AXL F AI4 U 1H

Axioline F analog input module, 4 voltage inputs, integrated sensor supply

Data sheet
8659_en_03

1 Description

Valid from firmware version 1.10.

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

It is used to acquire analog voltage signals.

Features

– 4 analog, bipolar input channels for the connection of voltage signals
– Connection of sensors in 2, 3, and 4-wire technology
– Voltage ranges: 0 V ... 10 V, ±10 V, 0 V ... 5 V, ±5 V
– Simultaneous scanning of all channels by means of simultaneous sampling
– High crosstalk attenuation between the channels, thanks to separate signal paths
– Particularly robust against electromagnetic interference
– Device type label stored
– Diagnostic and status indicators

i	This data sheet is only valid in association with the UM EN AXL F SYS INST user manual.
i	Make sure you always use the latest documentation. It can be downloaded from the product at phoenixcontact.net/products.

PHŒNIX CONTACT

**INSPIRING INNOVATIONS**

2 Table of contents

3   Ordering data

Description	Type	Order No.	Pcs./Pkt.
Axioline F analog input module, 4 inputs: 0 - 5 V, ±5 V, 0 - 10 V, ±10 V, 2, 3, and 4-conductor connection technology, integrated sensor supply (including bus base module and connectors)	AXL F AI4 U 1H	2688501	1

Accessories	Type	Order No.	Pcs./Pkt.
Axioline F bus base module for housing type H (Replacement item)	AXL F BS H	2700992	5
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, un-printed, 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 28 mm (Marking)	EMT (35X28)R	0801602	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)
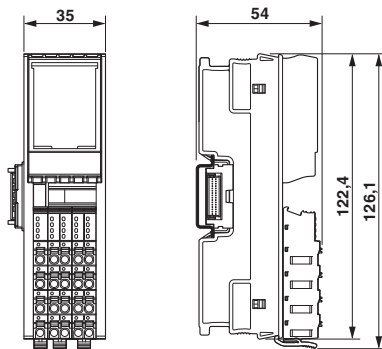
Width	35 mm
Height	126.1 mm
Depth	54 mm
Note on dimensions	The depth is valid when a TH 35-7.5 DIN rail is used (according to EN 60715).

General data

Color	traffic grey A RAL 7042
Weight	145 g (with connectors and bus base module)
Ambient temperature (operation)	-25 °C ... 60 °C
Ambient temperature (storage/transport)	-40 °C ... 85 °C

General data

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

> ℹ️ 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. 120 mA, max. 150 mA

I/O supply

Supply for analog modules U_A	24 V DC (I/O supply and sensor supply)
Maximum permissible voltage range	19.2 V DC ... 30 V DC (including all tolerances, including ripple)
Current consumption from U_A	typ. 38 mA (I_{iS} = 0 mA) max. 45 mA (I_{iS} = 0 mA) typ. 118 mA (I_{iS} = 4 x 20 mA (nominal load)) max. 125 mA (I_{iS} = 4 x 20 mA (nominal load)) typ. 238 mA (I_{iS} = 4 x 50 mA (full load)) max. 245 mA (I_{iS} = 4 x 50 mA (full load))
Surge protection	Electronic (35 V, 0.5 s)
Protection against polarity reversal	Polarity protection diode
Transient protection	Suppressor diode

Sensor supply U_{iS}

Supply voltage	24 V DC (from U_A)
Current consumption	max. 50 mA (per channel)
Short-circuit protection	PTC resistor

Total power consumption of the module

Power consumption	typ. 1.5 W (at U_{Bus} and U_A), max. 1.83 W (at U_{Bus} and U_A)

Analog inputs

Number of inputs	max. 4 (differential inputs, voltage)
Connection method	Push-in connection
Connection method	2, 3, 4-wire (shielded)
Voltage input signal	0 V ... 5 V , -5 V ... 5 V , 0 V ... 10 V , -10 V ... 10 V
Resolution A/D	16 bit

Analog inputs

A/D conversion time	31.25 µs
Limit frequency (3 dB)	30 Hz , 12 kHz
Measured value representation	16 bits (15 bits + sign bit)
Data formats	IB IL, S7-compatible
Process data update	160 µs
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
Input resistance of voltage input	268 kΩ (typical)
Common mode voltage range signal - ground	-50 V DC ... 50 V DC
Overload protection	±30 V DC, maximum

Configuration and parameter data in a PROFIBUS system

Required parameter data	7 Byte
Need for configuration data	6 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 inputs	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 inputs	500 V AC, 50 Hz, 1 min
24 V supply (I/O) / functional earth ground	500 V AC, 50 Hz, 1 min
Analog inputs/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.

