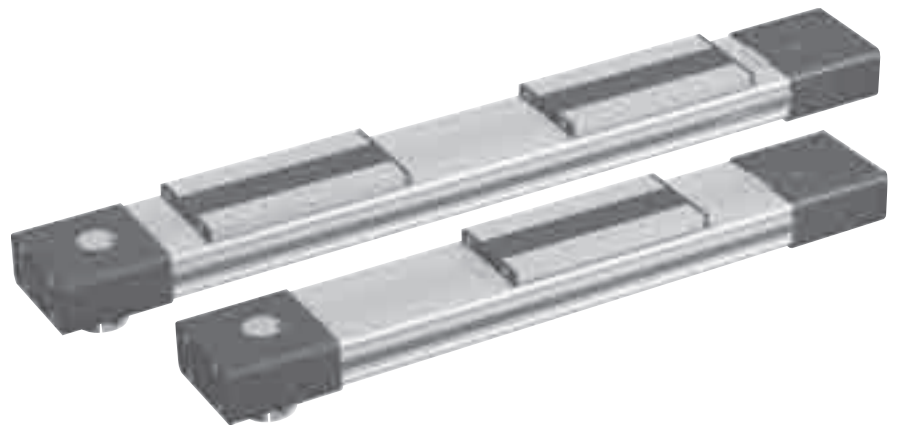


Linear Actuator with Toothed Belt and Integrated Guide

– with Roller Guide
– with Recirculating Ball Bearing Guide

Series OSP-E..BHD



Contents

Description	Page
Overview	11-14
Version with Roller Guide	
Technical Data	15-17
Dimensions	18, 23
Version with Recirculating Ball Bearing Guide	
Technical Data	19-21
Dimensions	22, 23

ELECTRIC LINEAR ACTUATOR FOR HEAVY DUTY APPLICATIONS

The latest generation of high capacity linear drives, the OSP-E..BHD series combines robustness, precision and high performance. The aesthetic design is easily integrated into machine constructions by virtue of extremely adaptable mountings.

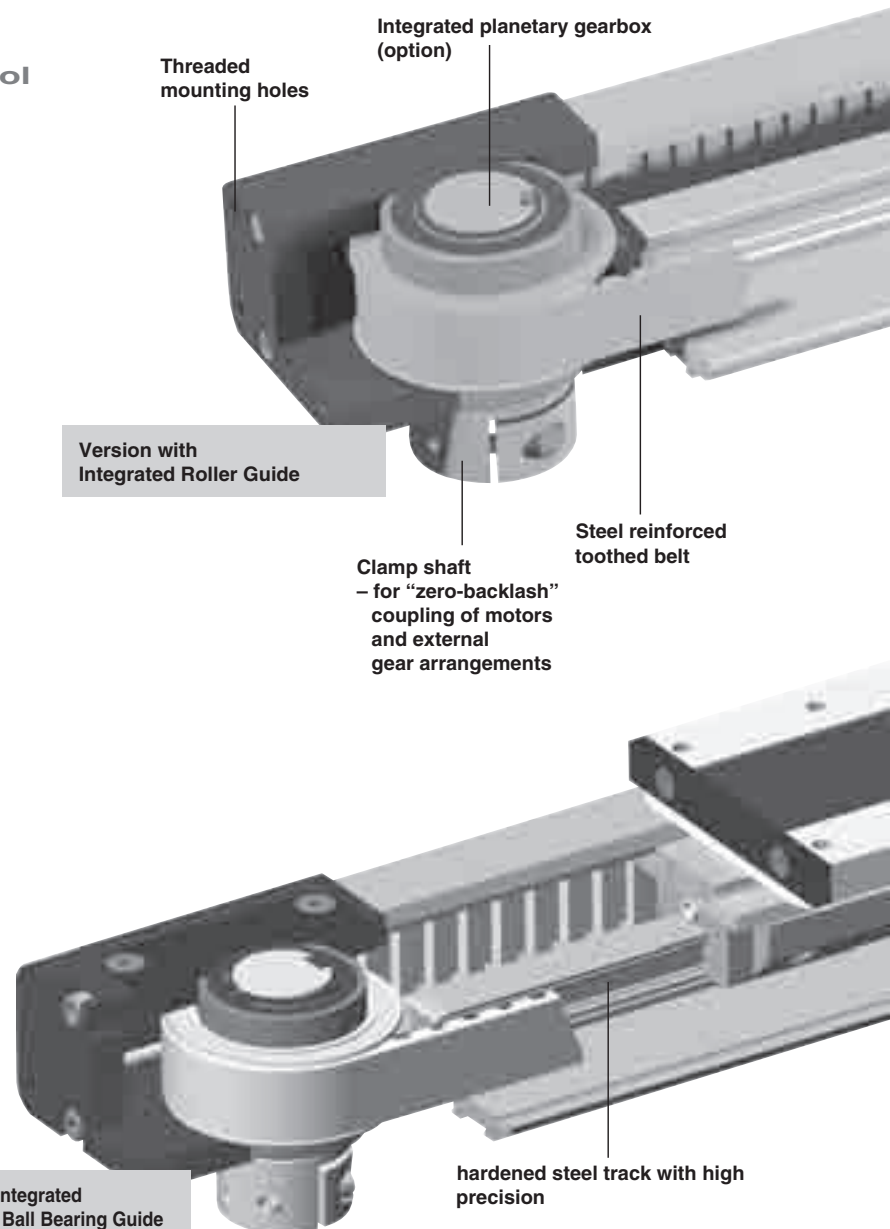
Linear Actuator with Toothed Belt and Integrated Roller Guide or Integrated Recirculating Ball Bearing Guide for high force output

Advantages:

- Accurate path and position control
- High force output
- High speed operation
- High load capacity
- Easy installation
- Low maintenance
- Ideal for multi-axis applications

Features:

- Integrated roller guide or integrated recirculating ball bearing guide
- Complete motor and control packages
- Optional integrated planetary gearbox
- Diverse range of multi-axis connection parts
- Diverse range of accessories and mountings
- Special options available

