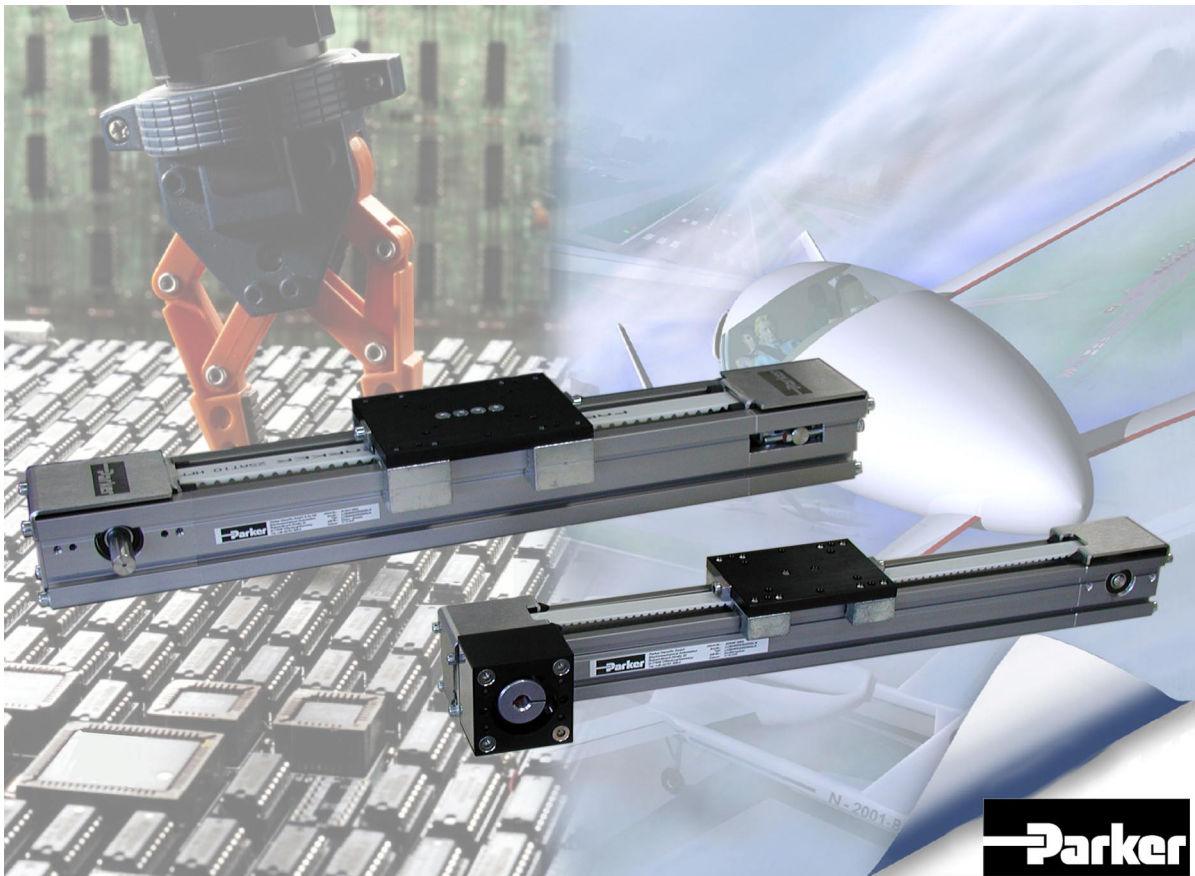


LCB Compact Linear Actuator



Autoryzowany dystrybutor Parker:

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Sizes LCB040 and LCB060

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Nonwarranty clause

We checked the contents of this publication for compliance with the associated hard 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.

Further information:

Our product on the Internet: <http://www.parker-eme.com/lcb>

Support for commissioning with Compax3 on:

ParkerOnline: POL C3KnowledgeBase Tab "start-up-guides"
<http://www.compax3.info/startup/>

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1. Introduction

In this chapter you can read about:

Device assignment.....	5
Safety Instructions	6
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1.1 Device assignment

This manual is valid for the following devices:

Linear actuator: LCB040

Linear actuator: LCB060

1.2 Safety Instructions

In this chapter you can read about:

General hazards	6
Intended use	6
Identifying Residual Dangers and Hazardous Areas	7
Working safely	7
Safety Instructions for the Company Using the System	8
Safety Instructions for Operating Personnel	8
Transport	8

1.2.1. General hazards

General Hazards on Non-Compliance with the Safety Instructions

This machine component 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

- ◆ danger for life and limb of the operator or third persons
- ◆ 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.

1.2.2. Intended use

The linear actuator has a number of uses including:

Positioning, transporting, feeding, removing, pallet handling, loading, unloading, processing and manipulating workpieces 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.

Please make sure that the mounting of parts or tools will not pose a threat to persons or cause damages to any parts or devices. This also applies, for example, to the case of a broken timing belt.

The linear actuator 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.

1.2.3. 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:



Danger

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



Warning

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 damage.-



Hint

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.

1.2.4. Working safely

Heed the Instructions

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.

The following jobs must only be performed by appropriately trained and authorized personnel:

- ◆ Installation and set-up tasks on the linear actuator
- ◆ Attaching safety transmitter switches (initiators)
- ◆ Connecting the drive and testing the motion direction

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 can be safeguarded with safety transmitter switches.

1.2.5. Safety Instructions for the Company Using the System

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.

1.2.6. Safety Instructions for Operating Personnel

Any work step that has a negative effect on the operating safety of the linear actuator 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 behaviour) 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 wearing parts, use only original Parker parts. We note here explicitly 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.

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.

1.2.7. Transport



Never step under overhead loads – danger of being injured!
Moving parts must always be secured against slipping or moving.

*By wrapping several turns of strong adhesive tape around the sliding carriage, which if possible is in the centre of the profile, for example.



Hint

Danger when transporting long actuators. Because the actuator bends under its own weight, guiding accuracy may deteriorate significantly. In addition, the shape of the profile may change and the travel behaviour of the sliding carriage may be negatively affected.

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

1.3 Warranty conditions

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.

2. Set-up

In this chapter you can read about:

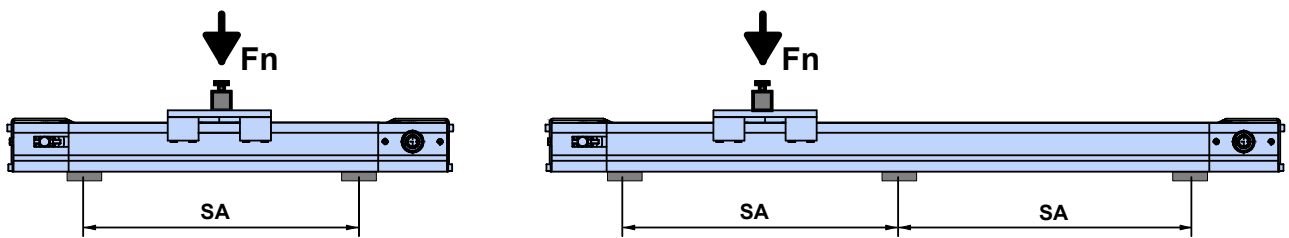
Preparations for substructure	10
Fitting / mouting	11

2.1 Preparations for substructure

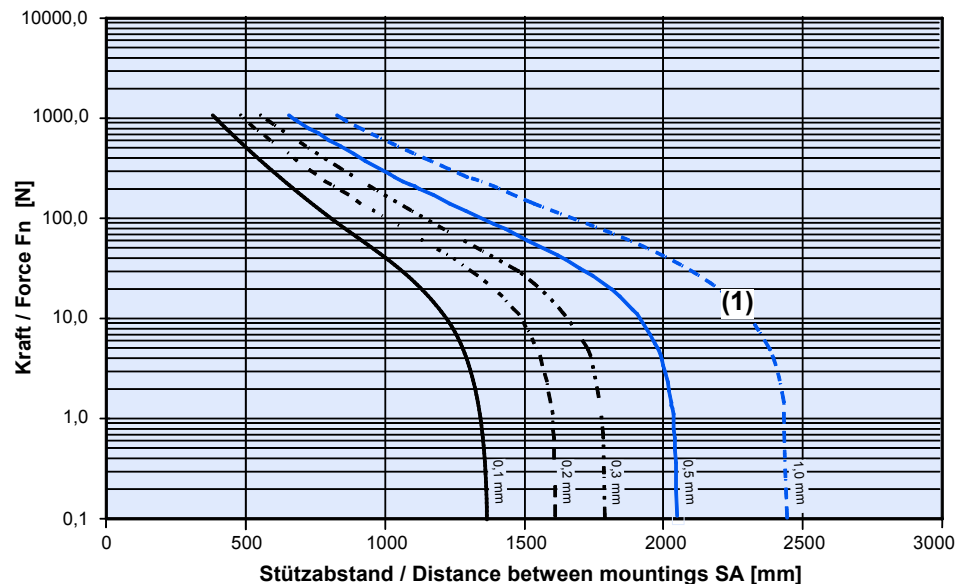
Each holding point must be even with a flat parallelism of 0.2 mm. All holding points must be aligned with parallelism to each other of better than 0.5 mm.

To simplify installation and adjustment, the holding points for the linear actuator can also consist of adapter plates. They can be aligned with tightening and pressure screws.

Deflection vs. distance between mountings and payload

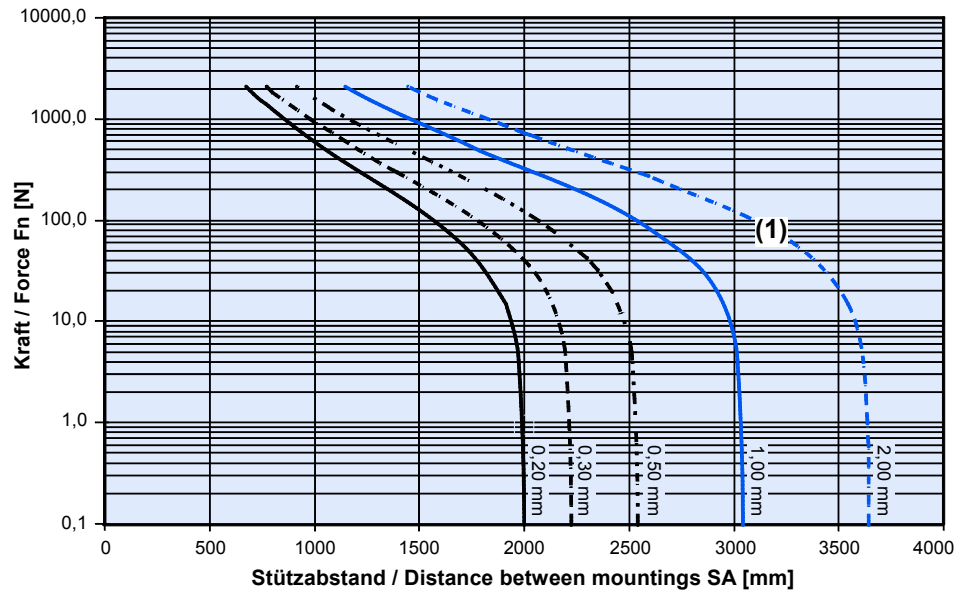


LCB040



(1): Max. permissible deflection

LCB060



(1): Max. permissible deflection

2.2 Fitting / mouting

2.2.1. Installation of a single actuator



Caution Danger when transporting long actuators. Because the actuator bends under its own weight, guiding accuracy may deteriorate significantly. In addition, the shape of the profile may change and the travel behaviour of the sliding carriage may be negatively affected. **Additional information on trans-port:** (see page 8)

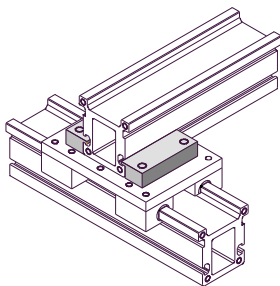


Hint When fitting the LCB into your plant, please make sure that the deflection station and the sliding carriage are accessible for maintenance! (Provide enough space behind the deflection station so that the sliding blocks or the sliding carriage can be removed).

- ◆ Take the linear module out of the shipping crate.
- ◆ Place the LCB on the connection points, which have been previously levelled (water level, levelling device).
- ◆ Fasten the actuator in place. (**LCB Mounting Options** (see page 11))
- ◆ Fasten the connection parts in place.



Hint There are two ways to fasten the LCB in place.



- ◆ Mounting with clamping profiles or
- ◆ With T slot bolts/nuts that are guided into the grooves of the aluminium profile.

Type	Designation		D	I	I1	K	GA	L	Art. No.
LCB040	T-Nut		M4	8	11.5	4	4	--	127-004020
LCB040	T-Nut		M5	8	11.5	4	4	--	127-004021
LCB040	Square nuts*	DIN 562-M4	M4	7	--	2.2	--	--	135-700001
LCB040	Square nuts*	DIN 562-M5	M5	8	--	2.7	--	--	135-700003
LCB040	Hexagon nut*	DIN 934-M4	M4	7	--	2.9	--	--	135-700600
LCB040	Hexagon nut*	DIN 934-M5	M5	8	--	3.7	--	--	135-700700
LCB060	T-bolt	DIN787 M8 x 8 x 25	M8	13	13	6	--	25	131-700001
LCB060	T-bolt	DIN787 M8 x 8 x 32	M8	13	13	6	--	32	131-700002
LCB060	T-bolt	DIN787 M8 x 8 x 40	M8	13	13	6	--	40	131-700003
LCB060	T-Nut		M4	13.7	22	7	7.5	--	127-006015
LCB060	T-Nut		M5	13.7	22	7	7.5	--	127-006016
LCB060	T-Nut		M6	13.8	23	7.3	5.5	--	400-000033
LCB060	T-Nut		M8	13.8	23	7.3	7.5	--	400-000034

* Square and hexagon nuts should only be used for lightly-loaded attachments



Hint

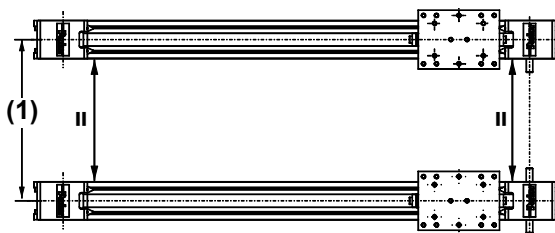
The standard installation position is horizontal with the sliding carriage up. Optionally (after consultation with the manufacturer) a horizontal installation position with the sliding carriage on the side or at the bottom or vertical installation are also possible.

