AXL F AI8 1F

Axioline F analog input module, 8 inputs, 2-wire connection method

Data sheet
7989_en_03

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1 Description

The module is designed for use within an Axioline F station.

It is used to acquire analog voltage and current signals.

Features

- Eight analog, bipolar input channels to connect either voltage or current signals
- Connection of sensors 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
- Device type label stored
- Diagnostic and status indicators

	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 from the product at phoenixcontact.net/products.

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3 Ordering data

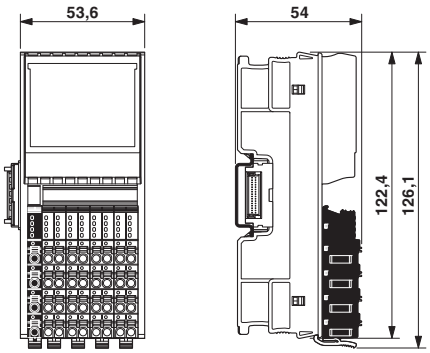
Description	Type	Order No.	Pcs./Pkt.
Axioline?F analog input module, 8 inputs: 0 - 10 V, ±10 V, 0 - 20 mA, 4 - 20 mA, ±20 mA, 2-wire connection method (including bus base module and connectors)	AXL F AI8 1F	2688064	1

Accessories	Type	Order No.	Pcs./Pkt.
Axioline F bus base module for housing type F (Replacement item)	AXL F BS F	2688129	5
Axioline F connector set (for e.g., AXL F AI8 1F, AXL F AO8 1F) (Replacement item)	AXL CNS 4L-O/D/UA/E1/E2	2700984	1
Axioline shield connection set (contains 2 busbar 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, Roll, white, unlabeled, can be labeled with: THERMOMARK ROLL, THERMOMARK ROLL X1, THERMOMARK X, THERMOMARK S1.1, Mounting type: snapped into marker carrier, Lettering field: 35 x 46 mm (Marking)	EMT (35X46)R	0801604	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	-	-

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	204 g (with connectors and bus base module)

General data

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

Designation	Axioline F connector
Connection method	Push-in connection
Conductor cross section solid / stranded	0.2 mm² ... 1.5 mm² / 0.2 mm² ... 1.5 mm²
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

Connection method	Bus base module
Transmission speed	100 MBit/s

Communications power

Communications power U_{Bus}	5 V DC (via bus base module)
Current consumption from U_{Bus}	typ. 105 mA, max. 130 mA
Power consumption at U_{Bus}	typ. 0.525 W

I/O supply

Supply of analog modules U_A	24 V DC
Maximum permissible voltage range	19.2 V DC ... 30 V DC (including all tolerances, including ripple)
Current consumption from U_A	typ. 35 mA max. 45 mA
Power consumption at U_A	typ. 0.84 W, max. 1.08 W
Surge protection	Electronic (35 V, 0.5 s)
Protection against polarity reversal	Polarity protection diode
Transient protection	Suppressor diode

Total power consumption of the module

Power consumption	typ. 1.365 W (at U_{Bus} and U_A), max. 1.605 W (at U_{Bus} and U_A)

Analog inputs

Number of inputs	max. 8 (Differential inputs, voltage or current can be chosen separately)
Connection method	Push-in connection
Connection method	2-wire (shielded, twisted pair)
Current input signal	0 mA ... 20 mA, 4 mA ... 20 mA, -20 mA ... 20 mA
Voltage input signal	0 V ... 5 V, -5 V ... 5 V, 0 V ... 10 V, -10 V ... 10 V
Resolution A/D	16 bit
A/D conversion time	2 µs
Limit frequency (3 dB)	30 Hz, 12 kHz (in fast mode)

Analog inputs	
Measured value representation	16 bits (15 bits + sign bit)
Data formats	IB IL, S7-compatible
Process data update	300 µs
Filtering	RFI filtering / passive TP 1st order
Input filter	30 Hz, 12 kHz and mean-value generation (can be parameterized)
Precision	0.1 % (of measuring range final value for active mean-value generation and 30 Hz filter)
Transient protection of inputs	Suppressor diode

differential inputs, voltage	
Number of inputs	8
Voltage input signal	0 V ... 5 V, -5 V ... 5 V, 0 V ... 10 V, -10 V ... 10 V
Input resistance of voltage input	268 kΩ (typical)
Open circuit response	Goes to 0 V
Common mode voltage range signal - ground	-50 V DC ... 50 V DC
Overload protection	±30 V DC, maximum

differential inputs, current	
Number of inputs	8
Current input signal	0 mA ... 20 mA, 4 mA ... 20 mA, -20 mA ... 20 mA
Input resistance current input	104 Ω (typical)
Open circuit response	Going to 0 mA; open-circuit detection from 4 mA ... 20 mA
Overload protection	No; ±5.2 V DC, maximum, I_{max} = 50 mA