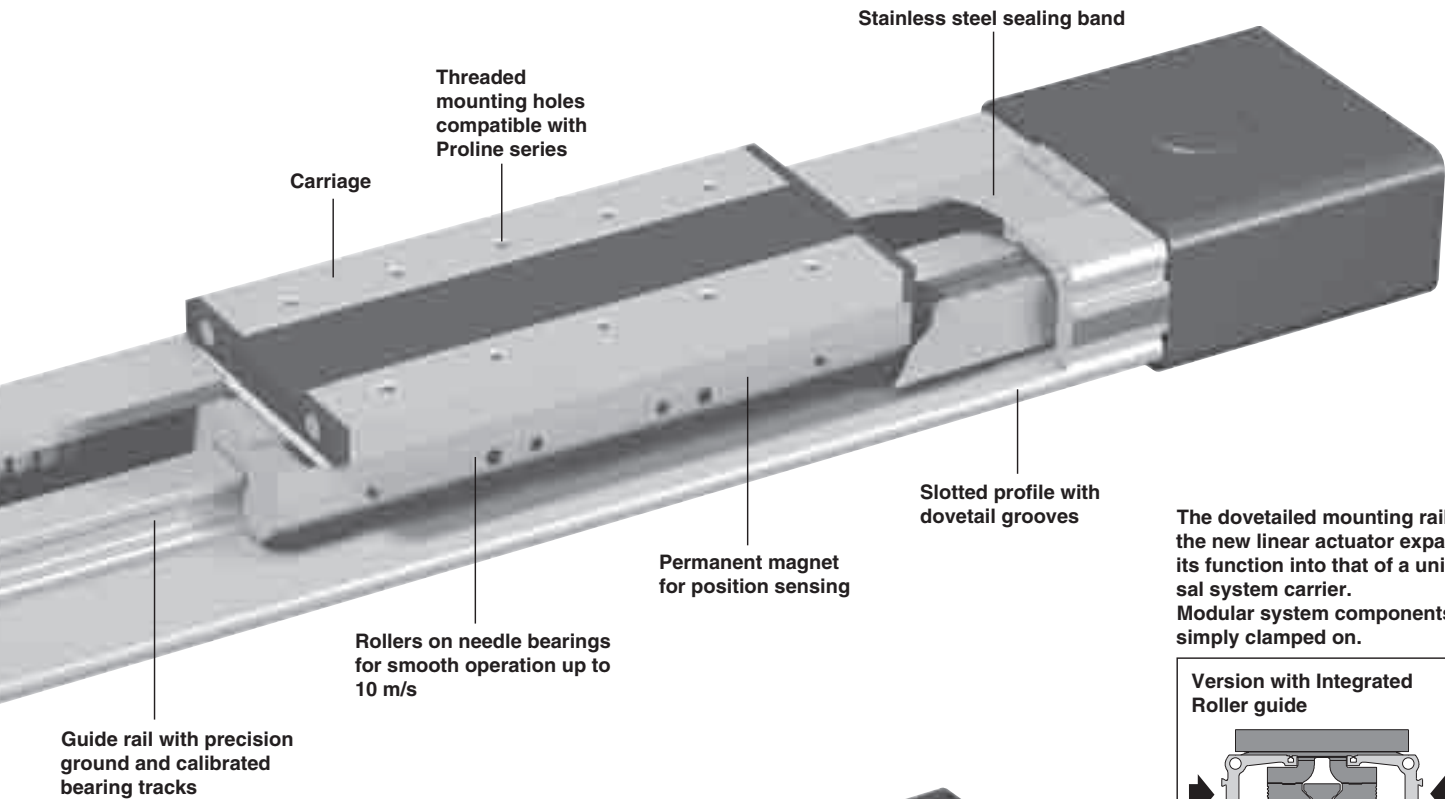
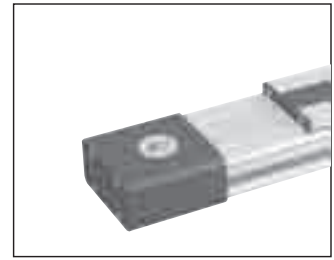


Optional Integrated PLANETARY GEARBOX

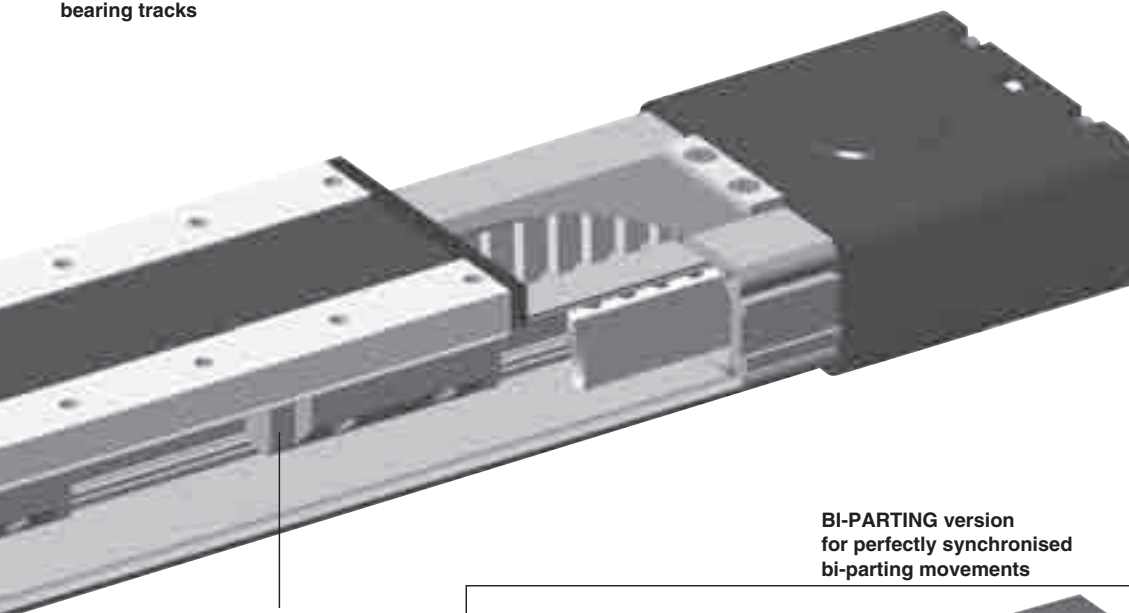
- Highly compact and rigid solution fully integrated in the drive end housing
- Purpose designed for the BHD series
- Available with three standard ratios (3, 5 and 10)
- Very low backlash
- A wide range of available motor flanges



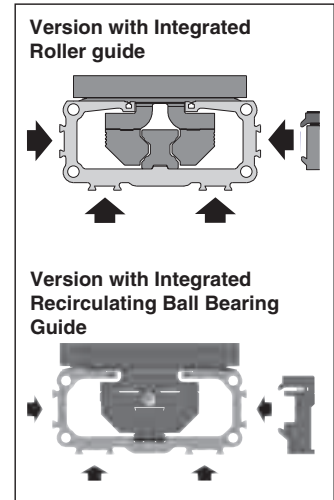
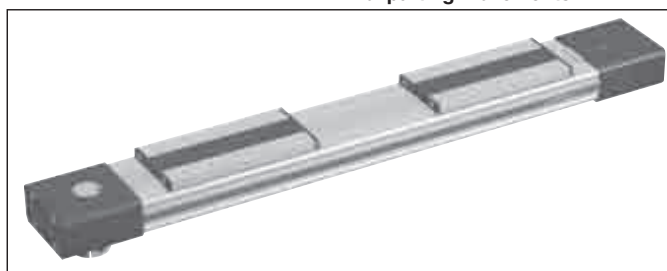
OPTION
Hollow shaft with keyway



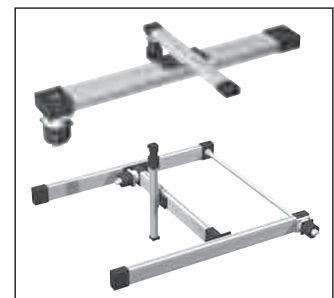
The dovetailed mounting rails of the new linear actuator expand its function into that of a universal system carrier. Modular system components are simply clamped on.