2.2.2. Installation of a double-axis actuator

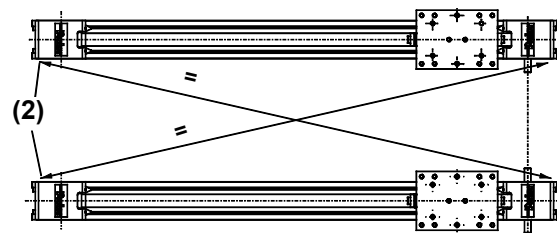
- ◆ Take the linear actuator out of the shipping crate.
- ◆ Place the LCB on the connection points, which have been previously levelled (water level, levelling device).
- ◆ Fixing the module (**LCB Mounting Options** (see page 11))
- ◆ Place second actuator and fix slightly.
- ◆ Measuring the parallelism (measure tape).
- ◆ Measure both diagonals in order to verify rectangularity (measuring tape). Correct diagonal measure by parallel movement of the second linear actuator, if necessary.
- ◆ Verify the horizontal alignment of the linear actuators (water level, leveling device) and correct if needs be.
- ◆ Fix the second actuator permanently.
- ◆ If the sliding carriages of the two linear actuators are to be linked mechanically, please take care that the system is mounted nondistortedly with respect to the guiding and the drive train. In order to avoid torsional stress, loosen and refasten the couplings of the shaft kit if needs be.

Alignment of a double-axis actuator

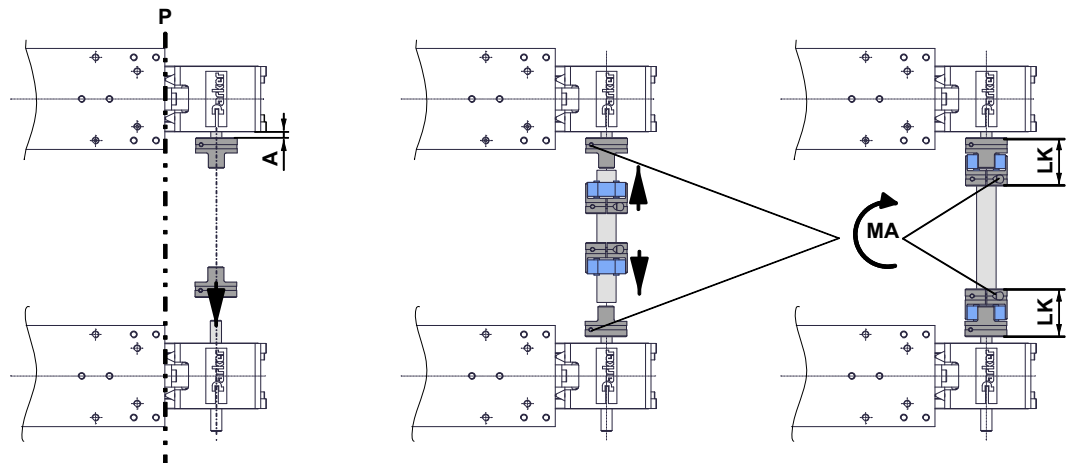
(1) Axis distance



(2) Measure to profile end



Installation of a shaft kit



- ◆ The sliding carriages of the two linear actuators must stand on the same position P (Recommendation: push both actuators to the same stop).
- ◆ Place half-coupling for small shaft diameter on the free shaft ends with distance A and tighten clamping screw with torque MA. Insert plastic part.
- ◆ Slide the two other coupling halves on to the connection shaft.
- ◆ Position connection shaft between the free shaft ends and push the respective coupling halves towards each other. Caution! Do not push to block – coupling package must have total length LK.
- ◆ Tighten clamping screws on both coupling halves on the connection shaft with torque MA.

		Unit	LCB040	LCB060
A	Distance coupling / drive station	mm	8	14
MA	Tightening torque of clamping screws	Nm	1.4	10.5
LK	Length of coupling package	mm	35	66

2.2.3. Setting the end limits

The software end limits (programmable end limits) can be used to define the maximum travel path in the positive and negative direction. The machine zero initiator (home switch) must always be within the software end limits. The switch must be mounted so that the sliding carriage can under no circumstances travel beyond (the switch should ideally be mounted in proximity of the drive station or the deflection station. switching distance 2 – 4 mm) if needs be an additional external buffer must be fitted.



Caution	The software end limits are not preset. For this reason, they must be defined and entered into the control system before the unit is placed in service.
----------------	---



Hint	Recommendation: the actual zero point of your controller should be the same as the machine zero point.
-------------	--

2.2.4. Attachment of Motor or Gearbox

If you ordered the LCB together with a coupling kit, the coupling housing with the half-coupling is already mounted on the drive shaft of the linear actuator. In this case please proceed with step 2, if not start with step 1.

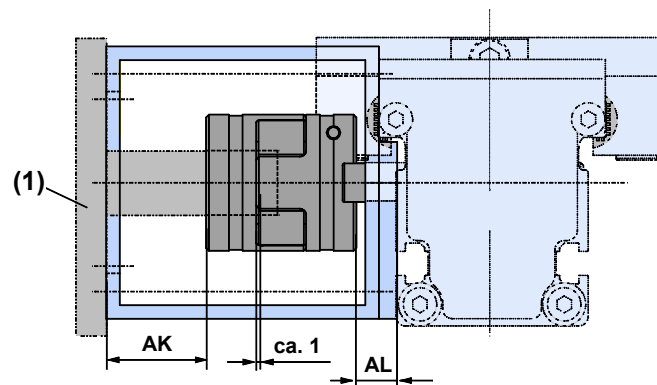
(1) If the coupling housing and the half-coupling are not pre-assembled, please proceed as follows:

- ◆ Place half-coupling for small shaft diameter on the drive shaft (with distance AL to LCB) and tighten clamping screw with torque MA.
- ◆ Insert plastic part.
- ◆ Mount coupling housing

(2) Coupling housing and half coupling are pre-assembled:

- ◆ Place the other half-coupling on the gear- or motor shaft and fix with distance AK to the flange surface of the drive unit with torque MA.
- ◆ Fix gearbox and motor to the coupling housing (the gearbox shaft must be exactly central with respect to the drive shaft of the linear actuator!)
- ◆ There should be only an air gap of about 0.5 - 1 mm between the half-coupling on the gearbox- or motor shaft and the other half-coupling.

Drawing without lateral cover



	Unit	LCB040			LCB060			
		L (PTN060)	U (SMH60)	N (SY56)	M (PTN080)	W (SMH100)	P (SY107)	
AK	Distance between flange surface of the coupling housing and the coupling	mm	23	4.5	40	15	13.5	54
MA	Tightening torque of clamping screws	Nm	1.4			10.5		
AL	Distance between flange surface of the coupling housing and the drive station	mm	8			14		

Dimensional drawings of drive options (see page 27)

3. Maintenance and service

In this chapter you can read about:

Safety Instruction	15
Maintenance schedule	16
Check free movement of the sliding carriage	16
Replacement interval for wearing parts	17
Checking / exchanging / tensioning timing belt	19

Use only repair parts of Parker Hannifin GmbH.

Improper or unprofessional repair will lead to an expiry of any warranty.

If you encounter problems, please contact:

Parker Hannifin GmbH
Electromechanical Automation
Service Dept.
Tel.: (+49) (0)781 509-700
Fax: (+49) (0)781 509-98316

3.1 Safety Instruction

Before performing any maintenance or repair work, turn the power switch to the '0' setting and secure it with a padlock -against manipulation. If the unit needs to be operable for specific repair works, you have to be especially cautious: Ensure by all means that no persons are in the hazardous area. If required, safeguard the hazardous area with additional barriers or gratings against unauthorized persons.

Repair jobs must only be performed by qualified specialists or employees of Parker.

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 authorised by the person responsible for the safety of the system to perform the required task and are capable of recognising potential hazards and avoiding them (definition of technical personnel according to 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.

If set-up, repair or maintenance works require that safety installations be dismantled, these must be reinstalled immediately after the respective works have been completed. The unit must be shut down before any of the safety installations are dismantled.

3.2 Maintenance schedule



Hint

Please take special care during all maintenance and repair that the guiding surface remains intact!

WHEN	WHAT	ACTION
After commissioning	Sliding carriage	Check free movement of the sliding carriage by manually moving the sliding carriage. (Check) (see page 16)
every 4 weeks or every 1000 km*	Sliding carriage	Check sliding carriage play and replace sliding blocks if necessary. (Exchange wearing parts) (see page 17) Check free movement of the sliding carriage by manually moving the sliding carriage. (Check) (see page 16)
semi-annually or every 5000 km	Toothed belt	Visual inspection of the timing belt for wear. Change timing belt if necessary. (Check toothed belt) (see page 19)

*With the very first set of sliding blocks (new LCB) please check the sliding carriage play weekly or every two weeks, as an increased wear can be expected during the initial break-in phase.

3.3 Check free movement of the sliding carriage

Move the sliding carriage manually over the entire stroke distance after assembly or setup. The sliding carriage must move easily and with constant force. If the sliding carriage does not move easily or rather "joltily", please check the following:

- ◆ Make a visual inspection of the guiding. Check for visual wear and for smoothness of the guiding surface. If necessary, replace profile. If the force needed to move the sliding carriage changes continually (increases or decreases continually), an alignment error of the double-axis actuator could be the case. **New alignment of double axis** (see page 12).
- ◆ Possibly too high deflection of the guiding profile. If needs be, **reduce distance between supports** (see page 10).
- ◆ If the causes mentioned above do not apply, please check the sliding carriage play (**check sliding play**) (see page 17).

3.4 Replacment interval for wearing parts

Check sliding carriage / play of sliding carriage

The diagrams "**Bearing capacity of sliding carriage / wear**" (see page 30) show the wear of the sliding blocks in an ideal case of load on the sliding carriage. The wear can differ from the indicated curves in a specific application.

Depending on the load and the distance traveled, the sliding blocks in the sliding carriage wear down and the sliding carriage play will increase accordingly. If the increased sliding carriage play does not have a negative influence on the application, the sliding blocks can be operated up to the wear limit (0.5 mm wear for LCB040 and 1.0 mm wear for LCB060).



The wear limit given in the diagrams may under no circumstances be exceeded – this could damage the surface of the guiding irreversibly!

Check sliding play (LCB)



Use a feeler gauge stock to determine the current wear as shown in the photograph on the left.

Lift sliding carriage plate for measurement.

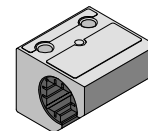
Exchange sliding block (LCB)

The sliding block is a wearing part.

You need 4 pieces per linear actuator .

LCB040: Order-No.: 127-004016

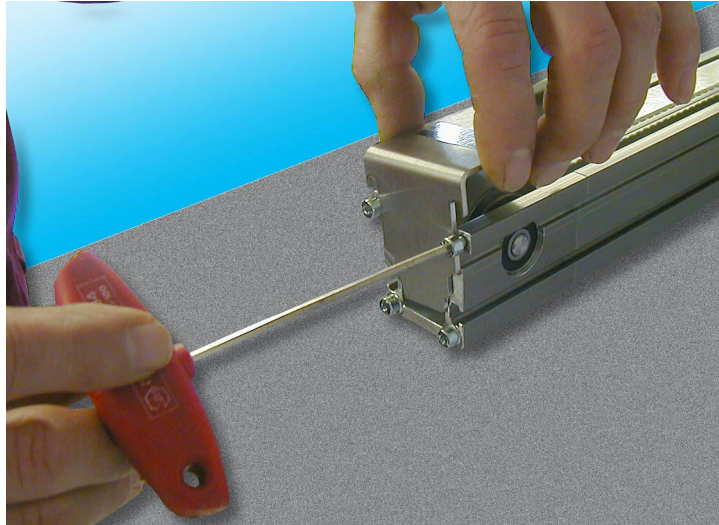
LCB060: Order-No.: 127-006014



We recommend to have at least 4 sliding blocks on stock.

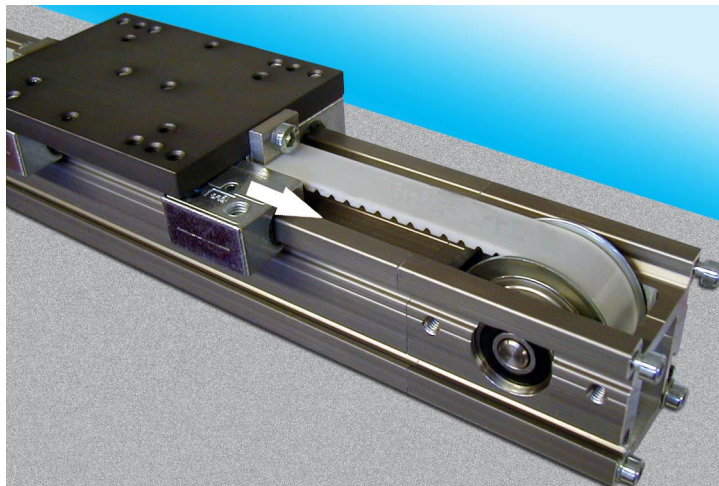
We recommend to drive or to push the sliding carriage to the deflection station for changing the sliding blocks.

Remove/mount covers:



Unscrew only the two upper screws of the cover at the deflection station (unscrew for about 1 – 3 mm, not more as they do not only fix the cover but also the deflection station itself).

Remove cover in upwards direction



Unscrew the two fixing screws at all four sliding blocks entirely and remove sliding blocks.

Mount new sliding blocks in reverse order. Tighten screws only slightly. Move sliding carriage forwards and backwards several times (so that the sliding blocks are aligned) and then tighten screws.

Check sliding carriage again for free movement.

3.5 Checking / exchanging / tensioning timing belt

Visual inspection of the timing belt

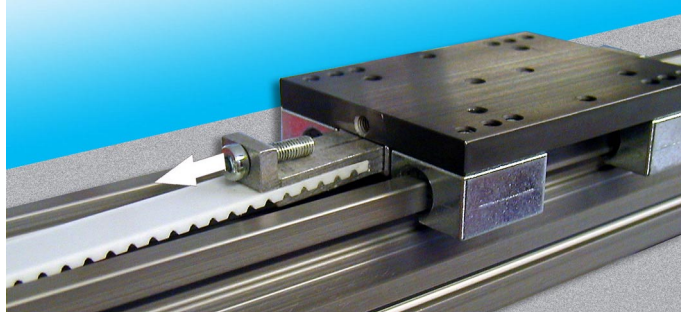
A certain sign of wear may have different causes so that it is not always possible, to determine the exact cause. The following table shows possible causes for typical damages:

Kind of error	mögliche Ursache	Action
Abnormal wear of loaded tooth flanks of the belt	Faulty belt pre-tension	Exchange timing belt, set pre-tension.
	Overload	Exchange timing belt, set pre-tension. Check, if the load is in the admissible range.
Abnormal wear at the tooth root surface of the belt	Pre-tension too high	Exchange timing belt, set pre-tension.
	Drive torque too high	Verify drive dimensioning.
Abnormal wear at the side flank of the belt	Faulty alignment of timing belt	Exchange timing belt, set pre-tension.
	Twisted edge of the roller/pulley	Please contact us.
Sheared off belt teeth	Pre-tensioning too weak Overload (by collision)	Exchange timing belt, set pre-tension.
Splits at the belt teeth	Faulty belt pre-tension	Exchange timing belt, set pre-tension.
	Overload	Exchange timing belt, set pre-tension. Check, if the load is in the admissible range.
	Deterioration of the belt material	Exchange timing belt, set pre-tension.
Breaking of the timing belt	Faulty belt pre-tension	Exchange timing belt, set pre-tension.
	Overload	Exchange timing belt, set pre-tension. Check, if the load is in the admissible range.
Softening of the timing belt material	Operating temperature too high	Exchange timing belt, set pre-tension. Lower operating temperature.
	Contact with solvent	Exchange timing belt, set pre-tension. Do not clean belt with solvents.
Skipping of teeth, loss of machine zero	Pre-tension too low Wrong motor position (below) with vertical application	Set pre-tension correctly. If possible move drive upwards Alternatively: Increase pre-tension or reduce load in lengthwise direction.

