

Software Manual

SCHUNK Sensors with IO-Link

Imprint

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Best regards,

Your SCHUNK team

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1 General

1.1 Applicable documents

- General terms of business*
- Documentation for the products used *

The documents marked with an asterisk (*) can be downloaded on our homepage schunk.com

1.2 IO-Link Basics

Fieldbus independent interface

IO-Link is a point-to-point interface for connecting a SCHUNK product (IO-Link device) to a control system (IO-Link master). Via this interface it is possible to transfer parameters, process data and diagnostic data. Parameter data are transferred to the IO-Link device from the master (actuator or sensors). In the opposite direction, the master receives cyclical process data and, if required, service and diagnostic data.

Further information on IO-Link can be found at www.io-link.com.

1.3 Data exchange

Cyclical data exchange

To exchange cyclic process data between an IO-Link device and a controller, the IO-Link data are transferred from the IO-Link master to the previously set address ranges. The user program of the controller accesses the process values via these addresses and processes them. Conversely, the cyclical data exchange is performed from the controller to the IO-Link device.

Further information, [Cyclical process data \(status word\)](#) [► 5].

Acyclical data exchange

The exchange of acyclic data, such as parameters or events, takes place over a specified index and sub-index range. Using the index and sub-index range, it is possible to access the data of the device in a targeted manner (e.g. for a reparameterization of the device or master during operation).

Further information, [Acyclical device data and events](#) [► 6].

2 Cyclic process data (status word)

To determine the current position value, the following cyclic data is provided:

Current position

Name	Current position
Description	Current process value
Data type	UIntegerT
Bit length	16-bit
Bit offset	0
Value range	0 – 10000 (depending on the entered value for stroke per base jaw)
Factor	0.01
Offset	-
Unit	mm

3 Acyclic device data and events

Identification data, parameters and diagnosis information (device status, error notification) and current values (current position, temperature, reverberaton values) and events are transmitted acyclically upon request of the IO-Link master.

3.1 Identification data

The following acyclic data is provided for identification:

Name	Index	Sub index	Data type	Data size [Byte]	Access rights *	Factory settings
Manufacturer name	16	Sub 0	StringT	max. 19	ro	SCHUNK GmbH und Co. KG
Manufacturer text	17	Sub 0	StringT	max. 11	ro	schunk.com
Product name	18	Sub 0	StringT	max. 6	ro	MMS 22
Product ID	19	Sub 0	StringT	max. 6	ro	
Product text	20	Sub 0	StringT	max. 16	ro	Magnetic switch
Serial number	21	Sub 0	StringT	max. 12	ro	
Hardware version	22	Sub 0	StringT	max. 32	ro	HW-V1.0
Firmware version	23	Sub 0	StringT	max. 3	ro	FW-V1.0
Application-specific marking	24	Sub 0	StringT	max. 32	rw	

- * ro (read permissions only)
- rw (read and write permissions)
- wo (write permissions only)

3.2 Parameter

The following acyclic data is provided for the parameters:

Command Reply

Name	Sensor Command Reply
Description	Response of the sensor
Index	65
Sub index	Sub 0
Data type	UIntegerT
Length	8-bit
Access rights	ro (read permissions only)
Factory settings	0
Value range	0=[0] No Parameter 1=[1] Teaching started 2=[2] Teaching finished 3=[3] Saving data done 4=[4] Canceled 5=[5] Teach Error 6=[6] Command not allowed in this state 7=Programming successful 8=Factory settings restored
Factor	-
Offset	-
Unit	-

Teach command

Name	Sensor Teach command
Description	Teaching in process is started
Index	66
Sub index	0
Data type	UIntegerT
Length	8-bit
Access rights	wo (write permissions only)
Factory settings	0
Value range	0=[0] No command 3=[3] Start teaching Magnetic Field
Factor	-
Offset	-
Unit	-

Stroke per jaw

Name	Stroke per jaw
Description	Jaw stroke of the gripper (1 mm - 100 mm)
Index	72
Sub index	0
Data type	UIntegerT
Length	16-bit
Access rights	rw (read and write permissions)
Factory settings	1000
Value range	100 - 10000
Factor	0.01
Offset	-
Unit	mm

Magnet Teaching Tool

Name	Magnet Teaching Tool
Description	Allow teaching with teaching in tool in SIO mode Forbid teaching with teaching in tool in SIO mode
Index	73
Sub index	0
Data type	UIntegerT
Length	8-bit
Access rights	rw (read and write permissions)
Factory settings	0
Value range	0=[0] Allowed 1=[1] Forbidden
Factor	-
Offset	-
Unit	-

