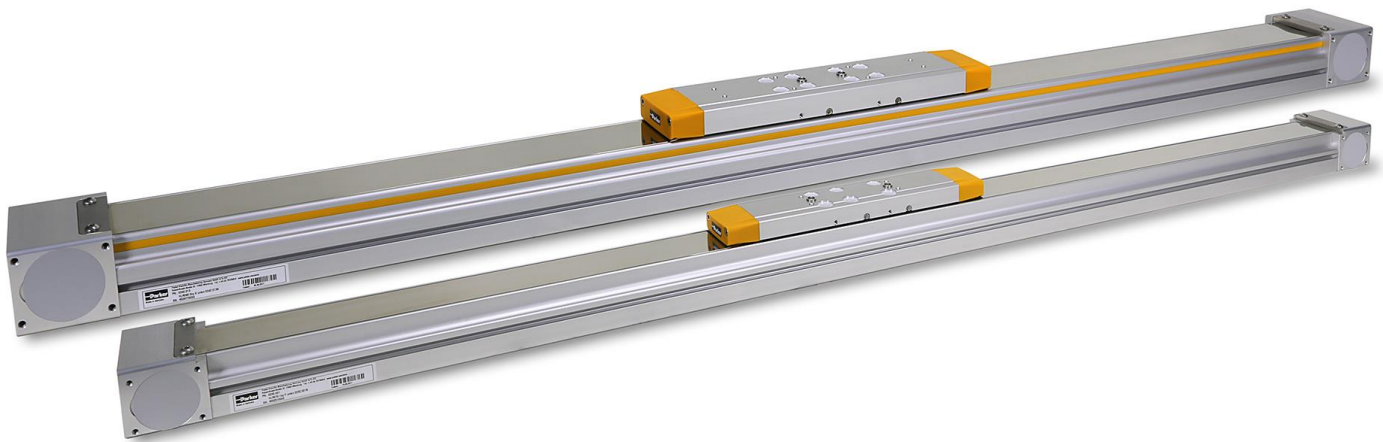


# HLR Mounting instructions

Operating Manual - Installation, Commissioning, Maintenance  
and Repair

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D O C - 0 0 1 3 - 0 2

192-510201N3 HLR  
Mounting  
instructions  
2023-03

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## Non-warranty clause

We checked the contents of this publication for compliance with the associated hardware and software. We can, however, not exclude discrepancies and do therefore not accept any liability for the exact compliance. The information in this publication is regularly checked, necessary corrections will be part of the subsequent publications.  
German Master created.

## Additional/ current information:

Our product on the internet: ([http://solutions.parker.com/hlr\\_support](http://solutions.parker.com/hlr_support))

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# 1. Introduction

**In this chapter you can read about:**

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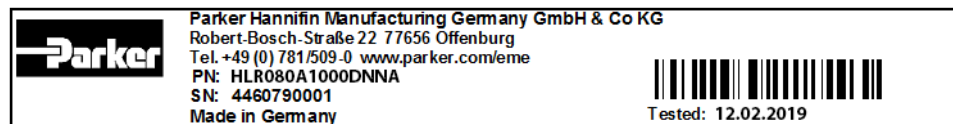
## 1.1 Device assignment

**This manual applies for the following devices:**

Linear actuators with the designation:

- ◆ HLR070
- ◆ HLR080

## 1.2 Type identification plate



Type specification plate (example)

**Type specification plate explanation**

	Manufacturer address
PN:	Order code
SN:	Unambiguous identification number
Tested:	Date of factory test

## 1.3 Mounting explanation



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### EINBAUERKLÄRUNG DECLARATION OF INCORPORATION

ACCORDING TO EC DIRECTIVE 2006/42/EC (ANNEX II, PART 1, SECTION B) FOR PARTLY COMPLETED MACHINERIES

Dokumenten Nr. <i>Declaration No.:</i>	<b>DoI008-R 2.0</b>
Firma / <i>Manufacturer:</i> Bevollmächtigter / <i>Authorized person:</i>	<b>Parker Hannifin GmbH &amp; Co KG Jürgen Killius (Frank Durban)</b>
Anschrift <i>Address:</i>	<b>Robert-Bosch-Straße 22 77656 Offenburg Deutschland</b>
Produkt <i>Product:</i>	<b>HLR: High Load Rodless</b>
Serien- / Typenbezeichnung <i>Model / Type:</i>	<b>HLR070; HLR080</b>
Seriennummer <i>Serial No.:</i>	HLR070 bis -080: <b>Ab 434982-0001</b> HLR070 till -080: <b>As of 434982-0001</b>
Baujahr <i>Year of manufacture:</i>	HLR070 bis -080: <b>Ab Februar 2016</b> HLR070 till -080: <b>As of February 2016</b>

Der oben genannte Hersteller / Bevollmächtigte erklärt, dass das Produkt den folgenden grundlegenden Anforderungen der Richtlinie Maschinen (2006/42/EG) entspricht:

*The above mentioned Manufacturer / authorized person declare that the product is complying with the following essential requirements of the machinery directive 2006/42/EC:*

Anhang I, Artikel / *Annex I, Article:* 1.1.1, 1.1.2, 1.1.3, 1.1.5, 1.3.1, 1.3.2, 1.3.3, 1.3.4, 1.3.7, 1.4.1, 1.5.4, 1.5.8 & 1.6.1.

Norm / <i>Standard</i>	Titel / <i>Title</i>	Ausgabe / <i>Edition</i>
DIN EN ISO 12100:2011	Sicherheit von Maschinen – Allgemeine Gestaltungsleitsätze, Risikobeurteilung und Risikominimierung <i>Safety of Machinery – General principles for design, risk assessment and risk reduction</i>	2011-03

Den im Produkthandbuch beschriebenen Sicherheits-, Installations- und Bedienungshinweisen muss Folge geleistet werden.

*These products must be installed and operated with reference to the instructions in the Product Manual.*

*All instructions, warnings and safety information of the Product Manual must be adhered to.*

Die unvollständige Maschine darf erst dann in Betrieb genommen werden, wenn festgestellt wurde, dass die Maschine, in die die unvollständige Maschine eingebaut werden soll, den Bestimmungen der Richtlinie Maschine 2006/42/EG entspricht.

*The partly completed machinery must not be put into service until the final machinery, into which it is to be incorporated, has been declared in conformity with the provisions of directive 2006/42/EC on machinery.*

Die zur Maschine gehörenden speziellen technischen Unterlagen nach Anhang VII Teil B wurden erstellt.

*The machinery related special technical documentation according annex VII B has been created.*

Der Hersteller verpflichtet sich, die speziellen Unterlagen zur unvollständigen Maschine einzelstaatlichen Stellen auf Verlangen elektronisch zu übermitteln. Die gewerblichen Schutzrechte des Herstellers der unvollständigen Maschine bleiben hiervon unberührt.

*The manufacturer commits to transmit, in response to a reasoned request by the market surveillance authorities, relevant documents on the partly completed machinery electronically by our documentation department.*

*The intellectual rights of the manufacturer of the incomplete machine are not affected.*

Offenburg, 20.01.2017  
Frank Durban, *Commercial Manager*

Parker Hannifin GmbH  
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USt.-IdNr.: DE 122 802 922  
Steuernummer: 5349 5747 1543

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**Geschäftsführung:**  
Dr. Gerd Scheffel, Günter Schrank, Ellen Raahede, Kees Veraart  
**Vorsitzender des Aufsichtsrates:** Hansgeorg Greuner

## 1.4 Applications in accordance with the Regulations

The incomplete machine can only be set in operation if it is sure that the machine in which the incomplete machine shall be mounted is conform to the 2006/42/EG machine directives.

Without further measures the product is not suitable for safety-oriented tasks. The linear actualor must only be used in areas that are not accessible to persons during operation.

If the linear actuator is used in areas accessible to people, it must be installed in such a manner that no one can be endangered during operation.

The described safety, installation and operating instructions must be adhered to. General functioning consists in converting a rotational movement in a linear movement without slip within the product related load limits.

Can be found here (see page 16) and in the HLR Catalogue (<http://www.parker.com/eme/hlr>).

Its applications are in industry and trade.

The linear actuator is used for: Positioning, transporting, feeding, removing, pallet handling, loading, unloading, processing and manipulating as well as testing work pieces or tools. Since the component can be used in a very wide range of applications, the user is responsible for its use in specific applications.

### 1.4.1. Applications not in accordance with the intended use

For risks of applications not in accordance with the intended use, the user shall bear the sole responsibility. Parker Hannifin does not accept any liability for damages caused by applications not in accordance with the intended use of the product.

## 1.5 For Safety Use

### 1.5.1. General hazards

#### **General Hazards on Non-Compliance with the Safety Instructions**

The subsystem has been designed in accordance with state-of-the-art technical developments and is operationally reliable. If it is not operated by qualified or at least trained personnel or if it is operated improperly or not in accordance with the operating instructions, however, the unit may bear the risk of hazards.

Electronic, moving and rotating components can

- ◆ cause danger for life and limb of the operator or third persons and / or
- ◆ cause material damage

If the linear actuator is installed in a machine plant, the safety requirements noted in the operating instructions for that machine must be combined with those described in this manual.

### 1.5.2. Identifying Residual Dangers and Hazardous Areas

If there are still residual dangers present to persons or property from the linear actuator in spite of operating it in a safe manner, the user must make reference to these residual dangers through signs and written rules requiring appropriate procedures.

**The following safety signal words are used:**



Indicates that an imminent hazardous situation may lead to death or serious bodily harm if not prevented using appropriate safety measures.



Indicates a potentially hazardous situation which, if not avoided using appropriate safety measures, could result in serious or minor injury.

**⚠ CAUTION**

Indicates a potentially hazardous situation which, if not avoided using appropriate safety measures, may result in minor injury or material damage.

**NOTICE**

Provides important information about the product, how to handle the product or about the part of the manual to which particular attention must be paid.

### 1.5.3. Working safely

**NOTICE**

The information (such as instructions and notes) contained in this manual must be heeded for all work involved in installing, commissioning, setting up, operating, changing operating conditions and modes, servicing, inspecting and repairing the unit.

The manual must be available close to the linear module during the performance of all tasks.

It is impermissible to operate the liner module if it is not in perfectly functional condition.

**Operating personnel**

Only qualified expert personnel is permitted to perform works on the linear actuator. All the applicable regulations and provisions must be heeded (IEC, EN, national accident prevention regulations etc.).

Qualified persons as the term is used in this manual are persons who:

- ◆ persons who, by virtue to their training, experience and instruction, and their knowledge of pertinent norms, specifications, accident prevention regulations and operational relationships, have been authorized by the officer responsible for the safety of the system to perform the required task and in the process are capable of recognizing potential hazards and avoiding them (definition of skilled persons in accordance with VDE015 or IEC364)
- ◆ Persons who have a knowledge of first-aid techniques and the local emergency rescue services.
- ◆ Persons who have read and will observe the safety instructions.

**⚠ DANGER****Instructions for Special Hazards**

The linear module must be fixed or supported in accordance with the indications in this manual.

The operator must ensure that operation of the linear module does not cause any danger.

If the linear module moves in hazardous areas, these areas must be safeguarded with safety transmitter switches.

### 1.5.4. Safety Instructions for the Company Using the System

**⚠ WARNING**

Supervisors must also become familiar with the entire chapter entitled "Safety" and handling required on the linear actuator.

Supervisors must ensure that installation and operating personnel have read and understand the chapter entitled "Safety" and the description of how to work with the machine, and that they observe the instructions.

The manual must be available close to the linear module during the performance of all tasks.

It is impermissible to operate the liner module if it is not in perfectly functional condition.

Depending on the application, the operating company must provide for a suitable separating safety fence. Access to the motion range during operation must be prevented.

The user must make sure that the work area is protected by appropriate safety devices.



### 1.5.5. Safety Instructions for Operating Personnel

#### **WARNING**

Any work step that has a negative effect on the operating safety of the linear motor module must be omitted.

Operating and supervisory personnel are required to check the linear actuator or machine at least once per shift for externally visible damage or defects. Changes that have occurred (including the operating behavior) that could have a negative effect on the operating safety must be reported immediately.

Components and accessories are designed especially for this product. When purchasing spare and wear parts, use only original Parker parts. We explicitly draw your attention to the fact that we are unable to check or release spare parts or accessories that were not provided by us. Installing and/or using such products may cause negative changes in the required design properties in some circumstances, which in turn could negatively effect the active and/or passive operating safety of the product.

The manufacturer is unable to accept any liability for damage caused by using non-original parts and accessories.

Depending on the operating conditions (rotation speed, load, etc.) increased surface temperature in the area of the drive may occur. When touching it during operation slight injuries from burning may occur. Don't touch the product during operation. At maintenance, service and repair always take care that the product is cooled off before starting work.

Safety and protection devices are strictly NOT to be removed or bypassed or set out of order.

Applicable requirements and national accident prevention regulations must always be observed when installing and operating our linear motor module.

## 1.6 Packaging, storage, transport

### First check

- ◆ Check the packaging for damages.
- ◆ Remove all items from the packaging.  
Do not discard the packaging; it is strongly recommended to use the original packaging material for return deliveries.
- ◆ Depending on the storage location, metal surfaces may have a temperature of 0 °C or below. Please provide appropriate worker protection (e.g. protective gloves).
- ◆ Please ensure that the consignment does correspond to your order.
- ◆ Check the product for damages. Do never use a device which seems damaged.
- ◆ Please read the installation manual carefully before installing or commissioning the device.

### Packaging material



**WARNING**

The packaging material is inflammable, if it is disposed off improperly by burning, lethal fumes may develop.

### Transport

Make sure to transport the linear module always in a safe manner and with the aid of suitable lifting equipment (Means of transport).

### Storage

The linear module must be stored evenly and without any mechanical load.

The stated storage temperature must be adhered to.

For a storage period longer than 1 year, the linear module must be relubricated before commissioning.

### Disposal

We recommend to dispose off the respective materials in accordance with the respectively valid environmental laws. The following table states the materials suitable for recycling and the materials which have to be disposed of separately.

Material	suitable for recycling	Disposal
Metal	yes	no
Plastic materials	yes	no

### 1.6.1. Special notes on transport

When using ropes, make certain they are not twisted or knotted. If you are using more than one rope, all the ropes should be equally taut.

When transporting the cylinder with a forklift, establish an equilibrium and secure the load if necessary.



**WARNING**

Never step under overhead loads danger of being injured!

Use only transport equipment with sufficient lifting capacity. Take care of structural safety when using lifting equipment!

Moving parts must always be secured against slipping or moving.

In general, no means of transport are needed for the linear actuator. Depending on its size, the linear actuator can be carried by one or two persons.

## 1.7 Terms of guarantee / warranty

These operating instructions are subject to changes including changes in technical details with respect to the information and figures contained herein.

Parker Hannifin Manufacturing Germany GmbH & Co. KG grants no quality or durability guarantees nor any guarantees as to the suitability for specific purposes. Such guarantees must be expressly agreed upon in writing

Public statements, recommendations or advertising do not in any way represent quality specifications.

The warranty rights of the user imply that he reports any fault immediately and describes it precisely in his notice of defects. Parker Hannifin Manufacturing Germany GmbH & Co. KG is not responsible under any circumstances for damage to the product itself or any consequential damage caused by the product resulting from improper handling of the product. If Parker-Hannifin Manufacturing Germany GmbH & Co. KG is responsible for a defect, Parker-Hannifin Manufacturing Germany GmbH & Co. KG shall be authorized, at its discretion, to undertake improvements or deliver replacements.

In compliance with ISO 9000, all products are equipped with a type plate and a note of care that are bound to the device. The type plate must not be removed or damaged under any circumstances.

Parker Hannifin Manufacturing Germany GmbH & Co. KG shall not be held liable, regardless of any legal basis, except for cases of intent or gross negligence; injuries to life, body or health; or defects of malicious nondisclosure or whose absence was expressly guaranteed in writing.

Furthermore, if there is compulsory liability under the Product Liability legislation for personal injury and property damage to privately used objects, in the event of negligent breach of significant contractual obligations, Parker Hannifin Manufacturing Germany GmbH & Co. KG shall also be liable for cases of ordinary negligence; however, this is limited to damages that are contractually typical and foreseeable.

Further claims are hereby excluded.

The warranty shall lapse in the event of non-compliance with these operating instructions, the relevant statutory provisions and other information provided by the supplier.

In particular, we are not responsible for failures caused by modifications made by the customer or other parties. In such cases, the normal repair costs will be calculated. These costs will likewise be calculated for a check of the unit if no fault can be determined on the unit.

This regulation also applies during the warranty period.

No claims exist as to the availability of previous versions or to the retrofitting capacity of the units delivered to adapt them to the respectively current model version.

### **User conversions and changes are not Permitted**

The linear actuator must not be changed in its design or in terms of safety without our approval. Any change as defined here made by the user excludes any liability on our part.

## 1.8 Conditions of utilization

### General introductory notes

With this linear actuator, you bought a product which was manufactured and tested before delivery with the utmost care.

Please take your time to read the following notes which you ought to follow closely during setup and operation.

### WARNING

The operation of the linear actuator is only permitted within the range of the limit values stated in this manual (technical data).

