

AXL F AO8 1F

Axioline F, analog output module, 8 outputs, 2-wire connection method

Data sheet
7990_en_06

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1 Description

The module is designed for use within an Axioline F station. It is used to output analog voltage and current signals.

Features

- 8 analog, bipolar output channels for the connection of either voltage or current signals
- Connection of actuators in 2-wire technology
- Voltage ranges: 0 V ... 10 V, ± 10 V, 0 V ... 5 V, ± 5 V
- Current ranges: 0 mA ... 20 mA, 4 mA ... 20 mA, ± 20 mA
- Short-circuit-proof outputs
- Device rating plate stored
- Safe analog value processing with SAFE AI and other components



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



Make sure you always use the latest documentation.
It can be downloaded at: phoenixcontact.net/product/2688080

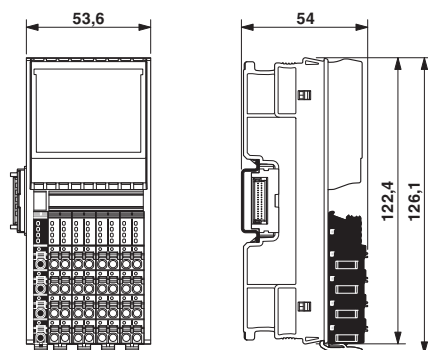
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3 Ordering data

Description	Type	Order No.	Pcs./Pkt.
Axioline F, analog output module, analog outputs: 8, 0 V ... 5 V, -5 V ... 5 V, 0 V ... 10 V, -10 V ... 10 V, 0 mA ... 20 mA, 4 mA ... 20 mA, -20 mA ... 20 mA, connection method: 2-wire, transmission speed in the local bus: 100 Mbps, degree of protection: IP20, including bus base module and Axioline F connectors	AXL F AO8 1F	2688080	1
Accessories	Type	Order No.	Pcs./Pkt.
Axioline F bus base module for housing type F (Replacement item)	AXL F BS F	2688129	5
Axioline shield connection set (contains 2 shield bus holders and 2 SK 5 shield connection clamps)	AXL SHIELD SET	2700518	1
Zack marker strip for Axioline F (device labeling), in 2 x 20.3 mm pitch, unprinted, 25-section, for individual labeling with B-STIFT 0.8, X-PEN, or CMS-P1-PLOTTER (Marking)	ZB 20,3 AXL UNPRINTED	0829579	25
Zack marker strip, flat, in 10 mm pitch, unprinted, 10-section, for individual labeling with M-PEN 0,8, X-PEN, or CMS-P1-PLOTTER (Marking)	ZBF 10/5,8 AXL UNPRINTED	0829580	50
Insert label, for the Axioline F series from Phoenix Contact, Roll, white, unlabeled, can be labeled with: THERMOMARK ROLLMASTER 300/600, THERMOMARK X1.2, THERMOMARK ROLL X1, THERMOMARK ROLL 2.0, THERMOMARK ROLL, mounting type: snapped into marker carrier, lettering field size: 35 x 46 mm (Marking)	EMT (35X46)R	0801604	1
Function block library for safety-related analog value acquisition with standard I/O modules. Please contact the safety hotline (+49 5281 9-462777) before ordering the SAFE AI article.	SAFE AI	2400057	1
Documentation	Type	Order No.	Pcs./Pkt.
User manual, English, Axioline F: System and installation	UM EN AXL F SYS INST	-	-
User manual, English, Axioline F: Diagnostic registers, and error messages	UM EN AXL F SYS DIAG	-	-
User manual "ANALOGINPUT-SF: Structure and method of operation of the SAFE AI system"	UM EN AX ANALOGINPUT_SF	2992242	1

4 Technical data

Dimensions (nominal sizes in mm)



Width	53.6 mm
Height	126.1 mm
Depth	54 mm
Note on dimensions	The depth is valid when a TH 35-7,5 DIN rail is used (according to EN 60715).

General data

Color	traffic grey A RAL 7042
Weight	260 g (with connectors and bus base module)
Ambient temperature (operation)	-25 °C ... 60 °C
Ambient temperature (storage/transport)	-40 °C ... 85 °C
Permissible humidity (operation)	5 % ... 95 % (non-condensing)
Permissible humidity (storage/transport)	5 % ... 95 % (non-condensing)
Air pressure (operation)	70 kPa ... 106 kPa (up to 3000 m above sea level)
Air pressure (storage/transport)	70 kPa ... 106 kPa (up to 3000 m above sea level)
Degree of protection	IP20
Protection class	III, IEC 61140, EN 61140, VDE 0140-1
Mounting position	any (no temperature derating)

Connection data: Axioline F connector

Connection method	Push-in connection
Conductor cross section solid / stranded	0.2 mm ² ... 1.5 mm ² / 0.2 mm ² ... 1.5 mm ²
Conductor cross section [AWG]	24 ... 16
Stripping length	8 mm



Please observe the information provided on conductor cross sections in the "Axioline F: system and installation" user manual.

