INSTALLATION AND OPERATING INSTRUCTIONS

2-jaw parallel gripper
GEP5000
3-jaw concentric gripper
GED5000
IO-Link

DDOC02457

THE KNOW-HOW FACTORY

Glossary

Term	Explanation
ActualPosition	Value of the current jaw position [1/100 mm]
Adjust	Starts the travel routing stored in the product to teach the BasePosition and WorkPosition.
BasePosition	Outer jaw position Depending on the application, this can be the base position or the work position.
ControlWord	Activation of the product Only one bit is permitted to be active in the ControlWord. The value 0 is also permitted.
DeviceMode	Used to select gripping profiles as well as the additional help modes in the product.
Diagnosis	If an error occurs, outputs a diagnostic code that can be compared with the error list.
GND	Ground/earth
GripForce	Setting the gripping force
PositionTolerance	Tolerance range for TeachPosition The value of the parameter acts in both directions.
StatusWord	Summary of binary states of the product that can be returned as information to the control system.
Teach	Adoption of the ActualPosition as the TeachPosition
TeachPosition	Taught-in workpiece position
Traversing routine	Defined procedure for movement of the jaws
Travel path	Path on which the gripper jaws travel.
WorkpieceNo	Number of the selected workpiece recipe
WorkPosition	Inner jaw position Depending on the application, this can be the standby position or the work position.

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Content

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1 Supporting documents

NOTICE

Read through the installation and operating instructions before installing or working with the product.

The installation and operating instructions contain important notes for your personal safety. They must be read and understood by all persons who work with or handle the product during any phase of the product lifetime.

The documents listed below are available for download on our website www.zimmer-group.com.

- Installation and operating instructions
- Catalogs, drawings, CAD data, performance data
- Information on accessories
- Technical data sheets
- General Terms and Conditions, including warranty information.

⇨ Only those documents currently available on the website are valid.

In these installation and operating instructions, "product" refers to the product designation on the title page!

1.1 Notices and graphics in the installation and operating instructions

DANGER

This notice warns of an imminent danger to the life and health of people. Ignoring these notices can lead to serious injury or even death.

► You absolutely must comply with the described measures for avoiding these dangers!

⇨ The warning symbols are assigned according to the type of danger.

WARNING

This notice warns of a situation that is potentially hazardous to personal health. Ignoring these notices can cause serious injury or damage to health.

► You absolutely must comply with the described measures for avoiding these dangers!

⇨ The warning symbols are assigned according to the type of danger.

CAUTION

This notice warns of a situation that is potentially hazardous to persons. Ignoring these notices can cause minor, reversible injuries.

► You absolutely must comply with the described measures for avoiding these dangers!

⇨ The warning symbols are assigned according to the type of danger.

NOTICE

This notice warns of possible material and environmental damage. Ignoring these notices can result in damage to the product or the environment.

► You absolutely must comply with the described measures for avoiding these dangers!

⇨ The warning symbols are assigned according to the type of danger.

INFORMATION

This category contains useful tips for handling the product efficiently. Failure to observe these tips will not result in damage to the product. This information does not include any information relevant to health or workplace safety.

2 Safety notices

CAUTION

Risk of injury and material damage in case of non-compliance

The product is state-of-the-art.

The following are examples of situations in which the product may cause a hazard:

- The product is not properly installed, used or maintained.
- The product is not used for its designated purpose.
- The locally applicable regulations, laws, directives or guidelines are not observed.

▶ The product may only be used in accordance with these installation and operating instructions and the product's technical data. Any changes or additions to the intended use of the product, as well as modifications to the product, such as those in the following examples, require the written permission of the manufacturer:

- Use of the product under extreme conditions, such as aggressive fluids or abrasive dusts
- Additional drilled holes or threads

⇨ Zimmer GmbH shall accept no liability for any damage caused by improper use. The operator bears sole responsibility.

▶ Make sure that the power supply is disconnected before you mount, adjust, modify, maintain or repair the product.

▶ Whenever work is carried out on the product, make sure that the product cannot be actuated by mistake.

▶ Perform maintenance tasks, renovation work or attachment work outside of the machine's danger zone when possible.

▶ Do not reach into the operational range of the product.

▶ Always adhere to the required maintenance intervals.

▶ When using the product under extreme conditions, adjust the maintenance interval according to the degree of contamination.

▶ Check the completeness and tightening torques of all mounting screws.

CAUTION

Notes and handling regulations for electrostatically sensitive components

Electrostatically sensitive components are individual components, integrated circuits or assemblies that can be damaged by electrostatic fields or electrostatic discharge.

▶ When handling electrostatic components, make sure that persons, the work area and packaging are all fully grounded.

▶ Touch electronic components only in appropriately identified areas with conductive flooring and only if:

- You are grounded by means of special bracelets.
- You wear shoes that are suitable and approved for the discharge of electrostatic charges.

▶ Do not bring electronic assemblies into contact with plastics and parts of clothing that have plastic content.

▶ Store electronic assemblies on conductive underlays only.

▶ Do not install electronic assemblies in the vicinity of data back-up devices or monitors (monitor distance > 100 mm).

▶ Perform measurements on electronic assemblies only if:

- The measuring instrument is grounded (e.g. via a ground conductor).
- The measuring head is momentarily discharged before measuring with a floating measuring instrument.

3 Proper use

NOTICE

Material damage and malfunction in case of non-compliance

The product is only to be used in its original state with its original accessories, with no unauthorized changes and within the stipulated parameter limits and operating conditions.

Any other or secondary use is deemed improper.

- ▶ Operate the product only in compliance with the associated installation and operating instructions.
- ▶ Operate the product only when it is in a technical condition that corresponds to the guaranteed parameters and operating conditions.
- ⇨ Zimmer GmbH shall accept no liability for any damage caused by improper use. The operator bears sole responsibility.

- The product is designed exclusively for electric operation using a 24 V DC power supply.
- The product must always be mounted on materials that dissipate heat.
- The product is intended for industrial use.
- The product is to be used as intended in enclosed rooms for temporary gripping, handling and holding.
- The product is not suitable for clamping workpieces during a machining process.
- Direct contact with perishable goods/food is not permitted.
- The product is not suited for use in a potentially explosive atmosphere.

4 Personnel qualification

WARNING

Inadequate qualification can cause injury and material damage

If inadequately qualified personnel perform work on the product, this can cause serious injuries and significant material damage.

- ▶ All work on the product must be performed by qualified personnel.
- ▶ Before working with the product, read the document in its entirety and make sure that you have understood everything.
- ▶ Observe country-specific accident prevention regulations and the general safety notices.

The following qualifications are a prerequisite for performing various work on the product.

4.1 Electricians

Electricians are able to perform work on electrical systems, can recognize and avoid possible dangers and know the relevant standards and provisions due to their technical training, knowledge and experience.

4.2 Specialists

Specialists are able to perform the assigned work, can recognize and avoid possible dangers and know the relevant standards and provisions due to their technical training, knowledge and experience.

4.3 Instructed personnel

Instructed personnel have been trained by the operating company on the tasks and possible dangers of improper behavior.

4.4 Service personnel

Service personnel are able to perform the assigned work and can recognize and avoid possible dangers due to their technical training, knowledge and experience.

4.5 Additional qualifications

Persons who work with the product must be familiar with the valid safety regulations and laws as well as the standards, guidelines and laws listed in this document.

Personnel who work with the product must have facility-issued authorization to commission, program, configure, operate, maintain and also decommission this product.

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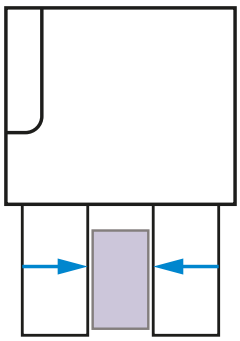
5 Product description

5.1 Possible applications

Outside gripping

The product can be used for outside gripping.