Steel runner block with integrated scraper system and grease nipples



MULTI-AXIS
A wide range of adapter plates and intermediate drive shafts simplify engineering and installation



SERIES OSP-E, BELT DRIVES WITH INTEGRATED GUIDE

STANDARD VERSIONS

OSP-E..BHD

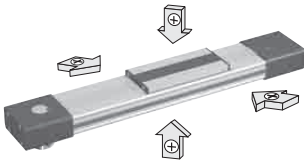
Version with Roller Guide

Page 15

Version with Recirculating Ball Bearing Guide

Page 19

Standard carrier with integrated roller guide. Dovetail profile for mounting of accessories and the actuator itself.



BASIC ACTUATOR OPTIONS

BI-PARTING VERSION

Page 18

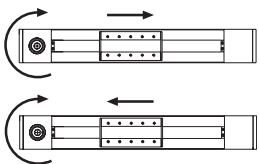
For perfectly synchronised bi-parting movements.



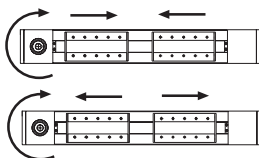
DRIVE SHAFT OPTIONS ACTUATING DIRECTION

Page 144

Important in parallel operations, e.g. with intermediate drive shaft



(Standard)



(Standard – Bi-Parting Version)

INTEGRATED PLANETARY GEARBOX

Page 23

For required torque and speed reduction



CLAMP SHAFT WITH CONNECTION SHAFT

For connection to connecting shaft (Page 38)



HOLLOW SHAFT WITH KEYWAY

For close coupling of motors and external gears



ACCESSORIES

END CAP MOUNTING

Page 40

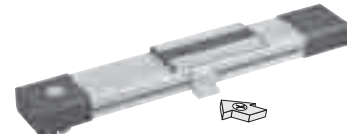
For mounting the drives on the end cap



MID-SECTION SUPPORT

Page 41

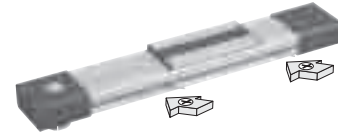
For supporting long actuators or mounting the actuator on dovetail grooves.



MAGNETIC SWITCHES SERIES RS AND ES

Page 130

For electrical sensing of end of stroke and intermediate carrier positions. Schlittens.



MOTOR MOUNTINGS

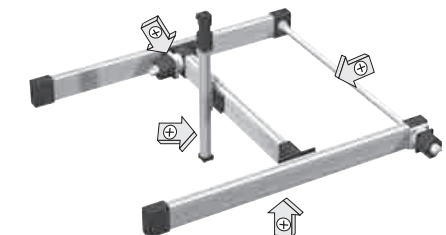
Page 44

For linear drive with clamp shaft



Page 25

For connection of linear drives in multi-axis systems. Carrier to carrier or carrier to profile and connecting shaft for parallel drive arrangements are available.



The right to introduce technical modifications is reserved

Linear Actuator with Toothed Belt and Integrated Roller Guide

Series OSP-E..BHD Size 25, 32, 50



Characteristics			
Characteristics	Symbol	Unit	Description
General Features			
Type			Belt-Driven Linear Actuator with integrated roller guide
Series			OSP-E..BHD/OSP-E..BHD-BP
Mounting			See drawings
Ambient Temperature range	ϑ_{\min} ϑ_{\max}	°C °C	-30 +80
Weight (mass)		kg	See table
Installation			In any position
Material	Slotted profile		Extruded anodized aluminium
	Toothed belt		Steel-corded polyurethane
	Belt wheels		Aluminium
	Rails		Aluminium
	Tracks		High alloy spring steel
	Roller cassettes		Roller bearing steel in aluminium casing
	Sealing band		Hardened stainless steel
	Screws, nuts		Zinc plated steel
	Mountings		Zinc plated steel and aluminium
Encapsulation class		IP	54

Weight (mass) kg and Inertia					
Series	Weight (mass) kg			Inertia [x 10 ⁻⁶ /kgm ²]	
	At stroke 0 m	Add per metre stroke	Moving mass	At stroke 0 m	Add per metre
OSP-E25BHD	3.8	4.3	1.0	984	197
OSP-E32BHD	7.7	6.7	1.9	3498	438
OSP-E50BHD	22.6	15.2	4.7	19690	1489
OSP-E25BHD-BP	5.7	4.3	2.0	1805	197
OSP-E32BHD-BP	11.3	6.7	3.8	6358	438
OSP-E50BHD-BP	31.7	15.2	9.4	34274	1489

Installation Instructions

Use the threaded holes in the end cap for mounting the linear actuator. Check if mid-section supports are needed using the maximum allowable unsupported length graph on page 17. At least one end cap must be secured to prevent axial sliding when mid-section support is used.

Maintenance

All moving parts are lifetime lubricated. We recommend a check of the linear actuator after an operation time of 12 months of operation or 3000 km, depending on the type of application. Please see separate instructions.

Commissioning

The products in this data sheet should not be operated until the machine/application in which they are used has passed necessary inspection.

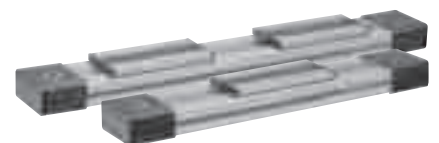
Standard Versions:

- Standard carrier with integrated roller guide
- Dovetail profile for mounting of accessories and the actuator itself
- Clamp shaft

Special Versions:

- Bi-parting version for synchronised movements (OSP-E..BHD-BP).
- Integrated planetary gearbox.
- Drive shaft / Actuating direction
- Clamp shaft with connection shaft (for use in Mutli-Axis systems with connecting shaft)
- Hollow shaft with keyway

The right to introduce technical modifications is reserved



Sizing Performance Overview

Maximum Loadings

Sizing of Linear Actuator

The following steps are recommended:

1. Calculate the static and the dynamic moments [Nm] created by the load L [N], the distance r [m] and the acceleration a [m/s²] in all directions (M , M_s and M_v) according to the diagram below.
2. Make a preliminary choice and get the calculation factors from the table.
3. Check maximum allowable torque on the drive shaft (pay attention to the note under the table).
If the value is lower than required, overview the moving profile or select if possible a bigger unit.
4. Before sizing and specifying the motor, the rms torque must be calculated using the cycle time of the application.
5. Check that maximum allowable unsupported length is not exceeded (see page 17).