Interface: Axioline F local bus

Number	2
Connection method	Bus base module
Transmission speed	100 Mbps

Axioline F local bus supply (U_{Bus})

Supply voltage	5 V DC (via bus base module)
Current draw	typ. 105 mA max. 130 mA
Power consumption	typ. 0.525 W max. 0.65 W

Supply for analog modules (U_A)

Supply voltage	24 V DC
Supply voltage range	19.2 V DC ... 30 V DC (including all tolerances, including ripple)
Current draw	typ. 50 mA (induced current consumption; no load, 0 V output) typ. 110 mA (8 voltage channels, 10 V output) max. 235 mA (8 current channels, 20 mA output)
Power consumption	typ. 1.2 W (induced current consumption; no load, 0 V output) typ. 2.64 W (8 voltage channels, 10 V output) max. 5.64 W (8 current channels, 20 mA output)
Surge protection of the supply voltage	electronic (35 V, 0.5 s)
Polarity reversal protection of the supply voltage	up to HW 03: polarity protection diode as of HW 04: parallel diode; with external 5 A fuse (for startup only)
Transient protection supply voltage	Suppressor diode

**NOTE: Damage to the electronics**

Provide external protection for the module to protect it against polarity reversal. If you are using an external fuse, the power supply unit must be able to supply four times the nominal current of the fuse. This ensures that it trips in the event of an error.



When using the module for the first time, protect it with a 5 A fuse. When all modules in the system are correctly connected, the 5 A fuse can be replaced with an 8 A fuse. After that, you can load the module up to 8 A.

Power consumption

Power consumption	typ. 1.725 W (to U_{Bus} and U_A ; power input; no load, output 0 V) max. 6.29 W (to U_{Bus} and U_A ; 8 current channels, output 20 mA)
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Analog outputs

Number of outputs	8
Connection method	Push-in connection
Connection technology	2-wire, shielded, twisted pair
Current output signal	0 mA ... 20 mA, 4 mA ... 20 mA, -20 mA ... 20 mA
Voltage output signal	0 V ... 5 V, -5 V ... 5 V, 0 V ... 10 V, -10 V ... 10 V
D/A resolution	16 bit
D/A conversion time	5 μ s

Analog outputs	
Representation of output values	16 bits (15 bits + sign)
Data formats	IB IL, S7-compatible
Process data update	300 μ s
Load/output load current output	to 500 Ω
Load/output load voltage output	> 2 k Ω
Precision	typ. 0.1 % (of output range final value)
Permissible cable length	max. 250 m (reference cable type LiYCY (TP) n*2*2*0.5 mm ²)
Short-circuit and overload protection	electronic
Transient protection	Suppressor diode

Input and output address area	
Input address area	16 Byte
Output address area	16 Byte

Configuration and parameter data in a PROFIBUS system	
Required parameter data	27 Byte
Required configuration data	7 Byte

Electrical isolation/isolation of the voltage areas	
Test section	Test voltage
5 V communications power (logic), 24 V supply (I/O)	500 V AC, 50 Hz, 1 min.
5 V supply (logic)/analog outputs	500 V AC, 50 Hz, 1 min.
5 V supply (logic)/functional earth ground	500 V AC, 50 Hz, 1 min.
24 V supply (I/O)/analog outputs	500 V AC, 50 Hz, 1 min.
24 V supply (I/O) / functional earth ground	500 V AC, 50 Hz, 1 min.
Analog outputs/functional earth ground	500 V AC, 50 Hz, 1 min.

Mechanical tests	
Vibration resistance in acc. with EN 60068-2-6/ IEC 60068-2-6	5g
Shock in acc. with EN 60068-2-27/IEC 60068-2-27	30g
Continuous shock according to EN 60068-2-27/ IEC 60068-2-27	10g

Conformance with EMC Directive 2014/30/EU**Noise immunity test in accordance with EN 61000-6-2**Electrostatic discharge (ESD) EN 61000-4-2/
IEC 61000-4-2

Criterion B, 6 kV contact discharge, 8 kV air discharge

Electromagnetic fields EN 61000-4-3/IEC 61000-4-3

Criterion A, Field intensity: 10 V/m

Fast transients (burst) EN 61000-4-4/IEC 61000-4-4

Criterion B, 2 kV

Transient overvoltage (surge) EN 61000-4-5/
IEC 61000-4-5up to HW 03: Criterion B,
DC supply lines: ± 0.5 kV/ ± 0.5 kV (symmetrical/asymmetrical),
 ± 1 kV to shielded I/O cables
as of HW 04: Criterion B,
DC supply lines: ± 3.0 kV/ ± 0.5 kV (symmetrical/asymmetrical),
 ± 1 kV to shielded I/O cables

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

Class B

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

5 Derating

The values apply for a closed control cabinet and stagnant air.

For standard mounting position, e.g., wall mounting on horizontal DIN rail, no derating applies.

Other mounting positions are possible, however the maximum permitted temperature should be lowered by 5 Kelvin.

When operated outside the specified range, the outputs will be switched off to protect them (0 V/0 mA).

The drift values refer to the relevant output range final value. The values refer to nominal operation with default settings.