3.5.1. Dismantling the timing belt

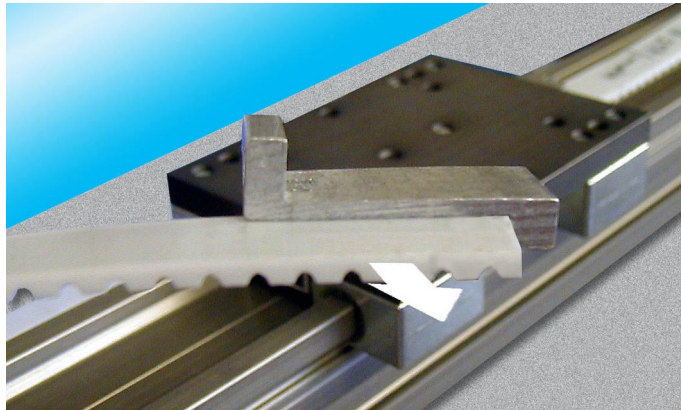
We recommend to remove the covers at the drive station and the deflection station before dismantling the timing belt (easy access

"Remove covers (see page 30)).



- ◆ Unscrew tensioning bracket on both sides of the sliding carriage and remove from support in the sliding carriage plate.

(Caution! Make sure not to lose the small distance plate of the LCB040! Unless you can no longer set the original belt tension!)



- ◆ Push timing belt sideways out of the clamping bracket.

3.5.2. Insert new timing belt

LCB040 Tension belt

- ◆ Remove old timing belt (**Dismantling** (see page 20)) and mount new belt.
- ◆ The new timing belt must have exactly the same length and pitch as the old timing belt!
- ◆ In the case of a long axis it may be helpful to connect the new belt to the old one (e.g. with tape) in order to insert the new belt while removing the old one.
- ◆ Insert ends of belt cautiously into both clamping brackets .
- ◆ On the LCB040, first screw the clamping bracket to the sliding carriage on the side of the drive station (as the timing belt of the LCB040 is tensioned on the other side of the sliding carriage).
- ◆ On the LCB040, first screw the clamping bracket to the sliding carriage on the side of the drive station (as the timing belt of the LCB040 is tensioned on the other side of the sliding carriage).
- ◆ Fix the clamping bracket on the opposite side of the sliding carriage (side towards the deflection station) and place the original small distance distance plates. The belt has now its originally preset tension.
- ◆ If you dispose of a **belt tension measuring device** (see page 21), you may use this to tension the belt to a value of 220 N.

LCB060
Tension belt

- ◆ The belt of a LCB060 must be tensioned to a value of 760 N.
- ◆ Please use a suitable **belt tension measuring device RSM** (see page 21) for measuring and setting this value.

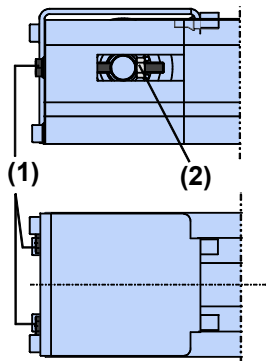
Belt tension measuring device RSM



The RSM belt tension measuring device determines the tension of the belt on the basis of preset data (specific mass of belt, freely oscillating length of belt) and the oscillating frequency of the belt.

The belt tension measuring device can be purchased at Parker (Part No. 037-000200).

An operating manual with a description of the measuring procedure comes with the device.



(1) timing belt tensioning screws

(2) counter screws

- ◆ The belt is tensioned with the aid of the timing belt tensioning screws at the tensioning station (loosen lock nut during tensioning process and re-fasten afterwards)
- ◆ After tensioning, the belt must be aligned.
 - ◆ An exact alignment is only possible during movement of the sliding carriage, with correct adjustment, the toothed belt always oscillates from left to right (in the driving direction).
- ◆ In order to maintain the pretension of the belt, please turn the tensioning screws only in very small steps.
- ◆ If necessary, check belt tension again after the alignment.

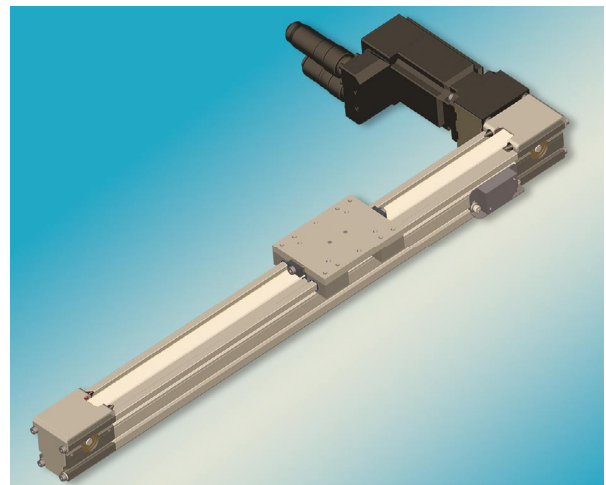
4. Product Description

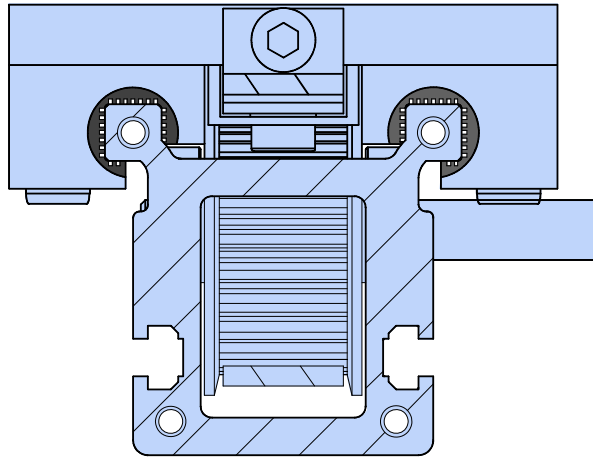
Features

- ◆ Available in 2 sizes
 - ◆ LCB040
 - ◆ LCB060
- ◆ Maximum thrust force
 - ◆ 160 N (LCB040)
 - ◆ 560 N (LCB060)
- ◆ Typical payload
 - ◆ 1 kg - 6 kg (LCB040)
 - ◆ 1 kg - 30 kg (LCB060)
- ◆ Maximum static bearing capacity in normal direction:
 - ◆ 1250 N (LCB040)
 - ◆ 3850 N (LCB060)
- ◆ Maximum stroke
 - ◆ 2 m (LCB040)
 - ◆ 5.5 m (LCB060)
 - ◆ Speed up to 8 m/s
 - ◆ Acceleration up to 20 m/s²
 - ◆ Repeatability: ±0.2 mm

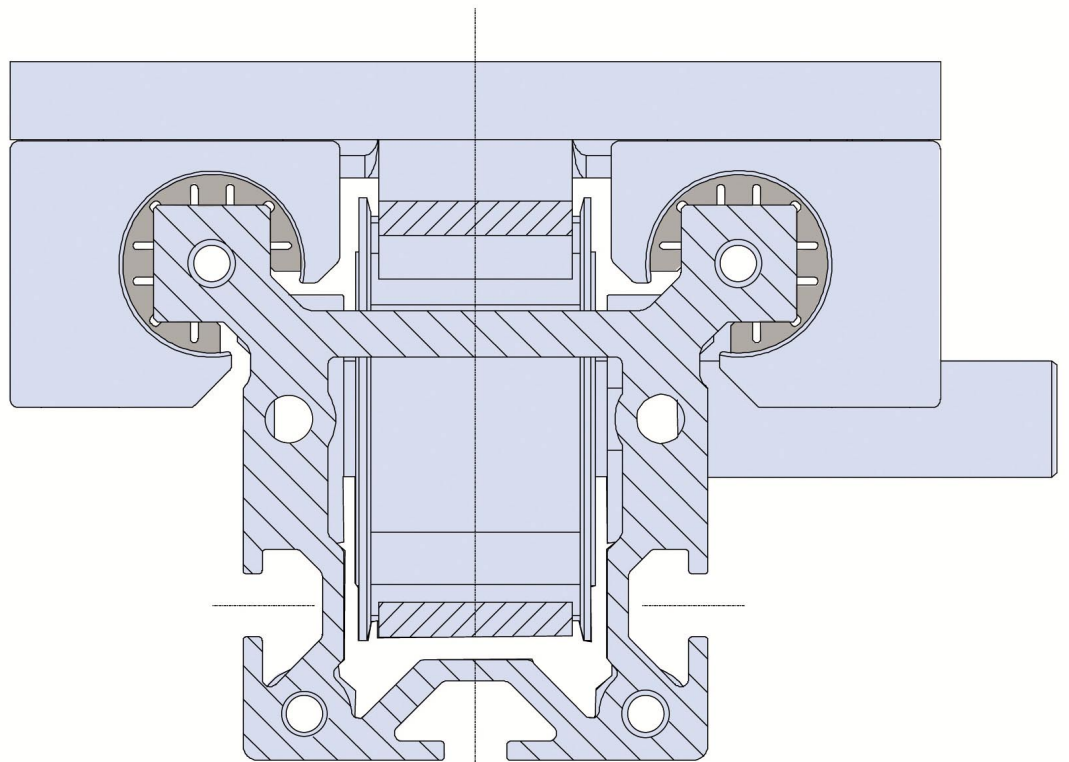
Typical areas of application

- ◆ Pick-&-Place applications
- ◆ Packaging, labelling and wrapping systems
- ◆ Sensor and format adjustment (e.g. back-stop)
- ◆ Pusher-, picker- and gripper applications
- ◆ Positioning
- ◆ Feeding
- ◆ Cutting





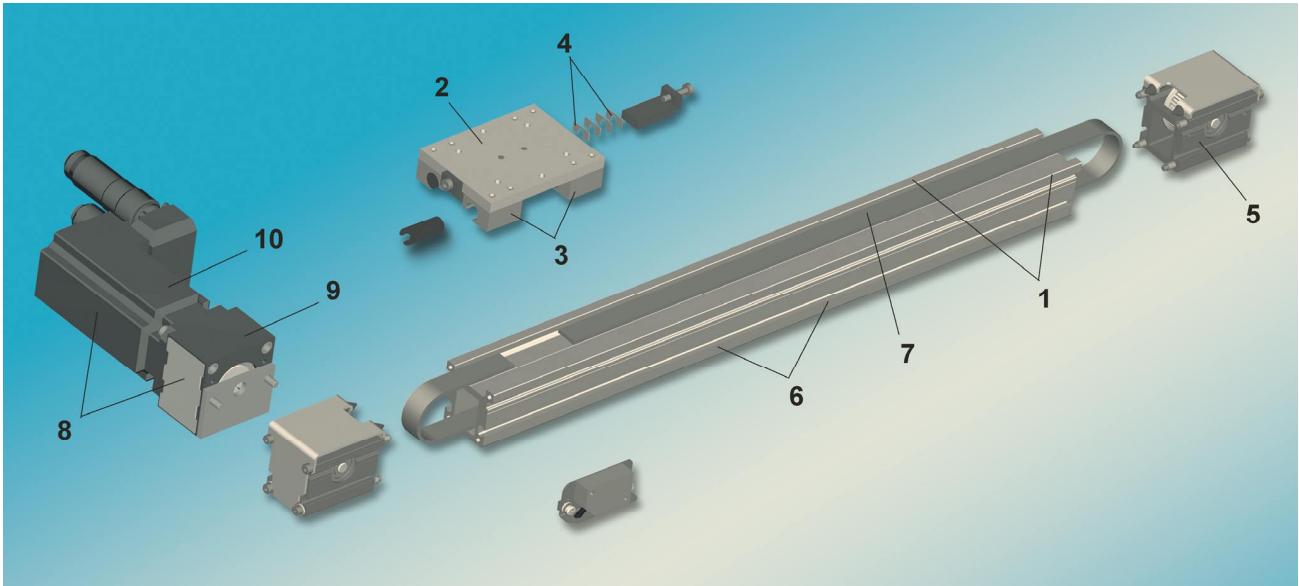
LCB040



LCB060

M1:1
(protection of utility patents: 20 2004 014 821.8)

4.1 Product Design



The LCB is protected by registered design No. 20 2004 014 821.8 20 2004 014 821.8

Guide (1) / sliding carriage (2):

- ◆ The external sliding guide is incorporated as part of the aluminium profile. It is unnecessary to adjust two separate guiding rails.
- ◆ The sliding carriage is available in three lengths. With a longer sliding carriage there is greater distance between the sliding blocks (3) and this improves the load capacity with respect to yawing and pitching moments.
- ◆ Maintenance-free sliding guiding with integrated dry-film lubricant.
- ◆ Sliding carriage (3) can be easily changed within 2 minutes without detensioning the timing belt.
- ◆ The toothed belt of LCB40 is tensioned directly at the sliding carriage by means of spacer plates (4).
On the LCB060, the toothed belt is tensioned via tensioning screws at the tensioning station (5).
- ◆ The low moving mass allows highly-dynamic movement to be achieved and saves operating power.

Profile (6):

- ◆ Available in 2 sizes
- ◆ High resistance to flexing
- ◆ High torsional stiffness due to the closed profile
- ◆ Compact design, minimum installation space required
- ◆ Dirt tolerant, chemically and mechanically robust

Timing belt drive (7):

- ◆ High stiffness and accuracy provided by the generously-dimensioned toothed belt.

Drive (8):

- ◆ Drive options:
 - ◆ Linear actuator with free shaft end
 - ◆ Coupling (9) and gearbox
 - ◆ Coupling, gearbox and motor (stepper or servo)
 - ◆ Coupling, gearbox, motor and controller
 - ◆ Coupling and direct-drive motor (10) with Compax3.

