Software manual
SCHUNK sensors with IO-Link
IO-Link Protocol
MMS 22-IOL

Translation of original software manual

Hand in hand for tomorrow

Imprint

Technical changes:
We reserve the right to make alterations for the purpose of technical improvement.

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Dear Customer,

Thank you for trusting our products and our family-owned company, the leading technology supplier of robots and production machines.

Our team is always available to answer any questions on this product and other solutions. Ask us questions and challenge us. We will find a solution!

Best regards,

Your SCHUNK team

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Please read the operating manual in full and keep it close to the product.

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1 General

1.1 Applicable documents

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

The documents labeled with an asterisk (*) can be downloaded from **schunk.com/downloads**.

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 transfered 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 cyclic data exchange is performed from the controller to the IO-Link device.

Further information, ▸ 2.1 [🗋 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, ▸ 2.2 [🗋 5].

2 Magnetic switch MMS 22-IOL

2.1 Cyclic process data (status word)

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

Position

Name	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

NOTE

Cyclical data "current Position" BYTE Swap High/Low Byte

If the values for the cyclical data is not output between 0 - 10,000, the high and low byte must be swapped.
Otherwise the values may count up several times from 0 -> 65295 -> 0 -> 65295.

2.2 Acyclic device data and events

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

2.2.1 Identification data

The following acyclic data is provided for identification:

Name	Index	Sub index	Data type	Data size [Byte]	Access rights *	Factory settings
Vendor name	16	Sub 0	StringT	max. 19	ro	SCHUNK GmbH und Co. KG
Vendor 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

Name	Index	Sub index	Data type	Data size [Byte]	Access rights *	Factory settings
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 tag	24	Sub 0	StringT	max. 32	rw	

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

2.2.2 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 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 process is started
Index	66
Sub index	0
Data type	UIntegerT
Length	8-bit

Name	Sensor Teach command
Access rights	wo (write 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)
Factory settings	1000
Value range	100 - 10000
Factor	0.01
Offset	-
Unit	mm

Magnet Teaching Tool

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

Standard command

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

2.2.3 Observation

The following cyclic data is provided for observation:

Position

Name	Position
Description	Current gripping position is displayed
Index	67
Sub index	0
Data type	UIntegerT
Length	16-bit
Access rights	ro (read 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

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 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 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 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

Name	Hall 2
Sub index	0
Data type	UIntegerT
Length	16-bit
Access rights	ro (read 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 only)
Factory settings	0
Value range	0 – 1023
Factor	-
Offset	-
Unit	-

2.2.4 Diagnosis

2.2.4.1 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 only)
Factory settings	0
Value range	0=Device is OK 1=Device error 2=Device is outside of specification

Name	Device status
Factor	-
Offset	-
Unit	-

Detailed device status

Name	Detailed device status [1]
Description	Current temperature errors / warnings are displayed
Index	122
Sub index	
Data type	UIntegerT
Length	8-bit
Access rights	ro (read only)
Factory settings	0
Value range	0= – 3=Undertemperature 4=Overtemperature
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 only)
Factory settings	0
Value range	0= – 1=Undervoltage 2=Overvoltage
Factor	-
Offset	-
Unit	-

Last fault

Name	Last fault [1] – [5]
Description	The last 5 errors are displayed
Index	106 – 110
Sub index	

Name	Last fault [1] – [5]
Data type	UIntegerT
Length	8-bit
Access rights	ro (read only)
Factory settings	0
Value range	0= – 1=Undervoltage 2=Overvoltage 3=Undertemperature 4=Overtemperature
Factor	–
Offset	–
Unit	–

2.2.4.2 Monitoring

The following cyclic data is provided for diagnosis:

Boot events

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

Name	Operating hours
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 only)
Factory settings	0
Value range	-128 ... 0 ... 127
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 only)
Factory settings	0
Value range	-128 ... 0 ... 127
Factor	-
Offset	-
Unit	°C

Undertemperature events

Name	Undertemperature events
Description	Number of undertemperature errors occurred is displayed
Index	94
Sub index	
Data type	UIntegerT
Length	32-bit
Access rights	ro (read only)

Name	Undertemperature events
Factory settings	0
Value range	0 ... 65535
Factor	-
Offset	-
Unit	-

Overtemperature events

Name	Overtemperature events
Description	Number of overtemperature errors occurred is displayed
Index	95
Sub index	
Data type	UIntegerT
Length	32-bit
Access rights	ro (read only)
Factory settings	0
Value range	0 ... 65535
Factor	-
Offset	-
Unit	-

Undervoltage events

Name	Undervoltage events
Description	Number of undervoltage errors occurred is displayed.
Index	92
Sub index	
Data type	UIntegerT
Length	32-bit
Access rights	ro (read only)
Factory settings	0
Value range	0 ... 65535
Factor	-
Offset	-
Unit	-

Overvoltage events

Name	Overvoltage events
Description	Number of overvoltage errors occurred is displayed
Index	93
Sub index	

Name	Overvoltage events
Data type	UIntegerT
Length	32-bit
Access rights	ro (read only)
Factory settings	0
Value range	0 ... 65535
Factor	-
Offset	-
Unit	-

2.2.4.3 Teaching

The following cyclic data is provided for diagnosis:

Teaching events

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

Failed teaching events

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

Number of teaching samples

Name	Number of teaching samples
Description	Number of measurement points of the current teach-in procedure is displayed
Index	82
Sub index	
Data type	UIntegerT
Length	16-bit
Access rights	ro (read only)
Factory settings	0
Value range	0 ... 128
Factor	-
Offset	-
Unit	-

Temperature teaching

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

2.2.5 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 process

Code	Name	Type	Description
36004	Sampling Point overrun	Error	Too many measuring points during the teaching in process
36010	Teaching started	Message	Teach-in process has started
36011	Teaching finished	Message	Teach-in process has 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 teach-in process
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
36019	Teaching samples to low	Warning	Too few measuring points during the teach-in process Check "Teaching events" measuring points • >7: -> i.O. for all products • 4 ... 7: -> OK for PGN-plus 50 / PGN-plus-P 50 -> not OK for all other products

2.3 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
Teach-in mode	flashes	1 Hz	Teach-in mode active
	flashes	2 Hz	Teach-in procedure completed
	flashes	6 Hz	Data saved
	flashes	10 Hz	Poor magnetic field, sensor cannot be taught in

2.4 IOL data storage

The sensor does not have an IOL data storage function.

MMS 22-IOL to Beckhoff IO Link Master

With Beckhoff, the data storage function for the sensor is activated automatically, even if the IODD has been loaded.

This function must be deactivated manually

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