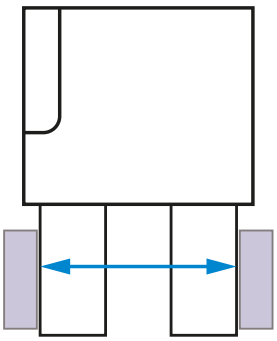
MoveToWork command



Inside gripping

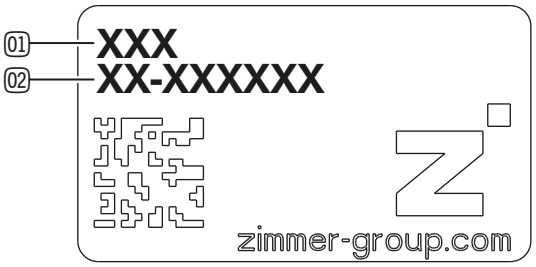
The product can be used for inside gripping.

MoveToBase command



5.2 Type plate

A type plate is attached to the product.



01 Article number

02 Confirmation number

6 Functional description

The gripper jaws of the GEP5000 series are arranged parallel to each other on two opposing guide rails and can be moved relative to each other.

The gripper jaws of the GED5000 series are arranged on three guide rails offset to each other at a 120° angle.

The force of the motor is transmitted over a gear to a worm gear. The movement is transferred from the worm gear to the toothed gripper jaws and a synchronized movement is generated.

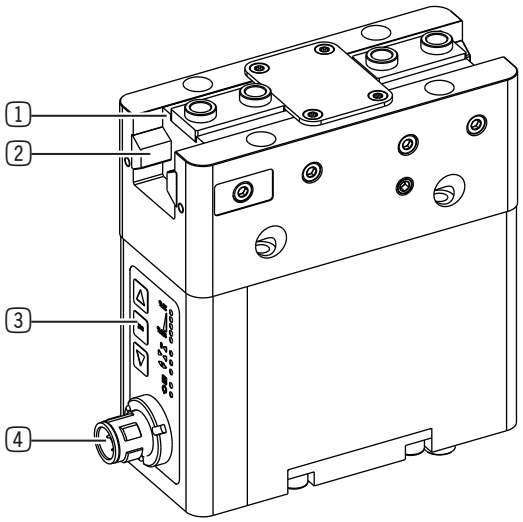
Despite their small installation space, these products are suited for gripping a wide range of form-fit and frictional fit parts.

The product has a mechanical self-locking mechanism to ensure that the workpiece remains held in the event of a power supply loss.

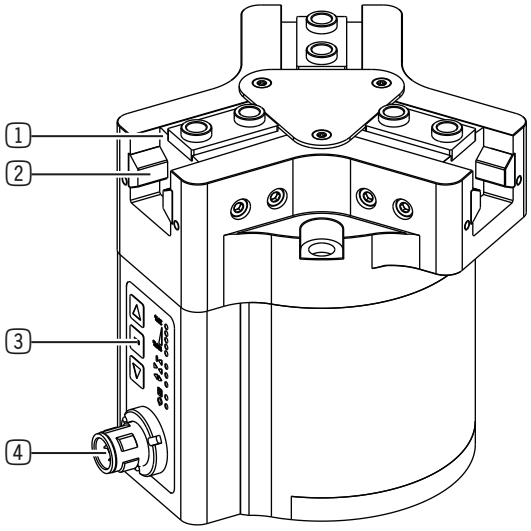
The products can be easily integrated into the existing control system.

The gripping force can be adapted optimally to the workpiece conditions via IO-Link.

GEP5000



GED5000



1 Gripper jaw

2 Guide rail

3 Integrated control module

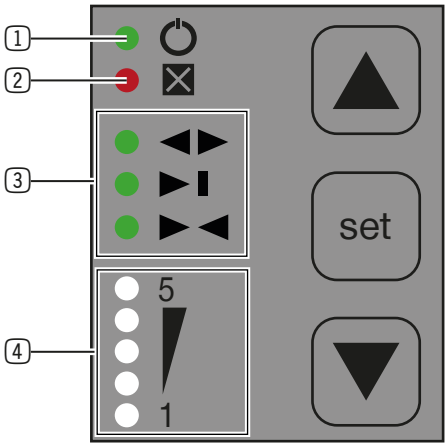
4 Power supply

6.1 LED status display

INFORMATION

For products with IO-Link only the LED display is active, the buttons have no function. The configuration of functions and all settings are made via the control system.

► Please contact Customer Service if you have any questions.



1 Power supply

2 Error

3 Positions

4 Force level

6.2 Verified configuration examples

INFORMATION

► You can find the information in the technical data sheet on our website.

► Please contact Customer Service if you have any questions.

7 Technical data

INFORMATION

► You can find the information in the technical data sheet on our website.

This data varies within the series, depending on the specific design.

8 Accessories/scope of delivery

INFORMATION

If any accessories not sold or authorized by Zimmer GmbH are used, the function of the product cannot be guaranteed. Zimmer GmbH accessories are specifically tailored to the individual products.

► For optional accessories and those included in the scope of delivery, refer to our website.

9 Transportation/storage/preservation

► Transport and storage of the product must be done only with the original packaging.

► If the product has already been installed on the superordinate machine unit, care must be taken during transport to ensure that no unexpected movements can occur.

  ► Before commissioning the product and after transport, check all power and communication connections as well as all mechanical connections.

► If the product is stored for an extended period, the following points are to be observed:

  ► Keep the storage location as dust-free and dry as possible.

  ► Avoid temperature fluctuations.

  ► Avoid wind/drafts/water condensation formation.

  ► Pack the product and do not expose it to direct sunlight during storage.

► Clean all components. There must be no soiling left on the components.

► Visually inspect all components.

► Remove all foreign substances.

► Properly remove potential corrosion spots.

► Close electrical connections using suitable covers.

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10 Installation

WARNING

Risk of injury due to uncontrolled movements

Risk of injury in case of unexpected movement of the machine or system into which the product is to be installed.

- ► Switch off the energy supply of the machine before any work.
- ► Secure the power supply against being switched on unintentionally.
- ► Check the machine for any residual energy that may be present.

CAUTION

Risk of injury due to uncontrolled movements

Risk of injury in the event of uncontrolled movement of the product when the power supply is connected.

- ► Switch off the power supply to the machine before carrying out any work.
- ► Secure the power supply against being switched on unintentionally.
- ► Check the machine for any residual energy that may be present.

Assembly requirements	
Permissible flatness tolerance [mm]	0,03
Strength class of the mounting screws	8.8

INFORMATION

Further installation information:

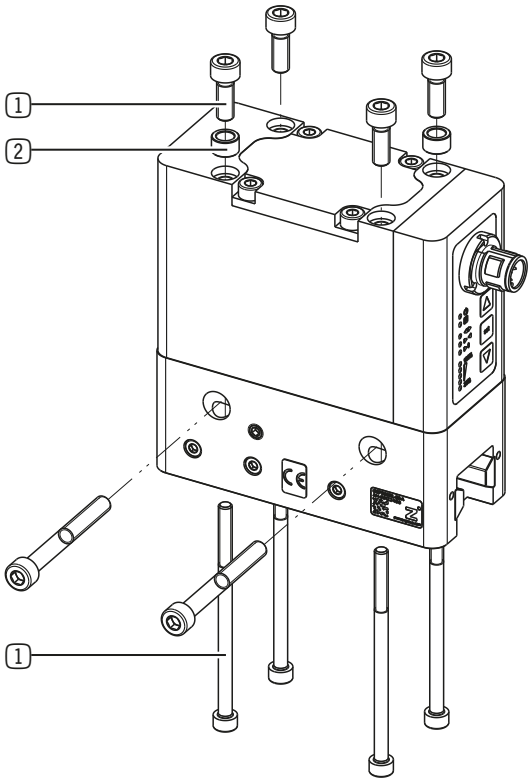
- The mounting screws are not included in the scope of delivery.