Configuration and parameter data in a PROFIBUS system	
Required parameter data	27 Byte
Need for configuration data	6 Byte

Electrical isolation/isolation of the voltage areas	
Test section	**Test voltage**
Logic	500 V AC, 50 Hz, 1 min
Analog I/O	500 V AC, 50 Hz, 1 min
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 2004/108/EC	
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 surge voltage (surge) EN 61000-4-5/IEC 61000-4-5	Criterion B; supply lines DC: ±0.5 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	
Radio interference properties EN 55022	Class B

Approvals

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

5 Tolerance data

The following applies for tolerance values:

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

Default configuration: Filter with 30 Hz, 16-sample mean-value, IB IL format.

300 µs update time, fast mode (12 kHz filter, without mean-value generation)

Tolerances at T_A = 25°C				
	Absolute		Relative	
	Typ.	Max.	Typ.	Max.
0 V ... 5 V, ±5 V, 0 V ... 10 V, ±10 V	±50 mV	±80 mV	±0.5%	±0.8%
0 mA ... 20 mA, 4 mA ... 20 mA, ±20 mA	±100 µA	±160 µA	±0.5%	±0.8%

300 µs update time, default (30 Hz filter, 16-sample average value)

Tolerances at T_A = 25°C				
	Absolute		Relative	
	Typ.	Max.	Typ.	Max.
0 V ... 5 V, ±5 V, 0 V ... 10 V, ±10 V	±10 mV	±30 mV	±0.10%	±0.30%
0 mA ... 20 mA, 4 mA ... 20 mA, ±20 mA	±20 µA	±60 µA	±0.10%	±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 measuring range final value.

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

Tolerance and temperature response at T_A = -25°C to +60°C		
	Drift	
	Typical	Maximum
0 V ... 5 V, ±5 V, 0 V ... 10 V, ±10 V	±40 ppm/K	±70 ppm/K
0 mA ... 20 mA, 4 mA ... 20 mA, ±20 mA	±45 ppm/K	±85 ppm/K

The drift values refer to the relevant measuring range final value.

Tolerances influenced by electromagnetic interference			
		Current	Voltage
Electromagnetic fields	EN 61000-4-3/ IEC 61000-4-3	< ±1.0%	< ±2.0%
Fast transients (burst)	EN 61000-4-4/ IEC 61000-4-4	< ±1.0%	< ±1.0%
Conducted interference	EN 61000-4-6/ IEC 61000-4-6	< ±0.5%	< ±0.5%

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.).

6 Internal circuit diagram

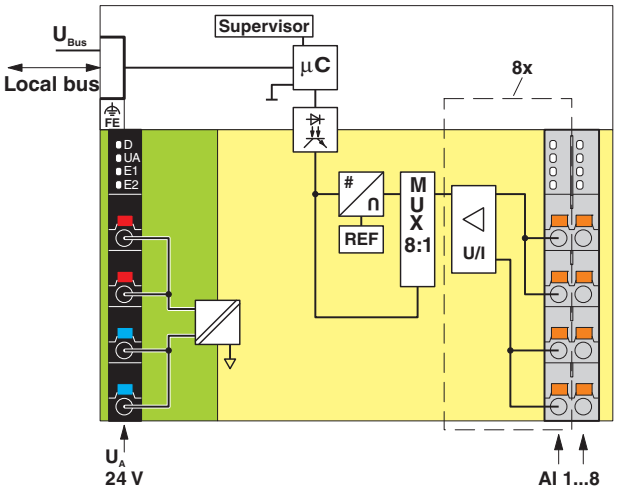


Figure 1 Internal wiring of the terminal points

Key:

Local bus	Axioline F local bus (hereinafter referred to as local bus)
µC	Microcontroller
	Optocoupler
	Power supply unit with electrical isolation
#	Analog/digital converter
MUX 8:1	Multiplexer
U/I	Input amplifier for current (I) or voltage (U)
REF	Reference voltage source
Supervisor	Hardware monitoring
	Electrically isolated areas