Performance Overview				
Characteristics	Unit	Description		
Series		OSP-E25BHD	OSP-E32BHD	OSP-E50BHD
Max. speed	[m/s]	10	10	10
Linear motion per revolution, drive shaft	[mm]	180	240	350
Max. rpm. drive shaft	[min ⁻¹]	3000	2500	1700
Max. effective action force	< 1 m/s: [N]	1070	1870	3120
	1-3 m/s: [N]	890	1560	2660
F_A at speed	> 3-10 m/s: [N]	550	1030	1940
No-load torque	[Nm]	1.2	2.2	3.2
Max. acceleration/deceleration	[m/s ²]	40	40	40
Repeatability	[mm/m]	±0.05	±0.05	±0.05
Max. standard stroke length	[mm]	7000	7000	7000

Maximum Allowable Torque on Drive Shaft Speed and Stroke											
OSP-E25BHD				OSP-E32BHD				OSP-E50BHD			
Speed [m/s]	Torque [Nm]	Stroke [m]	Torque [Nm]	Speed [m/s]	Torque [Nm]	Stroke [m]	Torque [Nm]	Speed [m/s]	Torque [Nm]	Stroke [m]	Torque [Nm]
1	31	1	31	1	71	1	71	1	174	1	174
2	28	2	31	2	65	2	71	2	159	2	174
3	25	3	31	3	59	3	60	3	153	3	138
4	23	4	25	4	56	4	47	4	143	4	108
5	22	5	21	5	52	5	38	5	135	5	89
6	21	6	17	6	50	6	32	6	132	6	76
7	19	7	15	7	47	7	28	7	126	7	66
8	18			8	46			8	120		
9	17			9	44			9	116		
10	16			10	39			10	108		

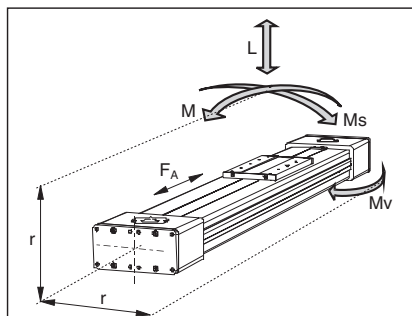
Important:

The maximum permissible moment on the drive shaft is the lowest value of the speed- or stroke-dependent moment value.

Example above: OSP-E25BHD-stroke 5 m, required speed 3 m/s from table T2; speed 3 m/s gives 25 Nm and stroke 5 m gives 21 Nm.

Max. torque for this application is 21 Nm.

When sizing Bi-parting units the stroke is the ordering stroke, see page 8.



$$M = F \cdot r$$

Bending moments are calculated from the centre of the linear actuator and F indicates actual force

$$M = M_{stat} + M_{dyn}$$

$$M_s = M_{s,stat} + M_{s,dyn}$$

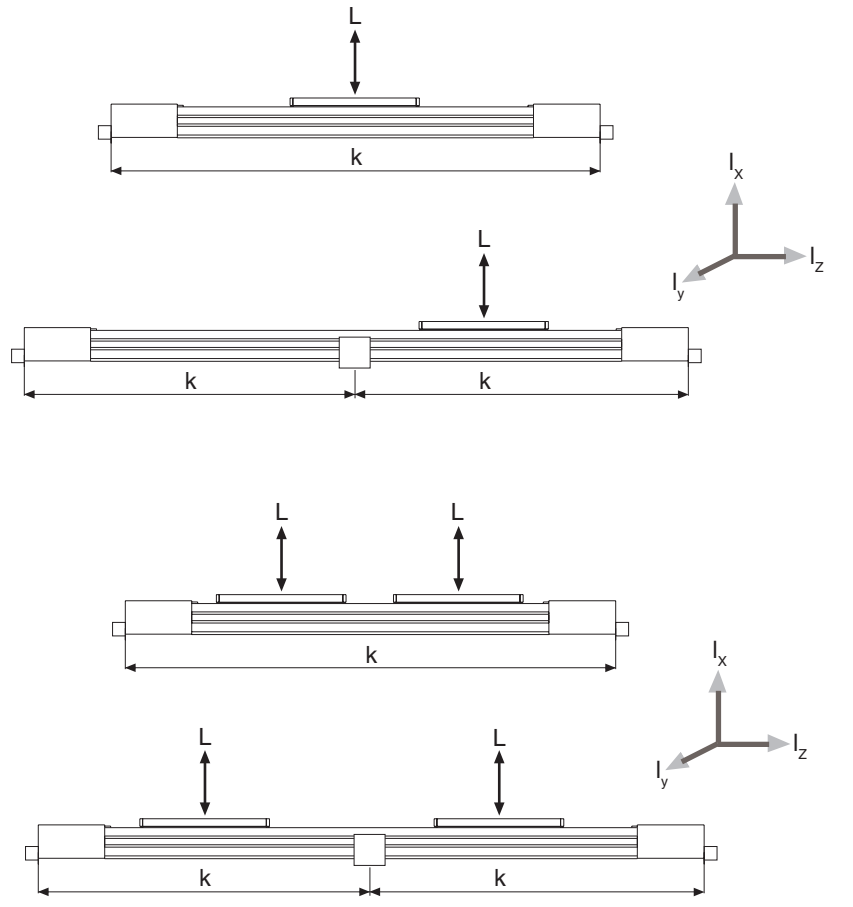
$$M_v = M_{v,stat} + M_{v,dyn}$$

Maximum Allowable Loadings				
Series	Max. applied load L [N]	Max. moments [Nm]		
		M	M_s	M_v
OSP-E25BHD	986	64	11	84
OSP-E32BHD	1348	115	19	115
OSP-E50BHD	3704	365	87	365

$$\frac{L}{L(max)} + \frac{M}{M(max)} + \frac{M_s}{M_s(max)} + \frac{M_v}{M_v(max)} \leq 1$$

The total of the loads must not exceed 1 under any circumstances.

Maximum Allowable Unsupported Length Stroke Length



Stroke Length

The stroke lengths of the linear actuators are available in multiples of 10 mm up to 7000 mm

Other stroke lengths are available on request.

The end of stroke must not be used as a mechanical stop.

Allow an additional safety clearance at both ends equivalent to the linear movement of one revolution of the drive shaft, but at least 100 mm.

The use of an AC motor with frequency converter normally requires a larger clearance than that required for servo systems.

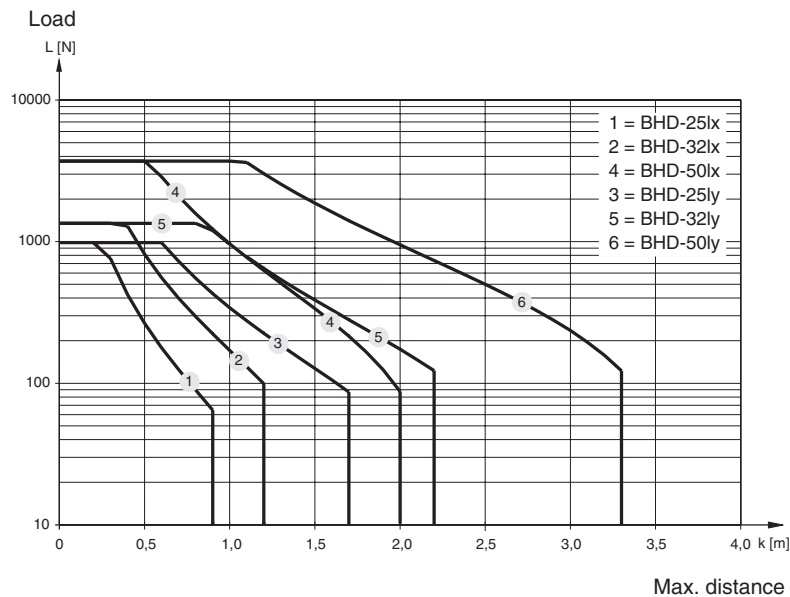
For advice, please contact your local HOERBIGER-ORIGA technical support department.

