

Software Manual

SCHUNK Grippers with IO-Link

Imprint

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Table of Contents

1	General.....	5
1.1	Applicable documents	5
1.2	IO-Link Basics	5
1.3	Data exchange	6
2	Outgoing process data (control word)	8
2.1	Commands.....	8
2.1.1	Execution command	8
2.1.2	Acknowledging	9
2.1.3	Referencing.....	10
2.1.4	Stroke measurement	11
2.1.5	Calibration	12
2.1.6	Gripping	13
2.1.7	Releasing.....	16
2.1.8	Positioning run.....	17
2.1.9	Relative run.....	18
2.1.10	Stop.....	19
2.1.11	Ventilation	19
2.1.12	FastStop	20
2.2	Command specifications	21
2.2.1	Workpiece number	21
2.2.2	Gripper direction	21
2.2.3	Gripping force	21
2.2.4	Target position.....	22
3	Incoming process data (status word).....	23
3.1	Status.....	23
3.2	Referenced	23
3.3	Success	23
3.4	End stop.....	24
3.5	Blocked	24
3.6	Process command	24
3.7	Workpieces.....	24
3.8	Sensor switch.....	24
3.9	Position	24

4 Acyclic device data and events..... 25

 4.1 Identification data 25

 4.2 Parameter 26

 4.3 System commands..... 28

 4.4 Teach in workpiece..... 29

 4.5 Measured values 30

 4.6 Device status 32

 4.7 Detailed device status 33

5 Startup behavior 36

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

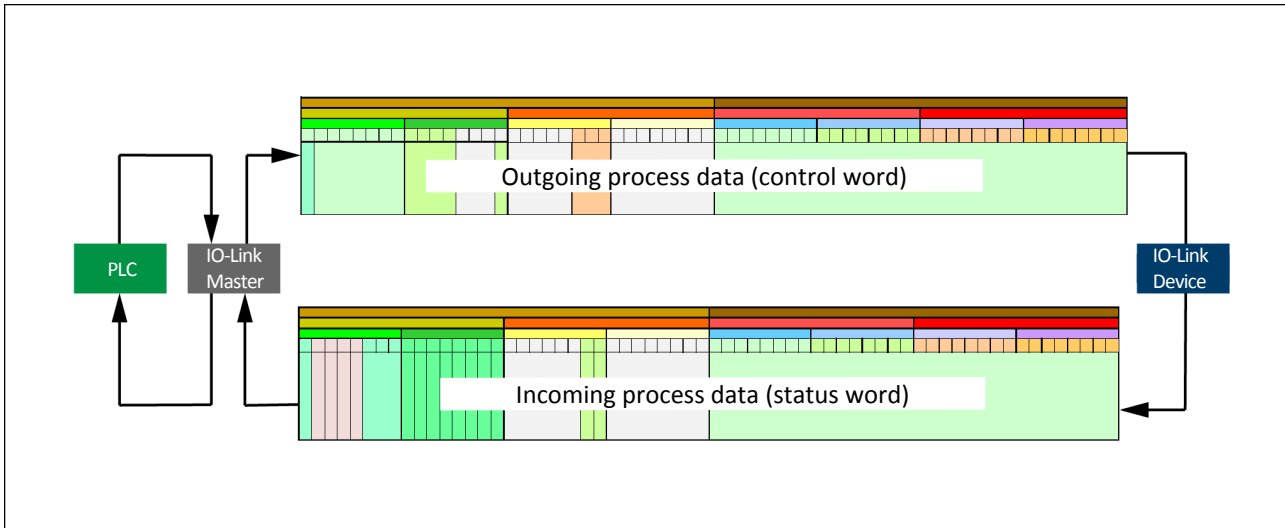
IO-Link is a point-to-point interface for connecting a SCHUNK product (IO-Link device) to a control system (IO-Link master). Via this interface it is possible to transfer parameters, process data and diagnostic data. Parameter data are transferred to the IO-Link device from the master (actuator or sensors). 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 cyclic data exchange is performed from the controller to the IO-Link device.