160 µs update time (12 kHz filter, without mean-value generation)

Tolerances at T_A = +25°C				
Measuring range	**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%

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

Tolerances at T_A = +25°C				
Measuring range	**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%

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		
Measuring range	**Drift**	
	Typical	**Maximum**
0 V ... 5 V, ±5 V, 0 V ... 10 V, ±10 V	±100 ppm/K	±150 ppm/K

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

Tolerances influenced by electromagnetic interference		
Electromagnetic fields	EN 61000-4-3/ IEC 61000-4-3	< ±0.1 %
Fast transients (burst)	EN 61000-4-4/ IEC 61000-4-4	< ±0.1 %
Conducted interference	EN 61000-4-6/ IEC 61000-4-6	< ±0.1 %

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

Key:

Local bus	Axioline F local bus (hereinafter referred to as local bus)
Supervisor	Hardware monitoring
µC	Microcontroller
	Optocoupler with bipolar buffer
	Power supply unit with electrical isolation
# ∩	Analog/digital converter
◁	Input amplifier
REF	Reference voltage source
	Electrically isolated areas
	Noiseless ground
	Analog I/O reference ground
	Logic reference ground
	Reference ground of sensor supply U_{iS}
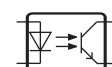
Figure 1   Internal wiring of the terminal points

7 Terminal point assignment
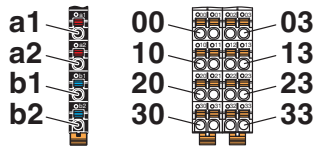
Figure 2   Terminal point assignment

Terminal point	Color	Assignment	
Supply voltage input			
a1, a2	Red	24 V DC (U_A)	Supply for analog modules (bridged internally)
b1, b2	Blue	GND	Reference potential of the supply voltage (internally jumpered)
Analog inputs			
00 ... 03	Orange	U1+ ... U4+	Positive voltage connection for channel 1 ... 4
10 ... 13	Orange	U1- ... U4-	Negative voltage connection for channel 1 ... 4
20 ... 23	Orange	$U_{iS}1$ ... $U_{iS}4$	24 V sensor supply for channel 1 ... 4
30 ... 33	Orange	GND	Reference potential of sensor supply

8 Connection examples
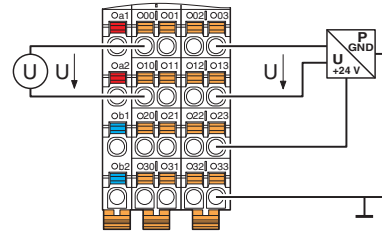
Figure 3   Connector for voltage measurement
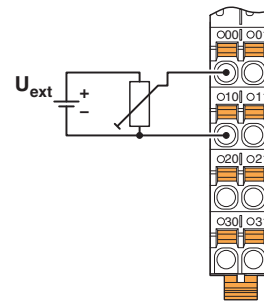
Figure 4   Connection of potentiometric position sensors

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).
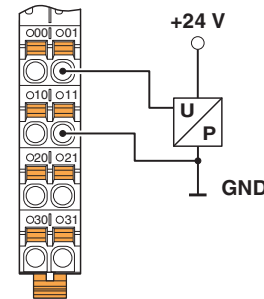
Figure 5   Differential voltage input with active 3-wire transmitter

9 Connection notes

> **NOTE: Damage to the electronics/mea-suring 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 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 man-ual.

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 6   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	Flashing red	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 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
Underrange	OFF	ON
Overrange	OFF	ON
Supply voltage faulty (supply for analog modules U_A)	ON	ON
Parameter table invalid	OFF	ON
Device error	OFF	ON
Flash format error	OFF	ON

ℹ️ 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 four words of IN process data.

Each channel is mapped to a word.

Input words IN0 to IN3

The measured values are transmitted to the controller board or the computer using process data input words IN0 to IN3.

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.

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)
8004	Measured value invalid/no valid measured value available
8020	Supply voltage faulty (supply for analog modules U_A)
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
hex	dec	V	V	V	V
8001	Overrange	> +10.837	> +10.837	> +5.419	> +5.419
7F00	32512	+10.837	+10.837	+5.419	+5.419
7530	30000	+10.0	+10.0	+5.0	+5.0
0001	1	+333.33 µV	+333.33 µV	+166.67 µV	+166.67 µV
0000	0	≤ 0	0	≤ 0	0
FFFF	-1		-333.33 µV		-166.67 µV
8AD0	-30000		-10.0		-5.0
8100	-32512		-10.837		-5.419
8080	Underrange		< -10.837		< -5.419

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
hex	dec	V	V	V	V
7FFF	Overrange	> +11.759	> +11.759	> +5.879	> +5.879
7EFF	32511	+11.759	+11.759	+5.879	+5.879
6C00	27648	+10.0	+10.0	+5.0	+5.0
0001	1	+361.69 µV	+361.69 µV	+180.85 µV	+180.85 µV
0000	0	≤ 0	0	≤ 0	0
FFFF	-1		-361.69 µV		-180.85 µV
F940	-1728		-0.625		-0.3125
9400	-27648		-10.0		-5.0
8100	-32512		-11.759		-5.879
8000	Underrange		< -11.759		< -5.879

The maximum measured value is 7EFF$_{hex}$.