Additional tolerances influenced by electromagnetic interference

Electromagnetic fields	EN 61000-4-3/ IEC 61000-4-3	< 1 %
Fast transients (burst)	EN 61000-4-4/ IEC 61000-4-4	0 %
Conducted interference	EN 61000-4-6/ IEC 61000-4-6	0 %

6 Tolerance data

Tolerances at $T_A = +25^\circ\text{C}$				
	Absolute tolerance		Relative tolerance	
	Typ.	Max.	Typ.	Max.
0 V ... 5 V, ± 5 V, 0 V ... 10 V, ± 10 V	± 10 mV	± 30 mV	$\pm 0.10\%$	$\pm 0.30\%$
0 mA ... 20 mA, 4 mA ... 20 mA, ± 20 mA	± 20 μA	± 60 μA	$\pm 0.10\%$	$\pm 0.30\%$

Typical data contains offset error, gain error, and linearity error in the respective default setting.

All tolerances indicated as a percentage are related to the positive output range final value.

The data is valid for nominal operation ($U_A = 24$ V in the default configuration).

Default configuration: IB IL format

Please also observe the values for temperature drift and the tolerances under influences of electromagnetic interferences.

The maximum tolerance values represent the worst case measurement inaccuracy. Besides maximum offset and gain drift, they also comprise longtime drift as well as the maximum tolerances of the test and calibration equipment.

Tolerance and temperature response at $T_A = -25^\circ\text{C} \dots +60^\circ\text{C}$		
	Drift	
	Typical	Maximum
0 V ... 5 V, ± 5 V, 0 V ... 10 V, ± 10 V	± 25 ppm/K	± 70 ppm/K
0 mA ... 20 mA, 4 mA ... 20 mA, ± 20 mA	± 25 ppm/K	± 70 ppm/K

All tolerances indicated as a percentage are related to the positive output range final value.

Additional tolerances may occur due to the influence of high-frequency electromagnetic interference caused by wireless transmission systems in the near vicinity. The values specified refer to nominal operation in the event of direct interference to components without additional shielding such as a steel cabinet, etc.

The above mentioned tolerances can be reduced by providing further shielding measures for the I/O module (e.g., use of a shielded control box/control cabinet, etc.).

7 Signal rise times

Voltage step 0 V ... 10 V (typical values)

Load	Time for 0 % ... 99 %
$R_L = 2 \text{ k}\Omega$	90 μs
$R_L = 2 \text{ k}\Omega \parallel C_L = 10 \text{ nF}$	100 μs
$R_L = 2 \text{ k}\Omega \parallel C_L = 220 \text{ nF}$	250 μs
$R_L = 2 \text{ k}\Omega + L_L = 3 \text{ mH}$	90 μs

Current step 0 mA ... 20 mA (typical values)

Load	Time for 0 % ... 99 %
$R_L = 500 \Omega$	350 μs
$R_L = 500 \Omega \parallel C_L = 10 \text{ nF}$	375 μs
$R_L = 500 \Omega \parallel C_L = 220 \text{ nF}$	950 μs
$R_L = 500 \Omega + L_L = 3 \text{ mH}$	600 μs

Key to the tables

R_L	Ohmic load
C_L	Capacitive load
L_L	Inductive load
\parallel	Parallel connection
$+$	Serial connection