- ► Install the product on an appropriate mounting surface in accordance with the flatness specifications.
- ► Make sure that the mounting piece is sufficiently rigid.
- ► Ensure the cleanliness of the connection surfaces.
- ► Please note the permitted tightening torques of the mounting screws at www.zimmer-group.com/en/td.

10.1 Installing GEP5000

The product can be installed from multiple sides.

- ▶ Insert the centering sleeves into the provided fits on the product.
- ▶ Position the product on the mounting piece using centering sleeves.
- ▶ Mount the product on the mounting piece using the appropriate mounting screws.



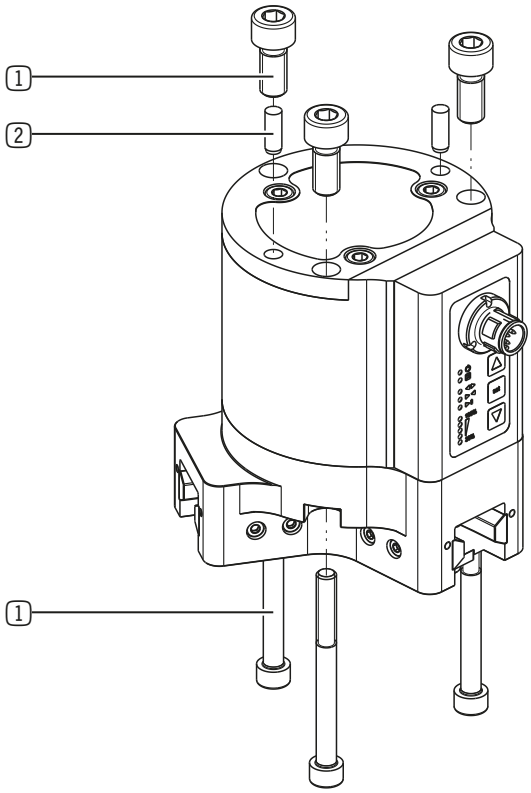
1 Mounting screw

2 Centering Disc

10.2 Installing GED5000

The product can be installed from multiple sides.

- ▶ Insert the straight pins into the designated fits on the product.
- ▶ Position the product on the mounting piece with the straight pins.
- ▶ Mount the product on the mounting piece using the appropriate mounting screws.



1 Mounting screw

2 Straight pins

10.3 Safe shutoff for products with IO-Link

INFORMATION

Without an externally fed voltage supply, the motor of the product cannot carry out an active movement and thus cannot carry out a hazardous movement.

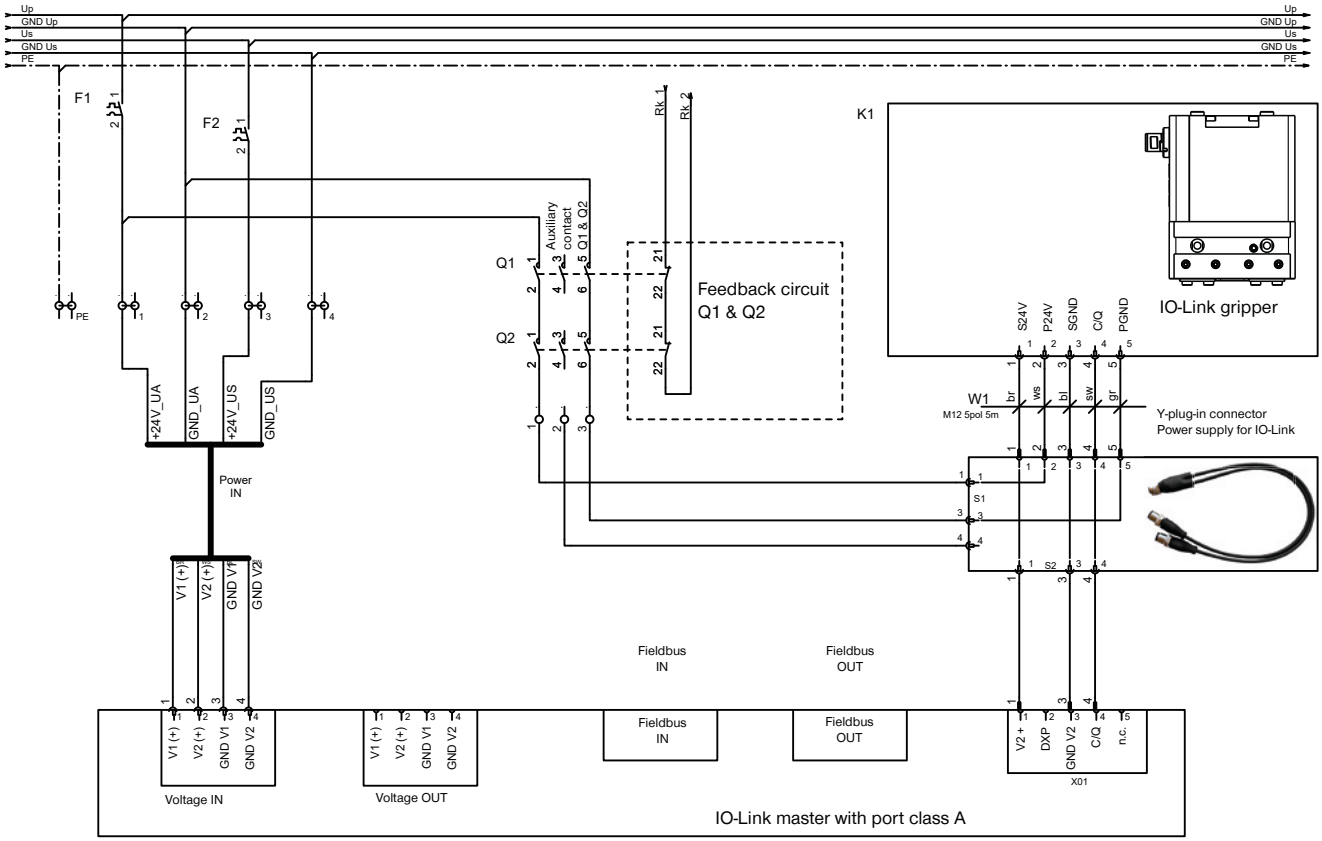
There is a galvanic separation between the two voltage supplies (signal and power).

Because of the self-locking mechanism, the product remains in the last approached position, even if no voltage is supplied.

INFORMATION

For safe shutoff for products with IO-Link, two contactors with one auxiliary contact each are switched in series. Here, the auxiliary contacts monitor the status of the contactors. If one contactor does not switch, the second contactor ensures safety. The malfunction can still be detected with the contacts.

The following figure shows the example of a circuit through which the IO-Link master cannot conduct the actuator current of the product.



10.4 Installing the energy supply

NOTICE

Destruction of the product

In the event that the polarity of the product is reversed, the IO-Link chip may be destroyed as a result of the duration of current of the C/Q (pin 4) being too long.

► Connect the product according to its assignment diagram.

NOTICE

Material damage and malfunction in case of non-compliance

The cable mounted on the product can be subjected to a torsional angle of +50°.