Unless, all claims under the warranty will become void and a reduced service life or even damages must be expected.

### Please compare the operating data with the stated limit values especially with reference to:

- ◆ Stroke length and setting of the limit switches, those must be set so that there is a sufficient safety distance at both ends of the stroke

### NOTICE

Even if the limit switches were already mounted at our premises, they must be adapted according to suitable values before operation!

- ◆ Velocity
- ◆ Acceleration
- ◆ Loads
- ◆ Process forces
- ◆ Environmental conditions (e.g. temperature, dirt)
- ◆ Please do take possible pulses caused by moved masses into consideration for the operating data.

### WARNING

#### Note on the installation of the linear actuator

Always use all available mounting possibilities and respect the requirements.

If the motor used with the linear actuator should be able to exceed individual limit values, the respective values for the motor must be limited in the control by appropriate parameterization. The parameterization should even be reduced to the values necessary for operation.

### CAUTION

The internal end stops serve as damping element during mechanical collision. However, they can avoid limited damages only.

The service life of the linear actuator is strongly dependent on the extent to which its performance capability is exhausted and whether - even if only for a short period of time - inadmissible operating states have occurred.

# 2. Device description

**In this chapter you can read about:**

..... 13  
 Technical data ..... 16  
 Dimensions..... 17

## High Load Rodless Linear Actuator - HLR

### Overview

#### Description

HLR is a linear actuator specially designed for the use in OEM applications.

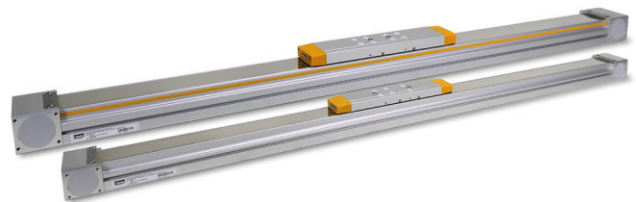
The HLR is a belt driven/ linear guided drive system offering a very high load capacity with an extremely small form factor.

Its compact outer dimensions and a variety of stroke steps make it ideal for a wide range of automation applications.

With its technical data, the HLR family meets the requirements in industrial applications.

Combined with a wide choice of accessories it offers a very quick and easy way to build multi-axis solutions.


The predefined drive trains simplify the sizing and selection process and reduce development time.



#### Features

- Compact outside dimensions of 69 x 64 mm and 82 x 76.5 mm
- Rigid aluminum extrusion profile for self-supporting solutions
- High load capacity up to 3847 N (based on a theoretical lifetime of 8.000 km)
- High thrust force up to 900 N
- Motor can be mounted on four sides for highest flexibility
- Acceleration up to 50 m/s<sup>2</sup>
- Velocity up to 5 m/s
- Last generation linear guide and timing belt for minimised noise emission
- Stainless steel cover as standard for the use in harsh environment
- Easy accessible lubrication bore for reduced maintenance effort
- Extreme straight movement over the complete stroke for building up reliable multi-axis solutions
- High repeatability for highest customer requirements.

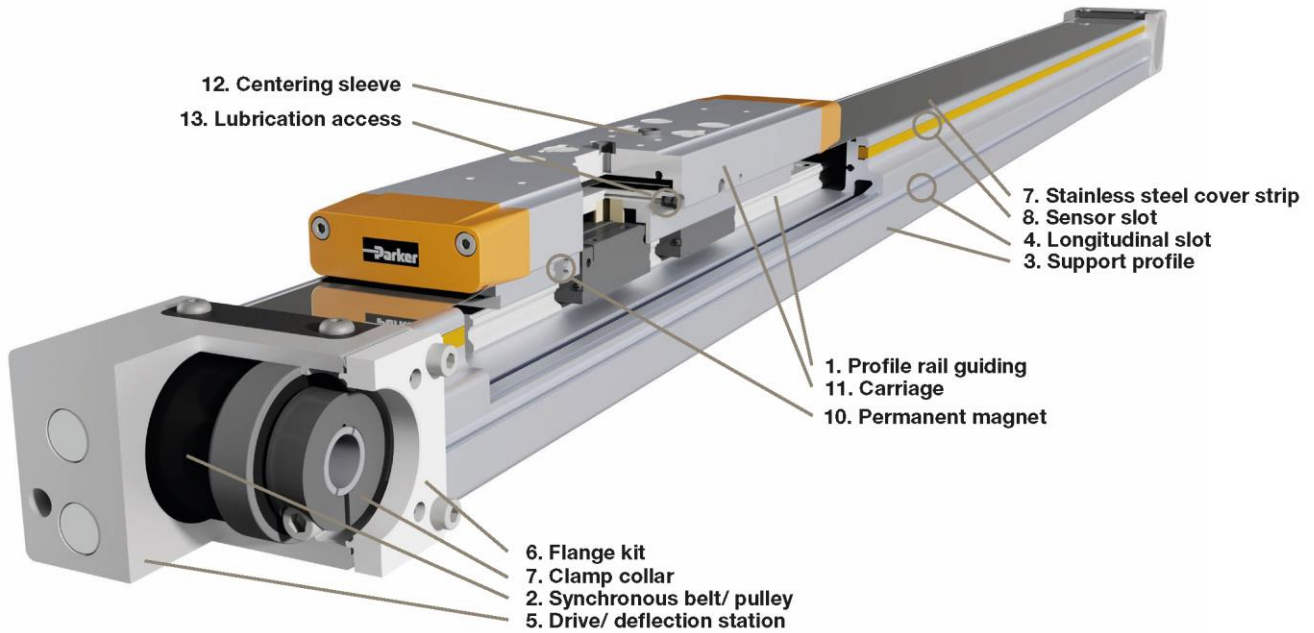
#### Technical Characteristics - Overview

Actuator size	HLR070	HLR080
Drive	Belt drive	
Guiding System	Linear guide	
Width x Height [mm]	69x64	82x76.5
Max. normal load Fz [N]	3847	
Max. thrust force Fx [N]	500	900
Repeatability [mm]	±0.05	
Max. velocity [m/s]	5	
Max. acceleration [m/s <sup>2</sup> ]	50	
Max. travel length [mm]	2500	3500
Distance [mm/rev]	105	125
Conformity	2011/65/EG: ROHS compliant	
	 RoHS	
Protection class	IP40	

#### Application

- Material handling and feed systems
- Packaging machines
- General-purpose applications

Product design



**Profile rail guiding (1)**

The integrated square rail guide ensures precise and backlash-free linear motion with constant running characteristics and simultaneously high load capacity and travel speed. In conjunction with the synchronous belt (2) and the synchronized pulleys, high feed forces, high repeatability and smoothness are achieved.

**Support profile (3)**

A lightweight, compact and self-supporting aluminium profile with one longitudinal groove (4) at each side and two at the bottom, which can be used for mounting the linear actuator or other mechanical components.

**Drive/ deflection stations (5)**

The symmetrically designed drive and deflection stations allow flexible mounting of the drive on each side of the linear actuator. With the optionally available flange kits (6), the drive can be moved to the other station or side at any time by the customer.

The clamping point (7) integrated directly in the drive station enables a direct and very compact connection of the drive to the linear actuator.

**Stainless steel cover strip (8)**

The stainless steel cover embedded in the support profile is reliably held in place by the magnetic strips integrated in the carrier profile and protects the internal guide against coarse contamination from the outside.

**Sensor slot (9)**

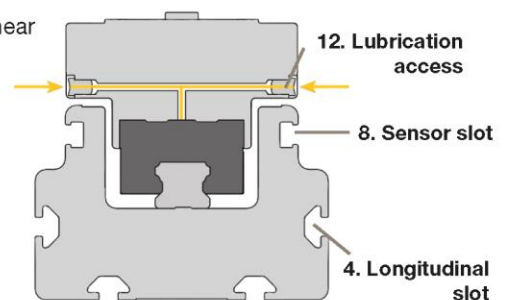
The sensor slots integrated in the profile on both sides enable the integration of several proximity sensors. These can be attached directly to the support profile at any position and without protruding edges. The sensors are actuated by the permanent magnets (10) integrated in the carriage on both sides. The cables of the sensors can be routed along the linear actuator with the aid of the yellow cover strips.

**Carriage (11)**

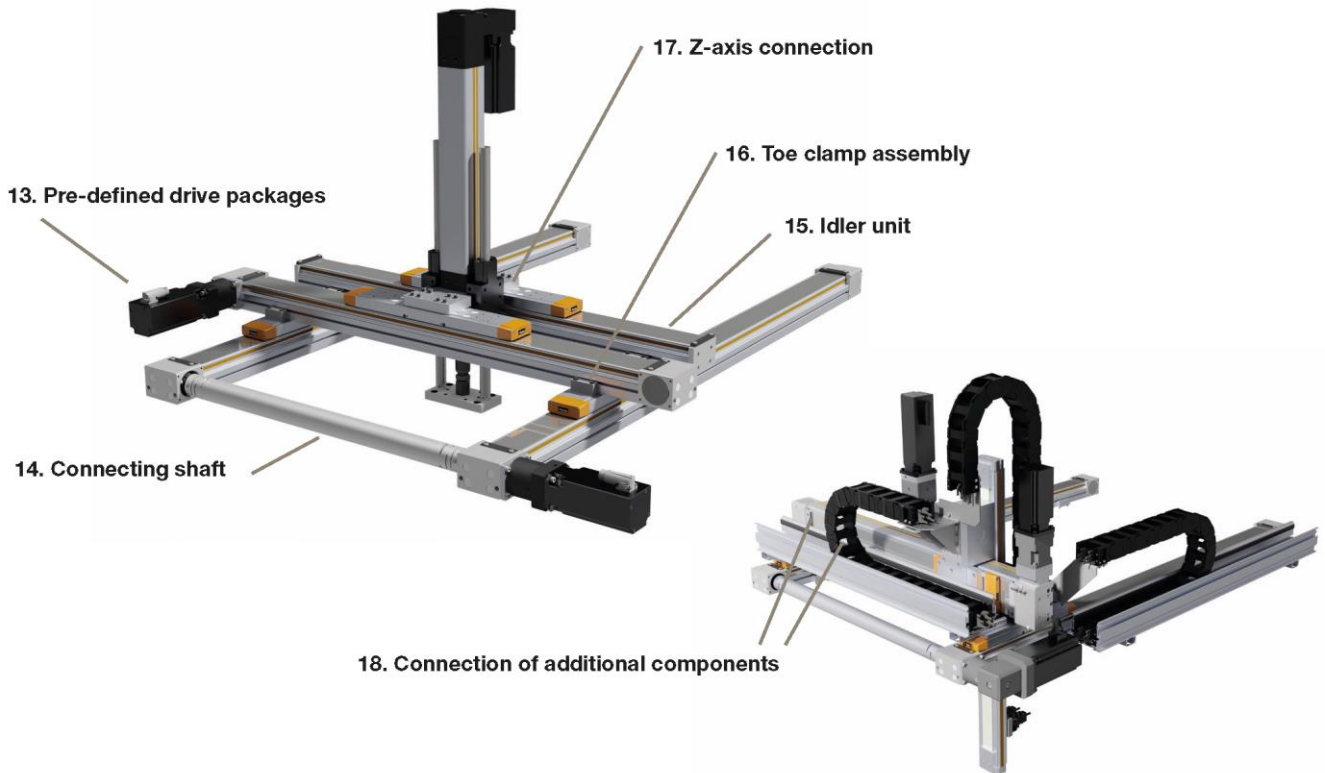
The carriage is available in two standard lengths for each frame size and has several mounting threads for fastening loads. In conjunction with the optionally available toe clamps, the mounting threads allow a cost-effective realisation of a multi-axis system.

The centering sleeves (12) integrated as standard in the carriage allow fast and precise alignment of the load on the carriage.

For relubrication of the internal guide, the carriage has several lubrication accesses (13). These are accessible from both sides of the carriage, making maintenance easier.







In addition to the two sizes of HLR linear actuators, Parker offers an accessory package not only for single-axis applications, but also for complete double or multi-axis systems.

#### **Pre-defined drive packages (13)**

Parker Hannifin also offers the complete drive and control packages for a wide range of applications to match the HLR linear actuators. By using the predefined drive packages, consisting of linear actuator, motor, gearbox and servocontroller, a complete drive train can be quickly selected for the desired application.

#### **Double axis applications**

The connecting shaft (14) ensures synchronous and very rigid transmission of the drive torque to a second HLE Linear actuator arranged in parallel. This makes dual axis applications very simple and cost-effective to implement. The connecting shaft is optionally available in different lengths, which allows different center distances to be realized.

For very short centre distances or pure support axes, there is the option of a non-driven, idler axis (15). Here the connecting shaft can be

dispensed with and the load can be mounted directly on the carriage of the driven and the idler axes.

#### **Toe clamp assembly (16)**

Toe clamps in different lengths are available for mounting the HLR linear actuators. These grip into the longitudinal slots in the profile and offer a quick and convenient method of fastening. Alternatively, the longitudinal slots in the support profile and slot nuts can also be used. With the toe clamps, one or two cross beams can be fastened directly to the carriage of the HLR linear actuators. This means that no additional connection plates are required and the overall height of the multi-axis system is minimised.

#### **Z-axis connection (17)**

With the optionally available mounting plates ETH and ETT can be mounted as z-axis in sizes 032 and 050 as well as the OSP-E20BV directly on the carriage of the HLR linear actuators.

The ETH electric thrust cylinders can also be connected with parallel guidance.

#### **Connection of additional components (18)**

Connection of further actuators and energy chains, grippers, etc. is easily possible by the customer by means of the longitudinal slots in the support profile or via the mounting threads in the carriage.

## 2.1 Technical data

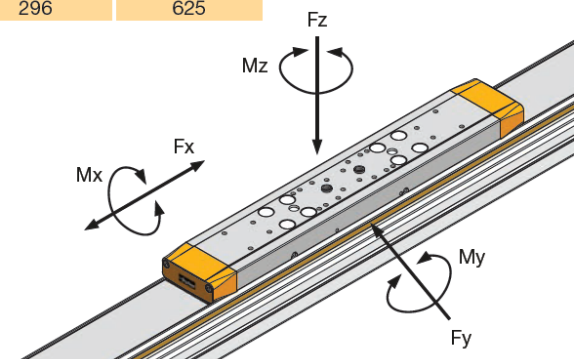
Axis size		HLR070	HLR080
Drive type		Toothed belt drive	
Guiding System		Square rail guide	
<b>Principle dimensions</b>			
Axis cross section incl. carriage (width x height)	[mm <sup>2</sup> ]	69 x 64	82 x 76.5
Max. stroke <sup>1)</sup>	[mm]	2500	3500
Carriage A (Standard)	[mm]	372	458
Carriage B (Extended)	[mm]	412	510
Zero stroke with carriage A	[mm]	262	330
Zero stroke with carriage B	[mm]	302	382
<b>Velocity &amp; acceleration</b>			
Max. travel speed	[m/s]	5	
Max. acceleration	[m/s <sup>2</sup> ]	50	
<b>Loads &amp; life times <sup>2)</sup></b>			
Max. drive torque	[Nm]	8.3	18
Idling torque $M_0$ <sup>3)</sup>	[Nm]	0.35	0.55
Max. Thrust force $F_{x,max}$ <sup>4)</sup>	[N]	500	900
Max. Lateral force (Carriage A / Carriage B)   $F_{y,max}$	[N]	2 628 / 3 847	3847
Max. load force (carriage A / carriage B)   $F_{z,max}$	[N]	2 628 / 3 847	
Max. Tilting torque (carriage A / carriage B)   $M_{x,max}$	[Nm]	21 / 30	30
Max. pitching torque (Carriage A / Carriage B)   $M_{y,max}$	[Nm]	80 / 164	164 / 262
Max. Yaw torque (Carriage A / Carriage B)   $M_{z,max}$	[Nm]	80 / 164	164 / 262
<b>Pulley data</b>			
Effective circular diameter	[mm]	33.4	39.8
Feed constant per revolution	[mm]	105	125
<b>Weights</b>			
Zero stroke weight with carriage A	[kg]	3.3	5.6
Zero stroke weight with carriage B	[kg]	3.6	5.9
Weight of additional length/ stroke (without carriage)	[kg/m]	4.8	6.6
Zero stroke weight of idler axis with carriage A	[kg]	2.3	3.8
Zero stroke weight of idler axis with carriage B	[kg]	2.7	4.3
Weight of additional length/ stroke of idler axis	[kg/m]	4.6	6.3
<b>Accuracy</b>			
Repeatability (according to ISO 230-2)	[mm]	±0.05	±0.05
<b>Area moment of inertia</b>			
Area moment of inertia	[10 <sup>4</sup> mm <sup>4</sup> ]	15.7	35.1
<b>Ambient conditions</b>			
Ambient temperature	[°C]	-10...+40	
Storage temperature	[°C]	-20...+40	
Humidity (no condensation)		0...95%	
Protection class		IP40	
<b>Mass moment of inertia relative to the drive shaft</b>			
Zero stroke with carriage A	[kgmm <sup>2</sup> ]	314	752
Zero stroke with carriage B	[kgmm <sup>2</sup> ]	372	829
Additional length/ stroke (without carriage)	[kgmm <sup>2</sup> /m]	53	113
Idler axis with carriage A (stroke independent)	[kgmm <sup>2</sup> ]	240	554
Idler axis with carriage B (stroke independent)	[kgmm <sup>2</sup> ]	296	625