8 Internal circuit diagram

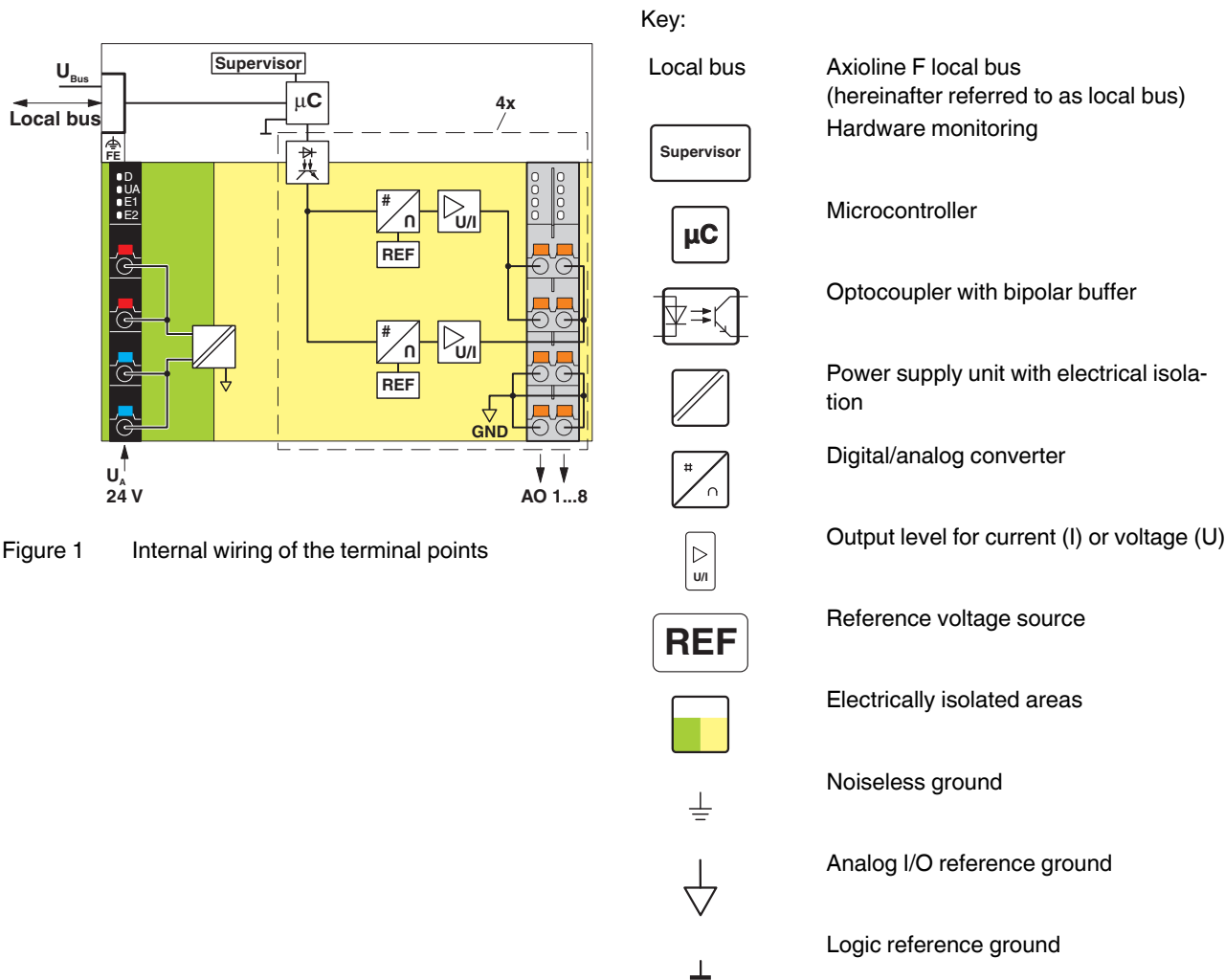


Figure 1 Internal wiring of the terminal points

9 Terminal point assignment

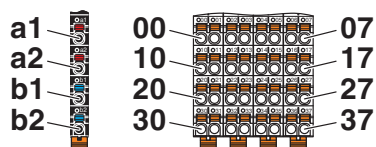


Figure 2 Terminal point assignment

Terminal point	Color	Assignment	
Supply voltage input			
a1, a2	Red	24 V DC (U _A)	Analog module feed-in (bridged internally)
b1, b2	Blue	GND	Reference potential of the supply voltage (bridged internally)
Analog outputs			
00 ... 07	Orange	U1 ... U8	Voltage connection for channels 1 ... 8
10 ... 17	Orange	I1 ... I8	Current connection for channels 1 ... 8
20 ... 27, 30 ... 37	Orange	GND	Reference potential for all channels

10 Connection example

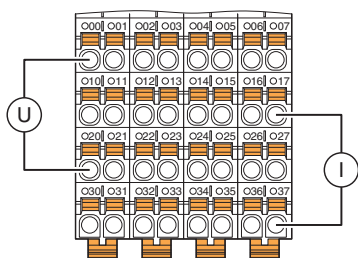


Figure 3 Connection for voltage and current output

11 Connection notes



NOTE: Damage to the electronics/ measuring errors

Always connect the analog actuators using shielded twisted-pair cables.

Unshielded cables may lead to values outside the specified tolerance limits in environments subject to heavy noise.

Connect the cable shield to functional earth immediately after the cables enter the control cabinet.

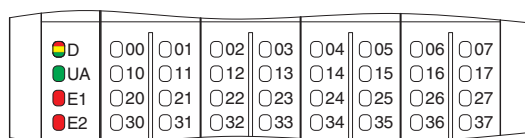
If a closed control cabinet is not available, connect the shield to a shield bus.

Use the AXL SHIELD SET Axiline shield connection set for an optimized connection directly in front of the module.



For further information on shielding, please refer to the UM EN AXL F SYS INST user manual.

12 Local diagnostic and status indicators



Channel errors are errors that can be associated with a channel.
Periphery errors are errors that affect the entire module.

Figure 4 Local diagnostic and status indicators

Designation	Color	Meaning	State	Description
D	Red/ yellow/ green	Diagnostics of local bus communication		
		Run	Green on	The device is ready for operation, communication within the station is OK. All data is valid. An error has not occurred.
		Active	Green flashing	The device is ready for operation, communication within the station is OK. The data is not valid. No valid data provided by the controller/higher-level network. There is no error on the module.
		Device application not active	Flashing green/yellow	The device is ready for operation, communication within the station is OK. Output data cannot be outputted and/or input data cannot be read. There is a fault on the periphery side of the module..
		Ready	Yellow on	The device is ready for operation but did not detect a valid cycle after power-up.
		Connected	Yellow flashing	The device is not (yet) part of the active configuration.
		Reset	Red on	The device is ready for operation but has lost the connection to the bus head.
		Not connected	Flashing red	The device is ready for operation but there is no connection to the previously existing device.
		Power down	Off	Device is in (power) reset.
UA	Green	U _{Analog}	On	Supply for analog modules (U _A) present.
			Off	Supply for analog modules (U _A) not present.
E1	Red	Supply voltage error	On	Supply for analog modules (U _A) is faulty.
			Off	Supply for analog modules (U _A) is OK.
E2	Red	Error	On	I/O or channel error has occurred.
			Off	No error

Error code and status of the E1 and E2 LEDs

Error	E1 LED	E2 LED
No error	off	off
Short-circuit	off	on
Open circuit	off	on
Faulty supply voltage	on	on
Parameter table invalid	off	on
Device error	off	on
Flash format error	off	on



Short or open circuits are detected with an output value of > 5% of the output range final value.