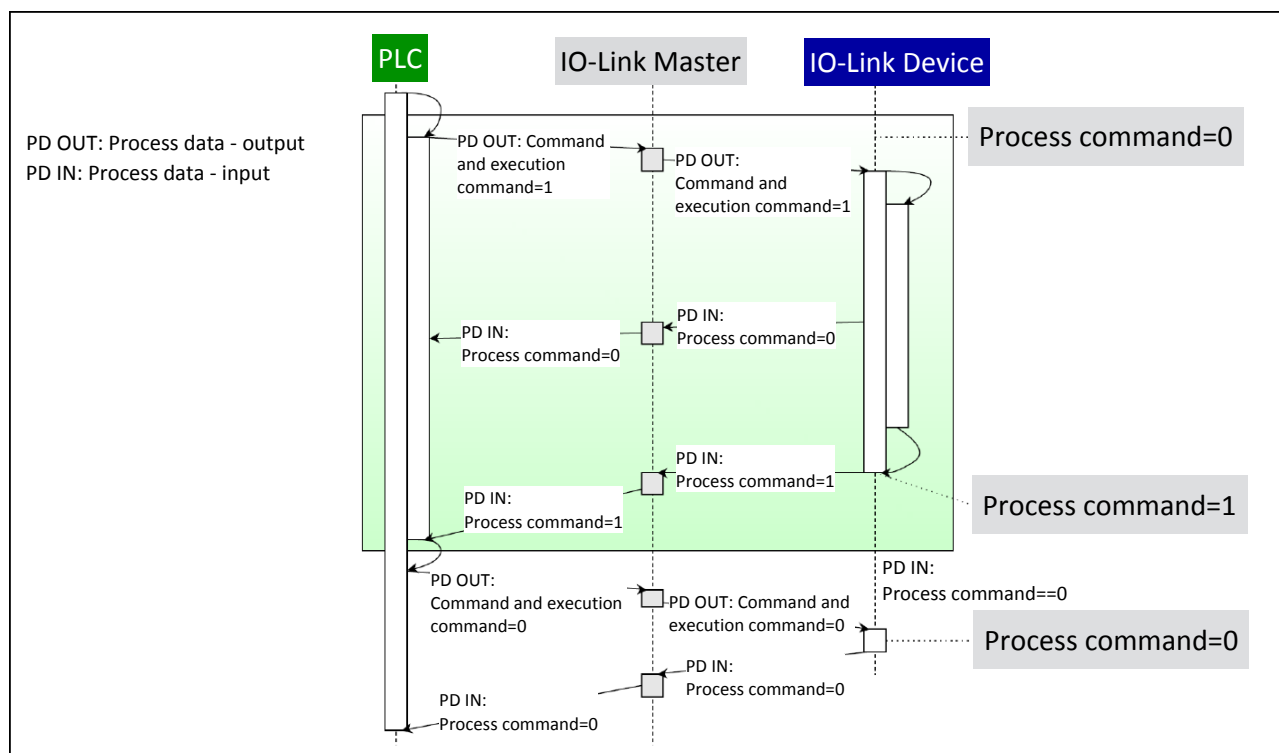


Cyclical data exchange

Handshake

The following illustration shows the sequence between the execution command and the process command. The IO-Link Device confirms the processing and reception of the data (handshake) to the sender.

The PLC cannot send another new command until the IO-Link device is ready to receive a command (process command = 1). Thereafter, the execution command and the process command are reset to 0. A new command can be sent from the PLC.