7 Terminal point assignment

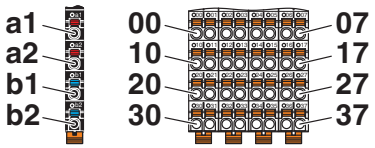


Figure 2 Terminal point assignment

Terminal point	Color	Assignment	
Supply voltage input			
a1, a2	Red	24 V DC (U_A)	Analog module supply (internally jumpered)
b1, b2	Blue	GND	Reference potential of the supply voltage (internally jumpered)
Analog inputs			
00 ... 07	Orange	U1+ ... U8+	Positive voltage connection for channels 1 ... 8
10 ... 17	Orange	U1- ... U8-	Negative voltage connection for channels 1 ... 8
20 ... 27	Orange	I1+ ... I8+	Positive current connection for channels 1 ... 8
30 ... 37	Orange	I1- ... I8-	Negative current connection for channels 1 ... 8

8 Connection examples

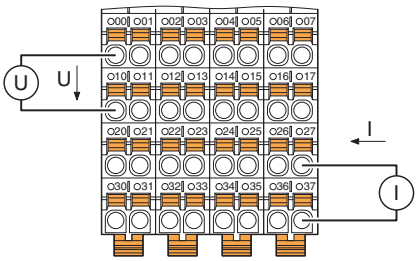


Figure 3 Connection for voltage and current measurement

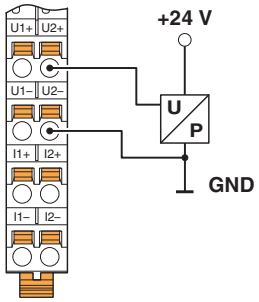


Figure 6 Differential voltage input with active 3-wire transmitter

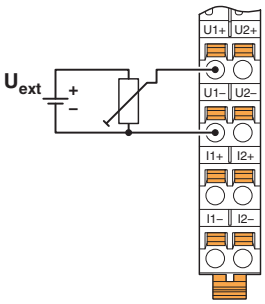


Figure 4 Connection of potentiometric position sensors

The values of potentiometric position sensors can be acquired with voltage measurement. Supply the potentiometer via an external power supply unit (U_{ext} = 10 V).

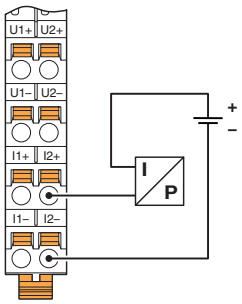


Figure 7 Differential current input with passive 2-wire transmitter

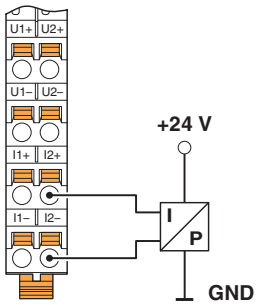


Figure 5 Passive pressure sensor at a differential current input

9 Connection notes

NOTE: Damage to the electronics/measuring errors

Always connect the analog sensors using shielded, twisted pair cables.

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

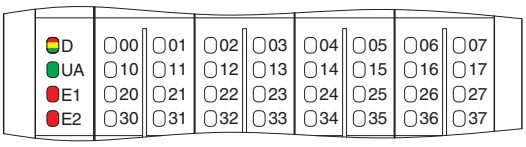
Connect the cable shield to functional earth immediately after the cables enter the control cabinet.

If there is no closed control cabinet, connect the shield to a shield bus.

Use the AXL SHIELD SET Axioline 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 SYS INST user manual.

10 Local status and diagnostic indicators



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

Figure 8 Local status and diagnostic 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. There are no faults.
		Active	Green flashing	The device is ready for operation, communication within the station is OK. The data is **not** valid. Valid data from the controller/higher-level network not available. There is no fault in 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-on.
		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	Red flashing	The device is ready for operation but there is no connection to the previously existing device.
		Power down	OFF	Device in (power) reset.
UA	Green	U_{Analog}	ON	Supply of analog modules present
			OFF	Supply of analog modules not present
E1	Red	Supply voltage error	ON	Supply voltage is faulty.
			OFF	Supply voltage is present.
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
Underrange	OFF	ON
Overrange	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

The error that can actually be reported depends on the measuring range. For additional information please refer to the tables with significant measured values in various formats.

11 Process data

The module uses eight input process data words.

Each channel is mapped to a word.

Input words IN0 to IN7

The measured values are transmitted to the controller board or the computer by means of the process data input words IN0 to IN7.