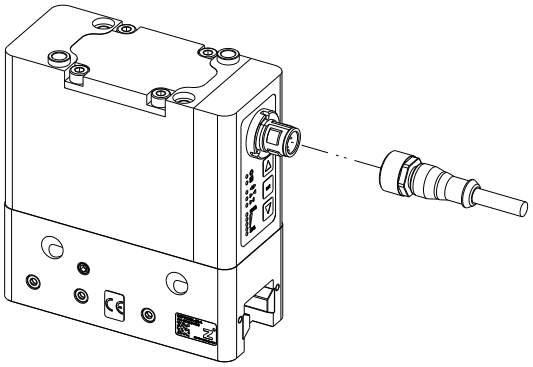
► Do not route the cable so that it is strained.

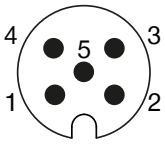
► You must meet the minimum bending radius of 10x the outer diameter.

► Secure free-hanging cables to prevent excessive motion loads or pinching.

► The contacts of the energy supply must be dry, clean and undamaged at all times.

► Connect the power supply cable to the control system of the product.



Pin	Color	Function	Explanation	Plug, M12
1	Brown	24 V DC sensor	24 V DC supply voltage for IO-Link communication	
2	White	PWR actuator	24 V DC supply voltage for actuator	
3	Blue	GND sensor	0 V DC supply voltage for IO-Link communication	
4	Black	C/Q	IO-Link communication	
5	Gray	GND actuator	0 V DC supply voltage for actuator	

► Connect the product to the IO-Link master.

► Reconnect the voltage supply.

► Configure the IO-Link master (see the chapter "Commissioning").

10.5 Static charge

NOTICE

Material damage from static charge

The movement of the gripper jaws creates low voltages as a result of static charging. These charges cannot be dissipated if the product is mounted on an insulating surface and if discharge is also not possible through the workpiece.

- ► Please note that ESD-sensitive parts can be damaged if they come into contact with the product.
- ► Ground the product for applications that require high EMC resistance.

10.6 Heat dissipation

NOTICE

Material damage from overheating of the product

If the product is operated under a very high ambient temperature and with fast clock cycles on an ongoing basis, this can reduce its service life.

- ► If the product is exposed to high ambient temperatures, always install it on heat-conducting materials.
- ► Reduce the load with increasing temperature.

10.7 Installing accessories

NOTICE

Non-compliance may result in material damage.

- ► Before installing an accessory, make sure it is suitable for use with the selected variant.
- ► You can find information on our website.
- ► Please contact Customer Service if you have any questions.

11 Commissioning

WARNING

Risk of injury from crushing

Injuries can be caused by crushing and clamping during the gripping process on the product or between the product and the workpiece.

- ► Do not reach into the operational range of the product.
- ► Make sure that there are no parts of the body in the range of movement of the product!

CAUTION

Risk of injury from impact

When the gripper jaws are opening, there is a risk of impact in the guide area.

- ► Always keep an adequate safety distance.

CAUTION

Reduction of the gripping force can cause injury and material damage

When flexible components are gripped, the gripping force of the product is reduced.

Reduced gripping force can cause injuries or material damage because the components can no longer be securely gripped and transported.

- ► Do not stand or walk underneath suspended loads.

NOTICE

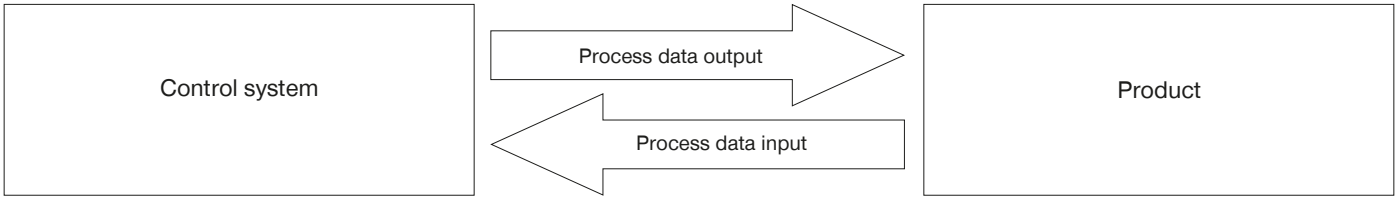
Malfunction in case of non-compliance

- ► Note the correct setting of the gripping force and the selection of the gripper finger length to prevent the gripper jaws from tensioning.

11.1 Process data

There is an option to control the product only with the process data that is transmitted in each cycle.

Process data output	Data type
ControlWord	UINT16
DeviceMode	UINT8
WorkpieceNo	UINT8
TeachPosition	UINT16
GripForce	UINT8
PositionTolerance	UINT8



Process data input	Data type
StatusWord	UINT16
Diagnosis	UINT16
ActualPosition	UINT16

11.2 IODD Import

► Import the IODD (device description) into the control system.
  ► Go to our website.
  ► Select the desired product.
  ► Download the corresponding .zip file via the Downloads section under IODD.

As soon as the hardware configuration is complete and the IO-Link connection to the product is established, data will be displayed in the process input data.

Some control systems demand a byte swap to bring this process data into a logical sequence.

► Look at bit 6 (GripperPLCActive) in the StatusWord to determine whether a byte swap is necessary.
  ► Determine whether bit 6 is active in the first or second byte of the StatusWord.
    ⇨ Bit 6 is active in the first byte: The bytes already have the correct sequence.
      ► Continue with the commissioning.
    ⇨ Bit 6 is active in the second byte:
      ► Apply a byte swap (see the section “StatusWord”).

INFORMATION

The product is controlled via IO-Link by means of the cyclical process data as well as the acyclic service data with a cycle time of 5 ms.

► You must check the process data.

11.3 Data transmission via handshake

The transfer of process data to the product takes place with what is referred to as a handshake. All process data described in the following sections must be transferred with the handshake.

► Send the ControlWord = 0x0001 to the product.
⇨ The data transfer was started.
► Check the response of the product by using StatusWord.12 = TRUE (data transfer OK).
► Send the ControlWord = 0x0000 to stop the data transfer.
⇨ The data transfer is complete when the product sends back StatusWord.12 = DataTransferOK = FALSE.

INFORMATION

► For examples, refer to the "Quickstart Basic Parameters" section.

11.4 Parameters

11.4.1 ControlWord

NOTICE

Malfunction in case of non-compliance

For ControlWord, only one single bit or the value 0 may be set at a time.

► Only use the values listed in the following table.

Parameter	Decimal value	Hexadecimal value
DataTransfer	1	0x0001
WritePDU	2	0x0002
Teach	8	0x0008
Adjust	128	0x0080
MoveToBase	256	0x0100
MoveToWork	512	0x0200
ErrorReset	32768	0x8000

Name	ControlWord
Data type	UINT16
Permission	Write
Transfer	Cyclical
Value range	0 - 65535

	Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8
Byte 1	ErrorReset	-	-	-	-	-	MoveToWork	MoveToBase
	Bit 7	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
Byte 2	Adjust	-	-	-	Teach	-	WritePDU	DataTransfer

Bit 0: DataTransfer

Setting this bit causes the product to acquire the data transmitted in the process data ("WorkpieceNo" = 0) or the data stored in the workpiece data ("WorkpieceNo" = 1 to 32) as the active data set.

Bit 1: WritePDU

Setting this bit tells the product that the current process data should be written to the selected tool recipe.

Bit 3: Teach

Setting this bit tells the product that the current position should be saved as the TeachPosition in the selected WorkpieceNo. This only works if there is no "0" that is transmitted in the workpiece number.

Bit 7: Adjust

Setting this bit causes a readjustment of the jaw end positions if no other bit is set in the control word.

Bit 8: MoveToBase

Setting this bit tells the product to move toward the BasePosition.

Bit 9: MoveToWork

Setting this bit tells the product to move toward the WorkPosition.

Bit 15: ErrorReset

This bit can be used to acknowledge all errors that can be reset (see the section “Error diagnosis”).