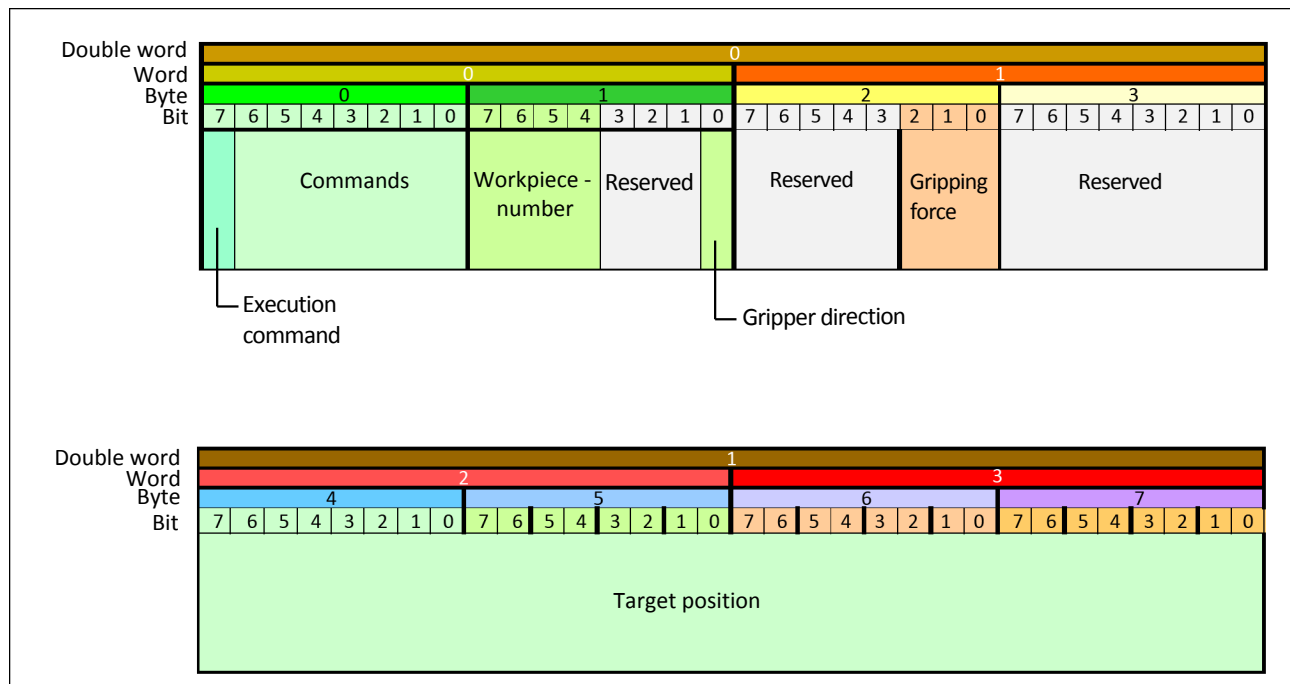
Execution command and process command

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, [Acyclic device data and events](#) [► 25].

2 Outgoing process data (control word)



Outgoing process data

2.1 Commands

2.1.1 Execution command

- Commands are executed by changing the status of the bit from 0 to 1.
Exception: FastStop
- A currently executed command has been interrupted.
Exception: Referencing, Calibration

2.1.2 Acknowledging

After an error has been rectified, the gripper is set to the normal operating status by acknowledging the error from the error status. The actuator remains de-energized until the next command.

Control word

Control word	Value
Command	1 (0b x000.0001): Acknowledge
Execute command	Change from 0 to 1

Truth table

Status word	Initial conditions - Enable	Feedback signal success	Feedback signal failure
Blocked	n.a.	n.a.	n.a.
End stop	n.a.	n.a.	n.a.
Success	n.a.	n.a.	n.a.
Referenced	n.a.	n.a.	n.a.
Status	n.a.	≠0	0
Position	n.a.	n.a.	n.a.
Workpiece [x]	n.a.	n.a.	n.a.

n.a.: not applicable

2.1.3 Referencing

The zero position is set during the referencing process. The gripper moves ([Parameter](#) [► 26]) to the mechanical end stop in the referencing direction set.

- A referencing run can only be stopped with a FastStop.
- The smallest gripping force adjustment is set for referencing runs with electric grippers, [Gripping force](#) [► 21].
- For modules with an absolute measuring system, referencing is an optional function.
- Referencing must be performed when the referencing direction has been changed or the stroke of the base jaw is restricted in the referencing direction, e.g. with specific gripper finger shapes.
- Before a referencing run, make sure that
 - all workpieces have been removed and
 - the base jaws are clear to the end stop in the referencing direction.

Control word

Control word	Value
Command	2 (0b x000.0010): Referencing
Execute command	Change from 0 to 1

Truth table

Status word	Initial conditions - Enable	Feedback signal success	Feedback signal failure
Blocked	n.a.	1	1
End stop	n.a.	1	n.a.
Success	n.a.	1	0
Referenced	n.a.	1	0
Status	n.a.	≠0	n.a.
Position	n.a.	0	n.a.
Workpiece [x]	n.a.	n.a.	n.a.

n.a.: not applicable

2.1.4 Stroke measurement

Stroke measurement is an optional function. During the stroke measurement, the maximum stroke of the gripper is set relative to the referencing position. A stroke measurement should be performed if the stroke of the base jaws is limited, e.g. for specific gripper finger shapes.

The recognition of the bit "End stop" or the bit "Success" depends on factors such as the parameter "Maximum stroke". If the stroke measurement does not take place, the standard saved parameter "Maximum stroke" is used. A stroke measurement overwrites the previous value "Maximum stroke", [Parameter](#) [► 26]. This is stored in the gripper and is available after a restart.

- The stroke measurement moves in the opposite direction to the referencing, [Parameter](#) [► 26].
- The smallest gripping force adjustment is set for stroke measurements with electric grippers, [Gripping force](#) [► 21].

Control word

Control word	Value
Command	7 (0b x000.0111): Stroke measurement
Execute command	Change from 0 to 1

Truth table

Status word	Initial conditions - Enable	Feedback signal success	Feedback signal failure
Blocked	n.a.	1	0
End stop	n.a.	1	n.a.
Success	n.a.	1	0
Referenced	1	1	1
Status	≠0	≠0	n.a.
Position	n.a.	≠0.0	n.a.
Workpiece [x]	n.a.	n.a.	n.a.

n.a.: not applicable

2.1.5 Calibration

Calibration is an optional function. For calibration, the functions "Referencing" and "Stroke measurement" are performed one after the other. For modules with an absolute measuring system, the offset and slope are determined.

Note: This function is currently not available with PGN-plus-E and EGP.