<sup>1)</sup> Min. stroke = 100 mm. Available standard strokes see order code

<sup>2)</sup> Based on a theoretical lifetime of 8.000 km under ideal conditions

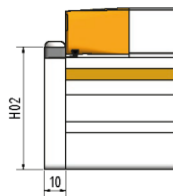
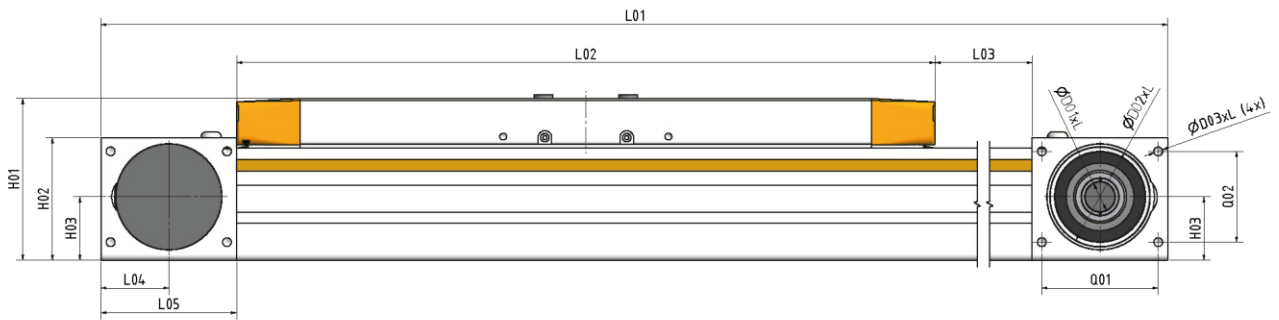
<sup>3)</sup> Relative to the velocity of 100mm/s with tolerance +/-10%

<sup>4)</sup> Thrust force dependent on travel speed, see diagram 2



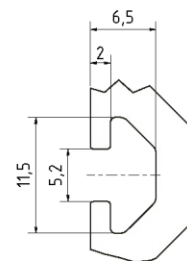
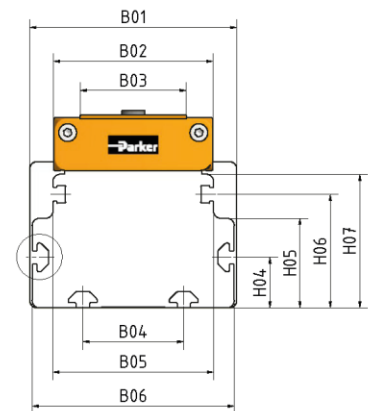


## 2.2 Dimensions



Idler unit <sup>1)</sup>

Frame size		HLR070	HLR080
L01	[mm]	L02 + 2 x L05 + stroke	
L02 (carriage A / B)	[mm]	262 / 302	330 / 382
L03	[mm]	Stroke	
L04	[mm]	28	32
L05	[mm]	55	64
H01	[mm]	64	76.5
H02	[mm]	49.3	58
H03	[mm]	22	30
H04	[mm]	20	
H05	[mm]	28.3	35.5
H06	[mm]	<sup>2)</sup>	45
H07	[mm]	44.3	53
B01	[mm]	69	82
B02	[mm]	48.2	63.2
B03	[mm]	30.4	42
B04	[mm]	40	
B05	[mm]	49.8	63.6
B06	[mm]	67	80
Q01	[mm]	42	55
Q02	[mm]	35	43
D01xL	[mm]	10H7 x 10..28	14H7 x 13..34
D02xL	[mm]	40 x 3	47 x 3
D03xL	[mm]	M4 x 12	M5 x 8



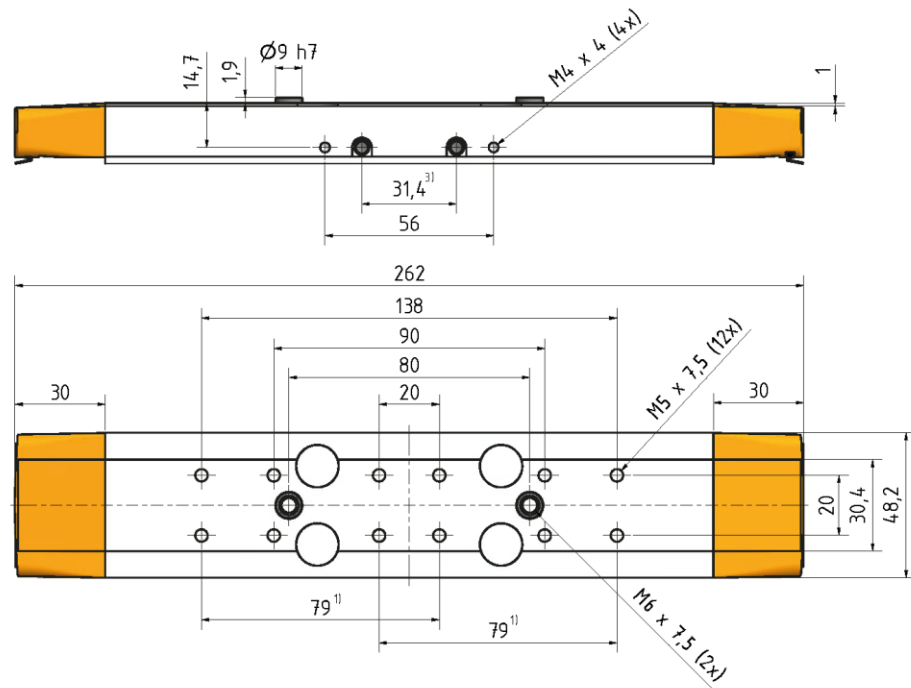
Dimensions in [mm]

<sup>1)</sup> Idler axis with end plate on both sides (without drive/ deflection station) for double axis applications with center distances below 200 mm. Example order code for idler axis: **HLR080A1000INNA** (in bold: to be selected)

<sup>2)</sup> HLR070 has no separate limit switch slot. The limit switches can be mounted in the T-slot.

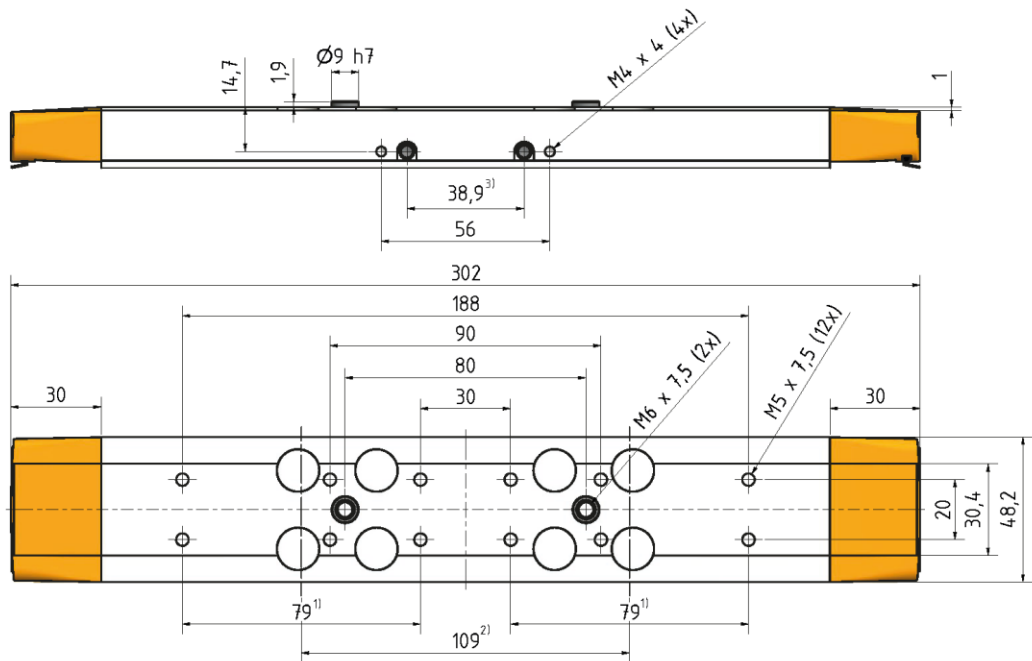
CAD data of the HLR linear actuators including accessories see: [www.parker.com/eme/hlr](http://www.parker.com/eme/hlr)

### HLR070 carriage A (short)



Dimensions in [mm]

### HLR070 carriage B (long)



Dimensions in [mm]

<sup>1)</sup> Distance for mounting a cross beam (HLR070) directly on the carriage by means of toe clamps

<sup>2)</sup> Axle distance of double axis suitable for the cross beam for the connection of a Z-axis.

<sup>3)</sup> Lubrication nipples on both sides of the carriage plate



# 3. Mounting

## In this chapter you can read about:

General installation instructions .....	20
Installation of a single axis .....	21
Mounting Method of a double axis .....	22
Correct position of loads on the carriage .....	26
Installation / dismantelling of the drive .....	27
Assembly of Z-axes .....	29
Assembly of accessories .....	34

## 3.1 General installation instructions

### **WARNING**

Before carrying out any installation work make sure that carriage cannot move. Therefore, de-energize the respective drive and mechanically secure the carriage.

### **DANGER**

Before carrying out any installation work de-energize the motor. Danger of electrical voltage. Improper wiring may lead to severe injuries or death. A wiring must always be made from a skilled electrician. Observe the safety instructions of the motor used.

### **WARNING**

Always ensure that the carriage is secured against slipping, especially when the linear actuator is mounted vertically! For this purpose, push the carriage slowly by hand to the (later) lower position against the internal end stop, even before the vertical position is reached.

### **CAUTION**

Depending on the operating conditions (rotation speed, load, etc.) increased surface temperature in the area of the drive may occur. When touching it during operation slight injuries from burning may occur. Don't touch the product during operation.

### **NOTICE**

When installing the HLR linear axes in your system, make sure that the deflection stations and the carriage are accessible for maintenance purposes! Provide sufficient space to lubricate the carriage and the deflection stations regularly, to replace the wear parts and, if necessary, to tighten or replace the toothed belt and, if necessary, to open or replace the steel strip cover.

Before installation, check the supplied linear actuator for compliance with the order confirmation, see order code on the type plate of the linear axis (complete specification of the actuator).

We recommend to secure the screws with a liquid bolt retaining compound (e.g. Loctite242)

## 3.2 Installation of a single axis

### ⚠ WARNING

Linear actuators must be sufficiently fastened to the surrounding construction/substructure. Not sufficiently fastened linear actuators may shift, slide and may cause considerable damage and injuries.

Do only use the appropriate mounting parts mentioned in the installation instructions for the respective mounting methods. The torque moments mentioned below are mandatory.

#### Requirements for substructure devices

### ⚠ CAUTION

Bends or deformations on the linear axis due to excessive loads / weights, too large support distances or uneven substructure devices should be avoided as much as possible. Substructure which do not meet the requirements may cause internal tension to the linear actuators and the guiding system. This may reduce expected service life of linear actuators.

The HLR linear axis should be supported as consistently as possible on leveled or machined connection surfaces:

- ◆ Flatness of the connection surfaces:  $\leq 0.2 \text{ mm/m}$
- ◆ permissible max. bend deflection of the axis: see HLR catalogue

#### Connection options for mounting

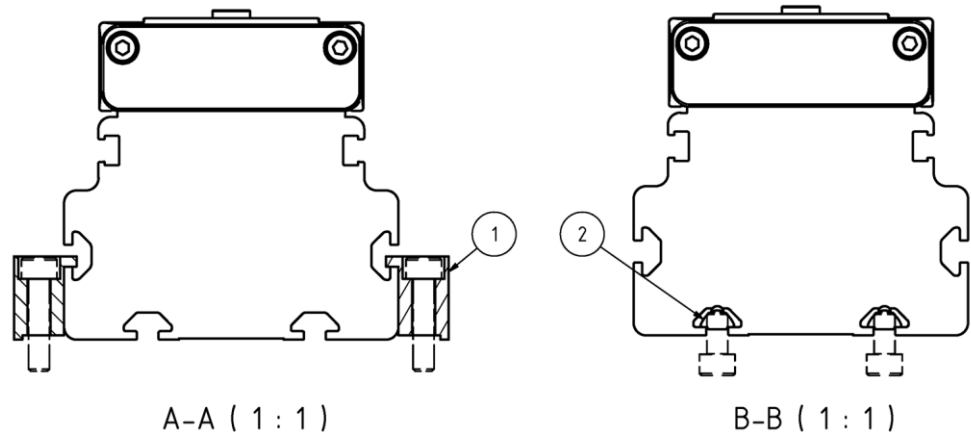


Figure 1: installation options

- ◆ To fasten the linear axis to the substructure device, one groove is provided on each side of the support profile and two grooves on the underside.
- ◆ For the installation of the lateral grooves, two toe clamps are optionally available (please refer to Figure 1, Pos. 1). For the installation of the grooves on the underside, two slot nuts are optionally available (please refer to Figure 1, Pos. 2). Please refer to accessories in the HLR catalogue.
- ◆ The linear actuator must be fixed at at least two points along the carrier profile. Additional mounting points are recommended for linear actuators with longer stroke lengths and high loads.
- ◆ Either two toe clamps (left and right on the carrier profile) or 4 slot nuts (two for each lower groove) are required for each fastening point, see Figure 1.

### NOTICE

For dimensions of the HLR linear actuator, hole pattern of the mounting options and recommended support distances, see HLR catalogue.

Depending on installation conditions and space conditions in the plant, it may be more advantageous to mount the drive to the linear actuator before installation; see chapter installation/ dismantling of the drive (see page 27).

**Installation of a single axis**

- ◆ Place the second linear actuator on the leveled connection surfaces. If fixing with slot nuts, position the slot nuts accordingly in the profile beforehand.  
For lubrication of the internal guide, lubrication access points are provided on both sides of the carriage.
- ◆ Rough alignment of the actuator with the system (alignment with the mounting holes of the selected connection option).
- ◆ Place the toe clamps on the fixing points and screw in the screws (screw in screws completely and loosen them approx. half a turn to allow adjustment of the axis).
- ◆ Final alignment of the linear actuator to the system (position and parallelism of the linear actuator). Depending on the required accuracy, a measuring tape, distance gauges, dial gauge or other suitable measuring equipment can be used.
- ◆ Tighten screws with the respectable tightening torque (see Table 1).
- ◆ Check alignment of the linear actuator to the system.

Tightening torque of clamp collar / slot nuts		HLR070 / HLR080
Screw type [ISO 4762]	-	M5 - 8.8
Tightening torque*	[Nm]	5.0

Table 1: tightening torques toe clamps

\*The required tightening torque can vary depending on application conditions, substructure devices and tightening and screwing procedures and must be defined by the customer in individual cases.

The assembly of the single actuator is completed.  
For mounting attachments such as drive, limit switches or loads on the slider, see the following chapters.

### 3.3 Mounting Method of a double axis

**In this chapter you can read about:**

Alignment of a double axis.....22  
Installation of connection shaft.....24

#### 3.3.1. Alignment of a double axis



Improper installation of parallel working linear actuators may cause internal tension which will significantly reduce lifetime. Furthermore, an improper installation may negatively affect operational behaviour and system accuracy.

**Requirements for substructure devices**

In addition to the requirements for the single axis, as described in the chapter installation of a single axis (see page 21), the following requirements also apply to the substructure device for double axis applications.