11.4.2 DeviceMode

The DeviceMode parameter can be used to control the movement of the product and the adaptation to the workpiece. For this purpose, various basic modes and movement profiles are available.

Name	DeviceMode
Data type	UINT8
Permission	Write
Transfer	Cyclical
Value range	1, 2, 3, 60, 70, 100

INFORMATION

For operation of the product, Zimmer GmbH recommends "DeviceMode" 60, 70 and 100.

Input	Mode	Description
1	Universal mode	Internal and external gripping, both movements with the set gripping force
2	Outside gripping	Inwards with set gripping force, outwards at maximum speed
3	Inside gripping	Outwards with set gripping force, inwards at maximum speed
60	Outside gripping	Inwards with set gripping force, outwards at maximum speed
70	Inside gripping	Outwards with set gripping force, inwards at maximum speed
100	Universal mode	Internal and external gripping, both movements with the set gripping force

11.4.3 WorkpieceNo

The workpiece number is used for selecting the previously stored workpiece data, as well as for selecting the WorkpieceNo data record in which the current process data is stored.

WorkpieceNo enables individual workpieces to be taught in to the product very quickly if the recipes are not managed on the control system.

With a value > 0 and data acquisition via a handshake, the corresponding workpiece recipe is loaded in the product.

INFORMATION

► You can find example codes in the sections “Quickstart Basic Parameters” and “Recipe Examples”.

Name	WorkpieceNo
Data type	UINT8
Permission	Write
Transfer	Cyclical
Value range	0 - 32

11.4.4 TeachPosition

The TeachPosition notifies the product of the expected position of the workpiece.

The PositionTolerance defines the tolerance range around the TeachPosition.

The StatusWord notifies the control system of whether the correct workpiece has been gripped.

If the jaws are within the tolerance range in the vicinity of the TeachPosition, bit 9 is set in the StatusWord.

With the position measuring system used, it is possible to achieve position accuracy of ± 0.2 mm.

► Use the following values:

Product	BasePosition	WorkPosition	TeachPosition
GEP5006/GED5006	0	1200	0 to max. 1200
GEP5008/GED5008	0	1600	0 to max. 1600
GEP5010/GED5010	0	2000	0 to max. 2000

Name	TeachPosition
Data type	UINT16
Permission	Write
Transfer	Cyclical
Value range	0 to max. jaw stroke of the product

11.4.5 GripForce

The product can use various gripping forces and gripping speeds to achieve an optimized flow of the gripping process. Since the product generates gripping force from the gripping speed and the amperage, the gripping force setting also conversely influences the gripping speed and amperage. The gripping force can be adjusted in five stages.

INFORMATION

► You can find the information in the technical data sheet on our website.
This data varies within the series, depending on the specific design.

Name	GripForce	
Data type	UINT8	
Permission	Write	
Transfer	Cyclical	
Value range	1	Level 1
	2	Level 2
	3	Level 3
	4	Level 4
	5	Stage 5

11.4.6 PositionTolerance

The TeachPosition notifies the product of the expected position of the workpiece.

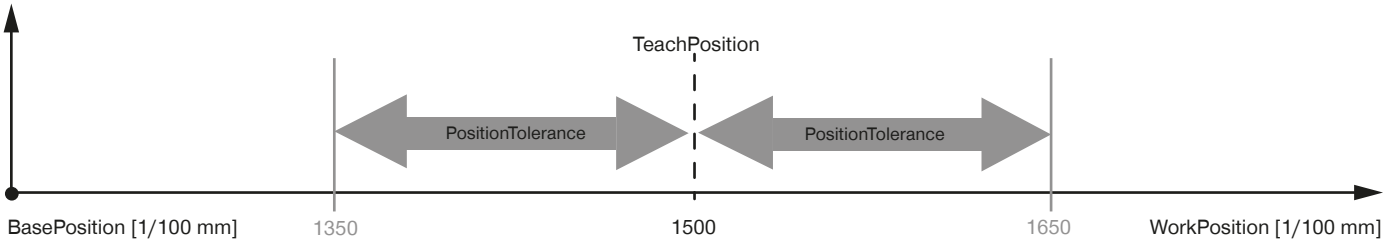
The PositionTolerance defines the tolerance range around the TeachPosition.

They are used to configure the position tolerance with a resolution of 0.01 mm.

Thus, the value range of 0 to 255 can be used to set a maximum tolerance of 2.55 mm in both directions.

INFORMATION

Example:
For TeachPosition 1500 (15 mm), PositionTolerance 150 lets you configure a tolerance of 1.5 mm in both directions.
This means that the TeachPosition range starts at 13.5 mm and goes up to 16.5 mm.



Name	PositionTolerance
Data type	UINT8
Permission	Write
Transfer	Cyclical
Value range	0 to 255

11.4.7 StatusWord

Name	StatusWord
Data type	UINT16
Permission	Read
Transfer	Cyclical
Value range	0 - 65535

	Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8
Byte 1	Error	ControlWord 0x0200	ControlWord 0x0100	DataTransferOK	UndefinedPo-sition	WorkPosition	TeachPosition	BasePosition
	Bit 7	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
Byte 0	-	Gripper-PLCActive	-	-	-	-	-	-

Bit 6: GripperPLCActive

Active as soon as the product has booted up after the cold boot.This bit can be used to verify a “byte swap."

Bit 8: BasePosition

Active if the product is set to BasePosition.

Bit 9: TeachPosition

Active if the product is set to TeachPosition.

Bit 10: WorkPosition

Active if the product is set to WorkPosition.

Bit 11: UndefinedPosition

Active if the product is not set to TeachPosition, WorkPosition or BasePosition.

Bit 12: DataTransferOK

This bit is used for data transmission with the handshake. Active as soon as the product has taken over the data with the parameter ControlWord 1 (decimal).

Bit 13: ControlWord 0x0100

This bit is a direction flag. Active if the last motion task was carried out toward BasePosition.

Bit 14: ControlWord 0x0200

This bit is a direction flag. Active if the last motion task was carried out toward WorkPosition.

Bit 15: Error

Active if the product has an active error. The error message can be determined using Diagnosis.

11.4.8 Diagnosis

The value returned in Diagnosis corresponds to the error code (see "Error Diagnosis" section).

Name	Diagnosis
Data type	UINT16
Permission	Read
Transfer	Cyclical
Value range	0 - 65535

If the product has a fault, the error bit is set in the StatusWord.

► Acknowledge the error by sending ControlWord 0x8000.

NOTICE

Malfunction in case of non-compliance

Not all errors can be reset. For some errors, such as *maximum permissible temperature exceeded*, the error message is not reset after acknowledgment.

► In this case, wait until correct values are sent to the product.

INFORMATION

► Use StatusWord to verify correct gripping.

► The TeachPosition tolerance can be adjusted in another process parameter.

► Observe the tolerances and fluctuations around the exact value of the actual position during programming the position query.

11.4.9 ActualPosition

ActualPosition is the current position of the gripper jaws.

The value is specified with a resolution of 0.01 mm.

The values can move between the BasePosition (minimum values) and the WorkPosition (maximum values).

Product	BasePosition	WorkPosition
GEP5006/GED5006	0	1200
GEP5008/GED5008	0	1600
GEP5010/GED5010	0	2000

Name	ActualPosition
Data type	UINT16
Permission	Read
Transfer	Cyclical
Value range	0 to max. jaw stroke of the product

INFORMATION

► Use the StatusWord to check whether a workpiece has been gripped correctly.

- The position measurement resolution is 0.01 mm.
- The position measurement accuracy is 0.2 mm.

► During commissioning, be aware of fluctuations around the exact value if you use ActualPosition to detect the workpiece.

