal width of 10.2 mm, color: white	ZB 10 :UNPRINTED	1053001	10 strips with 10 markers
Zack marker strip, flat, unprinted: 10-section, for individual labeling with B-STIFT, ZBF T, sufficient for 100 terminal blocks, color: white	ZBF 5:UNPRINTED	0808642	10 strips with 10 markers
Assembly material			
Patch cable, CAT6, pre-assembled, different lengths	FL CAT6 PATCH ... see INTERFACE catalog		
Power supply units	QUINT-PS...	See INTERFACE catalog	
DIN rail DIN EN 50022, 2 meters (corresponds to TH 35-7.5 according to EN 60715)	NS 35/7.5 PERFORATED NS 35/7.5 UNPERFORATED	0801733 0801681	
Lütze: Mounting straps with low DIN rail, height 7.5 mm, according to DIN EN 50022 Plate width 120 mm Plate width 160 mm	Lütze: SN 120 SN 160	Lütze: 330498 330738	
Standard end clamp; snapped on without tools	CLIPFIX 35-5	3022276	50
End clamp for use in the event of vibrations or installation on vertical DIN rail; secured with screws	E/AL-NS 35	1201662	50
Protected earth terminal strip, connection method: screw connection, cross section: 0.2 mm² - 4 mm², AWG 24 - 12, 5.2 mm wide, Color: green-yellow, way of mounting: NS 35/7.5, NS 35/15, NS 32 (can be used as end clamp)	USLKG 2.5N	0441119	50
Protective earth terminal strip: connection method: screw connection, cross section 0.2 mm2 - 6 mm2, AWG 24 - 10, 6.2 mm wide, Color: green-yellow, way of mounting: NS 35/7.5, NS 35/15, NS 32 (can be used as end clamp)	USLKG 5	0441119	50

Description	Type	Order No.	Pcs. / Pkt.
End terminal, 4 mm^2 , with insulating cap, green-yellow for PE	AK G GNYE	0421029	50
Ferrules			
Ferrules with insulating collar (plastic collar); according to DIN 46228-4	AI ...	See CLIPLINE catalog	
Length: 14 mm, cross section: 0.5 mm^2, insertion length: 8 mm	AI 0.5 - 8 WH	3200014	100
Ferrules without insulating collar (plastic collar) according to DIN 46228-1: Length 8 mm	A ...	See CLIPLINE catalog	
Cross section 0.5 mm^2	A 0.5 - 8	3202481	1000
Cross section 0.75 mm^2	A 0.75-8	3202504	1000
Cross section 1.0 mm^2	A 1 - 8	3202517	1000
Ferrules with insulating collar (plastic collar); according to DIN 46228-4	AI ...	See CLIPLINE catalog	
Length: 16 mm; Cross section: 0.5 mm^2, Insertion length: 10 mm	AI 0.5 - 10 WH	3201275	100
Ferrules without insulating collar (plastic collar) according to DIN 46228-1: Length 10 mm	A ...	See CLIPLINE catalog	
Cross section 0.5 mm^2	A 0.5 - 10	3202494	1000
Cross section 0.75 mm^2	A 0.75-10	3202234	1000
Cross section 1.0 mm^2	A 1 - 10	3200250	1000
Cross section 1.5 mm^2	A 1.5 - 10	3200276	1000
Material for shield connection		See CLIPLINE catalog	

Please observe the available space when selecting the shield connection clamps.