Standard command	Standard command	
	Name	Standard command
	Description	Sensor is reset to factory settings. Data is saved (after successful teaching in process). Current mode / command ended.
	Index	124
	Sub index	0
	Data type	UIntegerT
	Length	8-bit
	Access rights	wo (write permissions only)
	Factory settings	
	Value range	10=Restore Factory Settings 1=Save Data 2=Cancel
	Factor	-
	Offset	-
	Unit	-

3.3 Observation

The following cyclic data is provided for observation:

Current position	Current position	
	Name	Current position
	Description	Current gripping position is displayed
	Index	67
	Sub index	0
	Data type	UIntegerT
	Length	16-bit
	Access rights	ro (read permissions only)
	Factory settings	0
	Value range	0-10000 (depending on the entered value for stroke per jaw)
	Factor	0.01
	Offset	-
	Unit	mm

Current temperature	Current temperature	
	Name	Current temperature
	Description	Current sensor temperature is displayed
	Index	68
	Sub index	0
	Data type	IntegerT
	Length	8-bit

Name	Current temperature
Access rights	ro (read permissions only)
Factory settings	0
Value range	-128 ... 0 ... 127
Factor	-
Offset	-
Unit	°C

Current voltage

Name	Current voltage
Description	Current sensor supply voltage is displayed
Index	69
Sub index	0
Data type	UIntegerT
Length	8-bit
Access rights	ro (read permissions only)
Factory settings	0
Value range	18 – 30
Factor	-
Offset	-
Unit	V

Hall 1

Name	Hall 1
Description	Current value of sensor hall element 1 is displayed
Index	87
Sub index	0
Data type	UIntegerT
Length	16-bit
Access rights	ro (read permissions only)
Factory settings	0
Value range	0 – 1023
Factor	-
Offset	-
Unit	-

Hall 2

Name	Hall 2
Description	Current value of sensor hall element 2 is displayed
Index	88
Sub index	0
Data type	UIntegerT
Length	16-bit
Access rights	ro (read permissions only)
Factory settings	0
Value range	0 – 1023
Factor	-
Offset	-
Unit	-

Hall 3

Name	Hall 3
Description	Current value of sensor hall element 3 is displayed
Index	89
Sub index	0
Data type	UIntegerT
Length	16-bit
Access rights	ro (read permissions only)
Factory settings	0
Value range	0 – 1023
Factor	-
Offset	-
Unit	-

3.4 Diagnosis

3.4.1 Device status

The following cyclic data is provided for diagnosis:

Device status

Name	Device status
Description	Current device status is displayed
Index	121
Sub index	0
Data type	UIntegerT
Length	8-bit
Access rights	ro (read permissions only)
Factory settings	0
Value range	0=Device is OK 1=Device fault 2=Device is outside of specification
Factor	-
Offset	-
Unit	-

Detailed device status

Name	Detailed device status [1]
Description	Current temperature fault / warnings are displayed
Index	122
Sub index	
Data type	UIntegerT
Length	8-bit
Access rights	ro (read permissions only)
Factory settings	0
Value range	0= – 3=Insufficient temperature 4=Excessive temperature
Factor	-
Offset	-
Unit	-

Name	Detailed device status [2]
Description	Current voltage fields/warnings are displayed
Index	123
Sub index	
Data type	UIntegerT
Length	8-bit
Access rights	ro (read permissions only)
Factory settings	0
Value range	0= – 1=Insufficient voltage 2=Excessive voltage
Factor	-
Offset	-
Unit	-

Last fault

Name	Last fault [1] – [5]
Description	The last 5 errors are displayed
Index	106 – 110
Sub index	
Data type	UIntegerT
Length	8-bit
Access rights	ro (read permissions only)
Factory settings	0
Value range	0= – 1=Insufficient voltage 2=Excessive voltage 3=Insufficient temperature 4=Excessive temperature
Factor	-
Offset	-
Unit	-

3.4.2 Monitoring

The following cyclic data is provided for diagnosis:

Boot procedures

Name	Boot procedures
Description	Number of boot procedures is displayed
Index	70
Sub index	
Data type	UIntegerT
Length	32-bit
Access rights	ro (read permissions only)
Factory settings	0
Value range	0 ... 65535
Factor	-
Offset	-
Unit	-

Operating hours

Name	Operating hours
Description	Number of the entire operating hours is displayed
Index	71
Sub index	
Data type	UIntegerT
Length	32-bit
Access rights	ro (read permissions only)
Factory settings	0
Value range	0 ... 65535
Factor	-
Offset	-
Unit	h

Minimum temperature

Name	Minimum temperature
Description	Minimum temperature is displayed over the entire operating duration
Index	78
Sub index	
Data type	IntegerT
Length	8-bit
Access rights	ro (read permissions only)
Factory settings	0
Value range	-128 ... 0 ... 127