Control word

Control word	Value
Command	9 (0b x000.1001): Calibration
Execute command	Change from 0 to 1

Truth table

Status word	Initial conditions - Enable	Feedback signal success	Feedback signal failure
Blocked	n.a.	1	0
End stop	n.a.	1	n.a.
Success	n.a.	1	0
Referenced	1	1	1
Status	≠0	≠0	n.a.
Position	n.a.	≠0.0	n.a.
Workpiece [x]	n.a.	n.a.	n.a.

n.a.: not applicable

2.1.6 Gripping

When gripping, movement follows the gripping direction to the stop and the workpiece is held. With electric grippers, the workpiece is held with the gripping force set.

Impulse reduction for electric grippers:

In order to protect the workpiece from damage, electric grippers reduce the speed and current internally before reaching the intended workpiece position. The impulse decreases.

- **Workpiece position unknown:** During the first gripping process, the complete stroke is driven at a reduced speed and current. The position of the last successful grip is accepted as the intended workpiece position for the next grip command. The intended workpiece position is reset after referencing, stroke measurement and after positioning to the blockage.
- **Workpiece position known:** When gripping with workpiece indication or a specified target position, the impulse reduction is performed before reaching the predefined target position.

2.1.6.1 Gripping without workpiece indication

The command reports success if the gripper is blocked before the end position is reached.

Control word, pneumatic grippers

Control word	Value
Command	4 (0b x000.0100): Gripping
Execute command	Change from 0 to 1
Workpiece number	0 (no specification)
Gripper direction	Gripper direction [► 21]

Control word, electric grippers

Control word	Value
Command	4 (0b x000.0100): Gripping
Execute command	Change from 0 to 1
Workpiece number	0 (no specification)
Gripper direction	Gripper direction [► 21]
Gripping force	Gripping force [► 21]
Target position	Target position [► 22]

Truth table

Status word	Initial conditions - Enable	Feedback signal success	Feedback signal failure
Blocked	n.a.	1	1
End stop	n.a.	0	1
Success	n.a.	1	0
Referenced	1	1	1
Status	≠0	≠0	n.a.
Position	n.a.	End stop	≠ End stop
Workpiece [x]	n.a.	n.a.	n.a.

n.a.: not applicable

2.1.6.2 Gripping with workpiece indication

When gripping with workpiece indication, parameterized workpieces are gripped. The values that are saved in the parameter workpiece [x] overwrite the currently applied process data. The command reports success if the gripper is blocked within the stored workpiece tolerance at the target position.

Control word

Control word	Value
Command	4 (0b x000.0100): Gripping
Execute command	Change from 0 to 1
Workpiece number	1 ... 8

Truth table

Status word	Initial conditions - Enable	Feedback signal success	Feedback signal failure
Blocked	n.a.	1	1
End stop	n.a.	0	1
Success	n.a.	1	0
Referenced	1	1	1
Status	≠0	≠0	n.a.
Position	n.a.	Target position ± Tolerance	≠ Target position ± Tolerance
Workpiece [x]	n.a.	1	0

n.a.: not applicable

2.1.7 Releasing

When releasing, movement occurs in the opposite direction to gripping, up until the end stop. The command signals success when the end stop is reached. The smallest gripping force adjustment is set for the releasing process with electric grippers, [Gripping force](#) [► 21].

Control word

Control word	Value
Command	3 (0b x000.0011): Release
Execution command	Change from 0 to 1
Gripper direction	Gripper direction [► 21]

Truth table

Status word	Initial conditions - Enable	Feedback signal success	Feedback signal failure
Blocked	n.a.	1	1
End stop	n.a.	1	0
Success	n.a.	1	0
Referenced	1	1	1
Status	≠0	≠0	n.a.
Position	n.a.	End stop	≠ End stop
Workpiece [x]	n.a.	n.a.	n.a.

n.a.: not applicable

2.1.8 Positioning run

The gripper moves to the position that was specified under "Target position". If the run is interrupted by a blockage, the drive switches off. An error message requiring acknowledgment is generated. The actuator remains de-energized until the next run command.

Note: for positioning on an end stop, select the commands "Gripping" or "Release".

Control word

Control word	Value
Command	5 (0b x000.0101: Positioning run)
Execute command	Change from 0 to 1
Target position	Target position [► 22]

Truth table

Status word	Initial conditions - Enable	Feedback signal success	Feedback signal failure
Blocked	n.a.	0	0
End stop	n.a.	0	n.a.
Success	n.a.	1	0
Referenced	1	1	1
Status	≠0	≠0	n.a.
Position	n.a.	= Target position ± Tolerance *	n.a.
Workpiece [x]	n.a.	n.a.	n.a.
LED "STATUS"	Green	Green	Red

n.a.: not applicable

* see assembly and operating manual for the respective product

2.1.9 Relative run

The gripper moves to a position determined using relative distance from the last current position. The parameter "Target position" in this case is the relative distance. If the run is interrupted by a blockage, the drive switches off. An error message requiring acknowledgment is generated. The actuator remains de-energized until the next command.