* For Bi-parting version the max. load (L) is the total load of both carriers

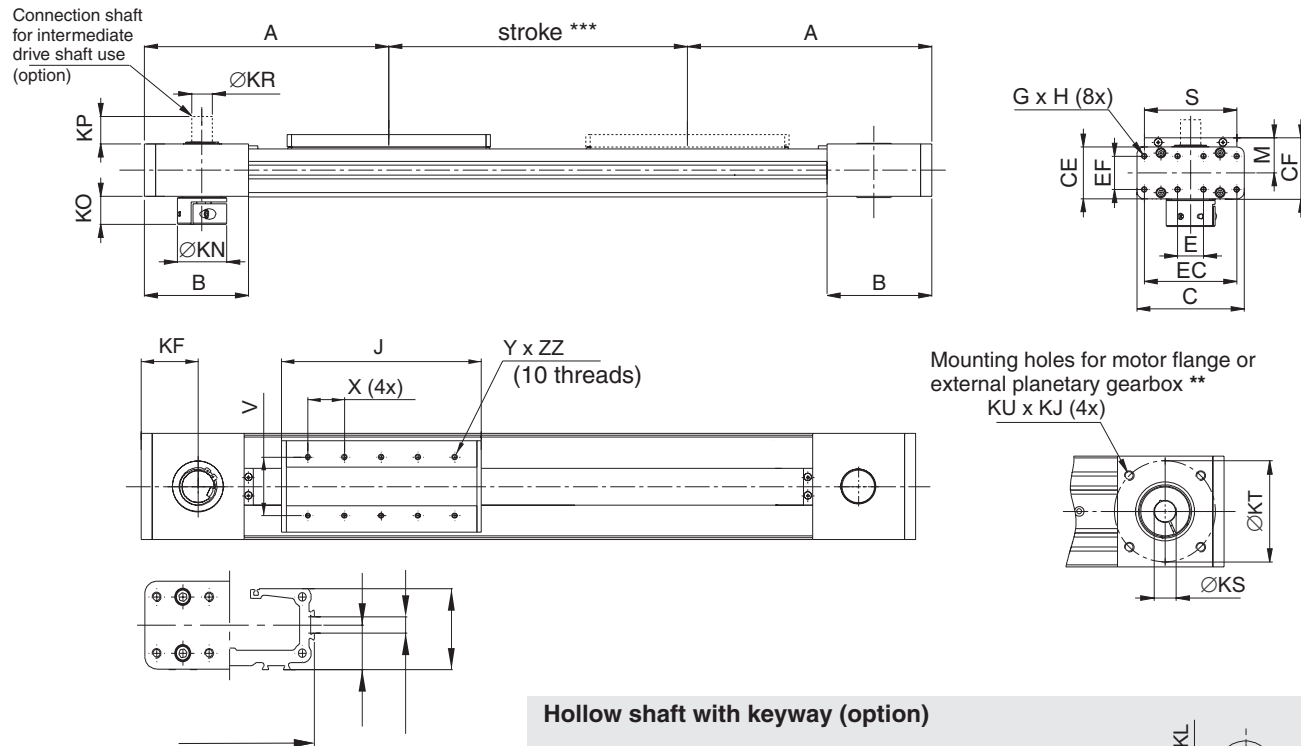
$$L = L_{\text{carrier 1}} + L_{\text{carrier 2}}$$

k = Max. allowable distance between mountings/mid-section support for a given load L

When loadings are below or up to the curve in the graph below the deflection will be max. 0.01 % of distance k



Belt Driven Linear Actuator with Roller Guide – Basic Unit
Series OSP-E25BHD, -E32BHD, -E50BHD



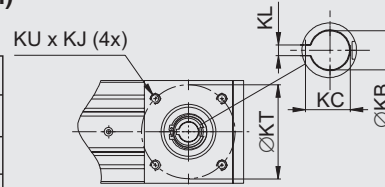
**** Note:**
 The mounting holes for the coupling housing/motor flange/gearbox are located on the opposite side to the carrier as standard. As an option they can be located on the same side as the carrier. (For additional drive shaft/actuating direction options see the Order Instructions on page 144).

Hollow shaft with keyway (option)

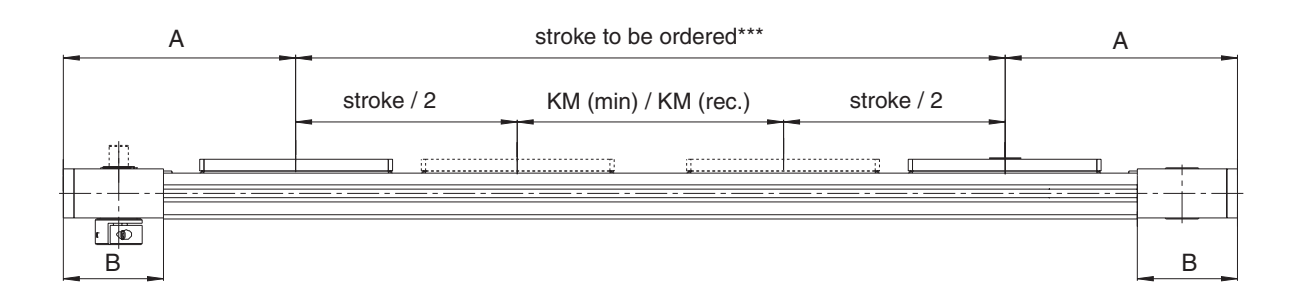
Dimension Table (mm)

Serie	KB*	KC	KJ	KL	KT	KU
OSP-E25BHD	16 ^{H7}	18.3	8	5	82	M8
OSP-E32BHD	22 ^{H7}	24.8	12	6	106	M10
OSP-E50BHD	32 ^{H7}	35.3	19	10	144	M12

*Other dimensions for KB on request



Options – Bi-Parting Version
Series OSP-E25BHD-BP, -E32BHD-BP, -E50BHD-BP



***** Note:**
 The mechanical end position must not be used as a mechanical end stop. Allow an additional safety clearance at both ends equivalent to the linear movement of one revolution of the drive shaft, but at least 100 mm. The use of an AC motor with frequency converter normally requires a larger safety clearance than that required for servo systems. For further information please contact your local HOERBIGER-ORIGA representative.