The I/O data is mapped as follows.

The measured values are depicted in IB IL or S7-compatible format. In both cases, the measured value is displayed in 16 bit format. The data type is Integer 16 from a technical programming point of view.

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

In the IB IL format a diagnostic code is mapped to the input data in the event of an error.

Code (hex)	Cause
8001	Measuring range exceeded (overrange)
8002	Open circuit
8004	Measured value invalid/no valid measured value available
8020	Faulty supply voltage
8040	Device faulty
8080	Below measuring range (underrange)

12 Significant values in various formats

12.1 Significant values in IB IL format

Input 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
8001	Overrange	> +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
0001	1	+333.33 µV	+333.33 µV	+166.67 µV	+166.67 µV	+0.6667 µA	+0.6667 µA	+4.0005333
0000	0	≤ 0	0	≤ 0	0	≤ 0	0	+4.0 ... +3.2
FFFF	-1		-333.33 µV		-166.67 µV		-0.6667 µA	
8AD0	-30000		-10.0		-5.0		-20.0	
8100	-32512		-10.837		-5.419		-21.6747	
8080	Underrange		< -10.837		< -5.419		< -21.6747	
8002	Open circuit							< +3.2

The maximum measured value is $7F00_{hex}$.

Depending on the measuring range, the minimum measured value is either 0000_{hex} or 8100_{hex}.

12.2 Significant values in S7-compatible format

Input 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	Overrange	> +11.759	> +11.759	> +5.879	> +5.879	> +23.5157	> +23.5157	> +22.8142
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
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		-361.69 µV		-180.85 µV		-0.7234 µA	+3.9994
F940	-1728		-0.625		-0.3125		-1.25	+3.0
9400	-27648		-10.0		-5.0		-20.0	
8100	-32512		-11.759		-5.879		-23.5157	
8000	Under-range/open circuit		< -11.759		< -5.879		< -23.5157	< +1.1852

The maximum measured value is $7EFF_{hex}$.

Depending on the measuring range, the minimum measured value is either 0000_{hex} or 8100_{hex}.

12.3 Calculation of the measured value from the process data input value

The following examples explain the calculation of the measured value from the process data input value for the measuring range 4 mA to 20 mA.

PD IW = Process data input word = input data

IB IL format

Resolution = (20 mA - 4 mA) / 30000 = 0.0005333

Measured value = PD-EW x 0.0005333 mA +4 mA

Example 1

PD IW	$493F_{hex} = 18751_{dec}$
Value x resolution	18751 x 0.000533 mA = 10 mA
+ 4 mA	10 mA + 4 mA = 14 mA
Measured value	14 mA

S7-compatible format

Resolution = (20 mA - 4 mA) / 27648 = 0.0005787

Measured value = PD IW x 0.0005787 mA + 4 mA

Example 1

PD IW	$6C00_{hex} = 27648_{dec}$
Value x resolution	27648 x 0.0005787 mA = 16 mA
+ 4 mA	16 mA + 4 mA = 20 mA
Measured value	20 mA

Example 2

PD IW	$F940_{hex}$ -> $FFFF_{hex}$ - $F940_{hex}$ + 1 = -1728_{dec}
Value x resolution	-1728 x 0.0005787 mA = -1 mA
+ 4 mA	-1 mA + 4 mA = 3 mA
Measured value	3 mA

13 Parameter, diagnostics and information (PDI)

Parameter and diagnostic data as well as other information is transmitted 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 object codes and data types.

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

Every visible string is terminated with a zero terminator (00_{hex}). The length of a visible string element is therefore one byte larger than the amount of user data.