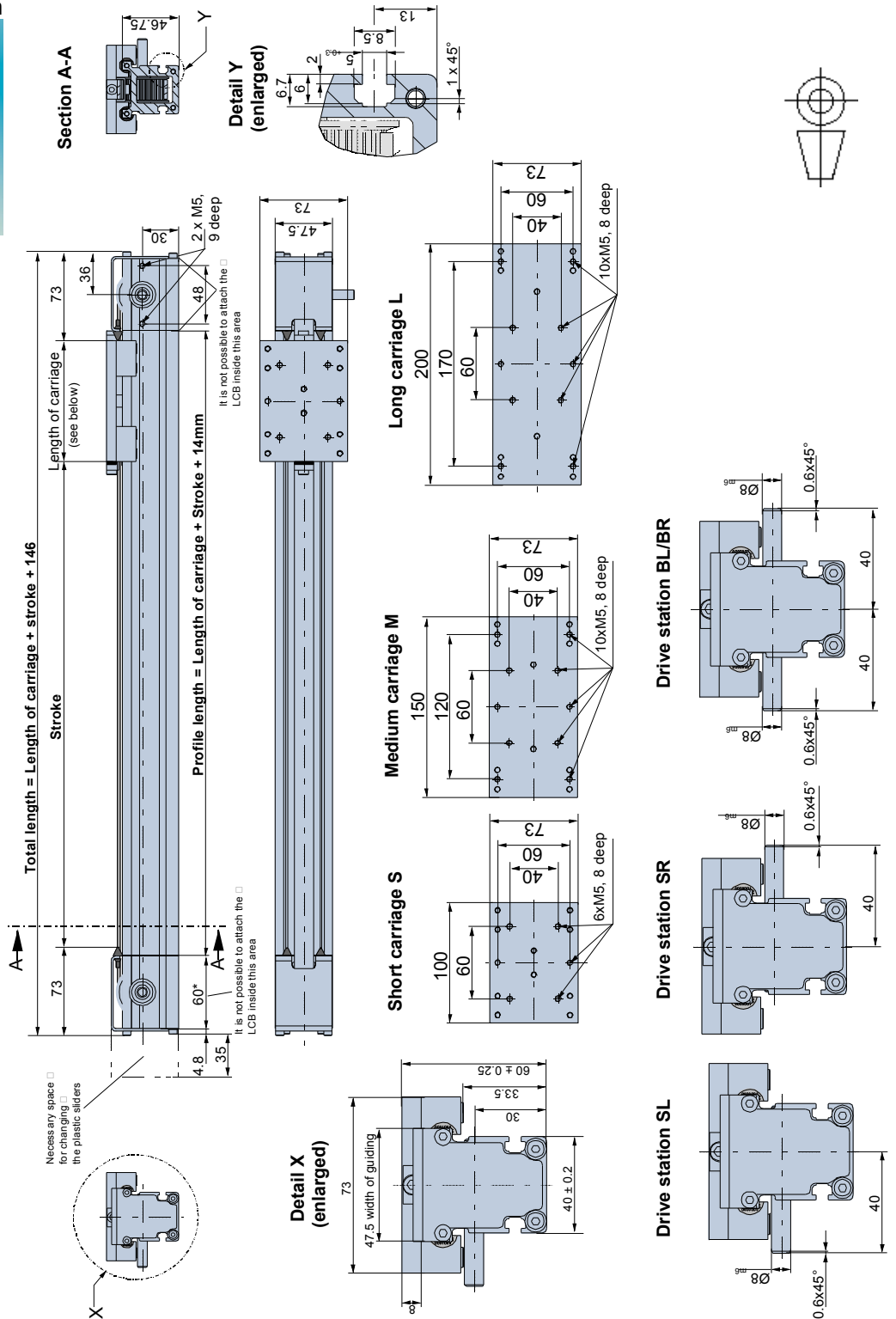
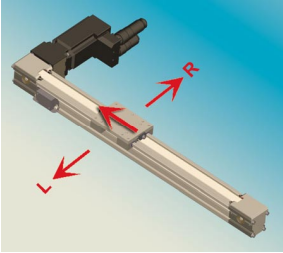
4.2 Dimensions

4.2.1. Dimensional drawings LCB040 & LCB060

LCB040 Basic unit dimensions

3D-CAD-data <http://www.parker-eme.com/lcb>

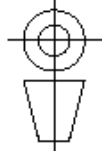
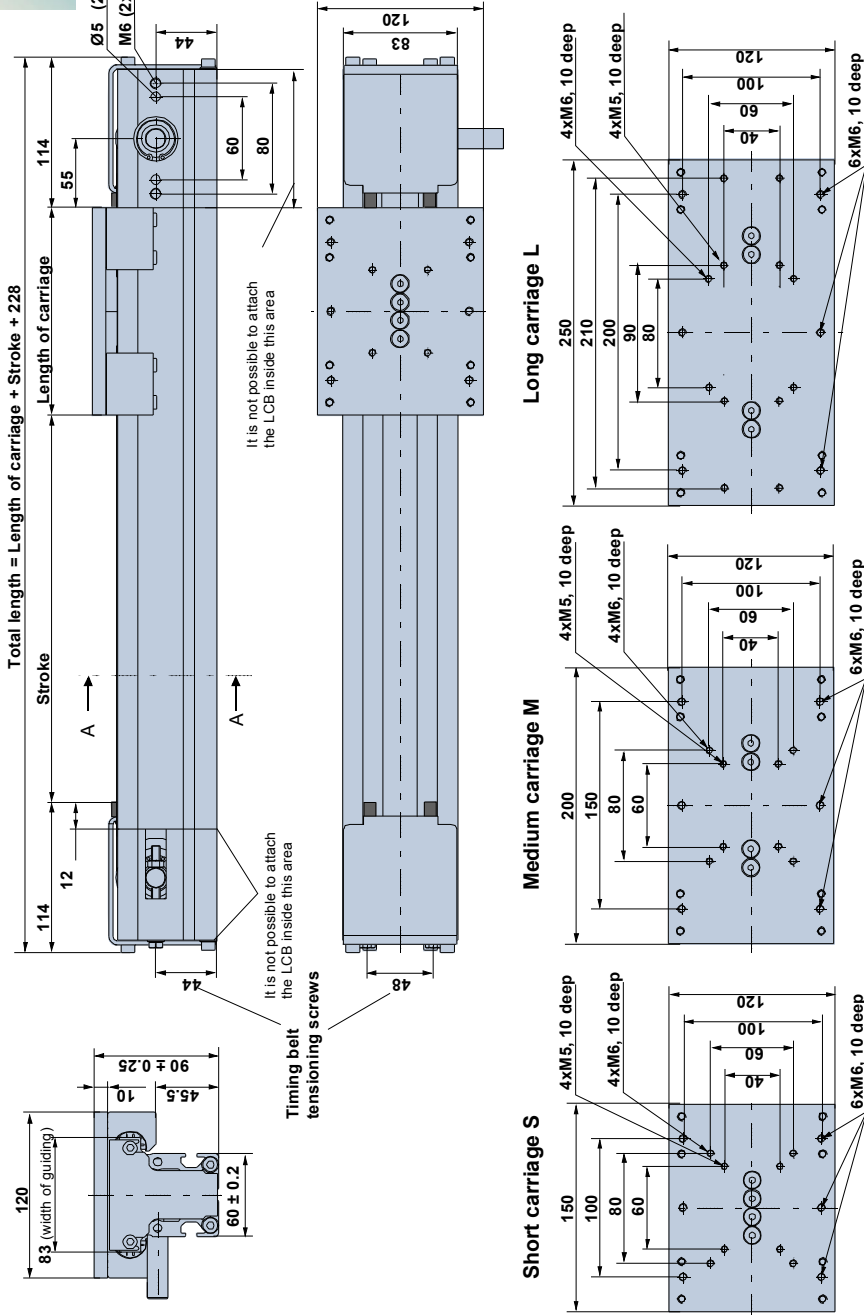
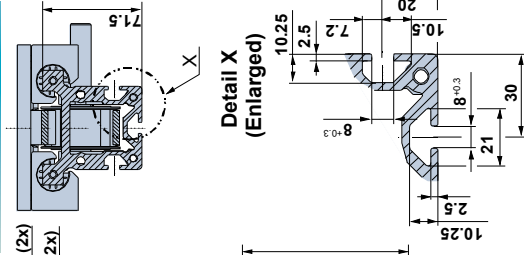
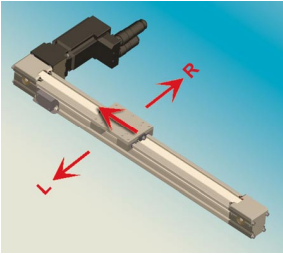
Definition: Right/left Indication



LCB060 Basic unit dimensions

3D-CAD-data <http://www.parker-eme.com/lcb>

Definition: Right/left Indication



Long carriage L

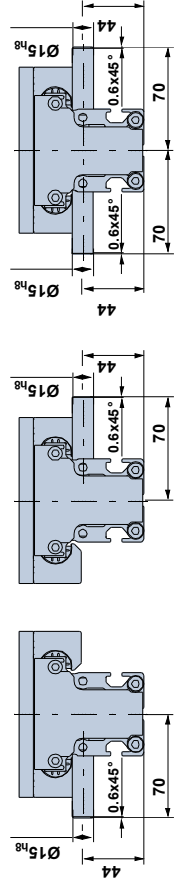
Medium carriage M

Short carriage S

Drive station BL/BR

Drive station SR

Drive station SL

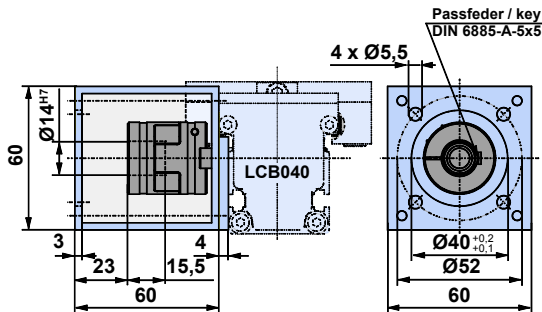


4.2.2. Dimensional drawings of drive options

LCB drive options L, M

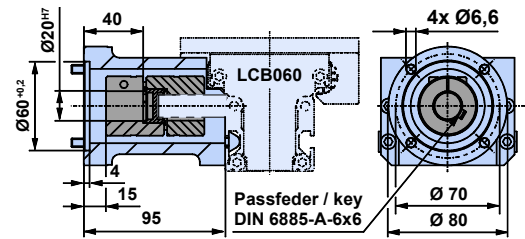
Drive option L

LCB040 prepared for planetary gearbox PTN060



Drive option M

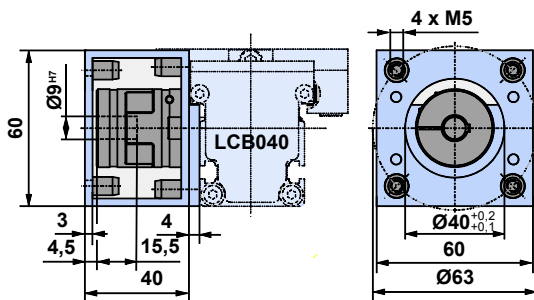
LCB060 prepared for planetary gearbox PTN080



LCB drive options U, W

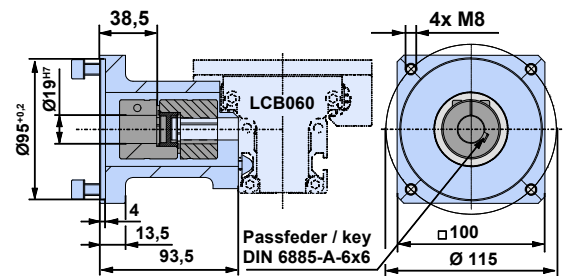
Drive option U

LCB040 prepared for servo motor SMH60 (direct drive)
only for single actuators with horizontal installation position



Drive option W

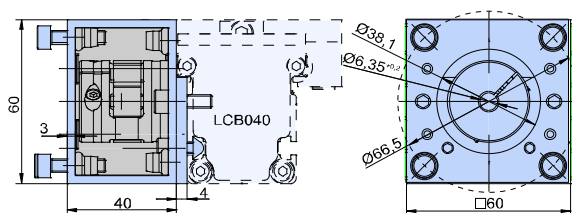
LCB060 prepared for servo motor SMH100 (direct drive)
only for single actuators with horizontal installation position



LCB drive options N, P

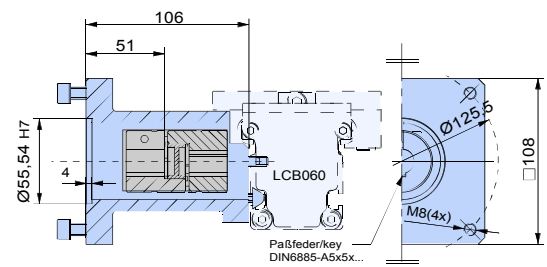
Drive option N

LCB040 prepared for stepper motor SY56 (direct drive)
only for single actuators with horizontal installation position



Drive option P

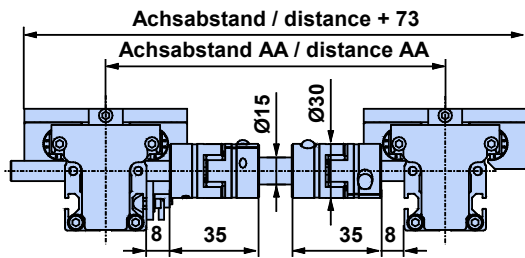
LCB060 prepared for stepper motor SY107 (direct drive)
only for single actuators with horizontal installation position



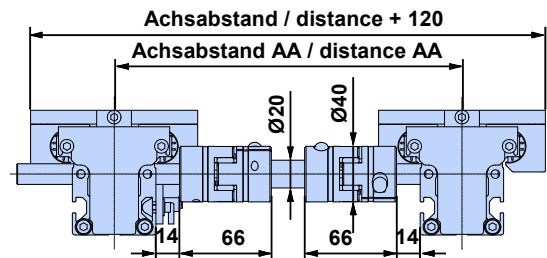
4.2.3. Dimensions dual-axis actuator

Dimensions dual-axis actuator

LCB040



LCB060



4.3 Technical data

Technical data issued 05/2005, using safety factor S=1. The technical data applies under standard conditions and only for the individually specified operating mode and load. In the case of compound loads, it is necessary to verify in accordance with normal physical laws and technical standards whether individual ratings should be reduced. In case of doubt please contact Parker Hannifin.

Travel lengths and speeds

LCB - Size	Unit	LCB040	LCB060
Maximum travel speed	m/s	5	8
Maximum acceleration	m/s ²	20	20
Maximum stroke	mm	2000	5500

Torques, forces, dimensions of pulley and timing belt

LCB - Size	Unit	LCB040	LCB060
Travel distance per revolution	mm/rev	125	170
Diameter of pulley	mm	39.79	54.11
Timing belt width / pitch	mm	16 / 5	25 / 10
Weight of timing belt	kg/m	0.048	0.167
Maximum drive torque	Nm	3.2	15.2
Static load capacity in normal direction	N	1250	3850
Maximum thrust force (effective load)	N	160	560
Repeatability	mm	± 0.2	± 0.2

Weights and mass moments of inertia

LCB - Size	Unit	LCB040	LCB060
Weight of base unit without stroke			
LCB with short sliding carriage	kg	1.47	4.33
LCB with medium sliding carriage	kg	1.66	4.71
LCB with long sliding carriage	kg	1.85	5.10
Weight of moved mass with short sliding carriage	kg	0.39	1.41
Weight of moved mass with medium sliding carriage	kg	0.46	1.53
Weight of moved mass with long sliding carriage	kg	0.53	1.66
Additional weight per metre of stroke	kg/m	2.45	5.21
Mass moment of inertia relative to the drive shaft			
LCB with free drive shaft, short sliding carriage, 1 m stroke	kgmm ²	244	1483
LCB with free drive shaft, medium sliding carriage, 1m stroke	kgmm ²	272	1580
LCB with free drive shaft, long sliding carriage, 1m stroke	kgmm ²	300	1672
Mass moment of inertia of coupling	kgmm ²	1	6
Additional mass moment of inertia due to the weight of the timing belt per metre of stroke	kgmm ² /m	37	500

Overall dimensions and physical data

LCB - Size	Unit	LCB040	LCB060
Length with short sliding carriage, zero stroke	mm	246	378
Length with medium sliding carriage, zero stroke	mm	296	428
Length with long sliding carriage, zero stroke	mm	346	478
Cross-section (heightxwidthxprofile width)	mm x mm	40 x 60 x 73	60 x 90 x 120
Moment of inertia I _x	cm ⁴	17.93	92.9
Moment of inertia I _y	cm ⁴	17.79	109.3
Moment of inertia I _t	cm ⁴	35.68	202.2
E-modulus (aluminium)	N/mm ²	0.72 x 10 ⁵	

Temperature data

Temperature Range	-20 °C to +60 °C The nominal data are valid for ambient temperatures between +15 °C and +30 °C.
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4.3.1. Load diagrams / wear

Requirements: The diagrams are valid solely for the guiding and under ideal operating conditions, faultless guidings provided. The diagrams are based on a trapezoidal motion sequence with 3 identically long sections for acceleration, constant travel and deceleration.