- ◆ Flatness of connection surfaces: ≤ 0.2 mm/m (to all adjacent contact surfaces in x and y direction)
- ◆ Max. permissible axis parallelism: ≤ 0.025 mm (ovr the entire stroke)

### Installation process of a double-axis actuator

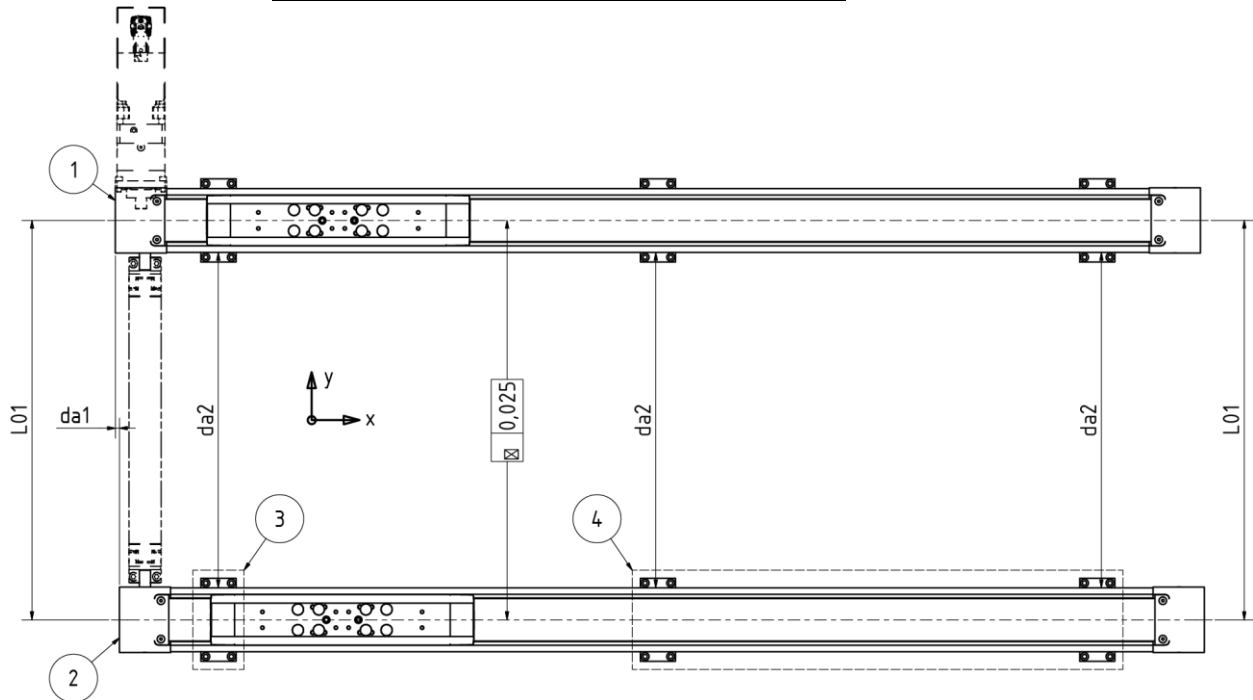


Figure 2: alignment double axis

#### As video:



- ◆ Installation of the first (driving) Linear actuator (Figure 2, Pos. 1) as described in chapter Installation of a single axis (see page 21)
- ◆ Place the second (driven) linear actuator (Figure 2, Pos. 2) to the leveled or treated connection surfaces. Rough alignment of the axis with the system (alignment with the mounting holes of the selected connection option). If the shaft trunions for mounting the connection shaft are already pre-assembled, make sure that the shaft trunions are oriented towards each other.
- ◆ Place the toe clamps on the fixing points and screw in the screws (screw in screws completely and loosen them approx. half a turn to allow adjustment of the axis).
- ◆ Check center distance of the double axis (Figure 2 und Table 2, measurement L01) and correct if necessary.
- ◆ Align the linear axes axially to each other. Use the front faces of the drive stations. Maximum permissible offset of the drive stations (Figure 2, measurement da1):  $(L01-158) * \tan 0.06$ .
- ◆ Tighten the screws of the first fastening point of the second linear actuator (Figure 2, Pos. 3) with the respective tightening torque (please refer to Table 1).
- ◆ For the parallel alignment of the double axes, set the same distances one after the other between the individual fixing points of the linear actuators (Figure 2, measurement da2) and tighten the screws of the fastening points of the second linear actuator (Figure 2, Pos. 4) with the respective tightening torque (please refer to Figure 2). Observe the maximum permissible axis parallelism  $\leq 0.025$  mm. For this, use stops/stop edges, distance gauges, a dial gauge or other suitable measuring equipment.

#### Recommendation: Checking the alignment of a double axes

- ◆ Push both carriages to the deflection station intended for mounting the connection shaft.
- ◆ Mechanically connect the carriage of the double axes. Use mounting threads in the carriages and observe the requirements to the installation surface of the mechanical connection, see chapter mounting loads on the carriage (see page 26).
- ◆ Move both carriages simultaneously to the first clamping point.
- ◆ Loosen the clamping point of the second (driven) linear actuator and tighten again the clamp position to the required tightening torque.
- ◆ Perform this procedure at each clamping point of the second (driven) linear axis.

### 3.3.2. Installation of connection shaft

Purpose of connection shafts is the force transmission of parallel connected linear actuators. Connection shafts including fixing material are available as accessories in the HLR catalogue.

**⚠ WARNING**

During operation it is not allowed to grasp in the working area of the connection shaft. Moving parts may cause severe injuries. Protect work area of connection shaft against accidental grasping.

**⚠ CAUTION**

The drive housing must not be loaded with additional torque. Care should be taken when the drive is mounted. Maximum permissible torque around the x-axis = 14Nm.

**NOTICE**

Connections shaft can compensate axial, radial and angular deviations. All application data of the double axis must lie within the technical specifications.

**Dimensions of connection shaft**

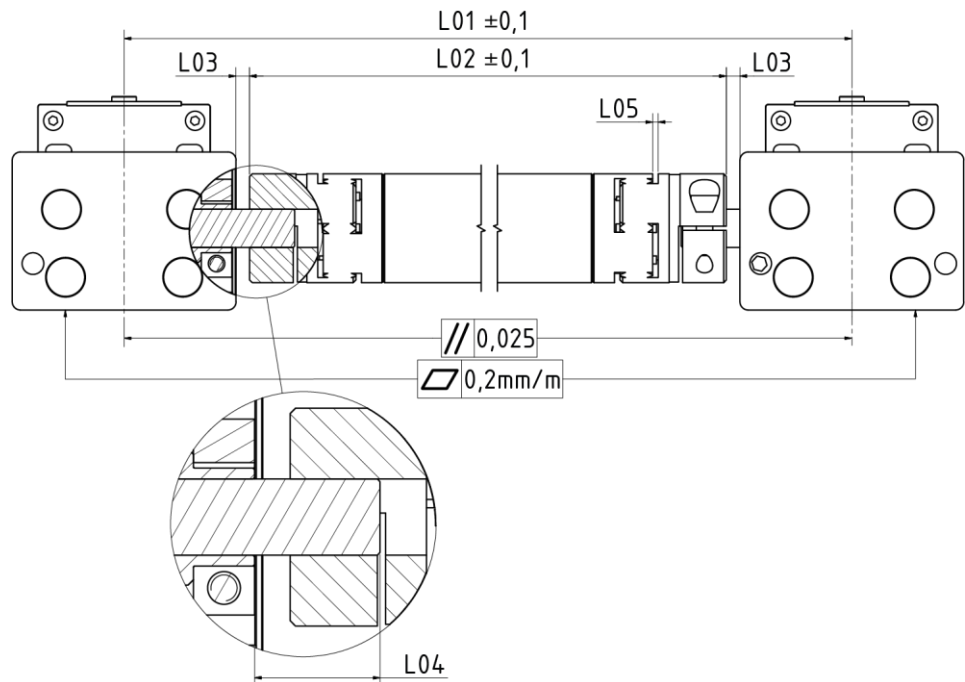


Figure 3: dimensions of connection shaft

		HLR070	HLR080
L01 ±1.0	[mm]	Center distance; (please refer to part number Connecting shaft: Ex. 0242.910-0500, L01=500mm)	
L02 ±1.0	[mm]	L01 – 92 mm	
L03	[mm]	11.5	5.0
L04	[mm]	28	23.0
L05	[mm]	2	

Table 2: dimensions of connection shaft



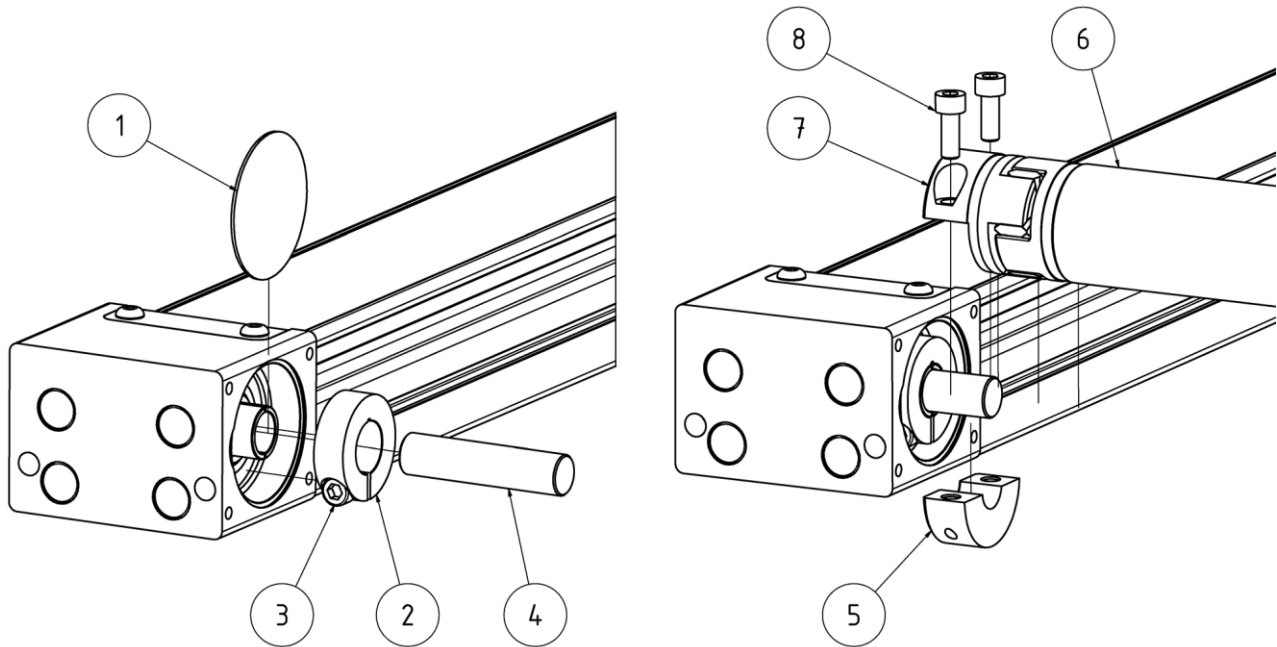
**Assembly sequence of connection shaft**

Figure 4: assembling sequence of connection shaft

- ◆ Both double axes are mounted according to the chapter alignment of a double axis (see page 22).
- ◆ Axes are aligned parallel to each other, shaft trunions are aligned and axes are aligned parallel and axial to each other (permissive deviations see Figure 3).

The following working steps need to be carried out at both linear actuators, at the opposite deflection stations.

- ◆ Remove protection caps (see Figure 4, Pos. 1) of the respective deflection station.
- ◆ Pull clamp collar (please refer to Figure 4, Pos. 2) incl. clamping screw (please refer to Figure 4, Pos. 3) onto the pulley. The clamping surface between pulley and clamp collar must be free of oil and grease.

## NOTICE

Clamp collar must abut to the pulley shoulder. The slot in the clamp collar must be aligned to the slot in the pulley. Please refer to (please refer to Figure 5 detailed view A.)

- ◆ Adjust clamp collar (please refer to Figure 4, Pos. 2) and pulley. Manually push carriage so that the clamping screw (please refer to Figure 4, Pos. 3) is accessible through the front mounting bore of the deflection station. For size HLR070, remove the corresponding plug from the return station so that the clamping screw (see Figure 5 Pos. 3) can be reached with the tool.
- ◆ Insert shaft trunions (see Figure 4, Pos. 4) into the pulley and adjust the excess length L04 (see Table 2, Figure 4). Clamping area between pulley and shaft trunions must be free of oil and grease!
- ◆ Tighten the clamp collar to the required tightening torque using the clamping screw on the face side through the bore of the deflection station (see Table 3).
- ◆ Remove the clamping halves (see Figure 4, Pos. 5) of the connection shaft on both sides.
- ◆ Check distance between the connection shaft (see Figure 4, Pos. 6) and the coupling halves (see Figure 4, Pos. 7) and readjust in the event of deviation (see Table 2, Figure 3 measurement L05).
- ◆ Clean clamping areas of the connection shaft (tension halves and coupling halves) and shaft trunions (free of oil and grease).

- ◆ Align the carriages of the double axes with each other.  
Recommendation: Push both carriages to the internal stops of the drive stations with the mounted shaft trunions.
- ◆ Place the connection shaft (see Figure 4, Pos.6) on the shaft trunions and mediate between the linear axes. Check distance between deflection stations and connection shaft on both sides (see Table 2, Figure 4, measurement L03).
- ◆ Place tension halves of the connection shaft (please refer to Figure 4, Pos. 5) and slightly tighten with the clamping screws (please refer to Figure 4, Pos. 8).  
Tighten clamping screws in such a way that an equal-sized slot between coupling halves and tension halves turns up.
- ◆ Alternately tighten the clamping screws to the respective tightening torque (please refer to Table 3).

		HLR070	HLR080
<b>Tightening torque clamp collar (please refer to Figure 4, Pos. 3)</b>			
<b>Screw type [ISO 4762]</b>	-	M5 x 14 – 10.9	M6 x 20 - 10.9
<b>Tightening torque</b>	[Nm]	6.0	15.0
<b>Tightening torque connection shaft (please refer to Figure 4, Pos. 8)</b>			
<b>Screw type [ISO 4762]</b>		M6 x16 – A2-70	
<b>Tightening torque</b>	[Nm]	7.4	

Table 3: Tightening torques and screws of the connection shaft

### 3.4 Correct position of loads on the carriage.

Standar carriages of HLE linear actuators have various mounting threads for the connection of loads, cross beams or Z-axes.

Existing centering sleeves integrated into the carriage can be used to align the load.

Position of mounting threads and centering sleeves and depth see dimensions (see page 17).

#### **WARNING**

All loads mounted to the carriage must be securely safed against shifing and sliding. Not sufficiently fastened linear actuators may shift, slide and may cause considerable damage and injuries.

The torque moments mentioned below are mandatory.

#### **CAUTION**

The thread depth of the mounting bore in the carriage may not be exceeded.

Failure to comply with this may result in a breakthrough and damage to the carriage.

#### **CAUTION**

If the specified tightening torques are exceeded, there is a risk of damage to the threads.

<b>HLR070 &amp; HLR080</b>			
	<b>Present screw-in depth* HLR070 / HLR080</b>	<b>Recommended screw-in depth*</b>	<b>Tightening torque**</b>
<b>Thread size</b>	[mm]	[mm]	[Nm]
<b>M4</b>	4.0/6.0	3.5	2.5
<b>M5</b>	7.5/9.0	6.0	5.0
<b>M6</b>	7.5/9.0	6.0	7.5

Table 4: Anzugsmomente mounting thread of the carriage

\* Maximum present thread depth may not be exceeded.  
 \*\* Recommended tightening torque valid for the recommended screw-in depth. Depending on screw-in depth, application boundary conditions and tightening/ screwing procedure, the tightening torque may vary and must be defined by the customer in individual cases.

**Installation surface requirements of the payload**

Flatness of the installation surface of the payload  $\leq 0.05$  mm

**NOTICE**

When the centering sleeves for mounting the load are an obstacle, they can be carefully pulled out with a pair of needle-nose pliers.

**3.5 Installation / dismantelling of the drive**

**DANGER**

Before mounting or dismantelling the motor, de-energize it.

**CAUTION**

The drive housing must not be loaded with additional torque. Care should be taken when the drive is mounted. Maximum permissible torque around the x-axis = 14Nm.

**NOTICE**

As standard, the HLR Linear actuators are equipped without drive flange. For the gear attachment, one of the optionally available flange kits is needed (see accessories in the HLR catalogue).

As video:

For dismantelling, the assembling sequence has to be carried out in reverse order.



**Assembling sequence**

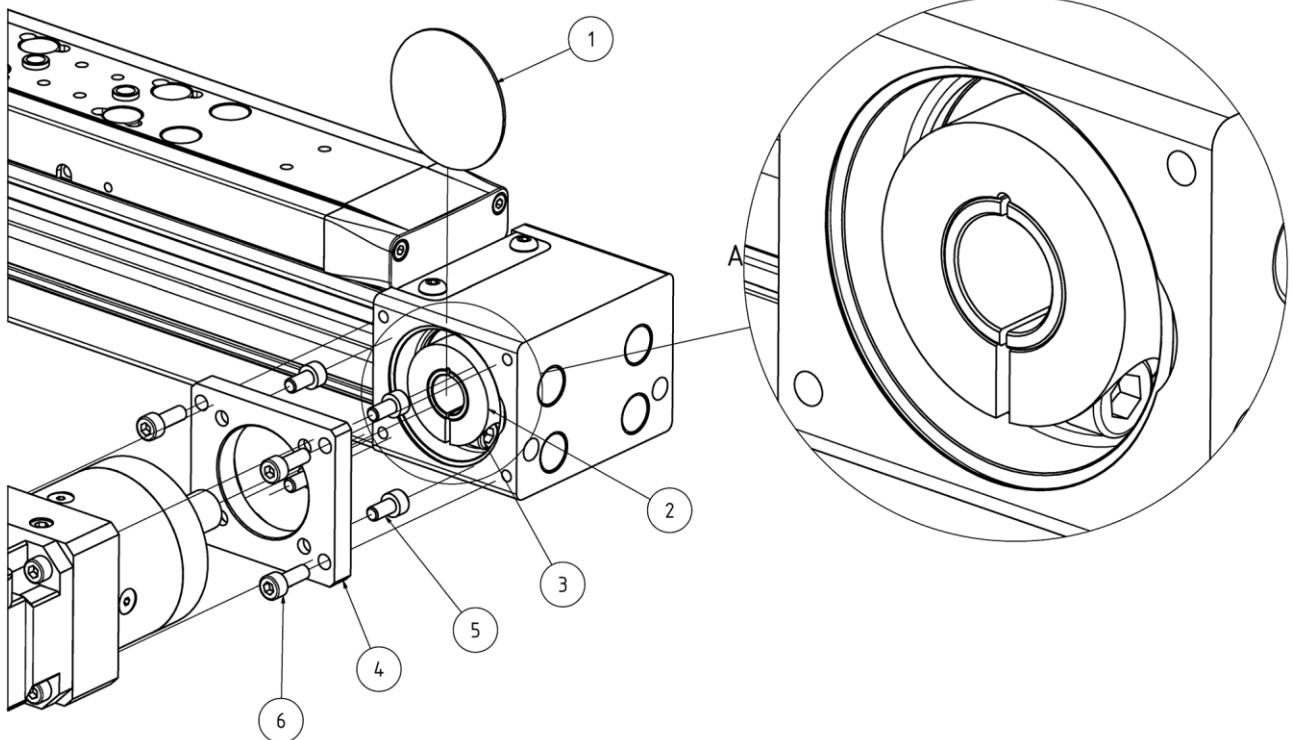


Figure 5: Assembly of drive

**⚠ WARNING**

Requirement: Axis is mounted in the system or fastened to another basic structure.