Note: for positioning on an end stop, select the commands "Gripping" or "Release".

Control word

Control word	Value
Command	6 (0b x000.0110): Relative run
Execute command	Change from 0 to 1
Target position	Target position [► 22]

Truth table

Status word	Initial conditions - Enable	Feedback signal success	Feedback signal failure
Blocked	n.a.	0	0
End stop	n.a.	0	n.a.
Success	n.a.	1	0
Referenced	1	1	1
Status	≠0	≠0	n.a.
Position	n.a.	= Target position ± Tolerance *	n.a.
Workpiece [x]	n.a.	n.a.	n.a.
LED "STATUS"	Green	Green	Red

n.a.: not applicable

* see assembly and operating manual for the respective product

2.1.10 Stop

This command may only be used with electric grippers.
The gripper is brought to a controlled standstill. The gripper remains in a controlled standstill while retaining the force provided in the previous command.

Control word

Control word	Value
Command	8 (0b x000.1000): Stop
Execute command	Change from 0 to 1

Truth table

Status word	Initial conditions - Enable	Feedback signal success	Feedback signal failure
Blocked	0	0	1
End stop	n.a.	n.a.	n.a.
Success	0	1	0
Referenced	1	1	n.a.
Status	≠0	≠0	n.a.
Position	n.a.	n.a.	n.a.
Workpiece [x]	n.a.	n.a.	n.a.

n.a.: not applicable

2.1.11 Ventilation

This command may only be used with pneumatic grippers.
All valves are opened and the gripper is brought to a uncontrolled standstill. After two seconds, the valves are closed again. The command reports success when the valves are closed again.

Control word

Control word	Value
Command	10 (0b x000.1010): Ventilation
Execute command	Change from 0 to 1

2.1.12 FastStop

The electrical power supply to the actuator is interrupted immediately, the gripper is stopped uncontrolled. A FastStop occurs independently of the status change of the "Execution command" bit.

An error message requiring acknowledgment is generated. A FastStop does not increase the error count and is not saved as the most recent error.

Note: To depressurize the gripper, select "Ventilation".

Control word

Control word	Value
Command	0 (0b x000.0000): FastStop

Truth table

Status word	Initial conditions - Enable	Feedback signal success	Feedback signal failure
Blocked	n.a.	n.a.	n.a.
End stop	n.a.	n.a.	n.a.
Success	n.a.	1	0
Referenced	n.a.	n.a.	n.a.
Status	n.a.	0	≠0
Position	n.a.	n.a.	n.a.
Workpiece [x]	n.a.	n.a.	n.a.

n.a.: not applicable

2.2 Command specifications

2.2.1 Workpiece number

The gripper can store the parameters (position and tolerance, gripping force, gripping direction) of eight workpieces (workpiece 1. .. workpiece 8). When gripping with indication of the workpiece number, these parameters are used.

Parameters are defined:

- when teaching in the workpiece, [Teach in workpiece](#) [► 29] or
- by specifying acyclic parameter data, [Parameter](#) [► 27].

Process data	Value
Workpiece number	4 bit unsigned Integer

2.2.2 Gripper direction

This bit determines whether the gripper is an internal or external gripper.

Process data	Value	Description	Illustration
Gripper direction	1 (I.D. gripping)	The base jaws move from the inside to the outside.	
		The workpiece is gripped from the inside.	
Gripper direction	0 (O.D. gripping)	The base jaws move from the outside to the inside.	
		The workpiece is gripped from the outside.	

2.2.3 Gripping force

The following settings are possible depending on the gripper specification:

- The gripping force can be set in increments.
- The gripping force is set to 100% in the factory and cannot be changed.