Axioline shield connection set (contains 2 busbar holders and 2 SK 5 shield connection clamps)	AXL SHIELD SET	2700518	1
Shield connection clamp for applying the shield on busbars: automatic fixing with springs	SKS ...		
3 mm ... 8 mm diameter	SKS 8	3240210	10
3 mm ... 14 mm diameter	SKS 14	3240211	10
5 mm ... 20 mm diameter	SKS 20	3240212	10
Shield connection clamp for applying the shield on busbars: fix with screws	SK ...		
8 mm diameter	SK8	3025163	10
14 mm diameter	SK14	3025176	10
20 mm diameter	SK20	3025189	10
35 mm diameter	SK35	3026463	10
Support (on mounting plate or for busbar)	AB	See CLIPLINE catalog	
N busbar, 10 mm x 3 mm, 1 m long	NLS-CU 3/10 SN 1000 MM	0402174	1
End terminal, 4 mm^2 , without insulating cap	AK 4	0404017	50
Material for the optional connection to functional earth ground			
Insulated slip-on sleeve (for FE down conductor via FE tab)	C-SCFI ... see CLIPLINE catalog		
Non-insulated slip-on sleeve (for FE down conductor via FE tab)	C-SCF ... see CLIPLINE catalog		
Cable for connecting PLC relays			
System cable for eight channels	VIP-CAB-FLK14/AXIO/0.14/ ...		
Cable length: 1 m	VIP-CAB-FLK14/AXIO/0.14/1.0M	2901605	
Additional cable lengths	VIP-CAB-FLK14/AXIO/0.14/ ..		

Ordering data for documentation

Description	Type	Order No.	Pcs. / Pkt.
"INTERBUS & AUTOMATION - Terms and definitions" user manual	IBS TERM RG UM E	2743682	1

The general documentation listed above and all module-specific documentation can be downloaded at www.phoenixcontact.net/catalog.

Make sure you always use the latest documentation.

A Technical appendix

A 1 Transmission speed

Within an Axioline station communication takes place over a fast, cyclic and equidistant Axio bus. The typical cycle time is less than 50 µs.

A 2 Typical cycle time on the Axio bus

The typical cycle time on the Axio bus is calculated according to the formula:

$$t_{SB} = 2\ \mu s + n * 1\ \mu s$$

Where:

t_{SB}	Typical cycle time on the Axio bus
n	Number of modules attached to the bus coupler

The typical cycle time for a station of five modules is:

$$t_{SB} = 2\ \mu s + n * 1\ \mu s$$

$$t_{SB} = 2\ \mu s + 5 * 1\ \mu s$$

$$t_{SB} = 7\ \mu s$$

A 3 Response times in a system

The system response time is the time between reading the input and setting the output.

It includes:

– The conversion time in the bus couplers (1 in Figure A-1),
– The cycle time of the Axio bus (2),
– The conversion time in the I/O modules (3),
– The update times of the higher-level system (4).

The control system cycle time is ignored since it is usually determined by the controller type and the application.

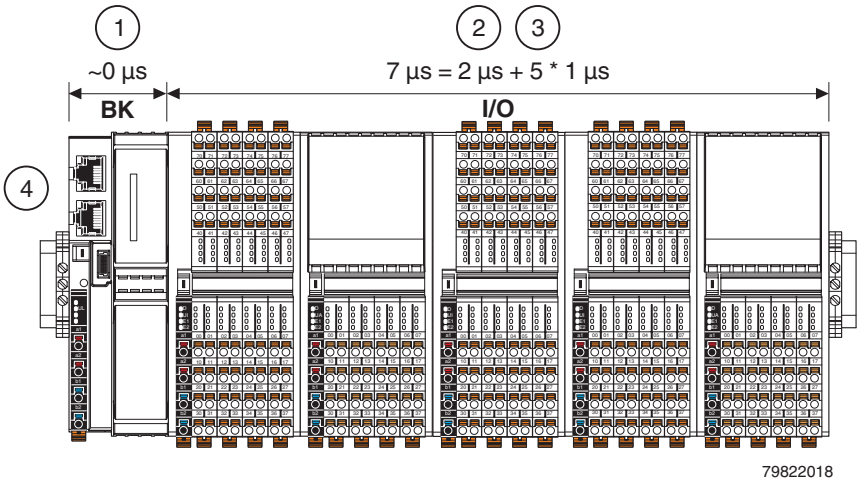


Figure A-1 Response times in a system

Typical times in an Axioline system:

Table A-1 Typical response times in a system (example)

1	Conversion time of the bus coupler	~ 0 µs
2	Cycle time of the Axio bus	Here: 7 µs
3	Conversion time in the I/O modules (depends on the implementation)	E.g., 100 µs, 10 µs, 1 µs
4	Cycle time of the higher-level system (depends on the higher-level system)	E.g., PROFINET IRT with 250 µs

The example shows that for Axioline, the response time of the whole system is exclusively determined by the higher-level network and the controller.