- ◆ Remove cover lid (see Figure 5, Pos. 1) on the desired side of one of the two deflection stations.
- ◆ Push clamp collar (please refer to Figure 5, Pos. 2) incl. clamping screw (please refer to Figure 5 Pos. 3) onto the pulley. The clamping surface between pulley and clamp collar must be free of oil and grease.

**NOTICE**

Clamp collar must abut to the pulley shoulder. The slot in the clamp collar must be aligned to the slot in the pulley (see Figure 5 detailed view A).

- ◆ Adjust clamp collar (please refer to Figure 5, Pos. 2) and pulley. Manually push carriage so that the clamping screw (please refer to Figure 5, Pos. 3) is accessible through the front mounting bore of the deflection station.  
For size HLR070, remove the corresponding plug from the return station so that the clamping screw (see Figure 5 Pos. 3) can be reached with the tool.
- ◆ Pre-assemble drive package (motor with gears). Please observe operating instructions/ manual of motor and gearbox. Clean drive shaft and drive flange from anti corrosion agents, grease and oil.
- ◆ Mount the HLR gear flange (see Figure 5, Pos. 4) to the gear output side using the gear screws (see Figure 5, Pos. 5). For screws please refer to Table 5.
- ◆ Carefully insert the gearbox drive shaft into the pulley of the HLR linear actuator. The drive shaft must be easy to insert. Clamping area between pulley and shaft trunions must be free of oil and grease!
- ◆ Screw in the screws (see Figure 5, Pos. 6) and place them lightly against the gear flange (do not tighten).

**⚠ CAUTION**

Please take care that the carriage will not be moved during the installation of the drive. It is possible that the clamping slots are not longer aligned when moving the carriage. This may reduce clamping force.

- ◆ Tighten the clamp collar to the required tightening torque using the clamping screw on the face side through the bore of the deflection station (see Table 5).
- ◆ Tighten flange screws crosswise with the respectable tightening torque (see Table 5).

		HLR070	HLR080
<b>Tightening torque clamp collar (please refer to Figure 5, Pos. 3)</b>			
<b>Screw type [ISO 4762]</b>	-	M5 x 14 – 10.9	M6 x 20 - 10.9
<b>Tightening torque</b>	[Nm ]	6.0	15.0
<b>Tightening torque gear screws (please refer to Figure 5, Pos. 5)</b>			
<b>Screw type [ISO 4762]</b>	-	M4x8 – A2-70	M5x10 – A2-70
<b>Tightening torque</b>	[Nm ]	2.1	4.0
<b>Tightening torque drive flange (please refer to Figure 5, Pos. 6)</b>			
<b>Screw type [ISO 4762]</b>	-	M4 x 16 – A2-70 / 8.8	M5 x 14 – A2-70 8.8
<b>Tightening torque</b>	[Nm ]	2.1	4.0

Table 5: Tightening torques and screws for drive assembly

### 3.6 Assembly of Z-axes

**In this chapter you can read about:**

Mounting ETH/ETT032 on single axis via bracket plate .....29  
 Mounting ETH/ETT032 & ETH/ETT050 on double axis via cross beam .....31  
 Assembly of OSP-E20BV to single axis via mounting plates.....33

In the following subchapters, the assembly of predefined Z-axes with optionally available connection plates is described. Connection of further Z-axes or other mechanical components is possible by the customer via the mounting threads in the carriage.

**⚠ WARNING**

The rods of the ETH / ETT cylinder and the profile of the OSPE linear actuator are not self-locking! Make sure that the piston rod or the profile of the OSPE actuator is secured, especially in vertical alignment of the ETH / ETT cylinder!

**⚠ WARNING**

Make sure that you always transport or lift the Z-axis in a safe manner and with the aid of suitable lifting equipment (means of transport).

**⚠ CAUTION**

The maximum permissible loads or torques (rollers, pitch, yaw) of the HLR linear actuator (see technical data in the HLR catalogue) must not be exceeded. Please consider the entire load: Weight of the Z-axis, including motor/gear, additional loads and all application forces.

**⚠ CAUTION**

Make sure all screws are tightened before operation. We recommend to secure all screws with a liquid screw lock (e.g. Loctite 242).

#### 3.6.1. Mounting ETH/ETT032 on single axis via bracket plate

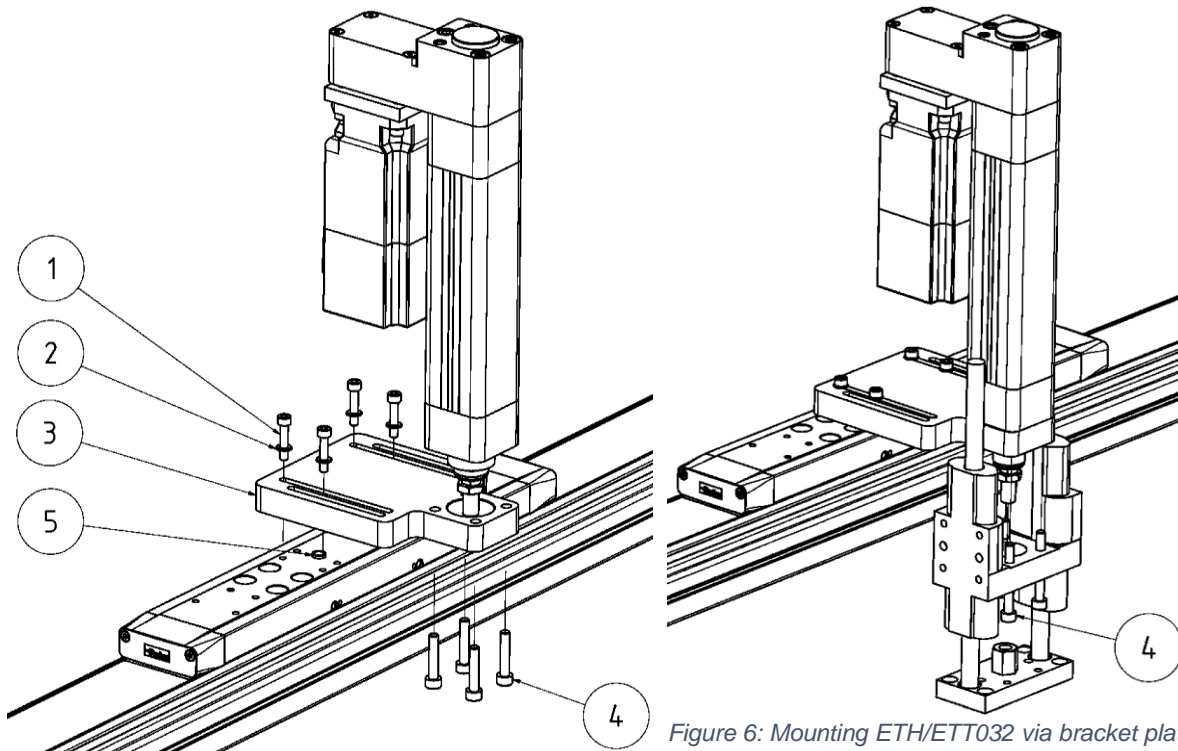


Figure 6: Mounting ETH/ETT032 via bracket plate

- ◆ The HLR linear axis must be mounted in the system according to these mounting instructions (see chapter mounting of an individual axis (see page 21)).
- ◆ Remove both centering sleeves on the carriage of the linear actuator (please refer to Figure 6: Pos. 5).

**NOTICE**

Carriage and bracket plate must be clean and free of grease.

- ◆ Position the bracket plate so that the longitudinal grooves of the bracket plate are above the mounting threads in the carriage. Depending on the size of the linear axis, either the outer or inner longitudinal grooves should be used.
- ◆ Fix the bracket plate with the screws supplied (see Figure 6: Pos. 1) on the carriage. Position screws only slightly.
- ◆ Adjust the desired excess of the bracket plate to the linear axis and crosswise tighten the screws (see Figure 6: Pos. 1) to the respective tightening torque (see Table 6).

**NOTICE**

For the following steps the ETH cylinder with attached motor/gear must be present. If this is not the case, mount the motor/gear package according to the ETH assembly instructions.

When using the ETH cylinder with parallel guide, first remove the parallel guide from the cylinder.

**⚠ WARNING**

Secure the Z-axis + motor / gear against tilting or falling during the assembly process.

- ◆ Place the ETH/ETT cylinder on the cantilever plate in the centering bore provided.
- ◆ Fix the ETH/ETT cylinder crosswise with the screws supplied (see Figure 6: Pos. 4) and the required tightening torque (see Table 6).  
When using the ETH cylinder with parallel guide, first place the parallel guide at the bottom of the outrigger plate and fix the entire unit with the screws supplied.

**⚠ CAUTION**

Depending on the position of the bracket plate and the load connection, it may not be possible to use the full stroke of the Z-axis. Consider the height of the HLR axis.

		HLR070 / HLR080
<b>Tightening torque bracket plate (please refer to Figure 6: Pos. 1)</b>		
<b>Screw type [ISO 47621]</b>	+	M5x25 – A2-70
<b>Tightening torque</b>	[Nm]	5.0
<b>Tightening torque ETH/ETT (please refer to Figure 6: Pos. 4)</b>		
<b>Screw type [ISO 47621]</b>	-	M6 – A2-70
<b>Tightening torque</b>	[Nm]	7.5

Table 6: Tightening torques of bracket plate



### 3.6.2. Mounting ETH/ETT032 & ETH/ETT050 on double axis via cross beam

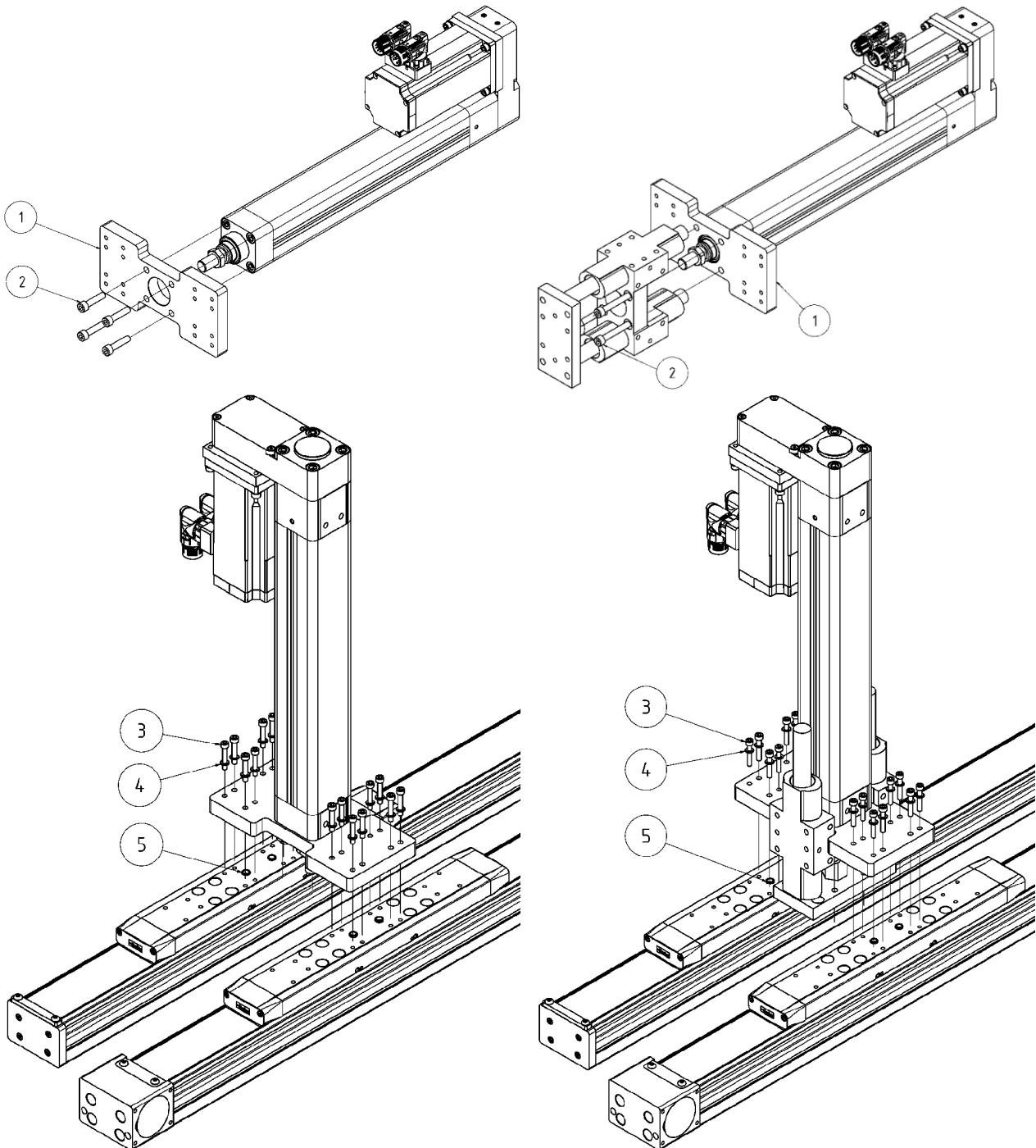


Figure 7: Assembly of ETH032 / 050 to cross beam

- ◆ The double axes are to be aligned and fastened parallel to each other according to the assembly instructions (see chapter mounting a double axis (see page 22)).
- ◆ Make sure the required axis distance for the cross beam is maintained over the entire length of the axis. Axis distance please refer to the HLR catalogue.
- ◆ Remove centering sleeves on the carriage of the linear actuator (please refer to Figure 7: Pos. 5).

**NOTICE**

Carriage and bracket plate must be clean and free of grease.

For the following steps the ETH cylinder with attached motor/gear must be present. If this is not the case, mount the motor/gear package according to the ETH assembly instructions.

When using the ETH cylinder with parallel guide, first remove the parallel guide from the cylinder.

- ◆ Slide the cross beam (see Figure 7: Pos. 1) onto the centering collar of the ETH/ETT cylinder.
- ◆ Fix the ETH/ETT cylinder crosswise with the screws supplied (see Figure 7: Pos. 2) and the required tightening torque (see Table 7).
- ◆ When using the ETH cylinder with parallel guide, first place the parallel guide at the bottom of the outrigger plate and fix the entire unit with the screws supplied.

**WARNING**

Secure the Z-axis + motor/gear against tilting or lowering during the assembly process.

- ◆ Position the carriages of the double axis side by side and place the pre-assembled unit (ETH/ETT cylinder with mounted cross beam) on the carriages of the double axis.
- ◆ Align the crosswise to the carriage of the double axis and fasten it with the screws supplied (see Figure 7: Pos. 3) and the required tightening torque (see Table 7). All bores of the cross beam must be used for bolting to the carriage profile.

		HLR070	HLR080
<b>Tightening torque ETH/ETT032 (Figure 7, Pos.2)</b>			
Screw type [ISO 4762]	-	M6 – A-70	
Tightening torque	[Nm]	7.5	
<b>Tightening torque ETH/ETT050 (Figure 7, Pos.2)</b>			
Screw type [ISO 4762]	-	M8 – A2-70	
Tightening torque	[Nm]	16.0	
<b>Tightening torque of cross beam (Figure 7, Pos.3)</b>			
Screw type [ISO 4762]	-	M5x25 – A2-70	M5x35 – A2-70
Tightening torque	[Nm]	5.0	5.0

Table 7: tightening torque of cross beam



### 3.6.3. Assembly of OSP-E20BV to single axis via mounting plates

Mounting plates for connecting the OSP-E20BV are only approved for attachment to size HLR080.