The diagrams are normalized on defined payloads: LCB040 with 1 kg, LCB060 with 5 kg.

Shown are the respective mass centroids with their typical load arms.

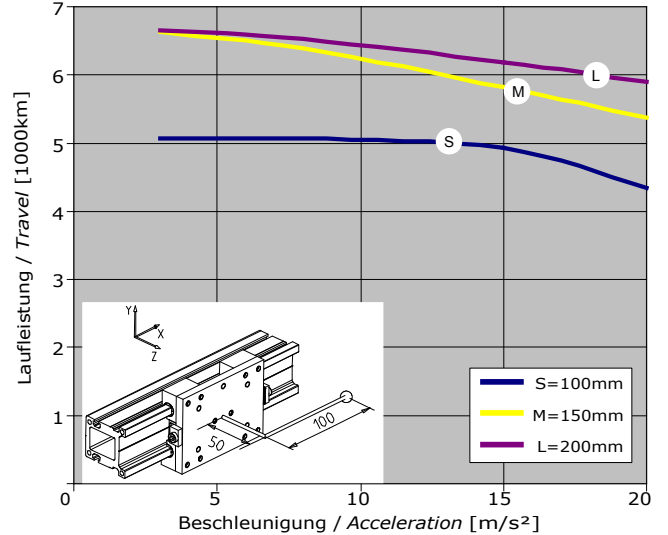
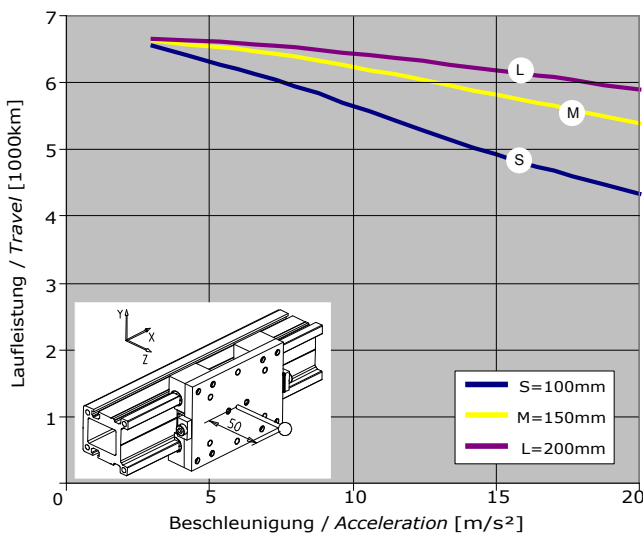
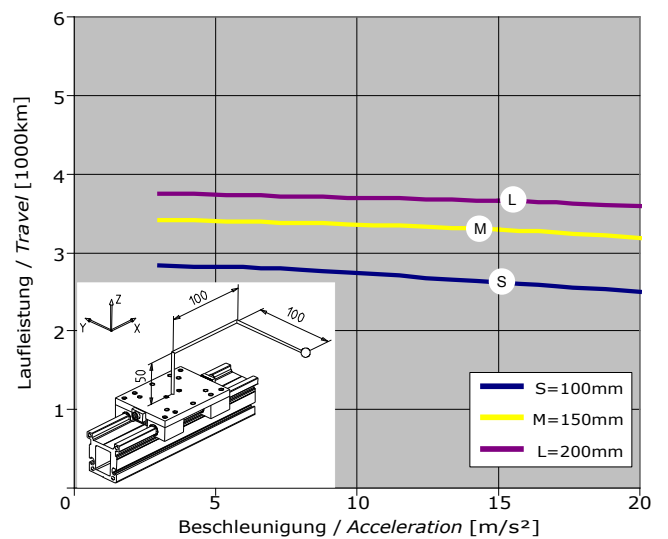
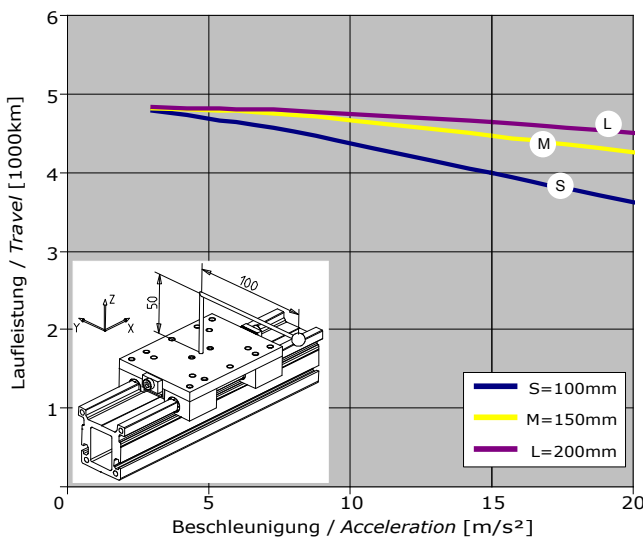
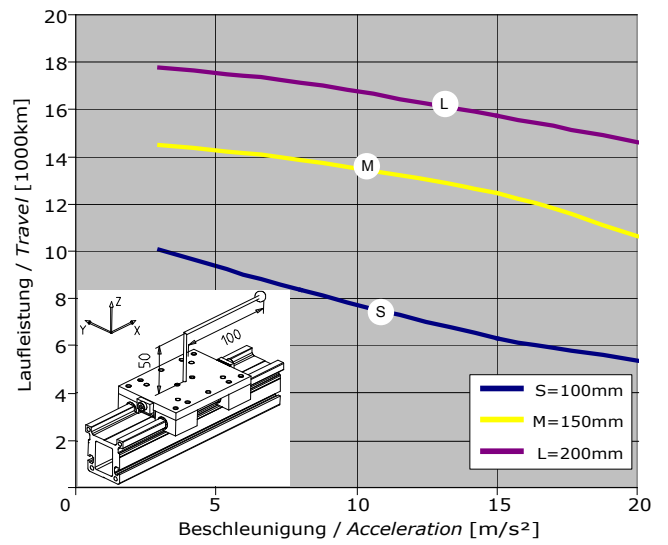
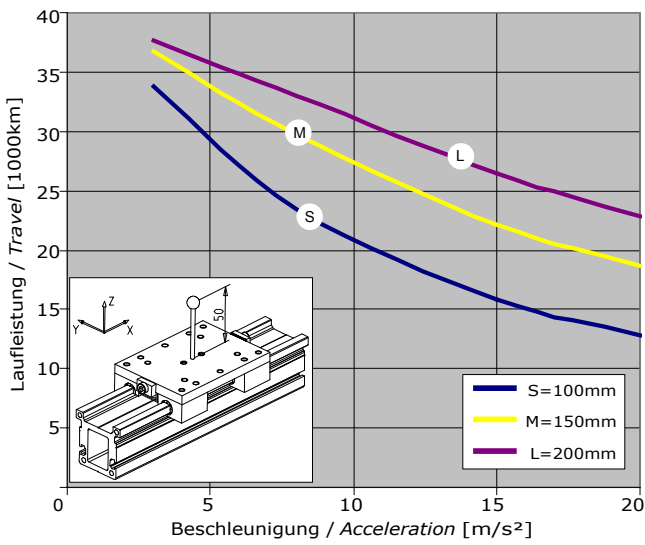
Lifetime: Naturally, the sliding guiding has already a slight play under new condition, so that the guiding does not jam and the sliding carriage moves smoothly. The play is measured as a gap for each slide and is approx. 0.1 to 0.2 mm in normal direction and at the sides.

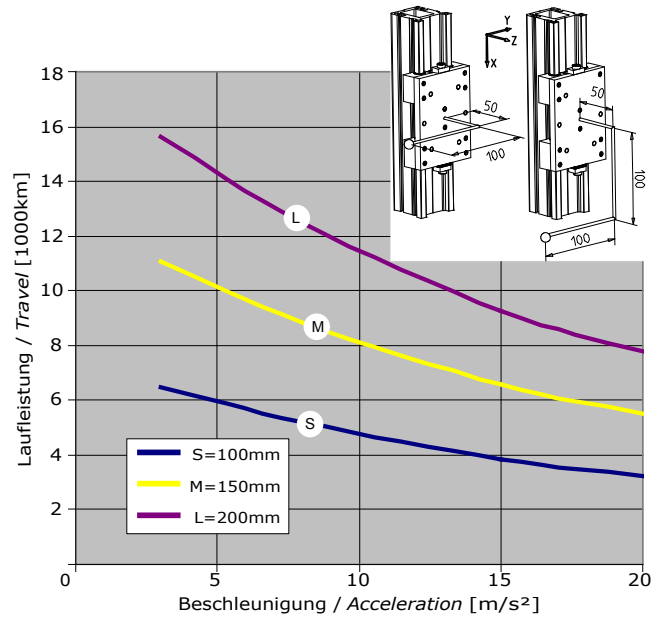
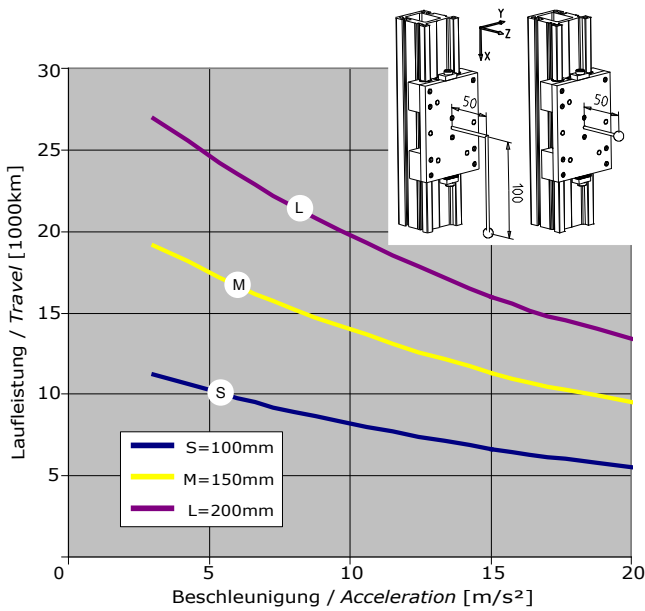
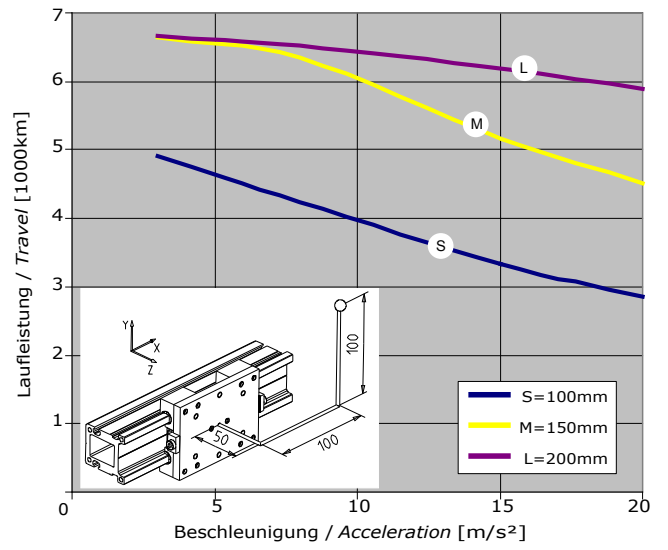
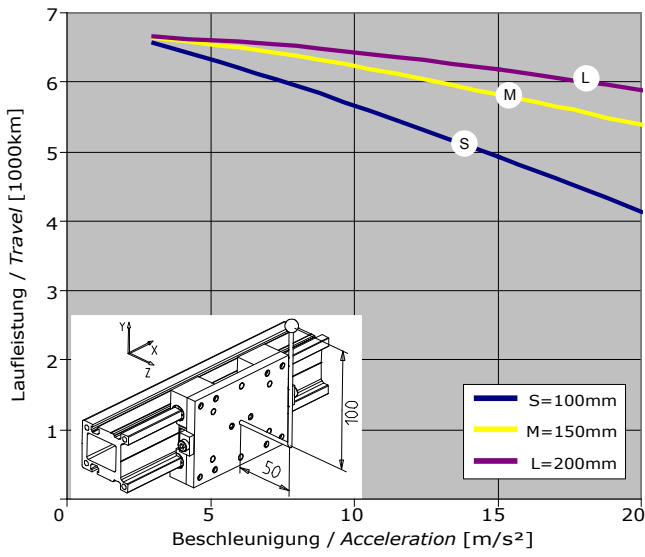
During the operation, the play increases according to the loads shown in the diagrams.

If a certain state of wear is reached, at the latest however at the wear limit (0.5 mm for the LCB040, 1.0 mm for the LCB060), the slides can be exchanged easily within a few minutes. After the exchange, a new lifetime cycle begins according to the diagrams.