11.5 Cold start

INFORMATION

If the sensor supply is disconnected, the C/Q signal (IO-Link) must be disconnected as well.

For proper function, Zimmer GmbH recommends that the actuator and sensor voltage be supplied with power separately.

► Switch on the sensor supply.

► Switch on the actuator supply as soon as the product communicates with the control system.

Depending on the application, simultaneous activation of both voltages is possible.

11.6 Minimum travel path

INFORMATION

The minimum travel path applies to both directions of movement and is independent of the start position. The product moves slightly past the front and rear end position. The value shown on the LED display corresponds to the end position.

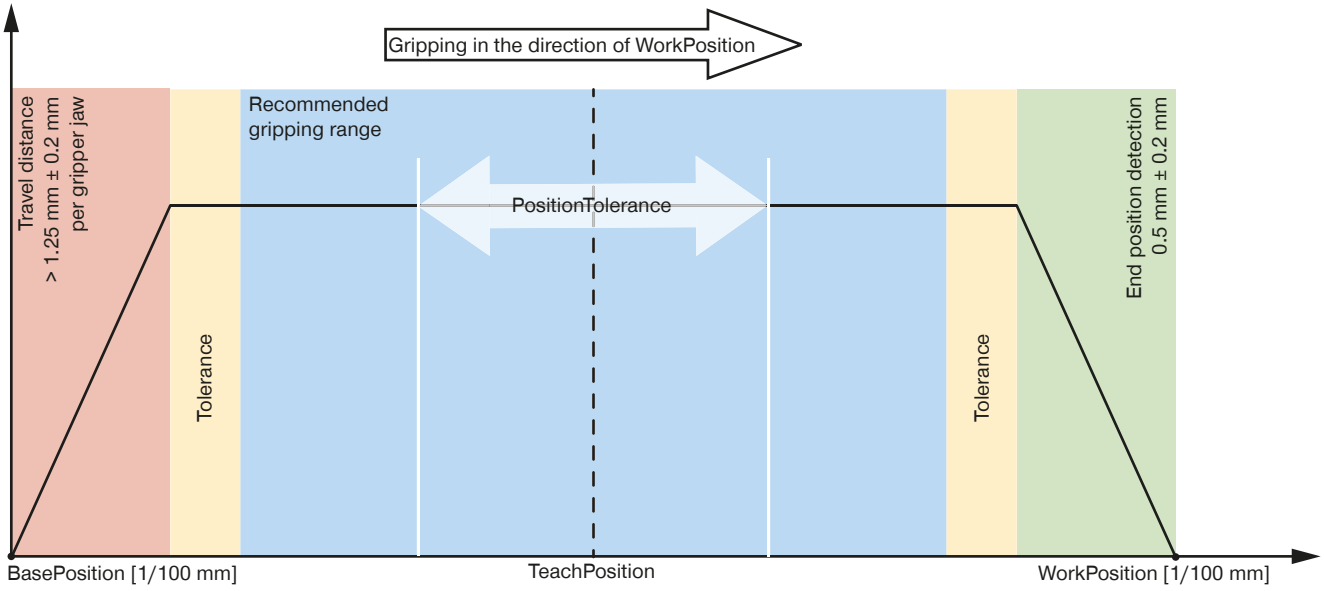
The product requires a certain minimum travel path to move to the desired position.

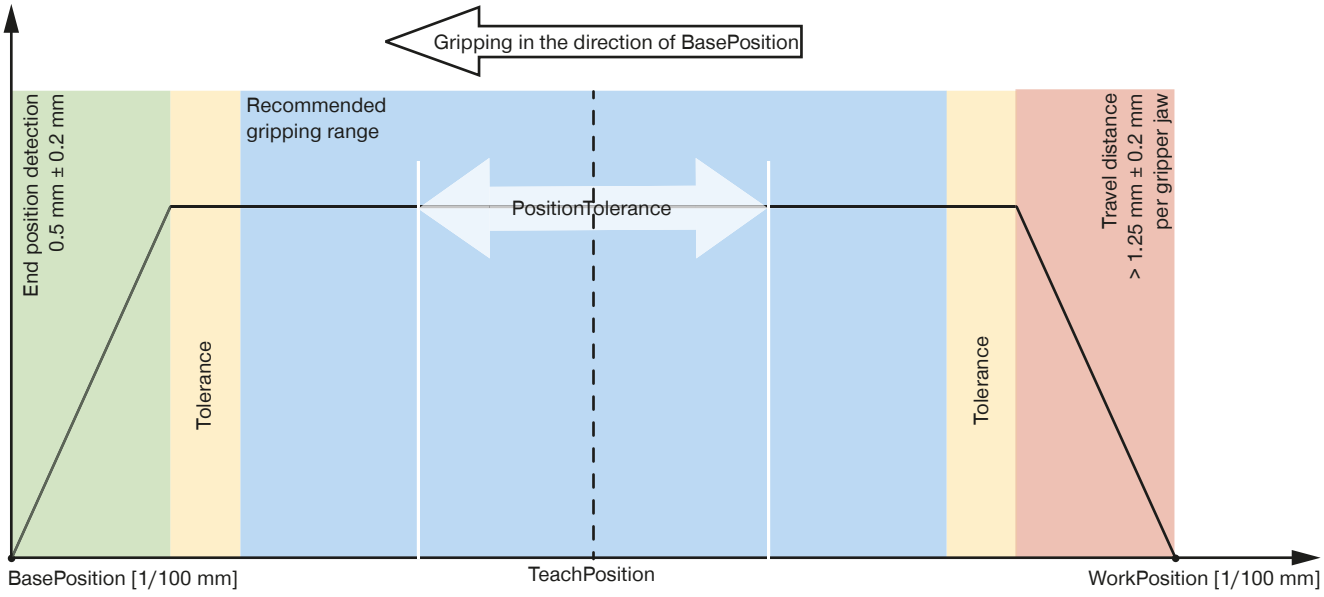
INFORMATION

► You can find the information in the technical data sheet on our website.

► Please contact Customer Service if you have any questions.

11.7 Movement profiles





Design size	Calculation	Recommended working stroke [mm]
GEP5006/GED5006	12 mm - value of end position - value of travel distance	8.6
GEP5008/GED5008	16 mm - value of end position - value of travel distance	12.6
GEP5010/GED5010	20 mm - value of end position - value of travel distance	16.6

11.8 Easy Startup

Describes the process from switching on the product to the initial movement.

► Connect the product according to its assignment diagram.

⇨ The product reports the process parameters StatusWord, Diagnosis and ActualPosition immediately after the internal controller is booted up.

⇨ As soon as the PLCActive bit is registered in the StatusWord, the communication process can start.

► Transmit the process parameters to move the gripper jaws.

- DeviceMode
- GripForce
- PositionTolerance

► Transmit the parameters to the product with a handshake.

INFORMATION

► For more information, refer to the section “Handshake data transfer method”.