The module can only detect a short circuit or open circuit if a value is set.

13 Process data

The module uses eight words of IN and eight words of OUT process data.

Each channel is mapped to a word.

13.1 OUT process data

The output values are transmitted from the controller board or the computer to the module by means of the process data output words OUT0 to OUT7.

Order of the process data words

OUT0	...	OUT7
Channel 1	...	Channel 8
AV	...	AV

AV Output value

Output value

The output values are mapped in IB IL format or S7-compatible format. In both formats the output value is represented in bits 14 to 0. An additional bit (bit 15) is available as a sign bit.

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
V	Analog value														

V Sign bit

13.2 IN process data



In the case of Sercos, the IN process data is hidden and therefore unavailable.

The following data is transmitted in the input process data:

- During normal error-free operation, the output value is mirrored in the input process data for each channel.
- If an error occurs, the diagnostic message is mirrored (in IB IL format) in the input process data for each channel. The diagnostics message is deleted as soon as the error is eliminated.

Order of the process data words

IN0	...	IN7
Channel 1	...	Channel 8
AW*/Diag	...	AW*/Diag

AW*/Diag Mirrored output value or diagnostics messages (in IB IL format)

Diagnostic message (in IB IL format)

Code (hex)	Cause
8002	Open circuit
8003	Short-circuit
8010	Parameter table invalid
8020	Faulty supply voltage
8040	Device faulty



In the event of error, a currently existing error is mirrored in the process data on the corresponding channel.

14 Significant values in various formats

14.1 Significant values in IB IL format

Output data		0 V ... 10 V	± 10 V	0 V ... 5 V	± 5 V	0 mA ... 20 mA	± 20 mA	4 mA ... 20 mA
hex	dec	V	V	V	V	mA	mA	mA
7FFF ... 7F01		+10.837	+10.837	+5.419	+5.419	+21.6747	+21.6747	+21.3397
7F00	32512	+10.837	+10.837	+5.419	+5.419	+21.6747	+21.6747	+21.3397
7530	30000	+10.0	+10.0	+5.0	+5.0	+20.0	+20.0	+20.0
3A98	15000	+5.0	+5.0	+2.5	+2.5	+10.0	+10.0	+12.0
0001	1	+333.33 μ V	+333.33 μ V	+166.67 μ V	+166.67 μ V	+0.6667 μ A	+0.6667 μ A	+4.0005333
0000	0	0	0	0	0	0	0	+4.0
FFFF	-1	0	-333.33 μ V	0	-166.67 μ V	0	-0.6667 μ A	+4.0
C568	-15000	0	-5.0	0	-2.5	0	-10.0	+4.0
8AD0	-30000	0	-10.0	0	-5.0	0	-20.0	+4.0
8100	-32512	0	-10.837	0	-5.419	0	-21.6747	+4.0
80FF ... 8000*		Hold last value	Hold last value	Hold last value	Hold last value	Hold last value	Hold last value	Hold last value
8001	Overrange	+10.837	+10.837	+5.419	+5.419	+21.6747	+21.6747	+21.3397
8080	Underrange	0	-10.837	0	-5.419	0	-21.6747	Hold last value

* without 8001, 8080

14.2 Significant values in S7-compatible format

Output data		0 V ... 10 V	± 10 V	0 V ... 5 V	± 5 V	0 mA ... 20 mA	± 20 mA	4 mA ... 20 mA
hex	dec	V	V	V	V	mA	mA	mA
7FFF ... 7F00	Overrange	0	0	0	0	0	0	0
7EFF	32511	+11.759	+11.759	+5.879	+5.879	+23.5157	+23.5157	+22.8142
6C00	27648	+10.0	+10.0	+5.0	+5.0	+20.0	+20.0	+20.0
5100	20736	+7.5	+7.5	+3.75	+3.75	+15.0	+15.0	+16.0
0001	1	+361.69 µV	+361.69 µV	+180.85 µV	+180.85 µV	+0.7234 µA	+0.7234 µA	+4.0005787
0000	0	0	0	0	0	0	0	+4.0
FFFF	-1	0	-361.69 µV	0	-180.85 µV	0	-0.7234 µA	+3.9994
E501	-6911	0	-2.4996	0	-1.2498	0	-4.99942	0.578 µA
E500	-6912	0	-2.5	0	-1.25	0	-5.0	0
AF00	-20736	0	-7.5	0	-3.75	0	-15.0	0
9400	-27648	0	-10.0	0	-5.0	0	-20.0	0
8100	-32512	0	-11.759	0	-5.879	0	-23.5157	0
80FF ... 8000	Underrange	0	0	0	0	0	0	0

15 Parameter, diagnostics and information (PDI)

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

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

The following applies to all tables below:

Please refer to the UM EN AXL F SYS INST for an explanation of the data types.

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



Each visible string is terminated with a null terminator (00_{hex}). The length of a visible-string-type element is therefore at least one byte larger than the number of user data items.
If the number of user data items plus null terminator is smaller than the specified length of the element, the visible string will be populated with a null character (00_{hex}).



For detailed information on PDI objects, please refer to the UM EN AXL F SYS INST user manual.