Dimension Table (mm)

Series	A	B	C	E	G	H	J	K	M	S	V	X	Y	CE	CF	EC	EF	FB	FH	KF	KJ	KM _{min}	KM _{rec.}	KN	KO	KP	KR	KS*	KT	KU	ZZ
OSP-E25BHD	218	88	93	25	M5	10	178	21.5	31	85	64	40	M6	42	52.5	79	27	92	39.5	49	8	210	250	34	21.7	30	16 ^{H7}	16 ^{H7}	82	M8	8
OSP-E32BHD	262	112	116	28	M6	12	218	28.5	38	100	64	40	M6	56	66.5	100	36	116	51.7	62	12	250	300	53	30	30	22 ^{H7}	22 ^{H7}	106	M10	10
OSP-E50BHD	347	147	175	18	M6	12	263	43	49	124	90	60	M6	87	92.5	158	70	164	77	79.5	19	295	350	75	41	35	32 ^{H7}	32 ^{H7}	144	M12	10

*Other dimensions for KS on request

Linear Actuator with Toothed Belt and Integrated Recirculating Ball Bearing Guide

Series OSP-E..BHD Size 25, 32, 50



Characteristics			
Characteristics	Symbol	Unit	Description
General Features			
Type			Belt-Driven Linear Actuator with integrated Recirculating Ball Bearing Guide
Series			OSP-E..BHD / OSP-E..BHD-BP
Mounting			See drawings
Ambient Temperature range	ϑ_{\min} ϑ_{\max}	°C °C	-30 +80
Weight (mass)		kg	See table
Installation			In any position
Material	Slotted profile		Extruded anodized aluminium
	Toothed belt		Steel-corded polyurethane
	Belt wheels		Aluminium
	Rail		Steel
	Track		hardened steel track with high precision, accuracy class H
	Runner block		Steel runner block with integrated scraper system, grease nipples, pre-loaded 0.02xC, accuracy H (N for Ø25)
	Sealing band		Hardened stainless steel
	Screws, nuts		Zinc plated steel
	Mountings		Zinc plated steel and aluminium
Encapsulation class		IP	54

Weight (mass) kg and Inertia						
Series	Weight (mass) [kg]			Inertia [$\times 10^{-6}$ kgm ²]		
	At stroke 0 m	Add per metre stroke	Moving mass	At stroke 0 m	Add per metre stroke	Add per kg Mass
OSP-E25BHD	4.3	3.7	1.5	1229	227	821
OSP-E32BHD	8.8	7.8	2.6	3945	496	1459
OSP-E50BHD	26	17	7.8	25678	1738	3103
OSP-E25BHD-BP	6.7	3.7	2.8	2353	227	821
OSP-E32BHD-BP	13.5	7.8	5.2	7733	496	1459
OSP-E50BHD-BP	40	17	15	49180	1738	3103

Installation Instructions

Use the threaded holes in the end cap for mounting the linear actuator. Check if mid-section supports are needed using the maximum allowable unsupported length graph on page 21. At least one end cap must be secured to prevent axial sliding when mid-section support is used.

Maintenance

We recommend a check of the linear actuator after an operation time of 12 months of operation or 3000 km, depending on the type of application. Please see separate instructions.

Commissioning

The products in this data sheet should not be operated until the machine/application in which they are used has passed necessary inspection.

Standard Versions:

- Standard carrier with integrated recirculating ball bearing guide
- Dovetail profile for mounting of accessories and the actuator itself
- Clamp shaft

Special Versions:

- Bi-parting version for synchronised movements (OSP-E..BHD -BP).
- Integrated planetary gearbox.
- Drive shaft / Actuating direction
- Clamp shaft with connection shaft (for use in Multi-Axis systems with connecting shaft)
- Hollow shaft with keyway



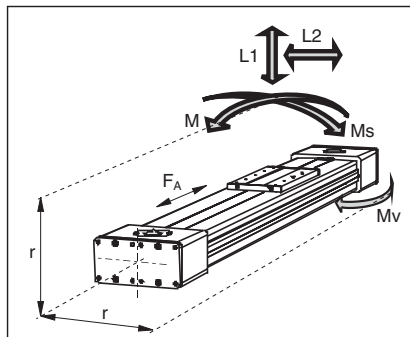
Sizing Performance Overview

Maximum Loadings

Sizing of Linear Actuator

The following steps are recommended:

1. Calculate the static and the dynamic moments [Nm] created by the load **L** [N], the distance **r** [m] and the acceleration **a** [m/s²] in all directions (**M**, **M_s** and **M_v**) according to the diagram below.
2. Make a preliminary choice and get the calculation factors from the table.
3. Check maximum allowable torque on the drive shaft (pay attention to the note under the table). If the value is lower than required, overview the moving profile or select if possible a bigger unit.
4. Before sizing and specifying the motor, the rms torque must be calculated using the cycle time of the application.
5. Check that maximum allowable unsupported length is not exceeded (see page 21).



$$M = F \cdot r$$

Bending moments are calculated from the centre of the linear actuator and **F** indicates actual force

$$M = M_{stat} + M_{dyn}$$

$$M_s = M_{s,stat} + M_{s,dyn}$$

$$M_v = M_{v,stat} + M_{v,dyn}$$

Performance Overview

Characteristics	Unit	Description			
Series		OSP-E25BHD	OSP-E32BHD	OSP-E50BHD	
Max. speed	[m/s]	5 ¹⁾	5 ¹⁾	5 ¹⁾	
Linear motion per revolution, drive shaft	[mm]	180	240	350	
Max. rpm. drive shaft	[min ⁻¹]	1700	1250	860	
Max. effective action force F_A at speed	< 1 m/s:	[N]	1070	1870	3120
	1-3 m/s:	[N]	890	1560	2660
	> 3 m/s:	[N]	550	1030	1940
No-load torque	[Nm]	1.2	2.2	3.2	
Max. acceleration/deceleration	[m/s ²]	50	50	50	
Repeatability	[mm/m]	±0.05	±0.05	±0.05	
Max. standard stroke length	[mm]	5700 ²⁾	5600 ²⁾	5500 ²⁾	

¹⁾ up to 10 m/s on request

²⁾ longer strokes on request

Maximum Allowable Torque on Drive Shaft Speed and Stroke

T2

OSP-E25BHD				OSP-E32BHD				OSP-E50BHD			
Speed [m/s]	Torque [Nm]	Stroke [m]	Torque [Nm]	Speed [m/s]	Torque [Nm]	Stroke [m]	Torque [Nm]	Speed [m/s]	Torque [Nm]	Stroke [m]	Torque [Nm]
1	31	1	31	1	71	1	71	1	174	1	174
2	28	2	31	2	65	2	71	2	159	2	174
3	25	3	31	3	59	3	60	3	153	3	138
4	23	4	25	4	56	4	47	4	143	4	108
5	22	5	21	5	52	5	38	5	135	5	89

Important:

The maximum permissible moment on the drive shaft is the lowest value of the speed- or stroke-dependent moment value.

Example above: OSP-E25BHD-stroke 5 m, required speed 3 m/s from table T2; speed 3 m/s gives 25 Nm and stroke 5 m gives 21 Nm.

Max. torque for this application is 21 Nm.

When sizing Bi-parting units the stroke is the ordering stroke, see page 22.