Values for gripper with stepwise adjustable gripping force

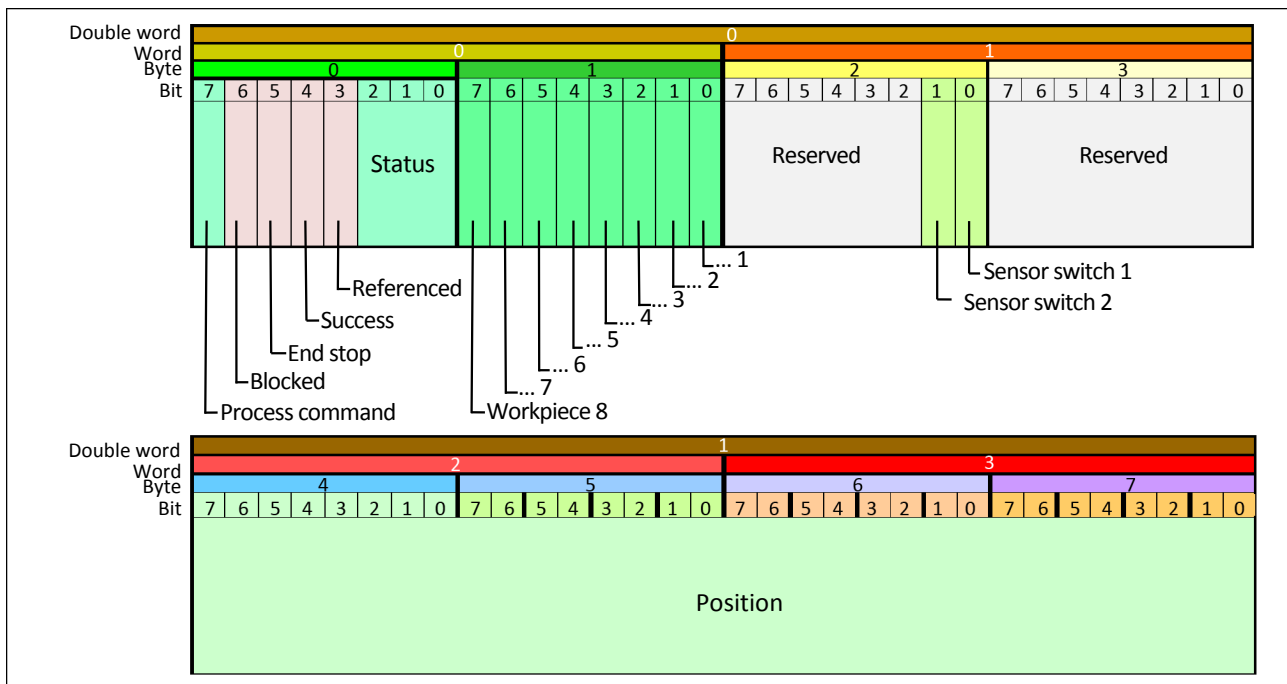
Process data	Value
Gripping force	0: 100% (standard) 1: 75% 2: 50% 3: 25%

2.2.4 Target position

The target position value is between 0.0 and "Maximum stroke", [Parameter](#) [► 26].

Process data	Value
Target position	4 Byte Float IEEE754

3 Incoming process data (status word)



Incoming process data

3.1 Status

The current status of the product is displayed. Further information is provided about acyclic device data and events, [Device status](#) [► 32].

Process data	Value
Status	0 (0b xxxx.x000): Error
	1 (0b xxxx.x001): Out of specification
	2 (0b xxxx.x010): Maintenance required
	3 (0b xxxx.x011): Ready for operation

3.2 Referenced

Gripper is referenced = 1, otherwise = 0

3.3 Success

When a new command is executed, the "Success" bit is reset to 0. If the command is successful, the bit is set to 1, see the truth table of the listed command.

3.4 End stop

When the gripper is positioned at the end stop, it is = 1, otherwise = 0.

The position of the end stop corresponds to the position $0.0 \pm \text{Tolerance}$ or the position "Maximum stroke" $\pm \text{Tolerance}$.

The tolerances of the end position detection are contained in the operating manual for the respective product.

End position detection tolerances using the PGN-plus-E 80 example

Position	Tolerance
0.0	$\pm 0.05 \text{ mm}$ (after referencing/calibration)
Maximum stroke	$\pm 0.5 \text{ mm}$ (at factory settings) $\pm 0.05 \text{ mm}$ (after stroke measurement/calibration)

3.5 Blocked

Active if the gripper does not move even though the actuator is energized, otherwise = 0.

3.6 Process command

Process command = 1 if the execute command is 1 and the process data has been processed.

Process command = 0 if the execute command changes to 0.

Information on data exchange (handshake), [Data exchange](#) [► 7].

3.7 Workpieces

If workpieces are parameterized, the incoming process data indicates which workpiece has been gripped after a gripping command. If the current position is within the workpiece tolerance at the target position, the relevant bit changes to 1.

- Workpieces are only recognized after a gripping command if Blocked = 1 and End stop = 0. Otherwise, all workpiece bits are set to 0.
- Overlapping workpiece tolerances can lead to the detection of multiple workpieces.

3.8 Sensor switch

Active if the gripper is in the position of the sensor switch, otherwise = 0.

Note: Internal hardware switches are not integrated on all grippers with IO-Link, see the operating manual for the respective product.

3.9 Position

The position is the current distance [mm] from a base jaw to the referenced zero point of the gripper (4 Byte Float IEEE754).