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

14 Standard objects

14.1 Objects for identification (device rating plate)

Index (hex)	Object name	Object type	Data type	A	L	Rights	Meaning	Contents
Manufacturer								
0001	VendorName	Var	Visible String	1	16	R	Vendor name	Phoenix Contact
0002	VendorID	Var	Visible String	1	7	R	Vendor ID	00A045
0003	VendorText	Var	Visible String	1	49	R	Vendor text	Components and systems for industrial automation
0012	VendorURL	Var	Visible String	1	23	R	Vendor URL	www.phoenixcontact.com
Module - general								
0004	DeviceFamily	Var	Visible String	1	14	R	Device family	I/O analog IN
0006	ProductFamily	Var	Visible String	1	6	R	Product family	AXL F
000E	CommProfile	Var	Visible String	1	4	R	Communication profile	633
000F	DeviceProfile	Var	Visible String	1	5	R	Device profile	0010
0011	ProfileVersion	Record	Visible String	2	11; 22	R	Profile version	2009-10-22; Basic - Profile V1.12
003A	VersionCount	Array	Unsigned 16	4	4 * 2	R	Version counter	e. g., 0007 0001 0001 0001_{hex}
Module - special								
0005	Capabilities	Array	Visible String	1	8	R	Features	Nothing
0007	ProductName	Var	Visible String	1	13	R	Product name	AXL F AI8 1F
0008	SerialNo	Var	Visible String	1	11	R	Serial number	xxxxxxxxxx (e. g., 1234512345)
0009	ProductText	Var	Visible String	1	24	R	Product text	8 analog input channels
000A	OrderNumber	Var	Visible String	1	8	R	Order No.	2688064
000B	HardwareVersion	Record	Visible String	2	11; 3	R	Hardware version	e. g., 2010-06-21; 01
000C	FirmwareVersion	Record	Visible String	2	11; 6	R	Firmware version	e. g., 2010-06-21; V1.10
000D	PChVersion	Record	Visible String	2	11; 6	R	Parameter channel version	2010-01-08; V1.00
0037	DeviceType	Var	Octet string	1	8	R	Module identification	00 20 00 10 00 00 00 $A0_{hex}$
Use of the device								
0014	Location	Var	Visible String	1	59	R/W	Location	Can be filled out by the user.
0015	EquipmentIdent	Var	Visible String	1	59	R/W	Equipment identifier	Can be filled out by the user.
0016	ApplDeviceAddr	Var	Unsigned 16	1	2	R/W	Application device address	Can be filled out by the user.

14.2 Object for multilingual capacity

Index (hex)	Object name	Object type	Data type	A	L	Rights	Meaning	Contents
0017	Language	Record	Visible String	2	6; 8	R	Language	en-us; English

14.3 Object descriptions

Index (hex)	Object name	Object type	Data type	A	L	Rights	Meaning
0038	ObjDescrReq	Record		2	3	Read, write	Object description request
0039	ObjDescr	Record		16	See subindi-ces	Read	Object description

These objects are only important for tools and are therefore not described in more detail here.

Please refer to the basic profile for comprehensive information.

14.4 Diagnostics objects

Index (hex)	Object name	Object type	Data type	A	L	Rights	Assignment
0018	DiagState	Record		6	2; 1; 1; 2; 1; 14	R	Diagnostic state
0019	ResetDiag	Var	Unsigned 8	1	1	W	Reset diagnostics

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

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

0018_{hex}: DiagState (Read)					
Subindex	**Data type**	**Length in bytes**	**Meaning**	**Contents**	
0	Record	21	Diagnostic state	Complete diagnostics information	
1	Unsigned 16	2	Error number	0 ... 65535_{dez}	
2	Unsigned 8	1	Priority	00_{hex}	No error
				01_{hex}	Error
				02_{hex}	Warning
				81_{hex}	Error removed
				82_{hex}	Warning eliminated
3	Unsigned 8	1	Channel/group/module	00_{hex}	No error
				01_{hex}	Channel 1
				:	:
				08_{hex}	Channel 8
				FF_{hex}	entire device
4	Unsigned 16	2	Error code	See table below	
5	Unsigned 8	1	More follows	00_{hex}	
6	Visible String	14	Text (14 characters)	See table below	

The message with the priority 81_{hex} or 82_{hex} is a one-time internal message to the bus coupler that is implemented onto the error mechanisms of the higher-level system by the bus coupler.

Error and status of the local status and diagnostics indicators

Subindex	2	3	4		6					
Error	Priority	Channel/ group/ module	Error code		Text	Process data	LED			
	hex	hex	hex	dec			D	UA	E1	E2
No error	00	00	0000	0	Status OK	xxxx	Green ON	ON	OFF	OFF
Faulty supply voltage	01	FF	5160	20832	Supply fail	8020	Flashing green/ yellow	OFF	ON	ON
Device error	01	FF	6301	25345	CS FLASH	8040	Green ON	ON	OFF	ON
Flash format error	01	FF	6302	25346	FO FLASH	8040	Green ON	ON	OFF	ON
Parameter table invalid	01	FF	6320	25376	Invalid para	8010	Green ON	ON	OFF	ON
Open circuit	01	01 ... 08	7710	30480	Open circuit	8002	Green ON	ON	OFF	ON
Overrange	02	01 ... 08	8910	35088	Overrange	8001	Green ON	ON	OFF	ON
Underrange	02	01 ... 08	8920	35104	Underrange	8080	Green ON	ON	OFF	ON