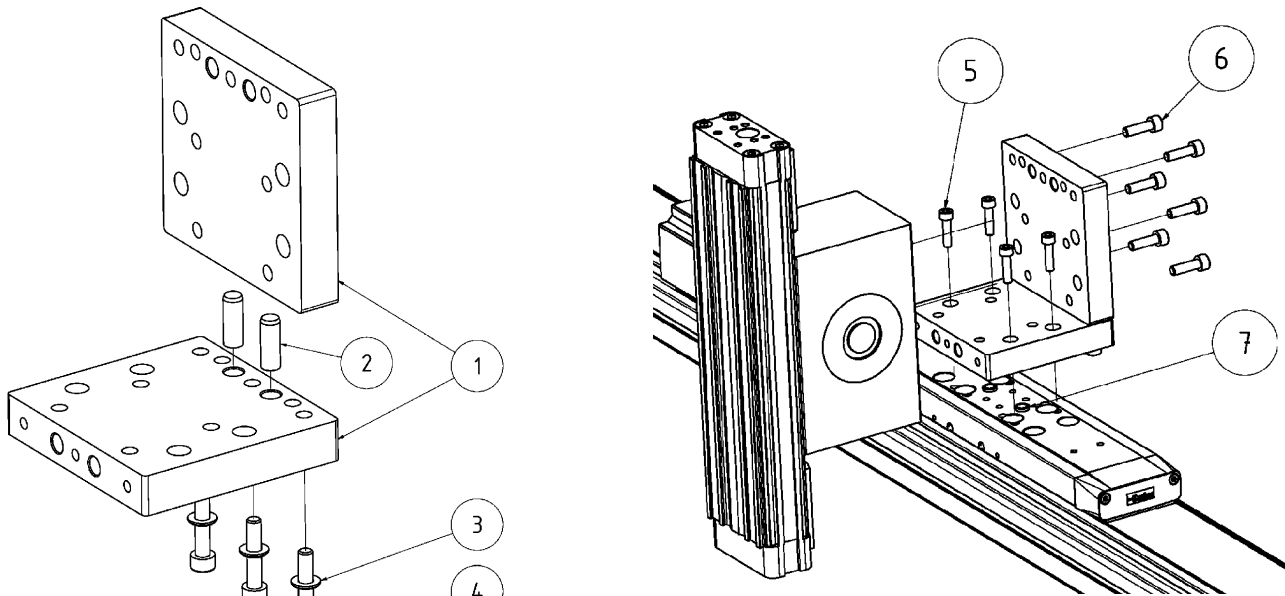


Figure 8: Assembly of mounting plates

- ◆ The HLR linear axis must be mounted in the system according to these mounting instructions (see chapter mounting of an individual axis (see page 21)).
- ◆ Remove both centering sleeves on the carriage of the linear axis (please refer to Figure 8: Pos. 7)

**NOTICE**

For the following steps the OSP-E20BV with attached motor/gear must be present. If this is not the case, mount the motor/gear package according to the OSP-E20BV assembly instructions.

**Pre-assembly of mounting bracket**

- ◆ Press the cylinder pins (see Figure 8: Pos. 2) supplied into the lower mounting plate (see Figure 8: Pos. 1). Use a one-hand lever press or a comparable, suitable press-in device.
- ◆ Then place the upper mounting plate (see Figure 8: Pos. 1) vertically on the lower mounting plate and press it onto the pre-assembled dowel pins.
- ◆ Screw together the two mounting plates with the screws supplied (see Figure 8 Pos. 4) and the required tightening torque (see Table 8).

**NOTICE**

Carriage and bracket plate must be clean and free of grease.

- ◆ Position the pre-assembled mounting plates on the carriage of the HLR linear actuator, align them parallel to the carriage profile and fix them with the screws supplied (see Figure 8: Pos. 5) and the required tightening torque (see Table 8).

**⚠ WARNING**

Secure the Z-axis + motor/gear against tilting or lowering during the assembly process.

- ◆ Place the OSP-E20BV z-axis on the mounting plate and fasten it with the supplied screws (see Figure 8: Pos. 6) and the required tightening torque (please refer to Table 8).

		HLR080
<b>Tightening torque of mounting plates (Figure 8, Pos.4)</b>		
Screw type [ISO 4762]	-	M6x30 – A2-70
Tightening torque	[Nm]	8.8
<b>Tightening torque of mounting plates (Figure 8, Pos.5)</b>		
Screw type [ISO 4762]	-	M5x20 – A2-70
Tightening torque	[Nm]	5.0
<b>Tightening torque OSP-E20BV (Figure 8, Pos.6)</b>		
Screw type [ISO 4762]	-	M6x20 – A2-70
Tightening torque	[Nm]	6.4

Table 8: Tightening torques of mounting plates for OSAP 20-7

### 3.7 Assembly of accessories

In this chapter you can read about:

Sensors .....35  
 External end stops .....36

### 3.7.1. Sensors

All HLR linear actuators have a permanent magnet integrated in the carriage on both sides of the support profile. It activates the sensors which are mounted in the special mounting grooves on the support profile of the cylinder. For sensor recommended please refer to the HLR catalogue.

#### ⚠ CAUTION

Please observe the Operating Instructions of the manufacturer when commissioning the sensors.

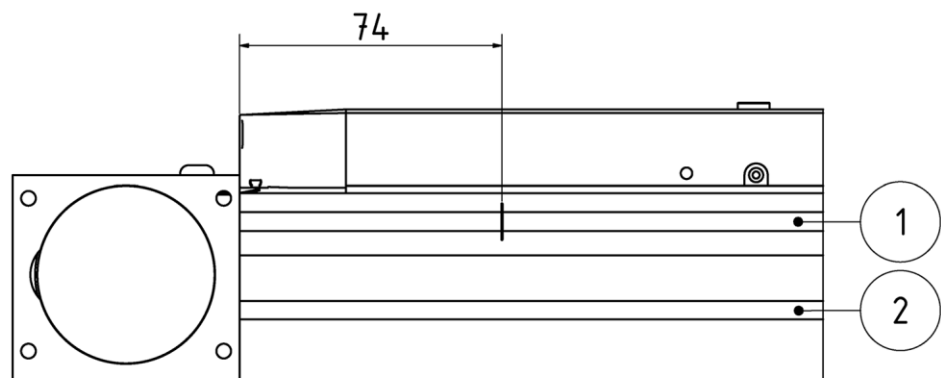
#### Sensor mounting

- ◆ Remove the groove cover strips (Figure 9, Pos. 1) from the sensor groove (only for HLR080) of the support profile.
- ◆ Insert the sensor into the sensor groove for HLR080 (Figure 9, Pos. 1) and into the T-slot (Figure 9), Pos.2) for HLR070 and push the sensor to the desired position (position of the permanent magnet in the carriage profile (see Figure 9)).

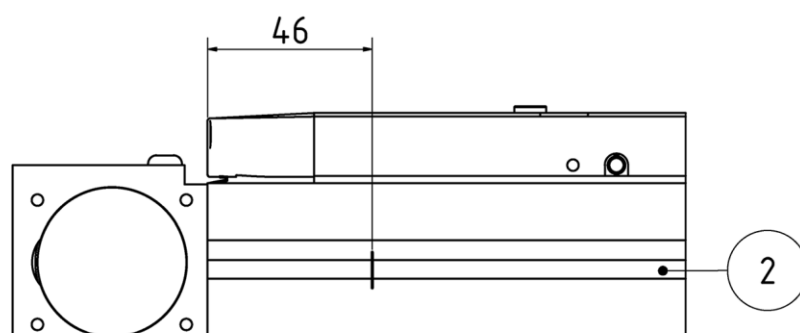
#### NOTICE

The position of the permanent magnet is not visible from the outside. Connect the sensor on the power supply according to the operating instructions and move it in the support profile along the carriage until the sensor is damped. This allows you to determine on which side of the carriage the permanent magnet is located.

- ◆ Tighten the fixing screws on the limit switches slightly and lead the cable along the profile groove.
- ◆ You can use the formerly removed protective covers (for HLR080 only) in order to fix the sensor cables. Please cut the covers to the desired length. A pair of scissors may be used. Insert the cover strips over the sensor cable in the groove again. Insert the cables into the grooves of the plastic covers and push the cover into the groove together with the cable.
- ◆ Connect the sensors to the controller according to the description in the supplier's manual.



HLR080



HLR070

Figure 9: Position of permanent magnets in the support profile

**NOTICE**

HLR070: Sensor and toe clamps cannot be mounted at the same position at the support profile.

**3.7.2. External end stops**

The external end stops can be positioned variably along the support profile and are suitable for limiting the stroke of the HLR linear axis to protect adjacent machine parts.

**WARNING**

External end stops are no safety devices. They are not designed to safely decelerate the maximum possible impact energy of the HLR linear axis. If the impact against the external or internal end stops of the HLR linear axis is not braked, the linear axis and adjacent machine parts can be irreparably damaged.

Dimensions of the external stops please refer to dimensions (see page 17).

**Assembly of the external end stop**

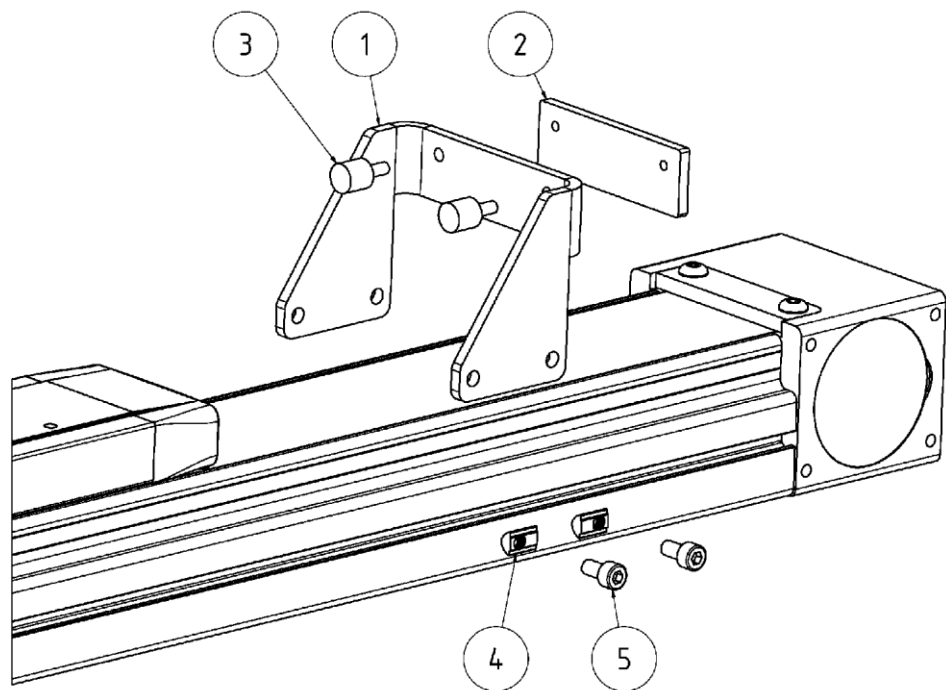


Figure 10: External end stop

- ◆ Place the thread plate (Figure 10, Pos. 2) on the external end stop (Figure 10, Pos. 1) and screw it to the buffers (Figure 10, Pos. 3).
- ◆ Insert the slot nuts (Figure 10, Pos. 4) into the clamping profiles of the HLR linear axis, two in each groove and roughly position them for the external stop.
- ◆ Slide the external stop onto the support profile (with the buffers in the direction of the carriage), over the slot nuts and screw-in the screws supplied (Figure 10, Pos. 5) (do not fastenn).
- ◆ Move the external stop to the desired position and tighten the screws (Figure 10, Pos. 5) with the required torque (see Table 9).

		HLR070 / HLR080
<b>Tightening torque slot nuts (Figure 10, Pos. 5)</b>		
Screw type [ISO 4762]	-	M5x10 – A2-708
Tightening torque*	[Nm]	5.2

Table 9: Tightening torques of the external end stop

**CAUTION**

After mounting or realigning the external end stops, always carry out a reference run (setting the end limits) and set the software end limits according to the existing travel path.

# 4. Commissioning

## In this chapter you can read about:

General notes on commissioning.....	37
Use at elevated ambient / operating temperatures.....	38

## 4.1 General notes on commissioning

### **⚠ WARNING**

During commissioning, special care must be taken to ensure that no objects or persons are within the operating range of the linear actuator (or the system). Always carry out commissioning at reduced speed. Do not reach to the action area of the linear actuator during commissioning.

The commissioning of the HLR Linear actuator may only be carried out by qualified personnel. This person is sufficiently informed about the safety instructions in this manual and how to handle the drive components used (motor, gear) as well as the control system.

The below described notes for commissioning of the HLR Linear actuator are very general. Depending on the operating conditions, appropriate measures must be taken to ensure safe and correct commissioning of the linear axis (or the system).

### **Commissioning**

- ◆ Before commissioning, make sure that the operating range of the linear axis (or system) is free.
- ◆ At the beginning of commissioning, check that the reference system of the control system corresponds to your system. To do this, move the carriage in one direction by a defined distance. If the carriage does not move in the desired direction, the motor direction of rotation is incorrectly set. If the carriage does not move by the specified distance, the parameters travel per motor revolution (see page 16) or "gear ratio" are set incorrectly.
- ◆ Set the software end limits so that they lie within the hardware end limits and provide sufficient safety travel. Move the carriage at reduced speed over the entire stroke to ensure that the software end limits are set correctly and that the hardware end limits are not approached.  
If it is necessary to approach the hardware end limits, do so only at reduced speed ( $\leq 10$  mm/s) and reduced motor current.
- ◆ Optimize the motor control to the desired behaviour of the Linear actuator (or the system).

### **NOTICE**

Vibrations, oscillations or unusual running noises indicate poorly adjusted control or mechanical distortion of the linear axis. These have a negative influence on the running behaviour and the expected service life of the linear axis.

- ◆ Limit the parameters speed, following error and motor current to what is required for normal operation (approx. 10 to 20% more). This minimizes the probability of an overload of the entire drive train in the event of a fault, and a possible negative change in the running behavior is detected at an early stage.

## 4.2 Use at elevated ambient / operating temperatures

The operation of the HLR linear actuator at high ambient and/or operating temperatures leads to a heating of the complete linear axis. Due to the different expansion coefficients of the support profile and the steel strip cover, these expand differently. With increasing ambient and/or operating temperature, the expansion difference increases steadily. The support profile expands more than the steel strip cover. This leads to a tightening of the steel strip cover and increases the friction on the wear parts, which further increases the operating temperature of the linear actuator.

### **⚠ CAUTION**

Uncontrolled heating of the linear axis can lead to increased wear on the steel strip cover and irreparable damage to the linear actuator.

#### **Factors influencing the heating of the linear actuator**

- ◆ **Ambient temperature** - this is the temperature of the air surrounding the linear actuator. It is influenced by the environment of the linear actuator e.g. heating by neighbouring devices, plant components or processes.
- ◆ **Operating temperature** - is the temperature of the linear actuator which is converted into heat by the resulting power loss. The power dissipation is primarily influenced by the operating data duty cycle and feed rate.  
If one of the operating data listed below is exceeded, the tension of the steel strip cover must be checked and corrected if necessary.
  - ◆ Ambient temperature >30 °C or
  - ◆ Duty cycle >50 % and feed rate >2 m/s

#### **Correct tension of the steel strip cover**

- ◆ The HLR Linear actuator is installed and commissioned according to the manual.
- ◆ Start normal operation of the linear axis (the entire system) and warm up the linear axis.
- ◆ Check the tension of the steel strip every 60 minutes (with duty cycle 80...100 % every 30 minutes).
- ◆ Stop the linear axis (the entire system) and switch off the power to the required drives.
- ◆ Loosen one of the steel strip cover terminal strips (see Figure 13, Pos. 1) Do not entirely screw-off screws
- ◆ Steel strip cover releases automatically (see Figure 13, Pos. 5) as soon as the terminal strip was loosened.
- ◆ Tip: A fine marking on the steel strip and profile visualizes the adjustment of the steel strip cover.
- ◆ Retighten the screws of the steel strip cover terminal strips (see Figure 13, Pos. 2) with the tightening torque (see page 43) indicated and resume operation of the linear axis (of the entire system).
- ◆ Repeat the process described above until the linear axis has reached its final operating temperature and no adjustment of the steel strip cover is visible.

# 5. Maintenance and service

## In this chapter you can read about:

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Maintenance schedule and replacement intervals.....	40
Lubrication of the guiding system.....	41
Steel strip cover disassembly and replacement .....	43
Toothed belt .....	45
Replace carriage lid.....	48
Check steel strip deflectors and steel strip sliding rods .....	49
Exchange guiding system.....	49
Spare and Wear Parts .....	50

## 5.1 General maintenance notes



**DANGER**

Before carrying out any installation work make sure that the carriage cannot move. Therefore, de-energize the respective drive or the complete system. In vertical applications, the carriages of the linear axes are secured against displacement. Secure the drives or the entire system against being switched on again.

**NOTICE**

Please observe the general safety instructions (see page 7) and chapter specific safety instructions.

**NOTICE**

The linear actuator guidance system is susceptible to dirt and foreign particles. During maintenance work please take care that no dirt or foreign particles enter the guidance system and may deposit there.