11.9 Quickstart Basic Parameters

In the following example, you see the first initialization of the product and the transmission of the process parameters.

```
// Initialization of the product
// Motor switch-on
// Initial move command
// = EasyStartUp Example

IF bStart = TRUE THEN
        iStep                   := 10;
END_IF

CASE iStep OF

10:
    IF StatusWord.6 THEN                    // Query for PLCActive bit in the StatusWord
        ControlWord             := 1;       // Sends the DataTransfer bit in the ControlWord for initialization
        iStep                   := 20;      // Jump to the next step
    END_IF

20:
    IF StatusWord.12 THEN                   // Query for DataTransferOK bit in the StatusWord
        ControlWord             := 0;       // Reset the ControlWord
        iStep                   := 30;      // Jump to the next step
    END_IF

30:
    IF NOT StatusWord.12 THEN
        DeviceMode              := 100;     // Command to select the universal mode
        GripForce               := 4;       // Gripping force setting
        ControlWord             := 1;       // Data transfer to the product
        iStep                   := 40;      // Jump to the next step
    END_IF

40:
    IF StatusWord.12 THEN                   // Query for DataTransferOK bit in the StatusWord
        ControlWord             := 0;       // Reset of the ControlWord
        iStep                   := 50;      // Jump to the next step
    END_IF

50:
    IF NOT StatusWord.12 THEN               // Query for DataTransferOK bit in the StatusWord
        ControlWord             := 512;     // Handshake is completed,
                                            // Product moves to WorkPosition (0x0200 or 512(decimal) = MoveToWork)
        iStep                   := 100;
    END_IF

100:
        ;                                   // Continue with the program

END_CASE
```

11.10 Starting the gripper jaw movement

► Send ControlWord 0x0200 so that the jaws move toward the WorkPosition.
⇨ The jaws move toward the inside.
► Send ControlWord 0x0100 so that the jaws move toward the BasePosition.
⇨ The jaws move toward the outside.
- The motion task must be pending for as long as it takes until the desired position is reached.
- The current motion task is canceled as a result of a new handshake.

⇨ When the jaws reach the corresponding position, this is displayed in the StatusWord as follows:
- The jaws are in the BasePosition: StatusWord.8 = TRUE
- The jaws are in the TeachPosition: StatusWord.9 = TRUE
- The jaws are in the WorkPosition: StatusWord.10 = TRUE

11.11 Recipe examples

11.11.1 Save recipe

The following example code shows how process parameters can be stored in the internal workpiece recipe.

```
// Store tool workpiece recipes in Structured Text (ST)

IF bStart = TRUE THEN
        iStep               := 10;
END_IF

CASE iStep OF

10:
        DeviceMode          := 100;   // Assignment of desired process parameters
        WorkpieceNo         := 3;     // Recipe is to be stored as the third workpiece recipe
        PositionTolerance   := 50;
        GripForce           := 3;
        TeachPosition       := 500;
        iStep               := 20;    // Jump to the next step

20:
        ControlWord         := 1;     // Begins with the handshake
        iStep               := 30;    // Jump to the next step

30:
    IF StatusWord.12 THEN             // Queries the bit DataTransferOK=TRUE from StatusWord,
                                      // Response of the product to transferred data
        ControlWord         := 0;     // Reset the ControlWord
        iStep               := 40;    // Jump to the next step
    END_IF;

40:
    IF NOT StatusWord.12 THEN         // Query for completion of the data transfer,
                                      // DataTransferOK = FALSE
        ControlWord         := 2;     // Handshake is completed,
                                      // storage starts here via the WritePDU bit in the ControlWord
        iStep               := 50;    // Jump to the next step
    END_IF;

50:
    IF StatusWord.12 THEN             // Queries the DataTransferOK = TRUE bit from StatusWord
        ControlWord         := 0;     // Reset the ControlWord
        iStep               := 60;    // Jump to the next step
    END_IF;

60:
    IF NOT StatusWord.12 THEN         // Query for completion of the data transfer,
                                      // DataTransferOK = FALSE
        iStep               := 0;     // Storage is completed
    END_IF;

END_CASE
```

11.11.2 Loading a recipe

The following example code shows how process parameters can be loaded to the internal workpiece recipe.

```
// Load workpiece recipes in Structured Text (ST)

IF bLoad = TRUE THEN
        iStep           := 10;
END_IF

CASE iStep OF

10:
        WorkpieceNo     := 3;   // Load third workpiece recipe
        iStep           := 20;  // Jump to the next step

20:
        ControlWord     := 1;   // Begins with the handshake
        iStep           := 30;  // Jump to the next step

30:
    IF StatusWord.12 THEN       // Queries the bit DataTransferOK=TRUE from StatusWord,
                                // Response of the product to transferred data
        ControlWord     := 0;   // Reset the ControlWord
        iStep           := 40;  // Jump to the next step
    END_IF;

40:
    IF NOT StatusWord.12 THEN   // Query for completion of the data transfer,
                                // DataTransferOK = FALSE
        iStep           := 0;   //Handshake is completed,
                                // Parameters from the third recipe have been taken over into the current process parameters.
    END_IF;

END_CASE
```

12 Operation

INFORMATION

For products with IO-Link, menu operation is performed via the control system.

▶ Please contact Customer Service if you have any questions.

13 Gripping force charts

INFORMATION

▶ You can find information on our website.

▶ Please contact Customer Service if you have any questions.

14 Error diagnosis

Error code	Error	Possible cause	Measure
0x0000	Device is ready for operation.	-	-
0x0100	Actuator power supply is not present or is too low.	• Actuator power supply is not connected • Actuator power supply is not sufficient • Cable break • STO input circuit is interrupted.	▶ Check the actuator power supply. ▶ Switch on the STO input circuit.
0x0101	Temperature above maximum permitted temperature.	• Ambient temperature is too high • Overload of the product	▶ Provide sufficient ventilation/cooling/ connection. ▶ Reduce the clock speed/ cycle count. ▶ Check that the product moves freely.
0x0102	Max. permitted temperature undershot	• Ambient temperature is too low	▶ Provide an adequate operating temperature.
0x0300	ControlWord is not plausible.	• Multiple bits were set in the ControlWord.	▶ In the ControlWord, check that only one bit is set.
0x0301	Positions implausible	• Transmitted positions are not plausible. • Modified process data were not taken over.	▶ Check the transmitted process data. ▶ Apply the process data via a handshake.
0x0302	GripForce is not plausible.	• Transmitted GripForce is not plausible. • Modified process data were not taken over.	▶ Check the transmitted process data. ▶ Apply the process data via a handshake.
0x0303	Required motor speed not reached.	• Insufficient power supply. • Gripper jaws are blocked. • Gripper jaws are difficult to move.	▶ Check the power supply. ▶ Check that the product moves freely.
0x0304	PositionTolerance is not plausible.	• Transmitted PositionTol- erance is not plausible. • Modified process data were not taken over.	▶ Check the transmitted process data. ▶ Apply the process data via a handshake.
0x0305	Position measuring system not referenced.	• Position measuring system is not referenced. • A reference run is being performed.	▶ Reference the product. ▶ Wait until the reference run is complete.
0x0306	DeviceMode is not plausible.	• Transmitted DeviceMode is not plausible. • Modified process data were not taken over.	▶ Check the transmitted process data. ▶ Apply the process data via a handshake.
0x0308	WorkpieceNo cannot be selected.	• Transmitted workpiece number is outside the permitted range. • Modified process data were not taken over.	▶ Check the transmitted process data. ▶ Apply the process data via a handshake.

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Error code	Error	Possible cause	Measure
0x0309	TeachPosition was changed.	• Modified process data were not taken over.	▶ Apply the process data via a handshake.
0x030D	GripForce was changed.	• Modified process data were not taken over.	▶ Apply the process data via a handshake.
0x030F	TeachTolerance was changed.	• Modified process data were not taken over.	▶ Apply the process data via a handshake.
0x0310	DeviceMode was changed.	• Modified process data were not taken over.	▶ Apply the process data via a handshake.
0x0311	WorkpieceNo was changed.	• Modified process data were not taken over.	▶ Apply the process data via a handshake.
0x0312	Initial state after gripper restart	• Modified process data were not taken over.	▶ Apply the process data via a handshake.
0x0400	Difficulty of movement	• Insufficient power supply. • Incorrect DeviceMode (NO/NC) selection. • The free travel of the gripper (NO/NC) is blocked. • Gripper jaws are blocked. • Gripper jaws are difficult to move. • Travel distance of the gripper jaw is too small.	▶ Check the power supply. ▶ Check the selected DeviceMode. ▶ Check that the product moves freely. ▶ Check the travel distance.
0x0401	Current limit exceeded.	• Gripper jaws are blocked. • Gripper jaws are tensioned incorrectly.	▶ Make sure that the product moves freely.
0x0403	Temperature sensor error	• Fault of the integrated temperature sensor	▶ Please contact Customer Service.
0x0404	Position sensor error	• Fault of the integrated position sensor	▶ Please contact Customer Service.
0x0405	Travel time/runtime exceeded	• Gripper jaws are blocked. • Gripper jaws are tensioned incorrectly.	▶ Make sure that the product moves freely.
0x0406	System error	• Internal system error	▶ Please contact Customer Service.