16 Standard objects

16.1 Objects for identification (device rating plate)

Index (hex)	Object name	Data type	A	L	Rights	Meaning	Contents
Manufacturer							
0001	VendorName	Visible String	1	16	R	Vendor name	Phoenix Contact
0002	VendorID	Visible String	1	7	R	Vendor ID	00A045
0003	VendorText	Visible String	1	49	R	Vendor text	Components and systems for industrial automation
0012	VendorURL	Visible String	1	23	R	Vendor URL	www.phoenixcontact.com
Module - general							
0004	DeviceFamily	Visible String	1	15	R	Device family	I/O analog OUT
0006	ProductFamily	Visible String	1	6	R	Product family	AXL F
000E	CommProfile	Visible String	1	4	R	Communication profile	633
000F	DeviceProfile	Visible String	1	5	R	Device profile	0010
0011	ProfileVersion	Record of Visible Strings	2	11; 22	R	Profile version	2009-10-22; Basic - Profile V1.12
0017	Language	Record of Visible Strings	2	6; 8	R	Language	en-us; English
Module - special							
0005	Capabilities	Visible String	1	8	R	Capabilities	Nothing
0007	ProductName	Visible String	1	13	R	Product name	AXL F AO8 1F
0008	SerialNo	Visible String	1	11	R	Serial number	e. g., 1234512345
0009	ProductText	Visible String	1	25	R	Product text	8 analog output channels
000A	OrderNumber	Visible String	1	8	R	Order No.	2688080
000B	HardwareVersion	Record of Visible Strings	2	11; 3	R	Hardware version	e. g., 2010-06-21; 01
000C	FirmwareVersion	Record of Visible Strings	2	11; 6	R	Firmware version	e. g., 2010-06-21; V1.10
000D	PChVersion	Record of Visible Strings	2	11; 6	R	PDI version	2010-01-08; V1.00
0037	DeviceType	Octet string	1	8	R	Device type	00 10 00 10 00 00 00 A3 _{hex}
003A	VersionCount	Array of UINT16	4	4 * 2	R	Version counter	e. g., 0007 0001 0001 0001 _{hex}
Use of the device							
0014	Location	Visible String	1	59	R/W	Location	Can be completed by the user.
0015	EquipmentIdent	Visible String	1	59	R/W	Equipment identifier	Can be completed by the user.
0016	ApplDeviceAddr	UINT16	1	2	R/W	Application device address	Can be completed by the user.

16.2 Miscellaneous standard objects

Index (hex)	Object name	Data type	A	L	Rights	Meaning/contents	
Object descriptions							
0038	ObjDescrReq	Record	2	3	R/W	Object description request	
0039	ObjDescr	Record		16	R	Object description	
Diagnostics objects							
0018	DiagState	Record	6	2; 1; 1; 2; 1; 14	R	Diagnostic state	*
0019	ResetDiag	UINT8	1	1	R/W	Reset diagnostic messages	*
Objects for process data management							
0024	ResetCode	Array of UINT16	8	8 * 2	R/W	Substitute value behavior during bus reset (PDOOUT)	*
0025	PDIN	Octet string	1	16	R	Input process data	*
0026	PDOOUT	Octet string	1	16	R/W	Output process data	*
0027	GetExRight	UINT8	1	1	R/W	Get exclusive process data write rights	*
002F	PDOOUT_Subst	Array of UINT16	8	8 * 2	R/W	Substitute value for the OUT process data	*
003B	PDIN_Descr	Array of Records	3	8; 2; 2	R	Description of the IN process data	
003C	PDOOUT_Descr	Array of Records	3	8; 2; 2	R	Description of the output process data	
Objects for device management							
001D	Password	Octet string	1	9	W	Password	*

The objects marked in the last column with an * are described in more detail in the next sections.

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

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

16.3 Diagnostics objects

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

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

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



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

Error and status of the local diagnostics and status indicators

Subindex	2	3	4	6	LED			
	Priority	Channel/ group/ module	Error code	Text	D	UA	E1	E2
Error	hex	hex	hex					
No error	00	00	0000	Status OK	⦿	●	○	○
Short-circuit	01	01 ... 08	2130	Short-circuit	⦿	●	○	●
Faulty supply voltage	01	FF	5160	Supply fail	⦿	○	●	●
Device error	01	FF	6301	CS FLASH	⦿	●	○	●
Flash format error	01	FF	6302	FO FLASH	⦿	●	○	●
Parameter table invalid	01	FF	6320	Invalid para	⦿	●	○	●
Open circuit	01	01 ... 08	7710	Open circuit	⦿	●	○	●

Key:

- Off
- On
- ⦿ Green on
- ⦿ Flashing green/yellow

16.3.2 Reset diagnostic messages (0019_{hex}: ResetDiag)

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

0019 _{hex} : Reset diagnostic messages (read, write)				
Subindex	Data type	Length in bytes	Code (hex)	Meaning/contents
0	UINT8	1	00	Permit all diagnostic messages
			02	Delete and acknowledge all diagnostic messages that are still pending
			06	Delete and acknowledge all diagnostic messages, reset the error counter, and do not permit new diagnostic messages
			Other	Reserved

16.4 Objects for process data management

16.4.1 Substitute value behavior during bus reset (PDOOUT) (0024_{hex}: ResetCode)

With this object, you parameterize the behavior of the module in the event that process data is missing.