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

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

i 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.

i 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	30	R	Vendor URL	http://www.phoenix-contact.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; 20	R	Profile version	2011-12-07; Basis - Profil V2.0
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	Energ_0
0007	ProductName	Var	Visible String	1	15	R	Product name	AXL F AI4 U 1H
0008	SerialNo	Var	Visible String	1	11	R	Serial number	xxxxxxxxxx (e. g., 1234512345)
0009	ProductText	Var	Visible String	1	24	R	Product text	4 analog input channels
000A	OrderNumber	Var	Visible String	1	8	R	Order No.	2688501
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 08 00 00 00 A5$_{hex}$
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 subindices	Read	Object description

i	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
				:	:
				04$_{hex}$	Channel 4
				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	

> **i** 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			D	UA	E1	E2
No error	00	00	0000	Status OK	xxxx	Green ON	ON	OFF	OFF
Supply voltage faulty (supply for analog modules U$_A$)	01	FF	5160	Supply fail	8020	Flashing green/yellow	OFF	ON	ON
Device error	01	FF	6301	CS FLASH	8040	Green ON	ON	OFF	ON
Flash format error	01	FF	6302	FO FLASH	8040	Green ON	ON	OFF	ON
Parameter table invalid	01	FF	6320	Invalid para	8010	Green ON	ON	OFF	ON
Overrange	02	01 ... 04	8910	Overrange	8001	Green ON	ON	OFF	ON
Underrange	02	01 ... 04	8920	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 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	8	R	Input process data
0026	PDOUT	Var	Octet string	1	8	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

> **i** 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	8	Input process data

14.6   Objects for device management

These objects are available as of firmware 1.10.

Index (hex)	Object name	Object type	Data type	A	L	Rights	Meaning
002D	ResetParam	Simple variable	Unsigned 8	1	1	R/W	Reset parameterization
002E	CheckSum	Simple variable	Unsigned 32	1	4	R	Checksum

14.6.1 Reset parameterization (002D$_{hex}$: ResetParam)

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

To reset the module value 01_{hex} must be transferred during write access. Any other values are not permissible and will be acknowledged with an error.

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

14.6.2 Checksum (002E$_{hex}$: Checksum)

The data of the startup objects is verified with this CRC32 checksum.

Checksum for the default setting: 9C 09 21 54$_{hex}$

15 Application objects

Index (hex)	Object name	Object type	Data type	A	L	Rights	Assignment
0080	ParaTable	Array	Unsigned 16	6	6 * 2	R/W	Parameter table
0082	Measured Value Float	Array	Octet string	4	4 * 6	R	Measured values in the extended float format
0083	PD Min	Array	Integer 16	4	4 * 2	R	Minimum process data value
0084	PD Max	Array	Integer 16	4	4 * 2	R	Maximum process data value

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	6 * 2	Read/write all elements	See subindices
1	Unsigned 16	2	Parameterization of channel 1	0000$_{hex}$
:	Unsigned 16	2	:	0000$_{hex}$
4	Unsigned 16	2	Parameterization of channel 4	0000$_{hex}$
5	Unsigned 16	2	Data format	0000$_{hex}$
6	Unsigned 16	2	Reserved	0000$_{hex}$

Parameterization channel 1 ... channel 4

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
Channel inactive	1111	F
Reserved	Other	

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 (0082hex: Measured Value Float)

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

The 0082hex object is also available.

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

0082hex: Measured Value Float (Read)			
Subindex	**Data type**	**Length in bytes**	**Meaning**
0	Array of Records	4 * 6	Read all elements
1	Record	6	Measured value for channel 1
:	:	:	:
4	Record	6	Measured value channel 4

Measured value channel 1 ... channel 4

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 7Fhex
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 = 8001hex). If status = 0, the measured value is valid.

Unit	**Code**
Volt (V)	58 (3Ahex)

Status	**Code**
Measured value is valid	00hex
Measured value is invalid	Other

15.3 Minimum process data value (0083_{hex}: PD Min)

Object 0083_{hex} can be used to read the minimum IN process data values.

The values are initialized after each parameterization. The highest value is assigned for the minimum process data value.

PD Min = 7FFF 7FFF 7FFF $7FFF_{hex}$

On every analog conversion, the PD Min value is compared with the current measured values and overwritten if necessary.

0083_{hex}: PD Min (Read)			
Subindex	Data type	Length in bytes	Meaning
0	Array of Integer 16	4 * 2	Read all elements
1	Integer 16	2	Minimum process data value channel 1
:	:	:	:
4	Integer 16	2	Minimum process data value channel 4

15.4 Maximum process data value (0084_{hex}: PD Max)

Object 0084_{hex} can be used to read the maximum IN process data values.

The values are initialized after each parameterization. The lowest value is assigned for the maximum process data value.

PD Max = 8000 8000 8000 8000_{hex}

On every analog conversion, the PD Max value is compared with the current measured values and overwritten if necessary.

0084_{hex}: PD Max (Read)			
Subindex	Data type	Length in bytes	Meaning
0	Array of Integer 16	4 * 2	Read all elements
1	Integer 16	2	Maximum process data value channel 1
:	:	:	:
4	Integer 16	2	Maximum process data value channel 4

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.