15 Table with acyclic data (ISDU)

INFORMATION

IO-Link distinguishes between cyclical process data (PDU) and acyclic data (ISDU).

Access to acyclic data is not arranged very conveniently for all control system and IO-Link master combinations. For this reason, the product can be used without acyclic data. This makes it as easy as possible to control the product.

► Please contact Customer Service if you have any questions.

INFORMATION

► Note that the acyclic data with the following parameters correspond to the reflection of the process data:

- StatusWord, Diagnosis, ControlWord, ActualPosition, TeachPosition, WorkpieceNo, DeviceMode, PositionTolerance, Gripforce

Index	Name	Data type	Access rights	Values	Description
0x0040 (64)	StatusWord	UINT16	Read	0 - 65535	Read out the StatusWord
0x0041 (65)	Diagnosis	UINT16	Read	0 - 65535	Read out of the diagnostic code
0x0042 (66)	Cycle counter	UINT32	Read	0 to 4294967295	Read out of the total number of cycles
0x0043 (67)	Temperature	UINT16	Read	0 to 100 °C	Read out the current temperature
0x0044 (68)	ControlWord	UINT16	Read	0 - 65535	Read out of the ControlWord
0x0045 (69)	Error code	STRING	Read	1 to 32	Read out of the current error state
0x0046 (70)	Error counter	UINT32	Read	0 to 4294967295	Read out of the number of errors since the restart
0x0064 (64)	Firmware application	STRING	Read	1 to 64	Current firmware of the application controller
0x0100 (256)	ActualPosition	UINT16	Read	0 to max. jaw stroke of the product [0,01 mm]	Read out the current position of the gripper jaws
0x0101 (257)	TeachPosition	UINT16	Read	0 to max. jaw stroke of the product [0,01 mm]	Read out of the current transmitted TeachPosition
0x0102 (258)	WorkpieceNo	UINT8	Read	0 - 32	Read out of the transmitted workpiece number
0x0103 (259)	DeviceMode	UINT8	Read	1 to 95	Read out of the transmitted travel mode
0x0104 (260)	PositionTolerance	UINT8	Read	0 to 255	Read out of the transmitted tolerance of the TeachPosition
0x0105 (261)	GripForce	UINT8	Read	1 to 130 %	Read out of the transmitted gripping force

16 Maintenance

NOTICE

Material damage resulting from blowing out with compressed air

Blowing out the product with compressed air can cause malfunctions.

► Never purge the product with compressed air.

NOTICE

Material damage caused by unsuitable cleaning materials

Liquid and solvent-based cleaning agents can cause malfunctions.

► Do not clean the product with any cleaning agents that are liquid or contain solvents.

NOTICE

Contamination of the environment due to escaping lubricants

Lubricants can escape through moving machine parts. This can lead to contamination of the machine, the workpiece and the environment.

► Remove leaking lubricant immediately and thoroughly.

Maintenance-free operation of the product is guaranteed for up to **30 million cycles**.

► Note that the product could become damaged under the following circumstances:

- Dirty environment
- Improper use and use that does not comply with the performance data
- Permissible temperature range not observed

► Even though the product is maintenance-free as mentioned above, perform a regular visual inspection to check for any damage or contamination.

► Have maintenance work that requires disassembly of the product performed by customer service only.

⇨ Dismantling and reassembling the product without authorization may result in complications, as special installation equipment is required in some cases. Zimmer GmbH accepts no liability for any resulting malfunctions or damage.

17 Decommissioning/disposal

INFORMATION

When the product reaches the end of its operational phase, it can be completely disassembled and disposed of.

► Disconnect the product completely from the power supply.

► Dispose of the components properly according to the material groups.

► Comply with the locally applicable environmental and disposal regulations.

18 RoHS declaration

in terms of the EU Regulation 2011/65/EU

Name and address of the manufacturer:

Zimmer GmbH

Im Salmenkopf
77866 Rheinau, Germany
+49 7844 9138 0
info@zimmer-group.com
www.zimmer-group.com

We hereby declare that the incomplete machine described below

Product designation: 2-jaw parallel gripper, 3-jaw concentric gripper

Type designation: GEP5000, GED5000

conforms to the requirements of the directive in its design and the version we put on the market.

Michael Hoch	Rheinau, Germany, 2020-11-15	
Authorized representative for the compilation of relevant technical documents	(Place and date of issuance)	Martin Zimmer (Legally binding signature) Managing Partner

19 Declaration of Incorporation

In terms of the EU Machinery Directive 2006/42/EC (Annex II 1 B)

Name and address of the manufacturer:

Zimmer GmbH

Im Salmenkopf
77866 Rheinau, Germany
+49 7844 9138 0
info@zimmer-group.com
www.zimmer-group.com

We hereby declare that the incomplete machine described below

Product designation:	2-jaw parallel gripper, 3-jaw concentric gripper
Type designation:	GEP5000, GED5000

conforms to the requirements of the Machinery Directive, 2006/42/EC, Article 2g, Annex VII, b – Annex II, b, in its design and the version we put on the market.

We hereby confirm that all the relevant basic health and safety requirements for the product have been observed and implemented.

A full list of applied standards can be obtained from the manufacturer.

We also declare that the specific technical documents were produced in accordance with Annex VII Part B of this Directive. We undertake to provide the market supervisory bodies with electronic versions of special documents for the incomplete machine through our documentation department, should they have reason to request them.

The incomplete machine may only be commissioned if it has been ascertained, if applicable, that the machine or system in which the incomplete machine is to be installed satisfies the requirements of Directive 2006/42/EC on Machinery and an EC Declaration of Conformity has been drawn up in accordance with Annex II 1 A.

Kurt Ross	Rheinau, Germany, 2021-05-01	
Authorized representative for the compilation of relevant technical documents	(Place and date of issuance)	Martin Zimmer (Legally binding signature) Managing Partner

20 Declaration of Conformity

As defined by the EC Directive 2014/30/EU on electromagnetic compatibility

Name and address of the manufacturer:

Zimmer GmbH

Im Salmenkopf
77866 Rheinau, Germany
+49 7844 9138 0
info@zimmer-group.com
www.zimmer-group.com

We hereby declare that the product described below

Product designation:	2-jaw parallel gripper, 3-jaw concentric gripper
Type designation:	GEP5000, GED5000

conforms to the requirements of the Electromagnetic Compatibility Directive 2014/30/EU in its design and the version we put on the market.

The following harmonized standards have been used:

DIN EN ISO 12100	Safety of machinery - General principles for design - Risk assessment and risk reduction
DIN EN 61000-6-3	EMC Generic standard, Emission standard for residential, commercial and light-industrial
DIN EN 61000-6-2	EMC Generic standard, Emission standard for industrial environments
DIN EN 61000-6-4	EMC Generic standard, Immunity for industrial environments

A full list of applied standards can be obtained from the manufacturer.

Kurt Ross	Rheinau, Germany, 2021-05-01	
Authorized representative for the compilation of relevant technical documents	(Place and date of issuance)	Martin Zimmer (Legally binding signature) Managing Partner