4 Acyclic device data and events

4.1 Identification data

The following acyclic data is provided for identification:

Index	Parameter	Access	Data size	Description
0x0010	Manufacturer name	R	63 Byte	Manufacturer name: Schunk GmbH & Co.KG
0x0011	Manufacturer text	R	63 Byte	Additional information about the manufacturer: schunk.com
0x0012	Product name	R	63 Byte	Product designation, e.g. PGN-plus-E 080-1-IOL
0x0013	Product ID	R	63 Byte	ID number
0x0014	Product text	R	63 Byte	Grippers with IO-Link
0x0015	Serial number	R	15 Byte	Alphanumeric serial number of the gripper
0x0016	Hardware version	R	63 Byte	HW XX.xx (electronic)
0x0017	Firmware version	R	63 Byte	FW XX.xx
0x0018	Application-specific marking	R/W	31 Byte	Free text field for application- specific identification

4.2 Parameter

Index	Parameter	Access	Data size / Data type	Description
0x000C	Device access lock	R/W	2 bit	Controls the read/write access of parameters and the Data Storage (DS) from the IO-Link master to the device. The DS contains the following parameters: all workpiece parameters, referencing direction and user-specific marking. Bit 0: Parameter: 0 -unlocked Bit 0: Parameter: 1 -locked Bit 1: Data Storage: 0 -unlocked Bit 1: Data Storage: 1 -locked Delivery status: Bit 0: 0 Bit 1: 0
0x0054	Referencing direction	R/W	Boolean	Direction of the referencing run is defined 1: inner 0: outer When changing the parameter "Referencing direction", the gripper must be re-referenced. Delivery status: 0
0x00CC	Maintenance interval	R/W	int32	The parameter determines how many gripping cycles are to be performed before the next maintenance. Delivery status: see operating manual for the respective product
0x00DC	Maximum stroke	R	4 Byte Float IEEE754	During a stroke measurement, when the mechanical stop (Blocked = 1) is reached, the current position takes over the new value "maximum stroke".

Workpiece parameters

The parameters of the workpieces are set when teaching in the workpiece, [Teach in workpiece](#) [► 29]. The default values are overwritten.

Workpiece parameters 1 (0x0065) to 8 (0x006C)

Index	Sub index	Parameter	Access	Data size / Data type	Description
0x0065 to 0x006C	1	Target position	R/W	4 Byte Float IEEE754	Delivery status: 0 mm
	2	tolerance [+/-]	R/W	4 Byte Float IEEE754	Delivery status: ± 0.5 mm
	3	Gripping force	R/W	3 bit	Delivery status: 100%
	4	Gripper direction	R/W	Boolean	Delivery status: 0

4.3 System commands

Index	Command	Access	Code	Data type	Description
0x0002	Restore delivery status	W	0x0082	uint8	Reset to delivery status, see respective parameter description
0x0002	Reset maintenance counter	W	0x00A1	uint8	Reset maintenance counter to the value "maintenance interval".
0x0002	Teach in workpiece	W	0x00A0	uint8	The parameters of a workpiece are written. All undefined workpiece parameters are set to their default values.

4.4 Teach in workpiece

Parameterize workpiece

To teach in a workpiece, after it has been successfully gripper with a workpiece indication ([Gripping with workpiece indication](#) ► 15]), the acyclical parameter [teach in workpiece] is used in order to save the current process data for the workpiece.

When teaching in the workpiece, the current position is saved as position parameter value "Target position". The current values for reaching the position are taken from the cyclic process data as "Gripper direction" and "Gripping force". The values can be changed manually.

At the time of teach-in, the correct values for gripping force, gripping direction and the required workpiece number must be present in the process data.

NOTE

If the referencing direction is changed after the workpiece has been taught in, correct workpiece recognition is no longer guaranteed. As the referencing direction changes, the counting direction of the positions changes. The workpieces must be taught in again.

4.5 Measured values

Code	Measured value	Access	Data size/ Data type	Description
0x0046	Position [mm]	R	4 Byte Float IEEE754	Display current gripper position
0x0048	Current current [A]	R	4 Byte Float IEEE754	Display current power current
0x0051	Current voltage [V DC]	R	4 Byte Float IEEE754	Display current actuator voltage
0x0050	Current temperature [°C]	R	4 Byte Float IEEE754	Display current temperature
0x00AE	Sensor switch 1 [1/0]	R	Boolean	Display sensor switch S1 1: Switch is active 0: Switch inactive
0x00AF	Sensor switch 2 [1/0]	R	Boolean	Display sensor switch S2 1: Switch is active 0: Switch inactive
0x0020	Error counter	R	uint16	The error counter increases by 1 if a new error is present. An error is an event that results in a device status 4 (type error). Note: FastStop is ignored for counting errors.
0x00C9	Cycle counter	R	uint32	Total number of cycles is counted and recorded. Every second change of direction of the gripper defines one cycle.
0x00CA	Impulse counter	R	uint32	If a "blockage" is detected, this counter is incremented.