0024 _{hex} : substitute value behavior during bus reset (PDOOUT) (read, write)			
Subindex	Data type	Length in bytes	Meaning/contents
0	Array	8 * 2	Substitute value behavior during bus reset (PDOOUT)

Element	Data type	Length in bytes	Meaning	Contents	Default value
1	UINT16	2	Channel 1 reset code	0000 ... 0003 _{hex}	0002 _{hex}
:	:	:	:	:	:
8	UINT16	2	Channel 8 reset code	0000 ... 0003 _{hex}	0002 _{hex}

Value range:

Code (hex)	Behavior
0000	Output of zero values (0 V/0 mA/4 mA) at output
0001	Output of final values (10 V/5 V/20 mA) at output
0002	Hold last value
0003	Transfer the substitute values from the "Replace output process data" (002F _{hex}) object

Behavior of the outputs when the supply voltage fails

U _A	U _{Bus}	Behavior of the outputs
Available	Available	Nominal operation or see object 0024 _{hex}
Missing	Available	Outputs to 0 V/0 mA
Available	Missing	Hold the last values (as with object 0024 _{hex} , code 0002)

Special features

- You can only access this object via subindex 0, i. e., you access the entire object.
- Write access with 2 bytes is permissible. In this case, the parameterized value applies to all channels.
- In the case of valid parameters, the object is stored permanently.

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



In the case of Sercos, the IN process data is hidden and therefore unavailable.

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

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

0025 _{hex} : IN process data (read)			
Subindex	Data type	Length in bytes	Meaning
0	Octet string	16	Input process data

16.4.3 OUT process data (0026_{hex}: PDOUT)

You can read or write the OUT process data of the module with this object.

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

0026 _{hex} : OUT process data (read, write)			
Subindex	Data type	Length in bytes	Meaning
0	Octet string	16	Output process data

There are 2 bytes available for each channel, starting with channel 1.



Observe the notes in the section "Writing the analog values via the PDI channel".

16.4.4 Request exclusive write access (0027_{hex}: GetExRight)

This object allows you to determine which channel (process data channel or PDI channel) gets the rights for writing the outputs.

0027 _{hex} : Request exclusive write access (read, write)				
Subindex	Data type	Length in bytes	Meaning/contents	
0	Simple variable	1	00 _{hex}	Rights for writing output data over the PD channel (process data channel)
			01 _{hex}	Rights for writing output data via the PDI channel

All other values are invalid and will be acknowledged with an error.



Please note the following for your process:

The parameterization in object 0027_{hex} "Rights for writing the output data via the PDI channel" overwrites the OUT process data transmitted via the process data channel with the values from object 0026_{hex} PDOUT. From now, the OUT process data can only be changed using the PDI object. Changes on the process data channel will have no effect.

If the value from the process data channel is to be used again, write access must be changed to "Rights for writing the output data via the PD channel (process data channel)" via the GetExRight object. After a power reset, the values transmitted via the process data channel are always valid.

16.4.5 Substitute value for the OUT process data (002F_{hex}: PDOUT_Subst)

This object is used to parameterize the substitute values that are to be output at the analog outputs in the event that process data is missing. The condition is that option 0003 is selected in the "Substitute value behavior when process data is missing" object (0024_{hex}).

In the case of valid parameters, the parameterization is stored in the module permanently.

After resetting, the module works with the last permanently stored data. Upon delivery, the module works with the default data (default settings).

002F _{hex} : Substitute value for the OUT process data (read, write)			
Subindex	Data type	Length in bytes	Meaning/contents
0	Array of UINT16	8 * 2	Replace output process data

There are 2 bytes available for each channel, starting with channel 1.

The values are used in the parameterized format.

Example:

Channel 1: 1 V, Channel 2: 2 V ... Channel 8: 8 V, IB IL format

0B B8 17 70 23 28 2E E0 3A 98 46 50 52 08 5D C0

Special features

- You can only access this object via subindex 0, i. e., you access the entire object.
- In the case of valid parameters, the object is stored permanently.
- The parameterized values are compared with the selected output range. If the substitute value does not correspond to the output range, an error message is issued.

16.5 Objects for device management

Password (001D_{hex}: Password)

By entering the "Superuser" password you permit writing to the "Exclusiv right received" object. These rights are required to transmit process data over the PDI channel.

001D _{hex} : Password (Write)			
Subindex	Data type	Length in bytes	Meaning/contents
0	Simple variable	9	Password

17 Application objects

Index (hex)	Object name	Data type	A	L	Rights	Meaning/contents
0080	ParaTable	Array of UINT16	10	10 * 2	R/W	Parameter table

Parameter table (0080_{hex}: ParaTable)

Parameterize the module using this object.

In the case of valid parameters, the parameterization is stored in the module permanently.

After resetting, the module works with the last permanently stored data. Upon delivery, the module works with the default data (default settings).