14.4.2 Reset diagnostic mesages (0019_{hex}: ResetDiag)

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

0019_{hex}: ResetDiag (Write)					
Subindex	Data type	Length in bytes	Meaning	Contents	
0	Unsigned 8	1	Reset diagnostics	00_{hex}	All diagnostic messages approved
				02_{hex}	Deletes and acknowledges all pending diagnostic messages that have not been read out
				06_{hex}	Deletes and acknowledges all the diagnostic messages, resets the error counter, and allows no further diagnostic messages
				Other	Reserved

14.5 Objects for process data management

Index (hex)	Object name	Object type	Data type	A	L	Rights	Assignment
0025	PDIN	Var	Octet string	1	16	R	Input process data
0026	PDOUT	Var	Octet string	1	16	R	OUT process data; not applicable
003B	PDIN_Descr	Record		3	12	R	Description of the IN process data
003C	PDOUT_Descr	Record		3	12	R	Description of the output process data

Objects $003B_{hex}$ and $003C_{hex}$ are only applicable to tools and are therefore not described in more detail here.

Please refer to the basic profile for comprehensive information.

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

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

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

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

15 Application objects

Index (hex)	Object name	Object type	Data type	A	L	Rights	Assignment
0080	ParaTable	Array	Unsigned 16	10	10 * 2	R/W	Parameter table
0082	Measured Value Float	Array	Octet string	8	8 * 6	R	Measured values in the extended float format

15.1 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}: ParaTable (read, write)				
Subindex	**Data type**	**Length in bytes**	**Meaning**	**Default value**
0	Array of Unsigned 16	10 * 2	Read/write all elements	See subindices
1	Unsigned 16	2	Parameterization of channel 1	0000_{hex}
:	Unsigned 16	2	:	0000_{hex}
8	Unsigned 16	2	Parameterization of channel 8	0000_{hex}
9	Unsigned 16	2	Data format	0000_{hex}
10	Unsigned 16	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	Filter	0	0	Mean-value		0	0	0	0	Measuring range			

Filter	Code (bin)	Code (hex)
30 Hz (default)	0	0
12 kHz	1	1

Measuring 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
Reserved	0111 ... 1110	7 ... E
Channel inactive	1111	F

Mean-value	Code (bin)	Code (hex)
16-sample (default)	00	0
No mean-value	01	1
4-sample	10	2
32-sample	11	3

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

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

15.2 Measured value in extended float format (0082_{hex}: Measured Value Float)

You can read the IN process data in IB IL or S7-compatible format with the 0025_{hex} object.

The 0082_{hex} object is also available.

This object provides the measured value in the highest internal accuracy of the terminal in the float format.

0082_{hex}: Measured Value Float (Read)			
Subindex	**Data type**	**Length in bytes**	**Meaning**
0	Array of Records	8 * 6	Read all elements
1	Record	6	Measured value for channel 1
:	:	:	:
8	Record	6	Measured value for channel 8

Channel 1 ... channel 8 measured value

Element	Data type	Length in bytes	Meaning
1	Float 32	4	Measured value in float format according to IEEE 754
2	Unsigned 8	1	Status
3	Unsigned 8	1	Unit

Structure of the float format according to IEEE 754 in the bit representation:

VEEE EEEE	EMMM MMMM	MMMM MMMM	MMMM MMMM

V 1 sign bit, 0: positive, 1: negative

E 8 bits exponent with offset $7F_{hex}$

M 23 bits mantissa

Some example values for conversion from floating point to hexadecimal representation:

Floating point	Hexadecimal representation
1.0	3F 80 00 00
10.0	41 20 00 00
1.03965528	3F 85 13 6D
- 1.0	BF 80 00 00

Extended Float Format

Extended Float Format is a specially defined format. It consists of the measured value in float format, a status, and a unit.

Status is necessary because the float format defines no patterns providing information on the status of the numerical value.

The status corresponds to the LSB of the diagnostic code in IB IL format (e.g., overrange: status = 01, diagnostic code = 8001_{hex}). If status = 0, the measured value is valid.

Unit	Code
Volt (V)	58 ($3A_{hex}$)
Milliampere (mA)	39 (27_{hex})

Status	Code
Measured value is valid	00_{hex}
Measured value is invalid	Other

16 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.