Code	Measured value	Access	Data size/ Data type	Description
0x00CB	Maintenance counter	R	int32	The maintenance counter determines how many gripping cycles are to be performed before the next maintenance. The counter is reduced by 1 for every complete gripping cycle. If it falls below 0, it will continue to count up to a maximum of -1,000,000. The counter can be reset with the parameter "Reset maintenance counter". The maintenance interval can be defined product- and application-specifically, see the Assembly and Operating Manual for the respective product.

4.6 Device status

IO-Link generates acyclic EventCodes (events). These codes are divided as follows:

Index	Event type	Access	Code	Data size	Description
0x0024	Message 1	R	0	uint8	Ready for operation: The gripper is ready for operation. All voltages are present, there is no error.
0x0024	Message 2	R	1	uint8	Maintenance required: A notification is pending. Example: maintenance interval has expired
0x0024	Warning 1	R	2	uint8	Outside of specification: There is a warning. Example: under/over voltage
0x0024	Warning 2	R	3	uint8	Functional inspection: There is a warning. Example: calibration
0x0024	Error	R	4	uint8	Error: There is an error. Example: FastStop, invalid process data due to malfunction
0x0024	-	-	5 - 255	-	Reserved

4.7 Detailed device status

The last four events (errors, warnings or messages) and the last error are displayed.

Index	Sub index	Event type	Access	Data size
0x0025	0	Messages 1 to 4	R	octet
0x0025	1	Message 1	R	3 octets
0x0025	2	Message 2	R	3 octets
0x0025	3	Message 3	R	3 octets
0x0025	4	Message 4	R	3 octets
0x00C8	-	Last error	R	uint8

Errors, warnings and messages

Errors (EventCode 4) must be confirmed with the "acknowledge" command after rectifying the cause of the error.

Warnings (EventCode 2) and messages (EventCode 1 and 0) are self-acknowledging events.

Event code	Event type	Code	Display	Description
4	Error	0x1000	UNKNOWN ERROR	active if an unknown, unassignable error has occurred.
		0x4000	TEMPERATURE FAIL	active when the temperature is >75°C
		0x18D2	ERROR CONFIG MEMORY	Each time the software is started, the non-volatile memory is read out. active if the non-volatile memory is not readable Remedy: Switch the voltage supply off and on, restart the gripper. If the error continues to be listed: send gripper to SCHUNK for repair.
		0x18D9	ERROR FAST STOP	active if a FastStop has been triggered, FastStop [► 20].
		0x18DE	ERROR CURRENT	active if the current for the electronics has exceeded 5.5 A for more than 30 seconds

Event code	Event type	Code	Display	Description
		0x187A	ERROR_Life_Sign	active if communication has been aborted, e.g. by • cable breakage in the wiring within the gripper • voltage supply to actuator interruption (port B)
		0x187E	ERROR VALVE	active if a valve stops working properly
		0x18DA	ERROR PRESSURE	active if the air supply pressure is not between 2 bar and 8 bar
		0x18E5	ERROR POS SYSTEM	active if the position measurement system is not working properly
2	Warning	0x4210	Device temperature too high	active if device temperature $\geq 70^{\circ}\text{C}$ inactive if supply voltage $< 67^{\circ}\text{C}$
		0x5110	Supply voltage too high	active if supply voltage $> 28.8\text{ V}$
		0x5111	Supply voltage too low	active if supply voltage $> 18.8\text{ V}$
		0x1856	Gripping force outside of specification	active if invalid gripping force settings are transmitted via cyclic process data (control word)
		0x1857	Workpiece selection outside the specification	active if an invalid workpiece selection is transmitted via cyclic process data (control word)
1	Message	0x8C42	Maintenance required - change wearing parts	active if maintenance counter < 0 inactive if maintenance counter ≥ 0
0	Message	0x1806	Not referenced	active if gripper is not referenced inactive if gripper was successfully referenced
		0xFF99	Request upload	active as soon as the gripper wants to initiate an upload via the master Message is sent from the gripper if one or more workpiece parameters have changed or the referencing direction has been changed.

Event code	Event type	Code	Display	Description
		0x0000	No malfunction	active, if there are no errors The gripper is ready for operation.

5 Startup behavior

To enable a defined restart of the gripper, the gripper is in the following status when restarting:

Process data (Status word)	Value
Blocked	0
End stop	0
Success	0
Referenced	0
Status	0 (error)

To put the gripper in the operating state, the following steps are prescribed:

1. Acknowledge
2. Carry out referencing run if necessary

The gripper then has the status:

Process data (Status word)	Value
Blocked	n.a.
End stop	n.a.
Success	1
Referenced	1
Status	4 (ready for operation)

n.a.: not applicable