0080 _{hex} : Parameter table (read, write)				
Subindex	Data type	Length in bytes	Meaning/contents	Default value
0	Array of UINT16	10 * 2	Read/write all elements	See subindices
1	UINT16	2	Parameterization of channel 1	0000 _{hex}
:	UINT16	2	:	0000 _{hex}
8	UINT16	2	Parameterization of channel 8	0000 _{hex}
9	UINT16	2	Data format	0000 _{hex}
10	UINT16	2	Reserved	0000 _{hex}

Parameterization of channel 1 ... channel 8

Parameterization word

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
0	0	0	0	0	0	0	0	0	0	0	0	0	Output range		

Data format

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
0	0	0	0	0	0	Data format	0	0	0	0	0	0	0	0	0

Output range

Output range	Code (bin)	Code (hex)
0 V ... 10 V (default)	0000	0
±10 V	0001	1
0 V ... 5 V	0010	2
±5 V	0011	3
0 mA ... 20 mA	0100	4
±20 mA	0101	5
4 mA ... 20 mA	0110	6
Channel inactive	1111	F
Other	Reserved	

Data format	Code (bin)	Code (hex)
IB IL (default)	00	0
Reserved	01	1
S7-compatible	10	2
Reserved	11	3



Set all unused bits to 0.

18 Writing the analog values over the PDI channel

PDI = Parameters, Diagnostics and Information

The exclusive right must be changed first, if the analog values are not to be output via the process data, but via the PDI channel. To do this, proceed as follows.

- Write the ASCII string "Superuser" to the "Password" (001D_{hex}) object.
- Write the value 01_{hex} to the "Request exclusive write access" object (0027_{hex}).

You may now write to the "Output process data" (0026_{hex}) object.

19 Device descriptions

The device is described in the device description files.

The device descriptions for controllers from Phoenix Contact are included in PC Worx and the corresponding service packs.

The device description files for other systems are available for download at phoenixcontact.net/products in the download area of the bus coupler used.



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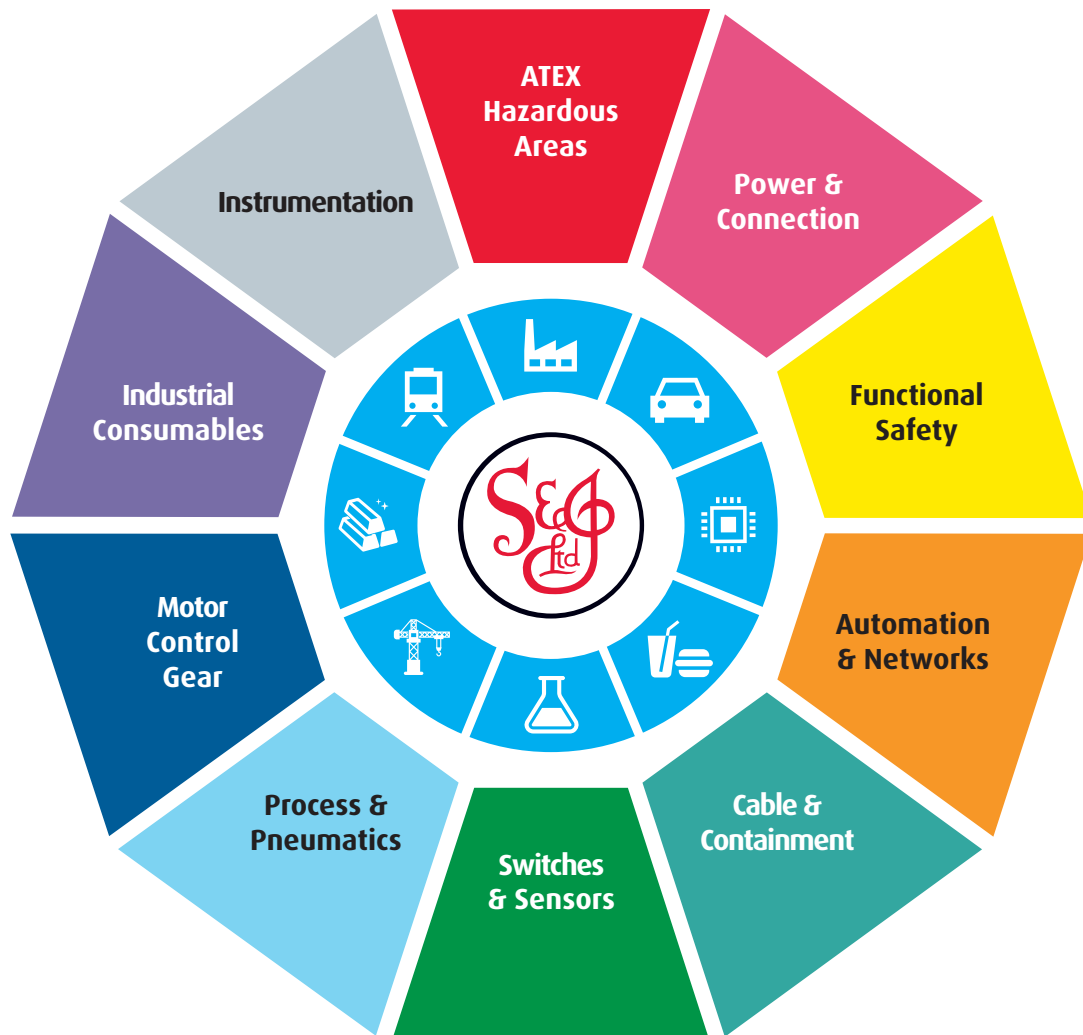
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