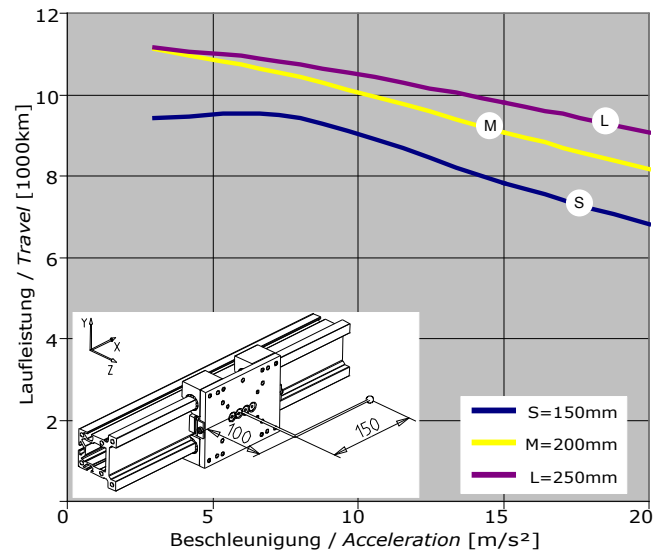
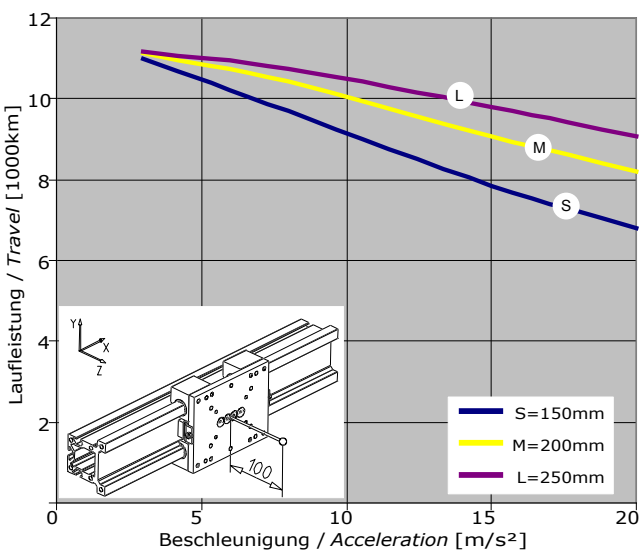
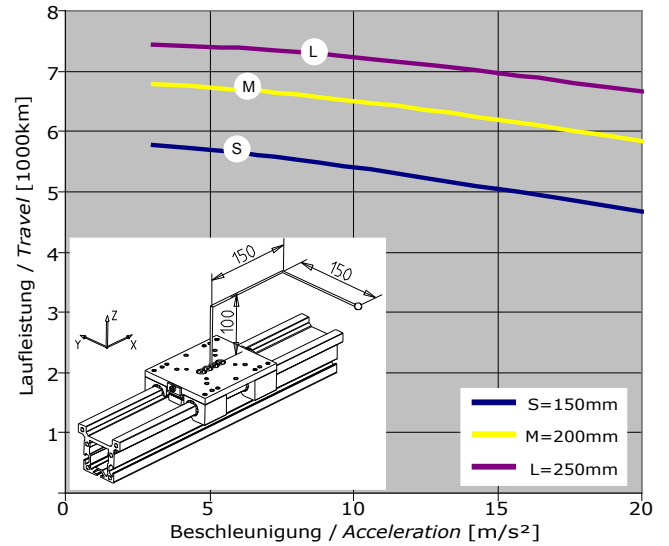
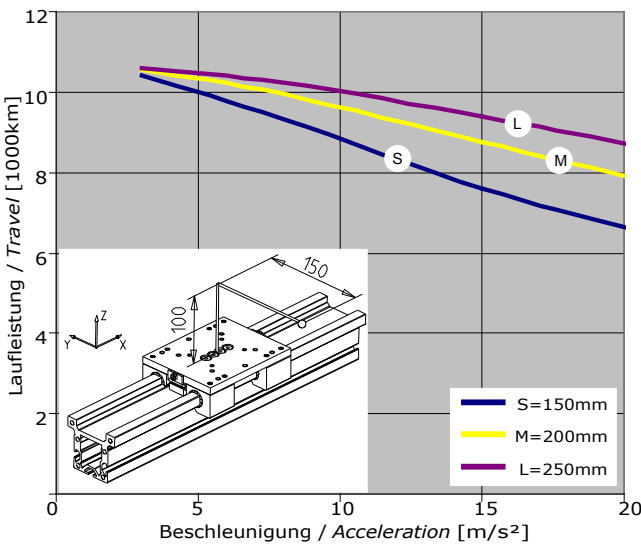
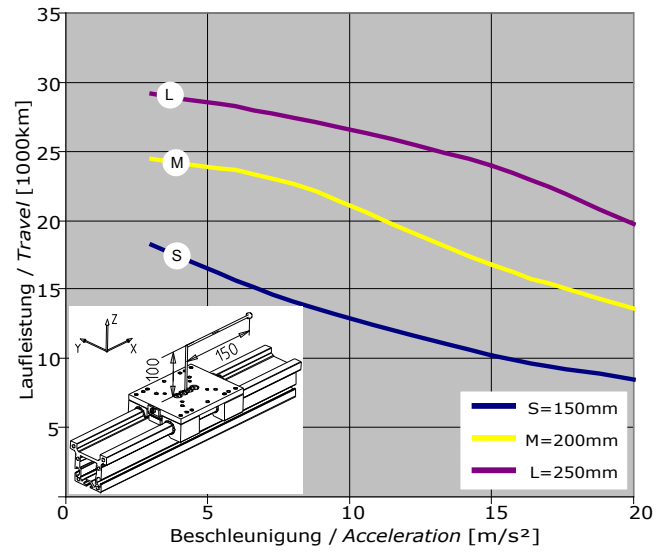
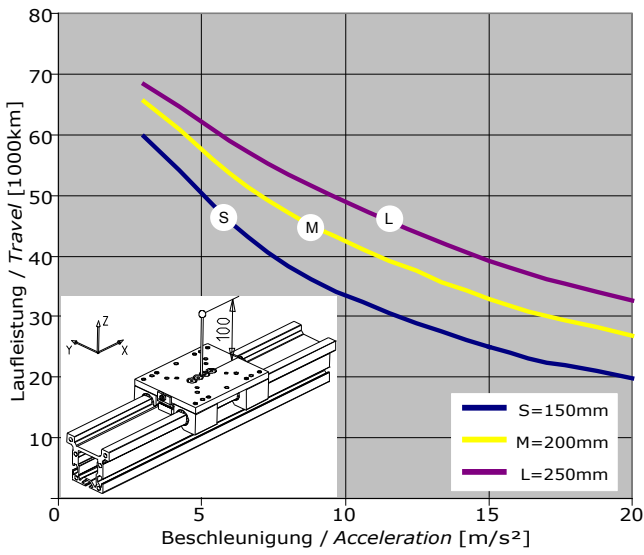
Use of the diagrams: The diagrams can be interpolated with respect to lifetime and extrapolated with respect to load. (for example: halved operational performance results in halved wear, doubled load will result in halved mileage in km).

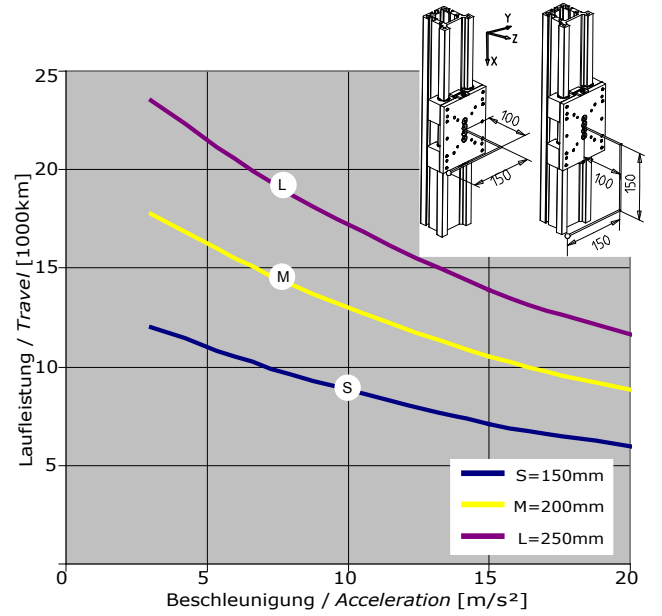
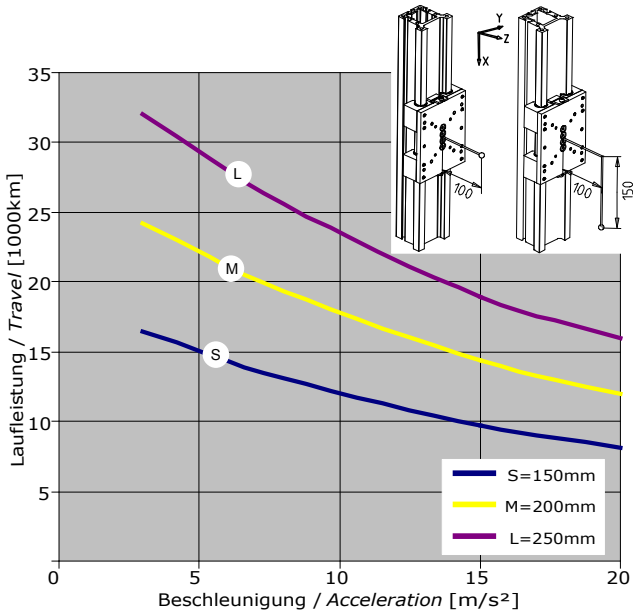
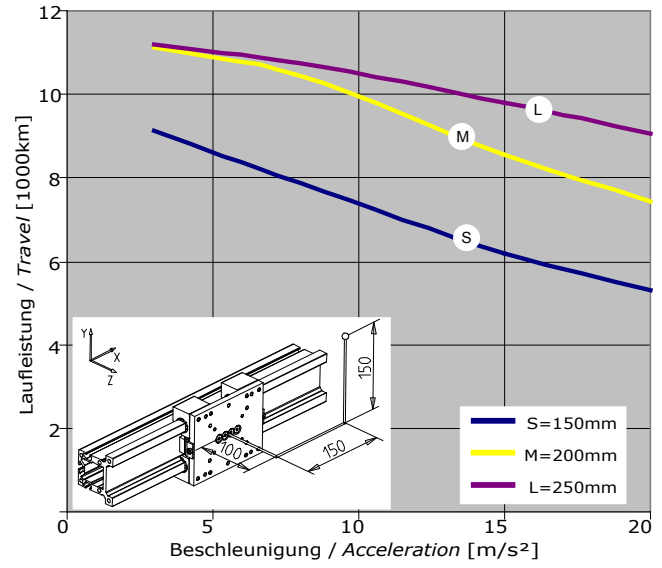
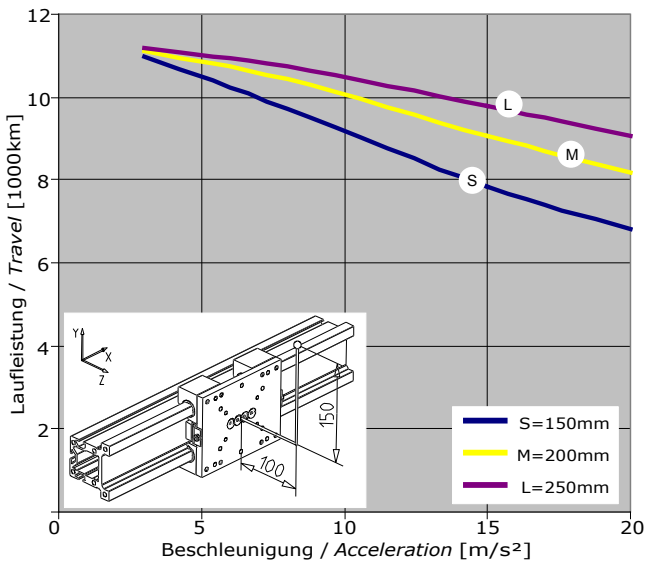
LCB040 – Lifetime / slides





LCB060 – Lifetime / slides





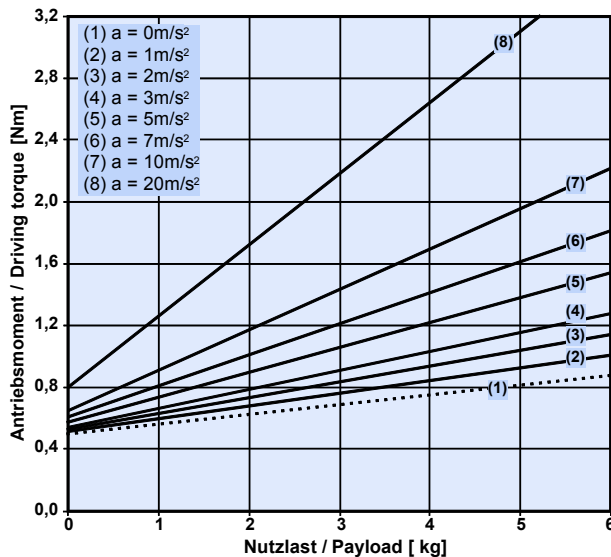
4.3.2. Required drive torque



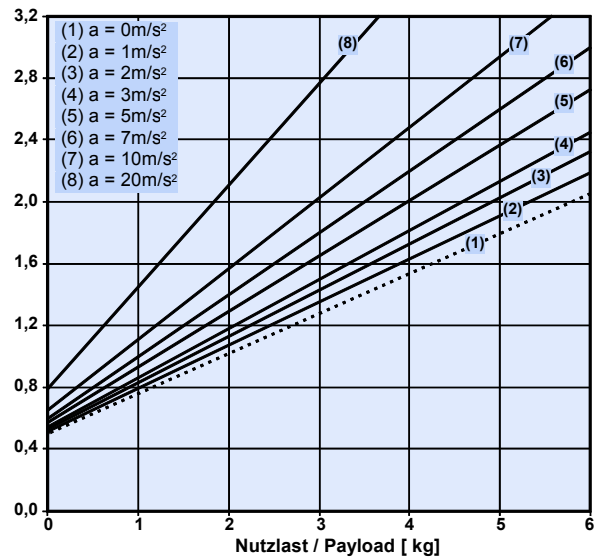
The diagrams include both acceleration and friction forces!