Maximum Allowable Loadings

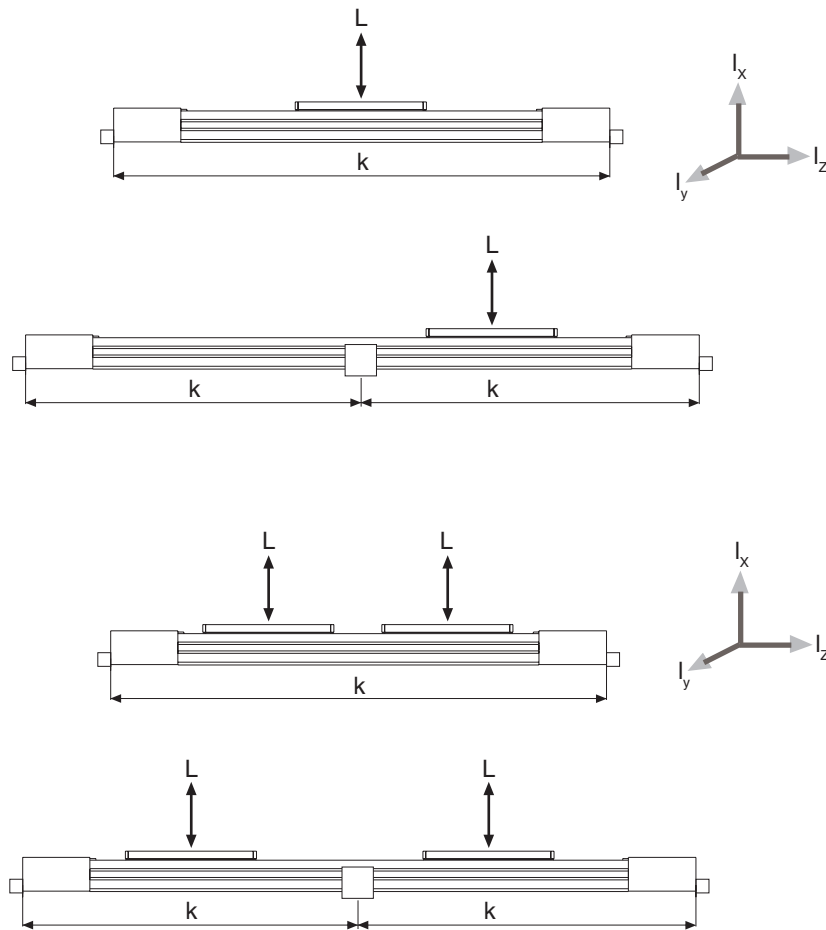
Series	Max. applied load		Max. moments [Nm]		
	L1[N]	L2[N]	M	M _s	M _v
OSP-E25BHD	3000	2000	500	50	500
OSP-E32BHD	10000	5000	1000	120	1400
OSP-E50BHD	15000	12000	1800	180	2500

If multiple forces and moments act upon the actuator simultaneously, the following equation applies.

$$\frac{L1}{L1(max)} + \frac{L2}{L2(max)} + \frac{M}{M(max)} + \frac{M_s}{M_s(max)} + \frac{M_v}{M_v(max)} \leq 1$$

The total of the loads must not exceed 1 under any circumstances.

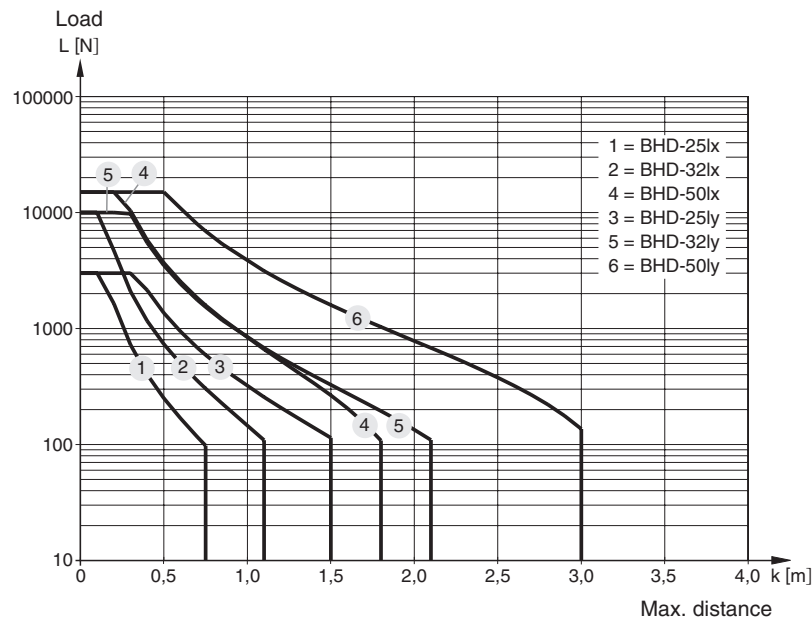
Maximum Allowable Unsupported Length – Placing of Mid-Section Support



* For Bi-parting version the max. load (L) is the total load of both carriers
 $L = L_{\text{carrier 1}} + L_{\text{carrier 2}}$

k = Max. allowable distance between mountings/mid-section support for a given load L

When loadings are below or up to the curve in the graph below the deflection will be max. 0.01 % of distance k



Maximum Allowable Unsupported Length Stroke Length

Stroke Length

The stroke lengths of the linear actuators are available in multiples of 10 mm up to 5700 mm

Other stroke lengths are available on request.

The end of stroke must not be used as a mechanical stop.

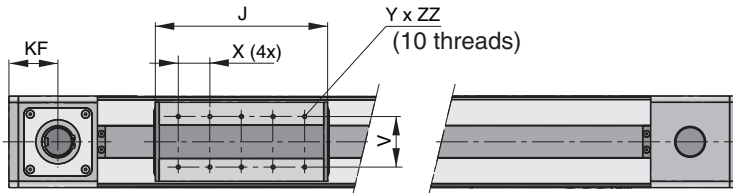
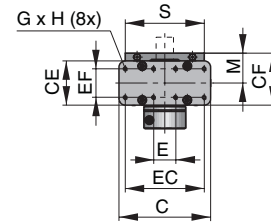
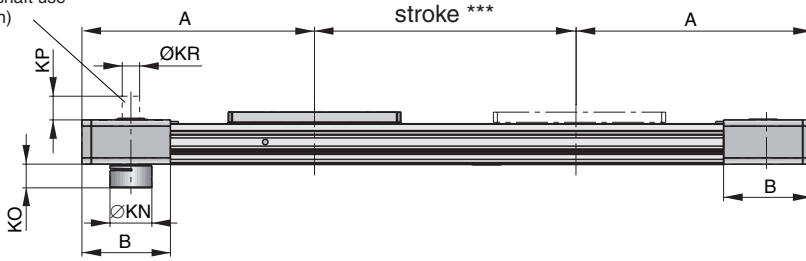
Allow an additional safety clearance at both ends equivalent to the linear movement of one revolution of the drive shaft, but at least 100 mm.

The use of an AC motor with frequency converter normally requires a larger clearance than that required for servo systems.

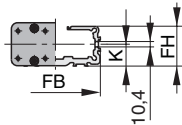
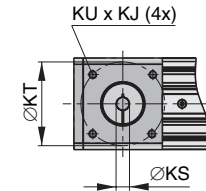
For advice, please contact your local HOERBIGER-ORIGA technical support department.