	Name	Minimum temperature
	Factor	-
	Offset	-
	Unit	°C

Maximum temperature	Name	Maximum temperature
	Description	Maximum temperature is displayed over the entire operating duration
	Index	79
	Sub index	
	Data type	IntegerT
	Length	8-bit
	Access rights	ro (read permissions only)
	Factory settings	0
	Value range	-128 ... 0 ... 127
	Factor	-
	Offset	-
	Unit	°C

Insufficient temperature fault	Name	Insufficient temperature events
	Description	Number of insufficient temperature faults occurred is displayed
	Index	94
	Sub index	
	Data type	UIntegerT
	Length	32-bit
	Access rights	ro (read permissions only)
	Factory settings	0
	Value range	0 ... 65535
	Factor	-
	Offset	-

Excessive temperature	Name	Excessive temperature
	Description	Number of excessive temperature faults occurred is displayed
	Index	95
	Sub index	
	Data type	UIntegerT
	Length	32-bit
	Access rights	ro (read permissions only)

Name	Excessive temperature
Factory settings	0
Value range	0 ... 65535
Factor	-
Offset	-
Unit	-

Insufficient voltage fault

Name	Low voltage fault
Description	Number of insufficient voltage faults occurred is displayed
Index	92
Sub index	
Data type	UIntegerT
Length	32-bit
Access rights	ro (read permissions only)
Factory settings	0
Value range	0 ... 65535
Factor	-
Offset	-
Unit	-

Excessive voltage fault

Name	Excess voltage fault
Description	Number of excessive voltage faults occurred is displayed
Index	93
Sub index	
Data type	UIntegerT
Length	32-bit
Access rights	ro (read permissions only)
Factory settings	0
Value range	0 ... 65535
Factor	-
Offset	-
Unit	-

3.4.3 Teaching in

The following cyclic data is provided for diagnosis:

Teaching in procedures

Name	Teaching in procedures
Description	Number of teaching in procedures is displayed
Index	74
Sub index	
Data type	UIntegerT
Length	16-bit
Access rights	ro (read permissions only)
Factory settings	0
Value range	0 ... 65535
Factor	-
Offset	-
Unit	-

Erroneous teaching in procedures

Name	Erroneous teaching in procedures
Description	Number of erroneous teaching in procedures is displayed
Index	75
Sub index	
Data type	UIntegerT
Length	16-bit
Access rights	ro (read permissions only)
Factory settings	0
Value range	0 ... 65535
Factor	-
Offset	-
Unit	-

Measuring points teaching in procedures

Name	Measuring points teaching in procedures
Description	Number of measurement points of the current teaching in procedure is displayed
Index	82
Sub index	
Data type	UIntegerT
Length	16-bit
Access rights	ro (read permissions only)
Factory settings	0

Name	Measuring points teaching in procedures
Value range	0 ... 128
Factor	-
Offset	-
Unit	-

Teaching in temperature

Name	Teaching in temperature
Description	Temperature of the sensor is displayed with the current teaching in procedure
Index	83
Sub index	
Data type	IntegerT
Length	8-bit
Access rights	ro (read permissions only)
Factory settings	0
Value range	-128 ... 0 ... 127
Factor	-
Offset	-
Unit	°C

3.5 Events

IO-Link generates acyclic EventCodes (events).

These codes are divided as follows:

Code	Name	Type	Description
36000	Temperature limit event	Warning	Temperature has exceeded or fallen short of exact limits
36001	Temperature change event	Warning	Temperature change took place too quickly
36002	Magnetic field event	Warning	Magnetic field value has exceeded or fallen short of exact limits
36003	Sampling Point underrun	Error	Too few measuring points during the teaching in procedure
36004	Sampling Point overrun	Error	Too many measuring points during the teaching in procedure
36010	Teaching started	Message	Teaching in process has been started
36011	Teaching finished	Message	Teaching in process has been finished
36012	Saving data done	Message	Data has been successfully saved
36013	Canceled	Message	Current command/mode has been ended
36014	Teach Error	Message	Error occurred during the teaching in procedure
36015	Command not allowed	Message	Command in the current position is not permitted
36016	No Magnetic Field learned	Error	Magnetic field must be taught in
36017	Programming successful	Message	Programming has been successfully completed
36018	Factory settings have been restored	Message	Sensor has been reset to factory settings

4 LED status

The LED on the sensor displays the current mode of the sensor by means of different flashing behavior.

Mode	LED		Description
IO-Link	flashes	1 Hz (90% duty cycle)	IO-Link connection active
Teaching in mode	flashes	1 Hz	Teaching in mode active
	flashes	2 Hz	Teaching in procedure completed
	flashes	6 Hz	Data saved
	flashes	10 Hz	Poor magnetic field, sensor cannot be taught in