## 5.2 Maintenance schedule and replacement intervals

### Maintenance schedule

When	What	Action / elimination	Chapter
For commissioning	Linear actuator	Visually inspect linear actuator for damages and free movement of carriage. In case of stiffness, contact Parker.	
	Guiding unit	At downtimes $\geq 1$ year: Relubricate (Manufacturing date- please refer to the type plate).	Description (see page 41)
1 x half-yearly	Linear actuator	Visually inspect and clean carriage, lip seal, cover strip, deflection station, connection shaft and drive unit. Lightly wet the steel strip over its entire length with PTFE spray (Teflon spray). Clean daily when heavily soiled.	
Once a year when reaching lubricating intervals	Guiding unit	Relubricate	Description (see page 41)
	Lip seal of carriage lid	Visual inspection for dirt and wear. Clean when heavily soiled. Replace if worn.	Description (see page 48)
	Steel strip cover	Visual inspection for damage and wear. Clean when soiled and lightly wet over its entire length with PTFE spray (Teflon spray). Clean daily when heavily soiled. Replace if damaged or worn.	Description (see page 43)
	Toothed belt	Check pre-tension and wear. Visually assess the wear of the toothed belt. If it is too high, exchange the toothed belt.	Description (see page 45)

Table 10: Maintenance plan

### Replacement interval:

What	Mileage	Action	Elimination
Lip seal	15.000	to be replaced	Description (see page 48)
Steel strip deflection	15,000	to be replaced	Description (see page 49)
Steel strip sliding rods	15,000	to be replaced	
Steel strip cover	According to life cycle of the ILinear actuator *	Replace linear actuator	
Toothed belt			
Guiding unit			
Ball bearing			

Table 11: Replacement intervals

\* Life cycle of guiding systems depends on application, see calculation HLR Catalogue.



### 5.3 Lubrication of the guiding system

**⚠ WARNING** Before working with lubricants please read the respective supplier manuals and adhere to it.

**⚠ CAUTION** Improper or insufficient lubrication or wrong lubricant can cause irreparable damage to the linear actuator guidance system and result in e.g. higher wear, reduced precision, higher friction and higher noise level. Furthermore, the expected lifetime may reduce significantly.

**NOTICE** Linear actuators are lubricated before shipment. In the case of storage or downtimes of more than year, the guiding system of the linear axis must be lubricated before initial operation. For low mileages, the linear axis guide must be lubricated at least once a year, even if the lubrication interval has not been reached.

**Grease gun**

To relubricate the guiding system, use a grease gun suitable for the grease nipples. We recommend a one-hand lubrication press (optionally available, article number see HLR catalogue) with nozzle attachment type D1a4 (DIN3405).

**Lubrication intervals**

Minimum lubrication intervals for grease are influenced by different parameters (time, load ratios, operating loads). Minimum lubrication intervals can be seen in the following diagram. For low mileages, the linear axis guide must be lubricated at least once a year, even if the lubrication interval has not been reached.

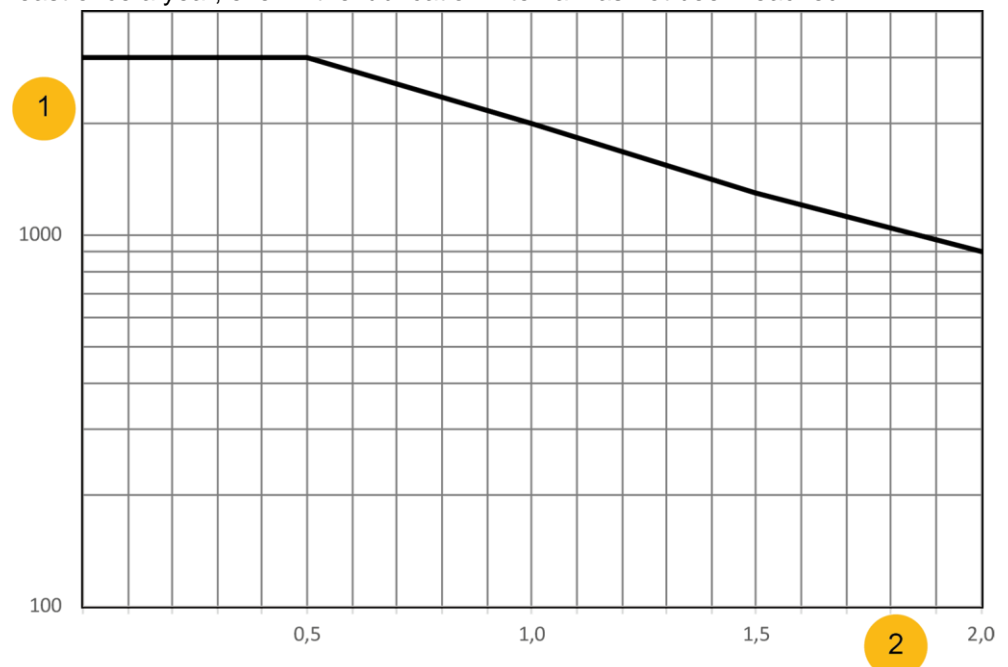


Figure 11: Lubrication intervals of the guiding system

- 1 Lubrication interval [km]
- 2 Load comparison factor  $f_v^*$

\* Calculation of the load comparison factor please refer to the HLR catalogue.

**Lubricant and amount of lubricant**

		HLR070 / HLR080
Recommended lubricant	-	Klüberplex BEM34-132
Lubricating amount depending on lubricating nozzle	[g]	1.2
Lubricating amount per carriage / Linear actuator	[g]	2.4

Table 12: Lubricant and amount of lubricant

As video:

**Procedure**

Standard carriages of HLE linear actuators have two greasing nozzles per carriage side<sup>1</sup>. Both lubricating nozzles are to be filled with the respective lubricant amount on one side of the carriage.

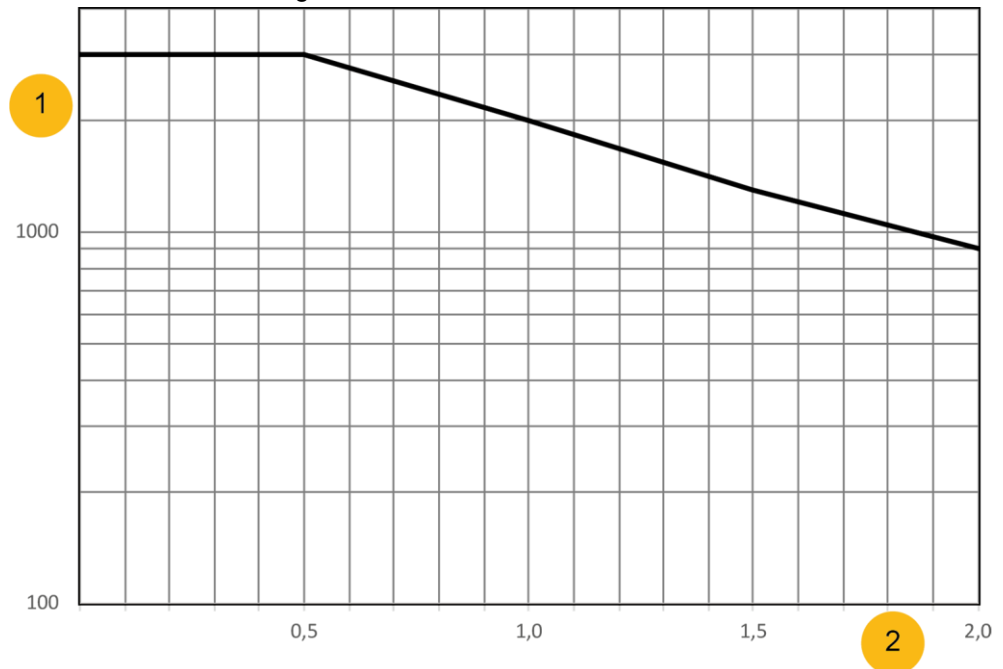


Figure 12: Lubrication of the guiding system

- ◆ Position the carriage at any point.
- ◆ Repeat the following process 4x
  - ◆ Fill each grease nozzle (only on one side of the carriage) with the required amount of lubricant by slowly actuating the grease gun  $\frac{1}{4}$  (see Table 12). When using the recommended lubricant and the recommended grease gun,  $\frac{1}{4}$  of the lubricant quantity corresponds to one full pump strokes.
  - ◆ Move the carriage at least twice the rotor length in one direction. For strokes smaller than the carriage length, move the carriage twice, forwards and backwards over the entire stroke.

<sup>1</sup> Je nach Ausführung der Linearachse können Schmiernippel nur auf einer Seite des Läufers vorhanden sein. Achten Sie beim Einbau der Linearachse auf Zugänglichkeit der Schmiernippel.

## 5.4 Steel strip cover disassembly and replacement

### **⚠ WARNING**

Steel strip cover is sharp-edged. If handled carelessly during maintenance, you might cut yourself. Protection gloves must be worn!

### **⚠ WARNING**

After dismantling the carriage lid, the frontal stop surface of the carriage is sharp-edged. If handled carelessly during maintenance, you might cut yourself. Protection gloves must be worn!

The steel strip cover used does not have to be changed over the entire service life of the linear axis, taking into account the technical axis data and boundary conditions. However, due to external influences or misuse, the steel strip cover may be damaged (scratches, dents or cracks) in these cases the cover must be replaced.

### Dismantling and assembly procedure

As video:

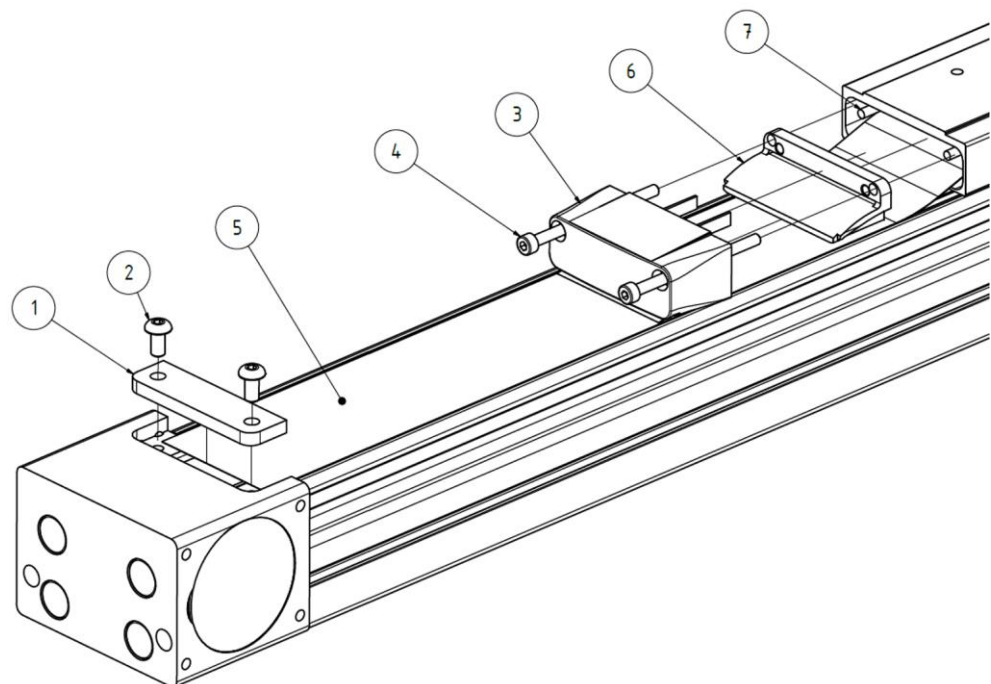


Figure 13: Disassembly of steel strip cover

Deflection station and carriage lid must be accessible for the following steps. Dismantle parts and loads if necessary.

- ◆ Position the carriage in the middle of the profile.
- ◆ Loosen screws (Figure 13, Pos. 2) of the steel strip cover terminal strips on both deflection stations (Figure 13, Pos. 1) and remove terminal strip.

### **⚠ CAUTION**

Take care when loosening or screwing in the round-head screws. Make sure that the tool is axial to the screw and engages completely in the hexagon socket to prevent damage to the screw head. When tightening the screws, observe the specified tightening torque.

- ◆ Remove screws of both carriage lids (Figure 13, Pos. 4) and remove carriage lid (Figure 13, Pos. 3).
- ◆ Carefully pull out steel strip cover (Figure 13, Pos. 5).
- ◆ Carefully pull out steel strip deflections (Figure 13, Pos. 6) and steel strip sliding rods<sup>2</sup> (Figure 13, Pos. 7).
- ◆ Check support profile and carriage for dirt, foreign bodies or damage. Carefully remove heavy dirt and foreign objects.

<sup>2</sup> Je nach Ausführung der Linearachsen sind keine Stahlbandgleitstäbe vorhanden.

**NOTICE**

When replacing the steel strip cover, it is recommended to visually check and clean the wearing parts of the lip seals in the carriage lids, steel strip deflections and steel strip sliding rods and to replace them depending on their condition (Details (see page 48)).

- ◆ For the installation of a new steel strip cover, cut the new steel strip cover to the required length using suitable sheet metal shears. Use the old steel strip cover as matrix.
- ◆ To install the old steel strip cover, clean both sides of the old steel strip cover before reinstalling it.
- ◆ Carefully slide the steel strip cover through the carriage and place it on the support profile.
- ◆ Thread the steel strip deflectors (Figure 13, Pos. 6) left and right onto the steel strip cover. When installing the old steel strip deflectors, clean them before reinstalling them.
- ◆ Push the steel strip deflectors as far as the carriage and carefully push them back into the carriage, up to the stop.
- ◆ Carefully push the steel strip sliding rods (Figure 13, Pos. 7) through the carriage profile and the steel strip covers. Make sure that the steel strip sliding rods are seated in the profile over the entire length of the carriage and do not hang out downwards.
- ◆ Fit the carriage lid (Figure 13, Pos. 3) on both sides and tighten the screws (Figure 13, Pos. 4) to the required tightening torque (see Table 13). Clean the lip seal before assembling the old lid.

**CAUTION**

Take care that the carriage lid is aligned exactly to the carriage profile (lip seal parallel to the steel strip cover). If the lip seal is mounted at an angle, there is a risk of premature wear.

- ◆ Align the steel strip cover over the entire profile length.

**CAUTION**

Ensure that the steel strip cover lies centrally in the profile over its entire length. In the off-centre position there is a risk of premature wear of the steel strip deflections and the steel strip cover.

- ◆ Clamp the steel strip cover (Figure 13, Pos. 5) with steel strip cover terminal strip (Figure 13, Pos. 1) on one of the two deflection station. Tighten screws with the respectable tightening torque (see Table 13).
- ◆ Move carriage to the deflection station with the assembled terminal strip.
- ◆ Smooth the steel strip cover (Figure 13, Pos. 5) in the direction of the second deflection station by hand and clamp it to the deflection station using the steel strip cover terminal strip. Tighten screws to the respectable tightening torque (see Table 13).
- ◆ Check if the steel strip cover is touching the carriage. Therefore move the carriage over the entire length of the stroke and pay attention to grinding noises.
- ◆ In the stroke area slightly moisten the steel strip with Teflon spray.

		HLR070 / HLR080
<b>Tightening torque of the carriage lid (Figure 13, Pos. 4)</b>		
<b>Screw type [ISO 4762]</b>	-	M4x60 – A2-70
<b>Tightening torque</b>	[Nm]	1.6
<b>Tightening torque Steel Strip Option (Figure 13, Pos. 2)</b>		
<b>Screw type [ISO 7380]</b>	-	M5x10 – A2-70
<b>Tightening torque</b>	[Nm]	2.4

Table 13: Tightening torques of steel strip cover

## 5.5 Toothed belt

**In this chapter you can read about:**

Checking and setting toothed belt tension.....45  
 Exchanging the toothed belt .....47

### 5.5.1. Checking and setting toothed belt tension

**⚠ WARNING**

An incorrect toothed belt tension may cause the belt to jump. This may cause a loss of position. This may lead to collisions or may cause property damage and personal injuries. Belt pre-tension must always be observed.

**NOTICE**

Toothed belt pre-tension is matched to the technical axis data and considers possible belt tension losses after installation. When operating under normal conditions and in compliance with technical specification, re-tensioning of the toothed belt is not necessary.