LCB040 – required drive torque

horizontal mounting position



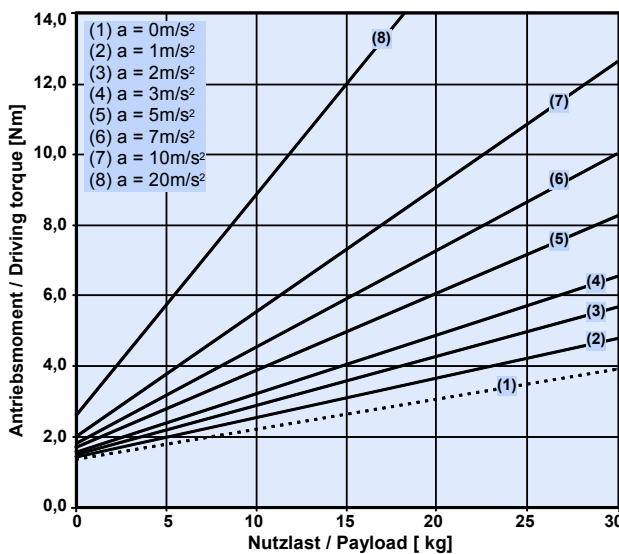
vertical mounting position (upward acceleration)



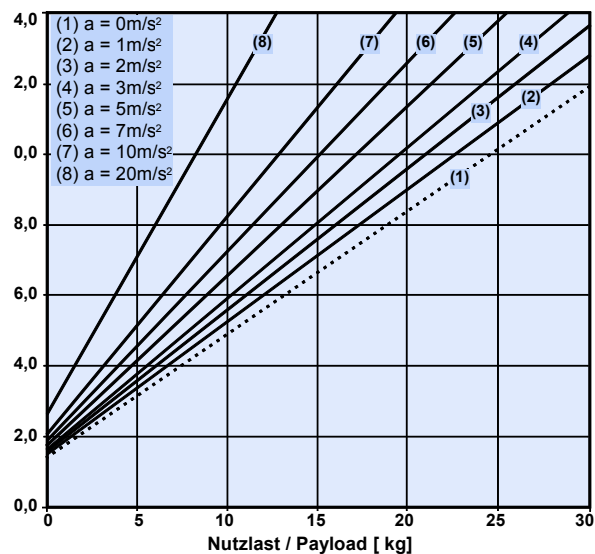
(1): Constant movement
(8): Acceleration

LCB060 – required drive torque

horizontal mounting position



vertical mounting position (upward acceleration)



(1): Constant movement
(8): Acceleration

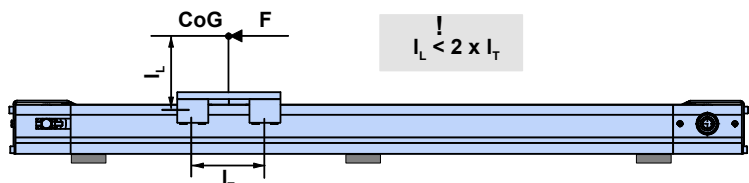
4.3.3. Location of mass barycenter or point of force application

2:1 rule

Displayed at the example of the pitching moment, is also valid for rolling and yawing moments respectively

l_L = load lever

l_T = support lever

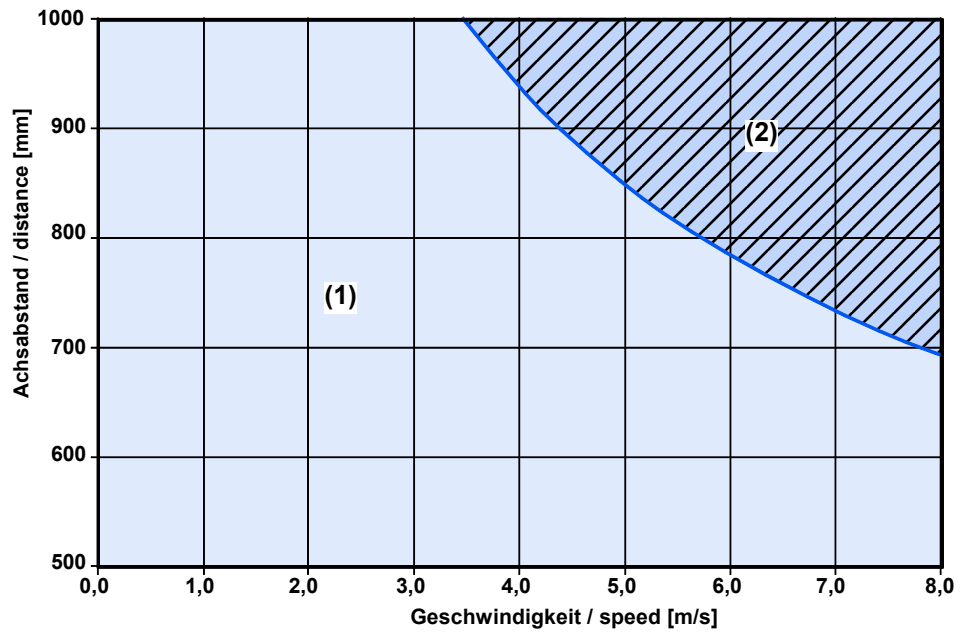


4.3.4. Critical whirling speed of the dual-axis actuator connection shaft

The critical whirling speed is the speed from which the connection shaft of the double-axis actuator shows natural oscillation. This oscillation can get so strong that, in an extreme case, the double-axis connection is destroyed.

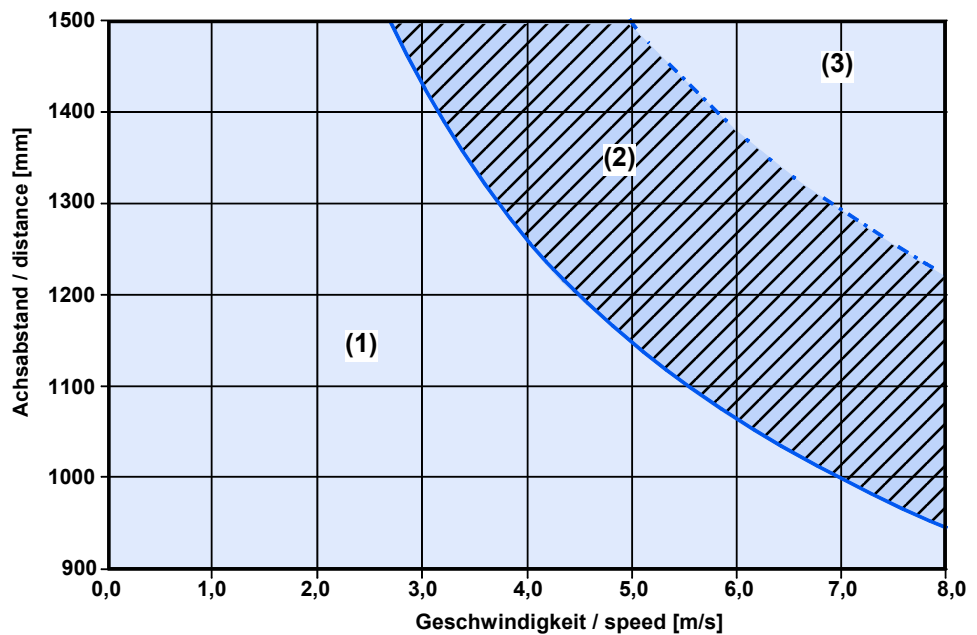
The critical rotational speed depends on the length of the connection shaft (=linear to the axis distance) and on the speed of the shaft (=linear to the speed of the actuator). The diagrams show from where it is necessary to equip the connection shaft with an additional support in the middle of the shaft.

LCB040



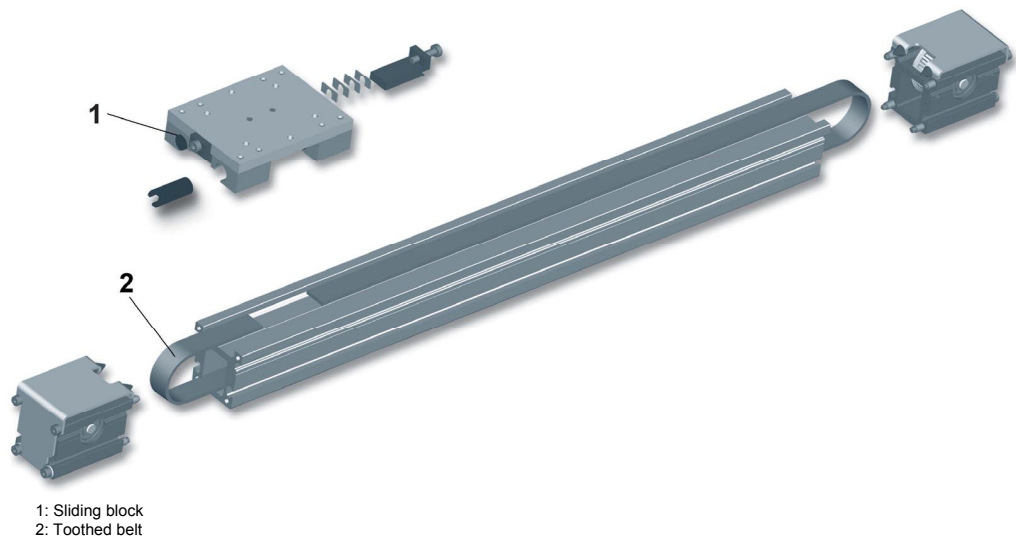
- (1) Connection shaft without intermediate shaft bearing
- (2) Connection shaft must be supported

LCB060



- (1) Connection shaft without intermediate shaft bearing
- (2) Connection shaft must be supported
- (3) impermissible range

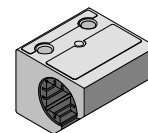
5. Spare and Wearing Parts



5.1 Sliding block

The sliding block is a wearing part.
You need 4 pieces per linear actuator .

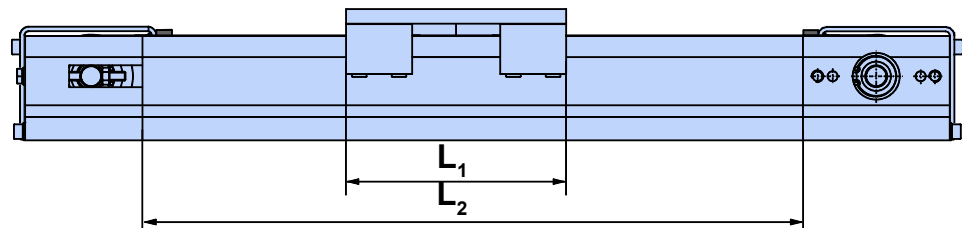
- LCB040: Order-No.: 127-004016
- LCB060: Order-No.: 127-006014



We recommend to have at least 4 sliding blocks on stock.

5.2 Toothed belt

Type	Designation	desired length	Art. No.
LCB040	Toothed belt	L ₁ : Length of carriage or L ₂ : Length of profile must be stated	420-000004
LCB060	Toothed belt	L ₁ : Length of carriage or L ₂ : Length of profile must be stated	420-000016



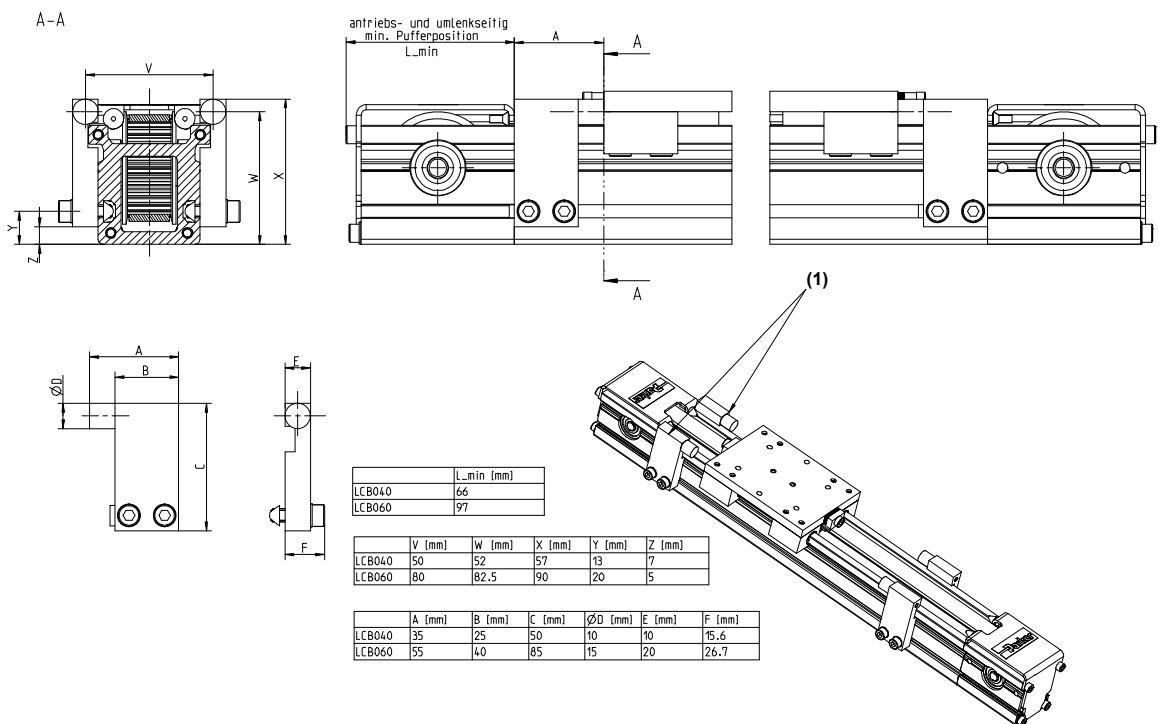
L₁: Length of sliding carriage
L₂: Length of profile

6. Accessories

In this chapter you can read about:

External buffers 38
 Electrical limit switches..... 39
 Clamping profiles..... 40
 T-Nuts and Bolts..... 41

6.1 External buffers

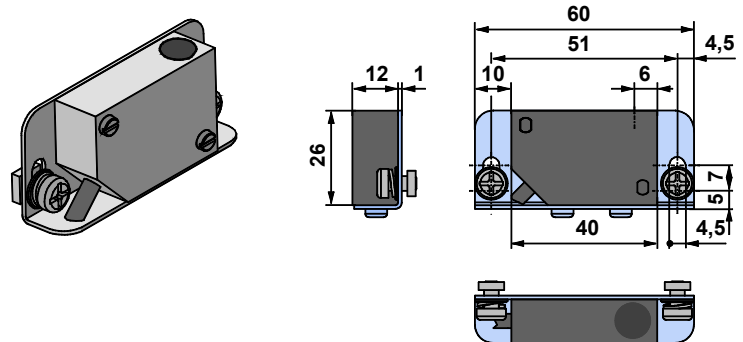


(1) We recommend to mount always two external buffers per side.