The Axio bus is synchronized to the higher-level network.

A 4 PDI channel

(PDI = Parameter, Diagnostics and Information)

In addition to the process data, the Axioline system has a channel for transferring parameter and diagnostics data, as well as other information; the PDI channel. Each Axioline device has this channel and can use it independently of the process data.

Services can be used to access objects created on the Axioline slave over the PDI channel. In most cases, this is done automatically, e.g., when writing the start parameterization during the bus coupler's startup.

The objects created in the slave are:

– General standard objects (Index 0001_{hex} up to $003C_{hex}$)
  Every device has these objects.
  For more detailed information on these objects, please refer to Section “General standard objects” on page A-5.
– Manufacturer-specific application objects (Index 0080_{hex} up to $5FFF_{hex}$)
  These objects are specified by the device manufacturer and have device-specific variables.
  For more detailed information on these objects, please refer to the module documentation.

You can access these objects using services.

Table A-2 Services

Service	Meaning
Read	Reading an object
Write	Writing an object

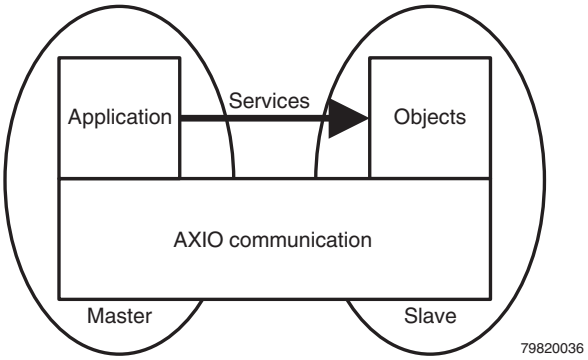


Figure A-2 PDI components

Every service access consists of a request and the associated confirmation. Only one service can be used by a device at a time.

The structure of these services depends on the higher-level system. Please refer to your system documentation for more information.

A 5 PCP objects

PCP objects are stored on each module. You can access these objects with read, write or read and write services via the PDI channel or via the hardware configurator (e.g., PC WORX or Step 7).

For an detailed description of all communication objects, please refer to the Basic Profile online at www.interbusclub.com under "Downloads, Interbus Profile".

This document describes only the objects used for Axioline. These include general standard objects and manufacturer-specific application objects.

The following applies for the tables below:

Table A-3 Key for tables in this section:

Abbreviation	Meaning
N	Number of elements
L [bytes]	Length of the element in bytes
R	Read
W	Write

Table A-4 Object and data type

Object type	Data type	Meaning
Var		Object with only one element (simple variable)
Array		Object with several simple variables of the same data type with the same length
Record		Object with several simple variables of different data types or the same data type with different lengths
	VisibleString	Byte string with ASCII characters that can only be printed
	Octet string	Byte string with any contents
	Unsigned 8	Value without sign, only positive values from 00_{hex}-... FFhex
	Unsigned 16	Value without sign, only positive values from 0000hex ... $FFFF_{hex}$
	Unsigned 32	Value without sign, only positive values from 0000 0000hex ... FFFF $FFFF_{hex}$

A 5.1 Function blocks for access to the objects

You can access the objects via function blocks that are stored in the axl_pdi_vx_yy library. The library can be downloaded at
www.phoenixcontact.net/catalog.

Select the pc_worx_6_x_AXL_PDI_x_yy.exe file to install the library under PC WORX in the download area of an Axioline bus coupler.

Detailed documentation is provided as online help for each of the function blocks.

When you access an object that is not implemented, you will receive a corresponding error message.

A 5.2 General standard objects

They include:
- Objects for identification
- Object for multilingual support
- Object with object descriptions
- Objects for diagnostics
- Objects for process data management

A 5.2.1 Objects for identification

These objects describe the manufacturer, the device and device application and form the device rating plate

The bold entries in Table A-5 are identical for all Axioline modules from Phoenix Contact.