As video:



Is a belt tension loss suspected, the toothed belt tensions must be verified and if necessary corrected as follows:

**Assembling sequence**

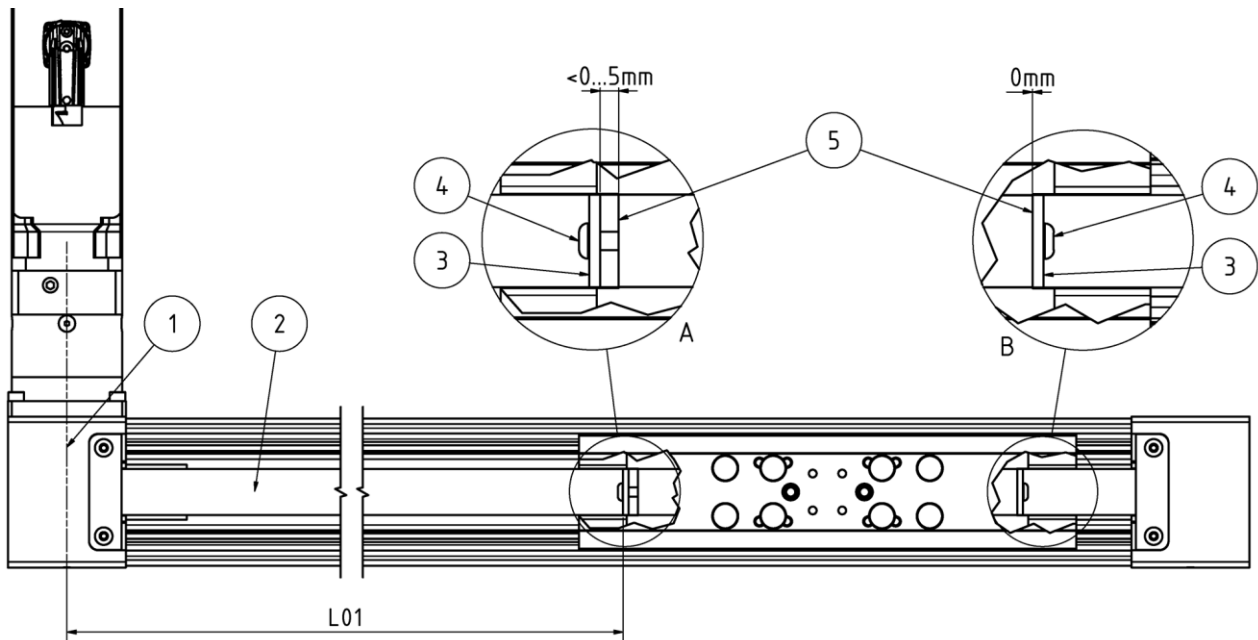


Figure 14: Check and adjust toothed belt tension

**⚠ WARNING**

After dismantling the carriage lid, the frontal stop surface of the carriage is sharp-edged. If handled carelessly during maintenance, you might cut yourself. Protection gloves must be worn!

- ◆ Dismantle and put aside steel strip cover, steel strip deflectors and steel strip sliding rods<sup>3</sup>.
- ◆ If possible, carefully drive carriage to end stop of pulley housing.
- ◆ Check belt on both carriage sides for abnormal wear (belt back and tooth flanks). In case of heavy wear, we recommend replacing the toothed belt (see page 47).
- ◆ Measure the free belt length (Figure 14, L01) between the middle level of the pulley (Figure 14, Pos. 1) and the belt tensioning element (Figure 14, Pos 3).

<sup>3</sup> Je nach Ausführung der Linearachsen sind keine Stahlbandgleitstäbe vorhanden.

- ◆ Enter the measure belt length (Figure 14, L01) as well as the belt weight (Table 14) in the belt tension gauge.  
We recommend to use the gauges "Sonic 507c" of the company Gates resp. the "Trummeter" gauge of the company Hilger&Kern. For precise measurement, the operating manual of the measurement equipment must be observed.
- ◆ Please check toothed belt tension in the center of the free belt length. If the toothed belt tension is below the permissible operating tension, the toothed belt must be tensioned to the "standard belt tension when retensioning". (please refer to Table 14). Toothed belt tension may not exceed "Standard belt pre-tension of new belts". In this case the toothed belt tension must be reduced.
- ◆ Depending on toothed belt tensions, carefully screw-in resp. screw-out the tension screw in the carriage (Figure 14, Pos 4).

**⚠ CAUTION**

Take care when loosening or screwing in the round-head screws. Make sure that the tool is axial to the screw and engages completely in the hexagon socket to prevent damage to the screw head.

**NOTICE**

One of the clamping screws is turned to the stop at the factory (Figure 14, detail view B). This is indicated by the fact that this clamping screw is screwed in deeper and cannot be screwed in any further. To increase the toothed belt tension, the other tensioning screw (Figure 14, detail view A) must be screwed in. To reduce toothed belt tension, both tensioning screws can be released. The belt tensioning elements (Figure 14, Pos. 3) must not protrude more than 5 mm on both sides, otherwise the steel belt deflections cannot be fitted.

- ◆ After each adjustment of the clamping screw, move the carriage forwards and backwards once over approx. the carriage length.

**⚠ CAUTION**

When moving the carriage during tensioning, make sure that the free, measured belt length matches the value in the gauge. Tip: Mark the position of the carriage on the profile and always move it to this position for the measurement.

- ◆ Then measure the toothed belt tension in the center of the free belt length.
- ◆ Repeat the three steps described above until the required toothed belt tension is reached.
- ◆ If both tensioning screws are screwed in at the stop (as shown in Figure 14, detail view B) and the required toothed belt tension has not yet been achieved, the toothed belt (Figure 14, Pos 2) must be shortened by one tooth.
- ◆ Loosen one of the tension screws completely (see Figure 14, Pos. 4).
- ◆ Carefully pull the toothed belt with the belt tensioning element (Figure 14, Pos. 3) out of the carriage (depending on the design, the belt tensioning element is one-piece or two-piece).
- ◆ Shorten the toothed belt for one tooth. Cut off the toothed belt exactly in the tooth base.
- ◆ Insert again the boothed belt (Figure 14, Pos. 2) with the belt tensioning element (Figure 14, Pos. 3) into the carriage.

**⚠ CAUTION**

The toothed belt must fit into all teeth of the belt tensioning element.

- ◆ Screw-in tensioning screw (Figure 14, Pos. 4) until the toothed belt tightens.
- ◆ Measure the toothed belt tension as described above and adjust the tension screw accordingly until the required toothed belt tension is achieved.
- ◆ If the required toothed belt pre-tensions ist set, steel strip cover, steel strip deflectors and steel strip sliding rods (see page 43) can be reassembled again.

	Belt weight per meter	Operating voltage	Standard belt tension during retensioning	Standard belt tension of new belt
	[g/m]	[N]	[N]	[N]
HLR070	80	550	605 ± 30	690 ± 30
HLR080	117.5	990	1090 ± 50	1240 ± 50

Table 14: toothed belt characteristics



## 5.5.2. Exchanging the toothed belt

Taking into consideration the technical axis data and boundary conditions, the toothed belt used is maintenance-free and must not be changed.

### Causes for abnormal toothed belt wear

Due to external influences or error applications, a toothed belt exchange might be necessary. Causes for abnormal toothed belt wear are:

- ◆ toothed belt tension too big or too small
- ◆ impermissibly high drive torque, braking torque, or feed force
- ◆ operating or ambient temperature too high
- ◆ Contact with chemicals

A certain sign of wear may have different causes so that it is not always possible to determine the exact cause. In case of abnormal belt wear it is recommended to replace the belt and to check the application for the above mentioned "causes of abnormal belt wear".

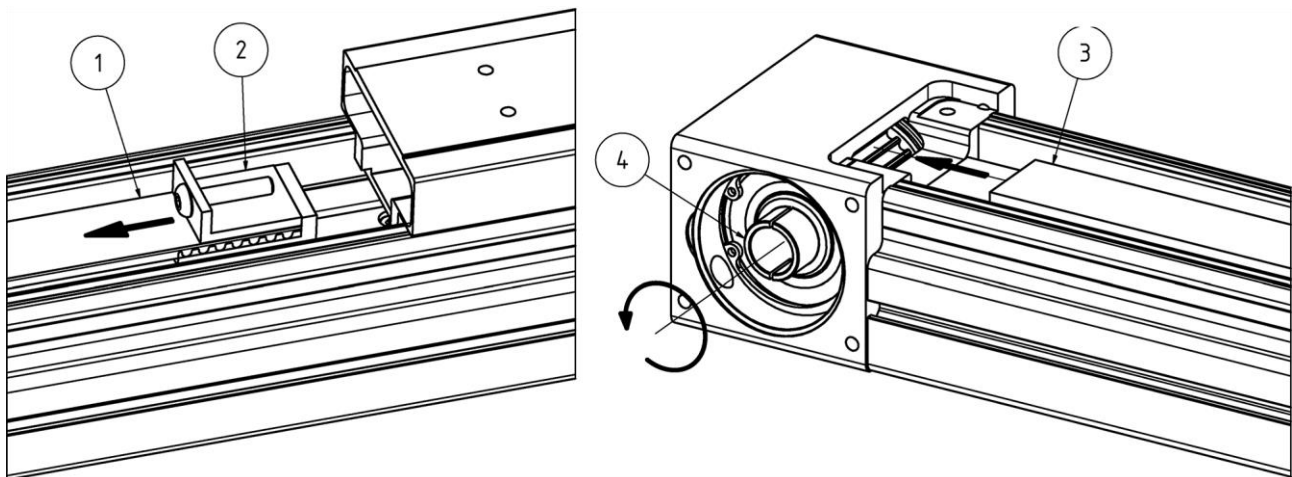


Figure 15: Toothed belt exchange

### Assembling sequence

- ◆ Dismantle and put aside the drive from the Linear actuator (see page 27).

### **⚠ WARNING**

After dismantling the carriage lid, the frontal stop surface of the carriage is sharp-edged. If handled carelessly during maintenance, you might cut yourself. Protection gloves must be worn!

- ◆ Dismantle and put aside steel strip cover, steel strip deflectors<sup>4</sup> and steel strip sliding rods (see page 43).

### **⚠ CAUTION**

Take care when loosening or screwing in the round-head screws. Make sure that the tool is axial to the screw and engages completely in the hexagon socket to prevent damage to the screw head.

- ◆ Loosen screws of the belt tensioning element Figure 15, Pos. 2) on both sides, carefully pull out and put aside the toothed belt with the belt tensioning element (Figure 15, Pos. 1) of the carriage (depending on the design, the belt tensioning element is one-piece or two-piece).
- ◆ Pull out belt on one axis side.

### **NOTICE**

Clean the interior of the linear axis, deflection stations and carriage profile (grease, abrasion, other impurities).

<sup>4</sup> Je nach Ausführung der Linearachsen sind keine Stahlbandgleitstäbe vorhanden.



- ◆ Cut the replacement belt to the required length using suitable sheet metal shears. Use the old steel strip cover as matrix.
- ◆ Insert the replacement toothed belt (Figure 15, Pos. 3) into the upper opening of one of the return stations and push the toothed belt around the toothed pulley (Figure 15, Pos. 4) . In order to facilitate installation, turn pulley in pushing direction.
- ◆ Push in the toothed belt further until the toothed belt runs through the profile and runs around the toothed pulley in the opposite deflection station. In order to facilitate installation process, turn pulley of the opposite deflection station in pushing direction.
- ◆ Pull the toothed belt out of the opposite deflection station and place both ends of the toothed belt on the carriage.
- ◆ Insert one toothed belt end into the toothed belt tensioning element (Figure 15, Pos. 2) and screw it in on one side of the carriage.

## ⚠ CAUTION

The toothed belt must fit into all teeth of the belt tensioning element.

- ◆ Insert the second toothed belt end into the belt tensioning element, insert it on the other side of the carriage and adjust the toothed belt tension to the "standard belt pre-tension of new belts" (see page 45) with the tensioning screw, see Table 14). After the toothed belt tension has been correctly adjusted, the steel strip sliding rods, steel strip deflections, steel strip cover, carriage lid (see page 43) and drive (see page 27) can be reassembled.

## 5.6 Replace carriage lid

### ⚠ WARNING

After dismantling the carriage lid, the frontal stop surface of the carriage is sharp-edged. If handled carelessly during maintenance, you might cut yourself. Protection gloves must be worn!

#### Carriage lids must be exchanged if:

- ◆ the recommended exchange interval of the lip seal is reached (see Table 11).
- ◆ abnormal or one-sided wear is present on the lip seal (Figure 16, Pos 1), due to improper operation or environmental influences or incorrect installation (misalignment) of the steel belt cover or carriage cover.

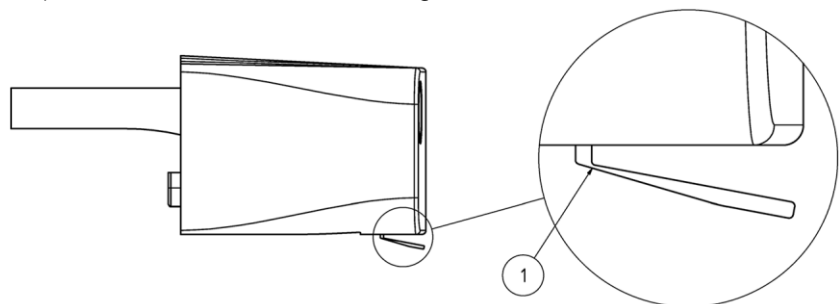


Figure 16: Abnormal wear of lip seal

- ◆ or after a collision with adjacent machine parts, provided that important functional parts of the linear axis have not been damaged (guide, carriage, toothed belt, deflection stations). In this case, the complete axis must be exchanged.

#### Exchange process of carriage lid

To exchange the carriage lid, it is not necessary to loosen the steel strip cover.

- ◆ Loosen the screws of the cover lid (see Figure 13, Pos. 4) and dispose the old lid (see Figure 13, Pos. 3).
- ◆ Position the new carriage lid on the carriage plate and screw it to the required tightening torque see Table 13).

**⚠ CAUTION**

Take care that the carriage lid is aligned exactly to the carriage profile (lip seal parallel to the steel strip cover). If the lip seal is mounted at an angle, there is a risk of premature wear.

- ◆ Check if the steel strip cover is touching the carriage. Therefore move the carriage over the entire length of the stroke and pay attention to grinding noises.
- ◆ In the stroke area slightly moisten the steel strip with Teflon spray.

## 5.7 Check steel strip deflectors and steel strip sliding rods

**Steel strip deflections and steel strip sliding rods must be exchanged if:**

- ◆ the recommended exchange interval of the wear parts is reached (see Table 11).
- ◆ abnormal or one-sided wear is present on the wear parts, due to improper operation conditions or environmental influences, extensive soiling from outside or incorrect installation of the steel belt cover.

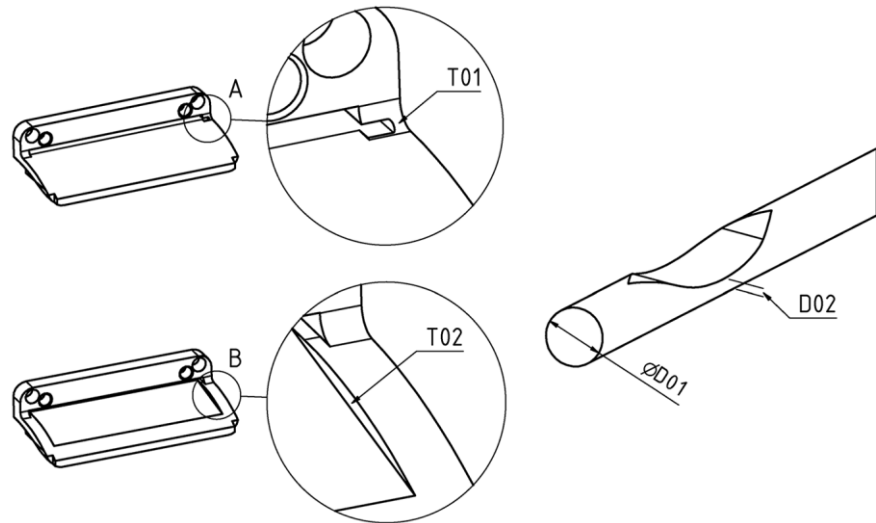


Figure 17: Abnormal wear of steel strip deflection (left) and steel strip sliding rods (right)

**Abnormal wear is present if**

- ◆ At the steel strip deflection the lateral residual web thickness falls below the value T01 or the wear at the sliding surface exceeds the value T02.
- ◆ At the steel strip sliding rod the thickness of the sliding rod falls below the value D02

		HLR070	HLR080
T01	[mm]	1.0	1.5
T02	[mm]	1.0	
D02	[mm]	ØD01 - 0.2	

Table 15: Abnormal wear limit values

**Exchange procedure of steel strip deflections and steel strip sliding rods**

To exchange the carriage lid, it is not necessary to completely remove the steel strip cover (see page 43).

## 5.8 Exchange guiding system

Exchanging the guiding system is only possible at the assembly plant and not at customer's site.

If damaged (due to impacts, soiling, loads or environmental conditions), the complete linear axis must be exchanged. Furthermore, it should be exchanged as soon as the forecasted lifetime of the linear actuator is reached.

## 5.9 Spare and Wear Parts

### In this chapter you can read about:

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### 5.9.1. Wear parts

	Order unit	Part number	
		HLR070	HLR080
Carriage lid incl. lip seal*	[Piece]	0231.023	0241.023
Steel strip deflection*	[Piece]	0231.038	0241.038
Steel strip sliding rods 350 mm*	[Piece]	0231.039-01	

Table 16: Wear parts

\* Min. Order amount 2 pieces

### 5.9.2. Spareparts

	Order unit	Part number	
		HLR070	HLR080
Toothed belt*	[m]	0231.904	0241.904
Steel strip cover*	[m]	400-300704	400-300711
Clamp collar incl. clamping screw	[Piece]	0232.007-03	0242.007-03

Table 17: Spare parts

\* Can only be ordered in full meters

## 6. Supply repair

In the event of a damage or a mechanical defect, the entire unit must be returned for repair (Parker Hannifin (see page 1)). The repair must be made by trained Parker personnel.

### **User conversions and changes are not Permitted**

The linear actuator must not be changed in its design or in terms of safety without our approval. Any change as defined here made by the user excludes any liability on our part.

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