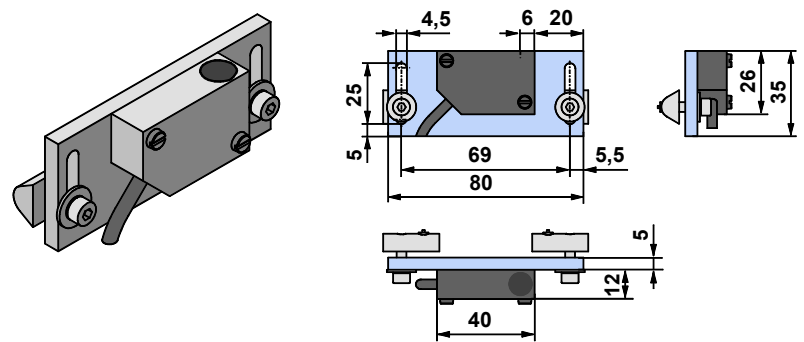
Type	Designation	Art. No.	Art. No. stainless
LCB040	Buffer module	510-001445	510-001495
LCB060	Buffer module	510-001645	510-001695

6.2 Electrical limit switches

LCB040

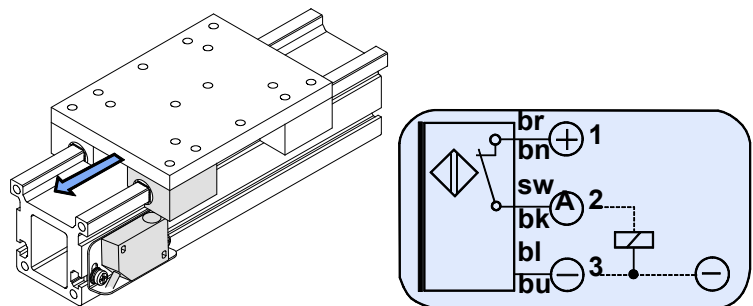


LCB060



Connection diagram LCB040 and LCB060

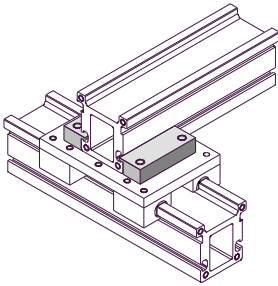
- 1: PNP normally closed contact
- 2-3: Load



Technical data: limit switches LCB040 and LCB060		Electrical characteristics	
Switching distance	2 mm / 4 mm ± 10 %	Rated Voltage	24 VDC
Switch hysteresis	> 1 % ...< 15 %	Voltage range	10...35 VDC
Repeatability	0.01 mm	Supply current	< 15 mA
Temperature drift	< 10 %	Maximum load current	300 mA
Ambient temperature	-25 °C - +70 °C	Residual voltage	< 2.5 VDC
Protection class	IP67	Switching frequency	2 kHz
Cable Length	6 m	Connecting cables	3 x 0.25 mm ²

Type	Designation	Art. No.
LCB040	Electrical limit switch NPN normally closed contact with 6 m cable and fixing material	510-001435
LCB040	Electrical limit switch NPN normally open contact with 6 m cable and fixing material	510-001436
LCB040	Electrical limit switch PNP normally closed contact with 6 m cable and fixing material	510-001437
LCB040	Electrical limit switch PNP normally open contact with 6 m cable and fixing material	510-001438
LCB060	Electrical limit switch NPN normally closed contact with 6 m cable and fixing material	510-001635
LCB060	Electrical limit switch NPN normally open contact with 6 m cable and fixing material	510-001636
LCB060	Electrical limit switch PNP normally closed contact with 6 m cable and fixing material	510-001637
LCB060	Electrical limit switch PNP normally open contact, 6 m cable and fixing material	510-001638

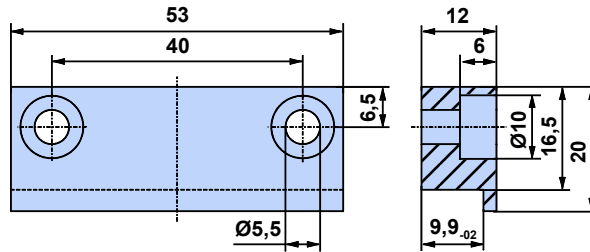
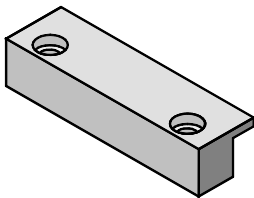
6.3 Clamping profiles



The toe clamps are used in conjunction with the standard load attachment plate to rapidly install and attach various combinations of linear actuators. Two clamping profiles are needed to fix a LCB on a flange plate. (The clamping profiles may not be used in the range of the drive- or of the clamping station).

LCB040

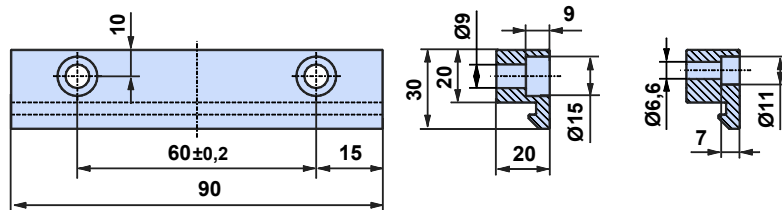
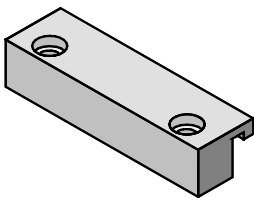
Order-No.: 500-000910



LCB060

Order-No.: 500-000901

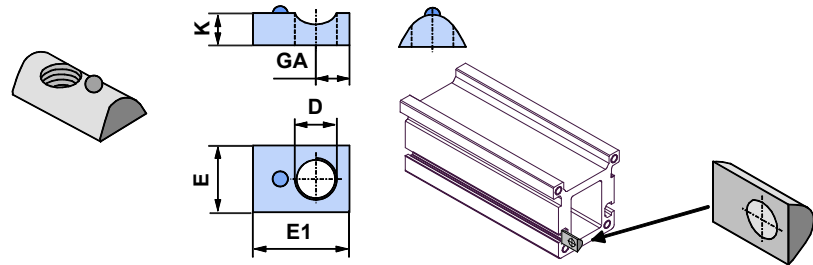
Order-No.: 500-000905



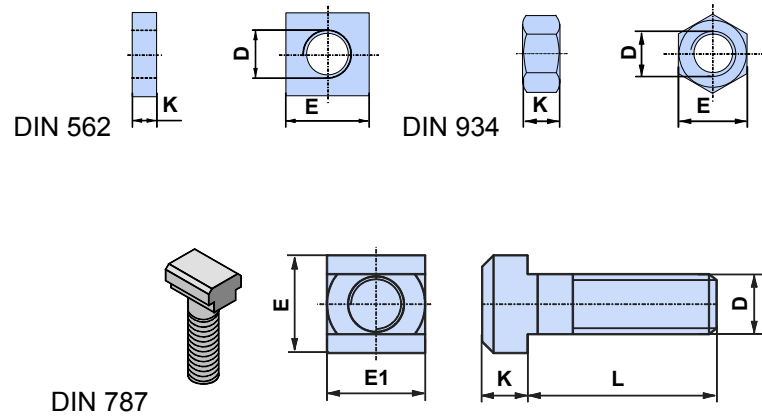
6.4 T-Nuts and Bolts

The T-nuts and bolts are used to attach external components to the T-grooves of the profile.

Nuts



T slot bolts and nuts



Type	Designation		D	l	l1	K	GA	L	Art. No.
LCB040	T-Nut		M4	8	11.5	4	4	--	127-004020
LCB040	T-Nut		M5	8	11.5	4	4	--	127-004021
LCB040	Square nuts*	DIN 562-M4	M4	7	--	2.2	--	--	135-700001
LCB040	Square nuts*	DIN 562-M5	M5	8	--	2.7	--	--	135-700003
LCB040	Hexagon nut*	DIN 934-M4	M4	7	--	2.9	--	--	135-700600
LCB040	Hexagon nut*	DIN 934-M5	M5	8	--	3.7	--	--	135-700700
LCB060	T-bolt	DIN787 M8 x 8 x 25	M8	13	13	6	--	25	131-700001
LCB060	T-bolt	DIN787 M8 x 8 x 32	M8	13	13	6	--	32	131-700002
LCB060	T-bolt	DIN787 M8 x 8 x 40	M8	13	13	6	--	40	131-700003
LCB060	T-Nut		M4	13.7	22	7	7.5	--	127-006015
LCB060	T-Nut		M5	13.7	22	7	7.5	--	127-006016
LCB060	T-Nut		M6	13.8	23	7.3	5.5	--	400-000033
LCB060	T-Nut		M8	13.8	23	7.3	7.5	--	400-000034

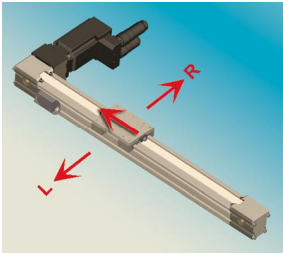
* Square and hexagon nuts should only be used for lightly-loaded attachments

7. Order code

In this chapter you can read about:

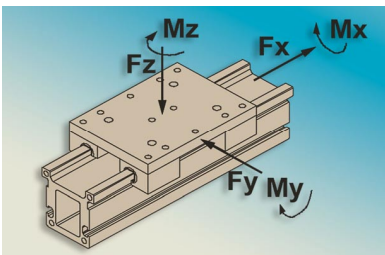
Order code for the LCB basic unit	44
Order code for the LCB coupling kit	45
Order code for intermediate drive shaft for LCB (for dual-axis actuator).....	46

Right/left Indication:



Right/left Indication: Looking from load attachment plate to drive module.

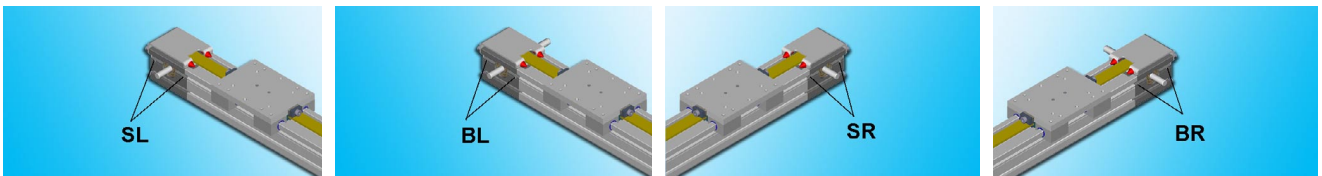
Length of sliding carriage:



All sliding carriages have 4 sliding blocks. On a longer sliding carriage the load bearing capacity for yawing and pitching moments is greater (M_y and M_z).

Description of all variants of the drive station and the drive orientation: with free drive shaft

The threads to attach the coupling are on the side defined under "Drive orientation".



Attachment thread:
only left

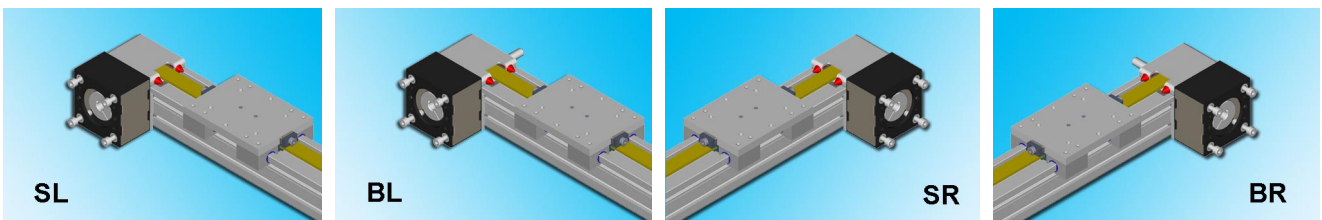
only left

only right

only right

With attached coupling kits:

The coupling is always mounted in the factory. BL and BR have an additional shaft on the opposite side of the coupling. This is used to attach the shaft for dual-axis actuators.



Available stroke lengths (in mm)

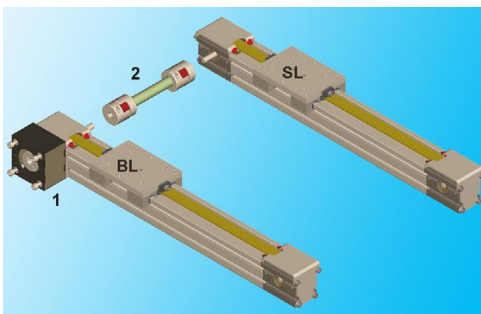
Depending on your application an additional safety travel on both sides of your travel path could be necessary.

Stroke	250	300	350	400	450	500	600	700	800	900	1000	1250	1500	1750	2000
LCB040	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
LCB060	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Stroke	2250	2500	2750	3000	3250	3500	3750	4000	4250	4500	4750	5000	5250	5500	
LCB060	x	x	x	x	x	x	x	x	x	x	x	x	x	x	

Dual-axis actuator variants:

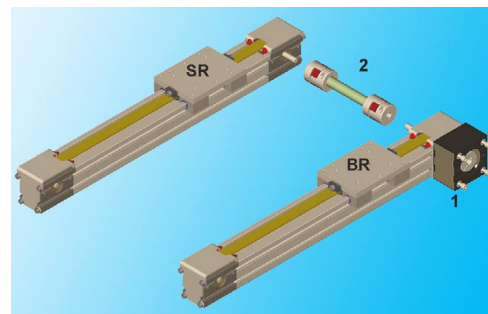
For a dual-axis actuator with the drive on the left side you need two LCB basic units. The left unit with drive option BLN, the right unit with drive option SLN.

- 1: Coupling Kits
- 2: Shaft kit



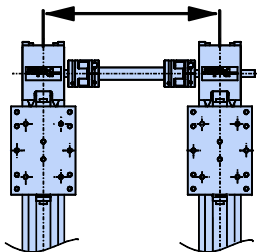
For a dual-axis actuator with the drive on the right side you need two LCB basic units. The right unit with drive option BRN, the left unit with drive option SRN.

- 1: Coupling Kits
- 2: Shaft kit



Drive shaft kit for LCB (for dual-axis actuator)

Center distance:
from center line to center line



For a dual-axis actuator two LCB basic units and a shaft corresponding to the desired center-distance are required. Parker will deliver the two basic units (with mounted couplings - if this was ordered) and a separate shaft-kit.

7.1 Order code for the LCB basic unit

	L	C	B	0	4	0	M	G	0	0	2	5	0	S	R	N
Example;																
Drive system																
LCB linear actuator	L	C	B													
Frame Size																
040 (LCB040)				0	4	0										
060 (LCB060)				0	6	0										
Length of sliding carriage (see page 42)																
Short sliding carriage							S									
Medium sliding carriage							M									
Long sliding carriage							L									
Special carriage (on request)							X									
Guide system																
Sliding Glide System								G								
Stroke (see page 43)																
Stroke in mm										n	n	n	n			
Drive Station																
One drive shaft														S		
Two drive shafts (Shaft on both sides)*														B		
Drive Orientation (see page 42)																
Shaft on Right															R	
Shaft on Left															L	
Interface to the drive																
Mandatory statement																N

*only LCB040: Feather key groove DIN6885 – 2x2x10 on the left or on the right of the drive side

7.2 Order code for the LCB coupling kit

	Example;	L	C	B	0	4	0	K	L
Drive system									
LCB linear actuator		L	C	B					
Frame Size									
040 (LCB040)					0	4	0		
060 (LCB060)					0	6	0		
Coupling* (see page 42)									
Coupling Kits								K	
Drive Options (see page 27)									
Prepared for planetary gearbox PTN060 (for LCB040)									L
Prepared for planetary gearbox PTN080 (for LCB060)									M
Prepared for servo motor (Direct drive) SMH60..B8, D=9 (for single actuator LCB040)									U
Prepared for servo motor (Direct drive) SMH100..B5, D=19 (for single actuator LCB060)									W
Prepared for stepper motor (Direct drive) SY56 (for single actuator LCB040)									N
Prepared for stepper motor (Direct drive) SY107 (for single actuator LCB060)									P

*The coupling is always mounted in the factory.

7.3 Order code for intermediate drive shaft for LCB (for dual-axis actuator)

				Example;	L	C	B	0	4	0	W	0	2	5	0	
Drive system																
LCB linear actuator					L	C	B									
Frame Size																
040 (LCB040)								0	4	0						
060 (LCB060)								0	6	0						
Linking Shaft Kit																
Linking Shaft Kit											W					
Center distance (in mm)																
Center distance from center line to center line													n	n	n	n

Center distances (in mm)

Center distance	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850
LCB040	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
LCB060	--	--	x	x	x	x	x	x	x	x	x	x	x	x	x
Center distance	900	950	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500		
LCB040	x	x	x	--	--	--	--	--	--	--	--	--	--		
LCB060	x	x	x	x	x	x	x	x	x	x	x	x	x		

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9. Further information

Our product on the Internet: <http://www.parker-eme.com/lcb>

Support for commissioning with Compax3 on:

ParkerOnline: POL C3KnowledgeBase Tab "start-up-guides"
<http://www.compax3.info/startup/>

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