Table A-5 Objects for identification (device rating plate)

Index [hex]	Object name	Object type	Data type	N	L [bytes]	Rights	Meaning	Content/example
Manufacturer								
0001	VendorName	Var	Visible string	1	15 + 1	R	Manufacturer name	**Phoenix Contact**
0002	VendorID	Var	Visible string	1	6 + 1	R	Manufacturer ID	**00A045**
0003	VendorText	Var	Visible string	1	48 + 1	R	Comments on the manufacturer	**Components and systems for industrial automation**
0012	VendorURL	Var	Visible string	1	29 + 1	R	Manufacturer URL	**http://www.phoenixcontact.com**
Module - General								
0004	DeviceFamily	Var	Visible string	1	58, max.	R	Device range	... (e.g., I/O analog IN)
0006	ProductFamily	Var	Visible string	1	32 + 1	R	Product range	**Axioline – High speed I/O system**
000E	CommProfile	Var	Visible string	1	3 + 1	R	Communication profile	**633**
000F	DeviceProfile	Var	Visible string	1	4 + 1	R	Device profile	**0010**
0011	ProfileVersion	Record		2		R	Device profile version	
.1	BuildDate	Var	Visible string	1	10 + 1	R	Version date	2009-10-22
..2	Version	Var	Visible string	1	40, max.	R	Version ID	E.g., Basic - Profile V1.12

Table A-5 Objects for identification (device rating plate)

Index [hex]	Object name	Object type	Data type	N	L [bytes]	Rights	Meaning	Content/example
003A	VersionCount	Array		4		R	Version count; Unique consecutive numbering for the version of the corresponding component	E. g., 0006 0001 0000 0000
.1	ProfileVersion	Var	Unsigned 16	1	2	R	Profile 06 for INTERBUS Basic Profile V1.12	xx xx_{hex} (e.g, 00 06)
.2	PDI version	Var	Unsigned 16	1	2		PDI version	xx xx_{hex} (e.g., 00 00)
.3	HardwareVersion	Var	Unsigned 16	1	2		Hardware Version	xx xx_{hex} (e.g, 00 01)
.4	FirmwareVersion	Var	Unsigned 16	1	2		Firmware version	xx xx_{hex} (e.g, 00 05)
Module - Specific (for a specific module)								
0007	ProductName	Var	Visible string	1	58, max.	R	Product designation	... (e.g., AXL AI 8-ME)
0008	SerialNo	Var	Visible string	1	11	R	Serial number	xxxxxxxxxx (e.g., 12345123456)
0009	ProductText	Var	Visible string	1	58, max.	R	Product text	... (e.g., 8 analog input channels)
000A	OrderNumber	Var	Visible string	1	8	R	Order No.	xxxxxxx (e.g., 2688187)
000B	HardwareVersion	Record		2		R	Hardware Version	
.1	BuildDate	Var	Visible string	1	10 + 1	R	Version date	YYYY-MM-DD
..2	Version	Var	Visible string	1	40, max.	R	Version ID	xxx (e.g., 01)
000C	FirmwareVersion	Record		2		R	Firmware version	
.1	BuildDate	Var	Visible string	1	10 + 1	R	Version date	YYYY-MM-DD
..2	Version	Var	Visible string	1	40, max.	R	Version ID	xxx (e.g., --)
000D	PDI version	Record		2		R	Parameter channel version	
.1	BuildDate	Var	Visible string	1	10 + 1	R	Version date	YYYY-MM-DD
..2	Version	Var	Visible string	1	40, max.	R	Version ID	xxx (e.g., --)
0013	DeviceDescFile	Var	Visible string	1	58, max.	R	File name of the device description file	... (e.g., AXL_AI_8-ME_dtmv00_1.00.xml)
0037	Device type	Var	OctetString	1	8	R	Manufacturer-specific device identification	xx xx xx xx xx xx xx xx_{hex} (e.g., 00 40 00 02 00 00 00 D1)
Device application								
0014	Location	Var	Visible string	1	58, max.	R/W	Installation location	... (e.g., Please fill in ...); Optional entry by the end user..
0015	EquipmentIdent	Var	Visible string	1	58, max.	R/W	Equipment identifier	... (e.g., Please fill in ...); Optional entry by the end user..
0016	ApplDeviceAddr	Var	Unsigned 16	1	2	R/W	User-defined device number	xx xx_{hex} (e.g., 00 01)); Optional entry by the end user.

A 5.2.2 Object for multilingual capacity

With this object you can read the currently valid language and, if more languages are available, select one.