Belt Driven Linear Actuator with Recirculating Ball Bearing Guide – Basic Unit
Series OSP-E25BHD, -E32BHD, -E50BHD

Connection shaft
for intermediate
drive shaft use
(option)



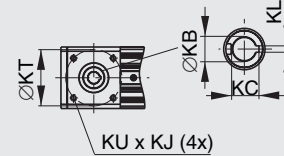
Mounting holes for motor flange or
external planetary gearbox **



Hollow shaft with keyway (option)

Dimension Table (mm)

Series	KB*	KC	KJ	KL	KT	KU
OSP-E25BHD	16 ^{H7}	18.3	8	5	82	M8
OSP-E32BHD	22 ^{H7}	24.8	12	6	106	M10
OSP-E50BHD	32 ^{H7}	35.3	19	10	144	M12

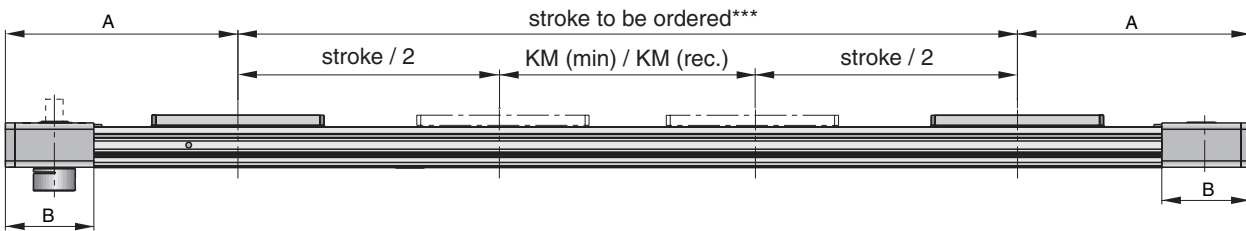


**** Note:**

The mounting holes for the coupling housing/motor flange/gearbox are located on the opposite side to the carrier as standard. As an option they can be located on the same side as the carrier. (For additional drive shaft/actuating direction options see the Order Instructions on page 144).

*Other dimensions for KB on request

Options – Bi-Parting Version
Series OSP-E25BHD-BP, -E32BHD-BP, -E50BHD-BP



***** Note:**

The mechanical end position must not be used as a mechanical end stop. Allow an additional safety clearance at both ends equivalent to the linear movement of one revolution of the drive shaft, but at least 100 mm. The use of an AC motor with frequency converter normally requires a larger safety clearance than that required for servo systems. For further information please contact your local HOERBIGER-ORIGA representative.

Dimension Table (mm)

Series	A	B	C	E	G	H	J	K	M	S	V	X	Y	CE	CF	EC	EF	FB	FH	KF	KJ	KM _{min}	KM _{rec.}	KN	KO	KP	KR	KS*	KT	KU	ZZ
OSP-E25BHD	218	88	93	25	M5	10	178	21.5	31	85	64	40	M6	42	52.5	79	27	92	39.5	49	8	210	250	34	21.7	30	16 _{n7}	16 ^{H7}	82	M8	8
OSP-E32BHD	262	112	116	28	M6	12	218	28.5	38	100	64	40	M6	56	66.5	100	36	116	51.7	62	12	250	300	53	30	30	22 _{n7}	22 ^{H7}	106	M10	10
OSP-E50BHD	347	147	175	18	M6	12	288	43	49	124	90	60	M6	87	92.5	158	70	164	77	79.5	19	354	400	75	41	35	32 _{n7}	32 ^{H7}	144	M12	10

*Other dimensions for KS on request

Series OSP-E..BHD – with optional Integrated Planetary Gearbox



Integrated Planetary Gearbox

Features

- Highly compact and rigid solution fully integrated in the drive end housing
- Purpose designed for the BHD series
- Available with three standard ratios (3, 5 and 10)
- Very low backlash
- A wide range of available motor flanges

Please contact your local HOERBIGER-ORIGA technical support for available motor flanges.

For motors and controllers, see separate catalogue.

Material:
Aluminium (AL-H) / Steel (St-H)

Standard Version:

- Gearbox on opposite side to carrier

Special Version:

- Gearbox on same side as carrier

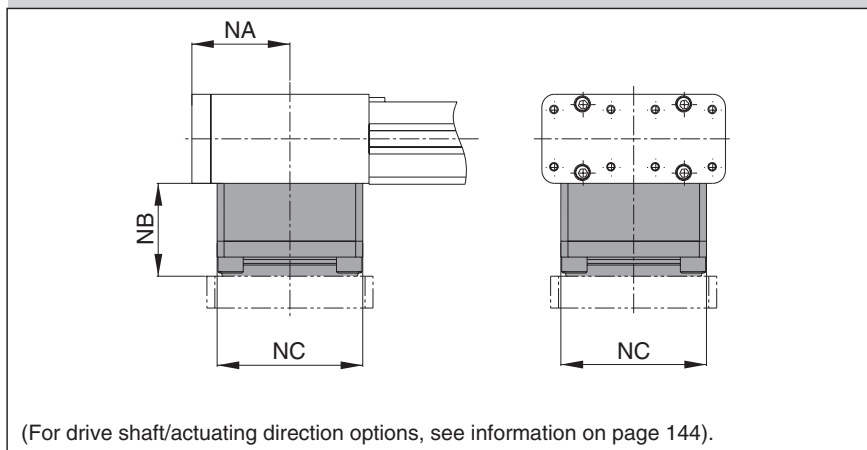
Note:

When ordering, specify type of motor and model for correct motor flange.

Performance Overview

Characteristics	Unit	Description		
		OSP-E25BHD	OSP-E32BHD	OSP-E50BHD
Ratio (1-stage)	i	3/5/10	3/5/10	3/5/10
Max axial load	F_{amax} [N]	1550	1900	4000
Torsional rigidity (i=5)	$C_{t,21}$ [Nm/arcmin]	3.3	9	24
Torsional rigidity (i=3/10)	$C_{t,21}$ [Nm/arcmin]	2.8	7.5	20.5
Torsional backlash	J_t [arcmin]	<12	<12	<12
Linear movement per rotation of drive shaft	[mm]	220	280	360
Nominal input speed	n_{nom} [min ⁻¹]	3700	3400	2600
Max input speed	n_{1max} [min ⁻¹]	6000	6000	6000
No-load running torque at Nominal input speed	T_{012} [Nm]	<0.14	<0.51	<1.5
Lifetime	[h]	20 000	20 000	20 000
Efficiency (1-stage)	η [%]	>97	>97	>97
Noise level ($n_1=3000$ min ⁻¹)	L_{PA} [db]	<70	<72	<74

Dimensions



Dimension Table (mm) and additional Weight (kg)

Series	NA	NB	NC	Weight (mass) [kg]
OSP-E25BHD	49	43	76	2.6
OSP-E32BHD	62	47	92	4.9
OSP-E50BHD	79.5	49.5	121	9.6