Table A-6 Object for multilingual support

Index [hex]	Object name	Object type	Data type	N	L [bytes]	Rights	Meaning	Content/example
0017	Language	Record		2		R/W	Object for language selection of the device; The currently valid language may be accessed or changed here.	
.1	LanguageCode	Var	Visible string	1	5 + 1	R/W	Language code	**en-us**
.2	NameLanguage	Var	Visible string	1	50, max.	R/W	Language name	**English**

A 5.2.3 Object with object descriptions

For startup and servicing it is not only necessary to know the target parameterization, but also the actual parameterization of the device. It is assumed that you know the implemented application objects. These objects and their descriptions can be read with the object description. These objects are only applicable to tools and are therefore not described in more detail here. For a more detailed description, please refer to the basic profile if necessary.

Table A-7 Objects for object description

Index [hex]	Object name	Object type	Data type	N	L [bytes]	Rights	Meaning
0038	ObjDescrReq	Record	Record	2	2 + 1	R/W	Description of the object requested
0039	ObjDescr	Record	Record	16		R/W	Description of the object whose index was requested

A 5.2.4 Objects for diagnostics

These objects describe the diagnostic state of the device and any connected I/O devices, as well as options for resetting diagnostics.

Table A-8 Objects for diagnostics

Index [hex]	Object name	Object type	Data type	N	L [bytes]	Rights	Meaning
0018	DiagState	Record		6	6 entries	R	Diagnostic state
.1	Seq.no.	Var	Unsigned 16	1	2	R	Consecutive error number since the last reset or error memory reset
.2	Priority	Var	Unsigned 8	1	1	R	Priority of the message. 1: Highest priority
.3	Channel/ Group/Module	Var	Unsigned 8	1	1	R	Channel, group or module on which the error occurred. FF: Entire device
.4	Code	Var	Octet string	1	2	R	Error code
.5	MoreFollows	Var	Bit string 8	1	1	R	Additional information on malfunction; not used with Axioline up to now
.6	Text	Var	Visible String	1	51, max.	R	Plain text message. Default: Status OK
0019	ResetDiag	Var	Unsigned 8	1	1	W	Reset diagnostics: Deletes the corresponding diagnostics memory and acknowledges the message

For the specific content of these objects, please refer to the module-specific data sheets.

A 5.2.5 Objects for process data management

These objects describe the IN and/or OUT process data.

Table A-9 Objects for process data management

Index [hex]	Object name	Object type	Data type	N	L [bytes]	Rights	Meaning
0025	PDIN	Octet string	Octet string	1	PD length	R	IN process data (from the device to the master) If the process data is structured (e.g., several channels) this object can also be structured and individual structure elements are accessed via the subindex.
0026	PDOUT	Octet string	Octet string	1	PD length	R/W	OUT process data (from the master to the device) If the process data is structured (e.g., several channels) this object can also be structured and individual structure elements are accessed via the subindex.
003B	PDIN_Descr	Record	Record	N x 3		R	Description of the IN process data structure N = Number of elements of the PDIN object
.1	Type	Visible string	Visible string	1	8	R	Type of I/O data
.2	ChNo	Unsigned 16	Unsigned 16	1	2	R	Number of channels
.3	ChLength	Unsigned 16	Unsigned 16	1	2	R	Length of the channel
003C	PDOUT_Descr	Record	Record	N x 3			Description of the OUT process data structure N = Number of elements of the PDOUT object
.1	Type	Visible string	Visible string	1	8	R	Type of I/O data
.2	ChNo	Unsigned 16	Unsigned 16	1	2	R	Number of channels
.3	ChLength	Unsigned 16	Unsigned 16	1	2	R	Length of the channel

For the specific content of objects 0025_{hex} and $0026_{hex,}$ please refer to the module-specific data sheets.

The objects $003B_{hex}$ and $003C_{hex}$ are only applicable to tools. For a more detailed description, please refer to the basic profile if necessary.

A 5.3 Manufacturer-specific application objects

Manufacturer-specific application objects are module-specific and are documented in each of the module-specific data sheets.

For example, parameterization of individual channels with analog modules or parameterization of filter times with digital input modules is implemented with these objects.

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